UNIVERSITI MALAYSIA PERLIS

UniMAP

• ilmu • keikhlasan • kecemerlangan •
• knowledge • sincerity • excellence •

Academic Guide Book
BACHELOR DEGREE PROGRAMME

Buku Panduan AKADEMIK

PROGRAM SARJANA MUDA



SIDANG AKADEMIK
2017/2018
ACADEMIC SESSION

Academic Guide Book Buku Panduan AKADEMIK
BACHELOR DEGREE PROGRAMME
PROGRAM SARJANA MUDA

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En. Zuber Hj. Mohamad,
Pn. Saodah Hassan
dan
Pn. Mazmin Mat Akhir

dan/*and*

semua Dekan Pusat Pengajian dan Pengarah Pusat/Unit di Universiti Malaysia Perlis.
all Deans and Directors of Centres/Units in Universiti Malaysia Perlis.

serta/*and*

kepada semua staf di Bahagian Pengurusan Akademik, Pejabat Timbalan Naib Canselor (Akademik & Antarabangsa), Universiti Malaysia Perlis.
all the staff at Academic Management Division, Deputy Vice-Chancellor (Academic & International) Office, Universiti Malaysia Perlis.

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* Dari semasa ke semasa, universiti mungkin melakukan perubahan kepada beberapa aspek kurikulum dan sistem akademik tertentu bagi memenuhi keperluan semasa. Semua pelajar akan dimaklumkan dan tertakluk kepada perubahan tersebut.
* *From time to time, the university may amend certain aspects of curriculum and academic system in order to fulfil current needs and requirements. All students shall be informed of and are subject to the change.*

PENGENALAN / *INTRODUCTION:*

Buku Panduan Program Ijazah Sarjana Muda ini disediakan untuk membantu pelajar baru dalam memahami proses dan prosedur yang berkaitan dengan pengajian mereka di UniMAP. Pelajar perlu menggunakan buku ini sebagai panduan utama dalam merancang dan membuat keputusan mengenai kursus yang akan diambil dari semester pertama sehingga semester akhir pengajian. Buku panduan ini juga memberikan beberapa maklumat asas mengenai sistem akademik, struktur program, senarai kursus yang ditawarkan bersama-sama dengan sinopsis, sumber rujukan, senarai kakitangan dan maklumat berkaitan yang lain. Diharapkan pelajar akan mendapat manfaat daripada maklumat yang diberikan dalam buku panduan untuk merancang pengajian mereka di UniMAP.

The Academic Guidebook for Bachelor Degree Programme is prepared to assist new UniMAP students in understanding processes and procedures that are related to their study in UniMAP. Students should use this book as their major guidence in planning and deciding on courses to be taken from their first until final semester of their studies. This guidebook also gives some basic information on the academic system, program structures, list of courses offered together with the synopsis, references, list of staff and other related information. It is hoped that students will benefit from the information given in this guidebook and use the information to plan their studies in UniMAP.

Senarai Pusat Pengajian/*List of Schools:*

1. Pusat Pengajian Kejuruteraan Mikrolektronik / *School of Microelectronic Engineering*
2. Pusat Pengajian Kejuruteraan Komputer & Perhubungan / *School of Computer & Communication Engineering*
3. Pusat Pengajian Kejuruteraan Mekatronik / *School of Mechatronic Engineering*
4. Pusat Pengajian Kejuruteraan Sistem Elektrik / *School of Electrical Systems Engineering*
5. Pusat Pengajian Kejuruteraan Pembuatan / *School of Manufacturing Engineering*
6. Pusat Pengajian Kejuruteraan Bahan / *School of Materials Engineering*
7. Pusat Pengajian Kejuruteraan Bioproses / *School of Bioprocess Engineering*
8. Pusat Pengajian Kejuruteraan Alam Sekitar / *School of Environmental Engineering*
9. Pusat Pengajian Inovasi Perniagaan & Teknousahawan / *School of Business Innovation and Technopreneurship*
10. Pusat Pengajian Pembangunan Insan dan Teknokomunikasi / *School of Human Development and TechnoCommunication* (iKOM)
11. Fakulti Teknologi Kejuruteraan / *Faculty of Engineering Technology*

Pusat-Pusat Pemantapan Akademik/*Academic Support Centres:*

1. Institut Matematik Kejuruteraan / *Institute of Engineering Mathematics* (IMK)
2. Pusat Kejuruteraan / *Engineering Centre*
3. Pusat Bahasa Antarabangsa / *Centre for International Languages* (CIL)
4. Pusat Ko-kurikulum / Centre for Co-Curriculum
5. Pusat Kerjasama Industri / Centre for Industrial and Governmental Collaboration (CIGC)

Senarai Program Pengajian Sarjana Muda/*List of Degree Programmes:*

1. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Mikroelektronik) /
   Bachelor of Engineering (Honours) (Microelectronic Engineering)
2. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Elektronik) /
   Bachelor of Engineering (Honours) (Electronic Engineering)
3. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Fotonik) /
   Bachelor of Engineering (Honours) (Photonic Engineering)
4. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Komputer) /
   Bachelor of Engineering (Honours) (Computer Engineering)
5. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Perhubungan) /
   Bachelor of Engineering (Honours) (Communication Engineering)
6. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Rangkaian Komputer) /
   Bachelor of Engineering (Honours) (Computer Network Engineering)
7. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Mekatronik) /
   Bachelor of Engineering (Honours) (Mechatronic Engineering)
8. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Mekanikal) /
   Bachelor of Engineering (Honours) (Mechanical Engineering)
9. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Elektronik Bioperubatan) /
   Bachelor of Engineering (Honours) (Biomedical Electronic Engineering)
10. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Sistem Elektrik) /
    Bachelor of Engineering (Honours) (Electrical System Engineering)
11. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Elektronik Industri) /
    Bachelor of Engineering (Honours) (Industrial Electronic Engineering)
12. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Elektrik Sistem Tenaga) /
    Bachelor of Engineering (Honours) (Electrical Energy System Engineering)
13. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Pembuatan) /
    Bachelor of Engineering (Honours) (Manufacturing Engineering)
14. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Rekabentuk Produk) /
    Bachelor of Engineering (Honours) (Product Design Engineering)
15. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Bahan) /
    Bachelor of Engineering (Honours) (Material Engineering)
16. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Metalurgi) /
    Bachelor of Engineering (Honours) (Metallurgical Engineering)
17. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Polimer) /
    Bachelor of Engineering (Honours) (Polymer Engineering)
18. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Bioproses) /
    Bachelor of Engineering (Honours) (Bioprocess Engineering)
19. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Biosistem) /
    Bachelor of Engineering (Honours) (Biosystems Engineering)
20. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Alam Sekitar) /
    Bachelor of Engineering (Honours) (Environmental Engineering)
21. Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Awam) /
    Bachelor of Engineering (Honours) (Civil Engineering)

22. Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Bioteknologi Industri) /
Bachelor of Chemical Engineering Technology (Honours) (Biotechnology Industry)
23. Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Rangkaian Elektronik) /
Bachelor of Electronic Engineering Technology (Honours) (Electronic Network Design)
24. Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Kuasa Industri) /
Bachelor of Electrical Engineering Technology (Honours) (Industrial Power)
25. Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemesinan) /
Bachelor of Mechanical Engineering Technology (Honours) (Machining)
26. Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Sistem Pertanian) /
Bachelor of Mechanical Engineering Technology (Honours) (Agricultural Systems)
27. Sarjana Muda Teknologi Kejuruteraan Awam (Kepujian) (Pembinaan) /
Bachelor of Civil Engineering Technology (Honours) (Construction)
28. Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pembangunan Produk) /
Bachelor of Mechanical Engineering Technology (Honours) (Product Development)
29. Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemprosesan Bahan) /
Bachelor of Mechanical Engineering Technology (Honours) (Materials Processing)
30. Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Teknologi Robotik dan Automasi) /
Bachelor of Electrical Engineering Technology (Honours) (Robotic and Automation Technology)
31. Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Sistem Elektronik) /
Bachelor of Electronic Engineering Technology (Honours) (Electronic Systems)
32. Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Elektronik Bersepadu) /
Bachelor of Electronic Engineering Technology (Honours) (Integrated Electronics)
33. Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Telekomunikasi Elektronik) /
Bachelor of Electronic Engineering Technology (Honours) (Electronic Telecommunication Design)
34. Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Proses Kimia Industri) /
Bachelor of Chemical Engineering Technology (Honours) (Industrial Chemical Process)
35. Sarjana Muda Teknologi Kejuruteraan Kimia (Teknologi Makanan) (Kepujian) /
Bachelor of Chemical Engineering Technology (Food Technology) (Honours)
36. Sarjana Muda Perniagaan (Kepujian) (Keusahawanan Kejuruteraan) /
Bachelor of Business (Honours) (Entrepreneurial Engineering)
37. Sarjana Muda Perniagaan (Kepujian) (Perniagaan Antarabangsa) /
Bachelor of Business (Honours) (International Business)
38. Sarjana Muda Komunikasi Media Baharu (Kepujian) /
Bachelor of New Media Communication (Honours)

MISI / MISSION:

Melahirkan insan kamil yang menyumbang kepada agenda pembangunan dan daya saing industri negara.
To produce exemplary individuals who contribute to the nation's development and industry competitiveness (agenda)

VISI / VISION:

Institusi akademik dan penyelidikan yang berdaya saing di persada antarabangsa.
An internationally competitive academic and research institution.

LAGU UniMAP / UniMAP ANTHEM:

WAWASANKU
Universiti Malaysia Perlis
Alam Kejuruteraan
Ilmu Keikhlasan Kecemerlangan
Wawasan Jiwa Kita

Berdikari rohaniah
Berteknologi
Pemimpin Berbestari
Untuk Bangsa Insan Dan Umat dunia
Negara Yang Tercinta

Universiti Malaysia Perlis
Alam Kejuruteraan
Ilmu Keikhlasan Kecemerlangan
Wawasan Jiwa Kita



DULI YANG TERAMAT MULIA
TUANKU SYED FAIZUDDIN PUTRA IBNI TUANKU SYED SIRAJUDDIN JAMALULLAIL
D.K., S.P.M.P., P.A.T., Doctor of Education (Honoris Causa) La Trobe University Melbourne, Australia
Honorary Doctorate in Management Science, Yala Rajabhat University, Thailand

RAJA MUDA PERLIS
(CANSELOR UNIVERSITI MALAYSIA PERLIS)



DULI YANG TERAMAT MULIA
TUANKU HAJAH LAILATUL SHAHREEN AKASHAH KHALIL
S.P.M.P., Honoris Causa in Health Sciences (Universidad Nacional Pedro Henriquez Urena, DR)

RAJA PUAN MUDA PERLIS
(PRO-CANSELOR UNIVERSITI MALAYSIA PERLIS)

KATA ALUAN YANG BERBAHAGIA NAIB CANSELOR UniMAP
FOREWORD BY THE VICE CHANCELLOR OF UniMAP

Bismillah Hirrahman Nirrahim
Salam Ilmu Keikhlasan Kecemerlangan UniMAP
Salam Negaraku Malaysia
Assalamualaikum Warahmatullahi Taala Wabarakatuh dan Salam Sejahtera

Bersyukur saya ke hadrat Allah Aza Wajalla atas limpah dan kurniaNya, kerana memberi kesempatan kepada saya untuk mencoretkan kata dalam buku Panduan Akademik Ijazah Sarjana Muda bagi sesi kemasukan 2017/2018.

Saya mewakili pihak pentadbiran Universiti Malaysia Perlis (UniMAP) ingin mengucapkan selamat datang dan setinggi-tinggi tahniah di atas kejayaan saudara/saudari kerana telah berjaya terpilih untuk menyambung pengajian di peringkat Ijazah Sarjana Muda di UniMAP bagi Sidang Akademik 2017/2018. Sesungguhnya UniMAP merupakan pilihan yang tepat untuk melanjutkan pengajian. Ini kerana UniMAP sentiasa berusaha memastikan peranannya sebagai penyumbang utama dalam pembangunan insan bagi negara ini dilaksanakan berdasarkan kepakaran yang dimiliki dan selari dengan keperluan negara.

Saya juga memanjatkan syukur ke hadrat Allah SWT kerana dengan limpah dan kurniaNya, Buku Panduan Akademik Program Pengajian Ijazah Sarjana Muda Sidang Akademik 2017/2018 dapat diterbitkan bagi membantu saudara/saudari sebagai pelajar baharu dalam memahami proses dan prosedur yang berkaitan dengan pengajian sepanjang di universiti ini.

Besarlah harapan UniMAP, agar saudara/saudari akan menjadi pemimpin kepada kecemerlangan bukan sahaja kepada orang lain malah menjadi pemimpin kepada diri sendiri supaya menjadi insan yang cemerlang dalam pelajaran dan juga hidup. Saudara/saudari haruslah berusaha membuktikan kecemerlangan diri bukan sahaja melalui akademik tetapi juga melalui sahsiah diri yang ditunjukkan kerana itu pasti menjadi bukti kejayaan di sini. Bermula dari saat ini, manfaatkanlah segala peluang yang ada sehinggalah saudara/saudari berjaya mengenggam ijazah pada hari bergraduat kelak.

Akhir kata, selamat maju jaya diucapkan kepada saudara/saudari. Hayatilah keseronokan dan cabaran yang menuntut banyak pengorbanan dan kecekalan demi mengutip ilmu pengetahuan ketika bergelar pelajar nanti.

I am grateful to Allah the Almighty for it is with His Bounty and Grace that we are embarking on the new academic year of 2017/2018.

On behalf of the management of Universiti Malaysia Perlis (UniMAP), I would like to welcome you to this university, and indeed congratulate you on your success in securing a place at UniMAP. You have made the right choice, and we are privileged to be able to execute our roles and responsibilities in nurturing the talent of tomorrow. Ever since its establishment, UniMAP has been playing a pivotal role on the agenda of human development for the nation, and we will continue to do so as is required by the needs of the nation

The Academic Guidelines for Undergraduate Programmes 2017/2018 is published so as to be a reference for all students to understand processes and procedures which will be relevant throughout your study in UniMAP. Please use it so that this new chapter in your life is made that much more easier.

The Academic Guidelines for Undergraduate Programmes 2017/2018 is published so as to be a reference for all students to understand processes and procedures which will be relevant throughout your study in UniMAP. Please use it so that this new chapter in your life is made that much more easier.



It is our hope that your time here at UniMAP will nurture you towards becoming a leader of excellence, of your own self and of others, and that the leadership encompasses all aspects of your life. This will then be a testimony of your success at UniMAP. As such, I urge you to take whatever opportunity that life throws at you, and we shall be here to support you and facilitate your efforts as best as we know how.

Finally, I wish everyone the best of luck. Have fun and face challenges that come your way in a mature way.

Wassalam.

Thank you

Dato' Prof. Dr. Zul Azhar Zahid Jamal
Naib Canselor / *Vice Chancellor*
Universiti Malaysia Perlis (UniMAP)

Pegawai Utama UniMAP

UniMAP Principal Officers



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Bendahari / *Bursar*



Pn. Mazmin Mat Akhir
Pustakawan Kanan / *Chief Librarian*



BAHASA MELAYU

KALENDAR AKADEMIK IJAZAH SARJANA MUDA
SIDANG AKADEMIK 2017/2018

AKTIVITI	SEMESTER PERTAMA 04 September 2017 hingga 14 Januari 2018 (19 minggu)		
	JANGKA MASA	TEMPOH	CATATAN
Pendaftaran Pelajar Baru / Minggu Suai Kenal	26 Ogos hingga 02 September 2017	5 hari	**Minggu Suaikenal** 26 hingga 30 Ogos 2017 **Hari Kebangsaan** 31 Ogos 2017 [Khamis] **Hari Raya Haji** 01 & 02 September 2017 [Jumaat & Sabtu]
Kuliah	04 September hingga 15 Oktober 2017	6 minggu	**Hari Malaysia** 16 September 2017 [Sabtu] **Awal Muharam** 22 September 2017 [Khamis]
Cuti Pertengahan Semester	16 hingga 22 Oktober 2017	1 minggu	**Hari Deepavali** 18 Oktober 2017 [Rabu]
Kuliah	23 Oktober hingga 17 Disember 2017	8 minggu	**Konvokesyen Ke-12 UniMAP** 28 – 30 Oktober 2017 [Sabtu –Isnin] **Maulidur Rasul** 01 Disember 2017 [Jumaat]
Minggu Ulangkaji	18 hingga 24 Disember 2017	1 minggu	-
Peperiksaan	25 Disember 2017 hingga 14 Januari 2018	3 minggu	**Hari Krismas** 25 Disember 2017 [Isnin]
Cuti Antara Semester	15 Januari hingga 11 Februari 2018	4 minggu	-

KALENDAR AKADEMIK IJAZAH SARJANA MUDA
SIDANG AKADEMIK 2017/2018

AKTIVITI	SEMESTER KEDUA 12 Februari hingga 24 Jun 2018 (19 minggu)		
	JANGKA MASA	TEMPOH	CATATAN
Kuliah	12 Februari hingga 01 April 2018	7 Minggu	**Tahun Baru Cina** 16 & 17 Februari 2018 [Jumaat & Sabtu]
Cuti Pertengahan Semester	02 hingga 08 April 2018	1 minggu	-
Kuliah	09 April hingga 27 Mei 2018	7 minggu	**Israk Mikraj** 14 April 2018 [Jumaat] **Hari Pekerja** 01 Mei 2018 [Selasa] **Hari Keputeraan DYMM Tuanku Raja Perlis** 17 Mei 2018 [Khamis]
Minggu Ulangkaji	28 Mei hingga 03 Jun 2018	1 minggu	**Hari Wesak** 29 Mei 2018 [Selasa]
Peperiksaan	04 Jun hingga 24 Jun 2018	3 minggu	**Nuzul Al-Qu'ran** 02 Jun 2018 [Sabtu] **Hari Raya Aidilfitri** 15 & 16 Jun 2018 [Jumaat & Sabtu]
Cuti Panjang/ Latihan Industri	25 Jun hingga 02 September 2018	10 minggu	**Hari Keputeraan SPB Yang Di-Pertuan Agung** 28 Julai 2018 [Sabtu] **Hari Raya Aidiladha** 22 & 23 Ogos 2018 (Rabu & Khamis) **Hari Kebangsaan** 31 Ogos 2018 [Jumaat]

⋆ *Latihan Industri (LI) bagi pelajar tahun 3 Ijazah Sarjana Muda Kejuruteraan, Ijazah Sarjana Muda Komunikasi Media Baharu dan pelajar tahun 2 Ijazah Sarjana Muda Perniagaan (Keusahawanan Kejuruteraan) bagi Semester II Sidang Akademik 2017/2018 akan bermula pada 26 Jun sehingga 3 September 2018 selama 10 minggu*

⋆ *Latihan Industri (LI) bagi pelajar tahun 4 Ijazah Sarjana Muda Teknologi Kejuruteraan akan bermula pada 16 Januari hingga 30 Jun 2018 selama 24 minggu*



SISTEM AKADEMIK

Kurikulum program pengajian Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan dirangka untuk dilengkapkan dalam tempoh 4 tahun manakala bagi program pengajian Sarjana Muda Perniagaan dan Sarjana Muda Komunikasi Media Baharu pula dalam tempoh 3 tahun, dengan setiap Tahun Akademik atau Sidang Akademik dibahagikan kepada Semester I dan Semester II. Setiap semester mengandungi 14 minggu pembelajaran. Peperiksaan akan diadakan pada hujung semester. Kursus-kursus yang ditawarkan dibahagikan mengikut peringkat pengajian iaitu peringkat 100, 200, 300 dan 400.

Bagi tujuan pengijazahan, pelajar Sarjana Muda Kejuruteraan perlu mengambil kursus-kursus Teras berjumlah 120 unit, pelajar Sarjana Muda Teknologi Kejuruteraan pula perlu mengambil kursus-kursus Teras berjumlah 123 unit, pelajar Sarjana Muda Perniagaan perlu mengambil 72 atau 74 unit Kursus Teras (mengikut pengkhususan yang diambil) dan 30 unit Kursus Elektif manakala pelajar Sarjana Muda Komunikasi Media Baharu pula perlu mengambil 87 unit kursus Teras dan 15 unit Kursus Elektif.

Pelajar juga perlu mengambil kursus Keperluan Universiti sebanyak 17 unit bagi program Sarjana Muda Kejuruteraan, 19 unit bagi program Sarjana Muda Teknologi Kejuruteraan, 20 unit bagi program Sarjana Muda Perniagaan dan Sarjana Muda Komunikasi Media Baharu pula perlu mengambil 20 unit kursus Keperluan Universiti.

Pelajar juga perlu lulus semua kursus dan mendapat jumlah kredit yang diperlukan mengikut program pengajian masing-masing serta PNGK sekurang-kurangnya 2.00 untuk bergraduat.

STRUKTUR PROGRAM

Struktur program Sarjana Muda Kejuruteraan, Sarjana Muda Kejuruteraan Teknologi Kejuruteraan, Sarjana Muda Perniagaan dan Sarjana Muda Komunikasi Media Baharu dikelompokkan seperti yang ditunjukkan dalam Jadual 1 (a), (b), (c), (d) dan (e). Bagi tujuan pengijazahan, pelajar dikehendaki untuk mengambil sejumlah 137 unit bagi program Sarjana Muda Kejuruteraan, 142 unit bagi program Sarjana Muda Teknologi Kejuruteraan, 122 unit atau 124 unit bergantung kepada pengkhususan program Sarjana Muda Perniagaan dan 122 unit bagi program Sarjana Muda Komunikasi Media Baharu.

Jadual 1(a): Struktur Program Sarjana Muda Kejuruteraan

SARJANA MUDA KEJURUTERAAN	
KURSUS	**UNIT**
KURSUS TERAS KEJURUTERAAN	120
KURSUS KEPERLUAN UNIVERSITI	17
a. Keusahawanan Kejuruteraan	2
b. Kemahiran Berfikir	2
c. Bahasa Melayu Universiti	2
d. * Bahasa Inggeris Asas	(*2 audit)
e. ** Bahasa Inggeris Umum	(**2)
f. Bahasa Inggeris untuk Komunikasi Teknikal	2
g. Tamadun Islam & Tamadun Asia/Budaya Malaysia	2
h. Hubungan Etnik / Pengajian Malaysia	2
i. Ko-kurikulum	3
j. ***Kursus Opsyen	(***2)
JUMLAH	**137**

Jadual 1(b): Struktur Program Sarjana Muda Teknologi Kejuruteraan

SARJANA MUDA TEKNOLOGI KEJURUTERAAN	
KURSUS	**UNIT**
KURSUS TERAS TEKNOLOGI KEJURUTERAAN	123
KURSUS KEPERLUAN UNIVERSITI	19
a. Keusahawanan Kejuruteraan	2
b. Kemahiran Berfikir	2
c. Bahasa Melayu Universiti	2
d. *Bahasa Inggeris Asas	(*2 audit)
e. ** Bahasa Inggeris Umum	(**2)
f. Bahasa Inggeris untuk Komunikasi Teknikal	2
g. Tamadun Islam & Tamadun Asia/Budaya Malaysia	2
h. Hubungan Etnik / Pengajian Malaysia	2
i. Kemahiran & Teknologi dalam Komunikasi	2
j. Ko-kurikulum	3
k. ***Kursus Opsyen	(***2)
JUMLAH	**142**

Jadual 1(c): Struktur Program Sarjana Muda Perniagaan (Keusahawanan Kejuruteraan)

SARJANA MUDA PERNIAGAAN (KEUSAHAWANAN KEJURUTERAAN)	
KURSUS	**UNIT**
KURSUS TERAS PERNIAGAAN	72
ELEKTIF	30
KURSUS KEPERLUAN UNIVERSITI	20
a. Keusahawanan Kejuruteraan	2
b. Kemahiran Berfikir	2
c. Bahasa Melayu Universiti	2
d. *Bahasa Inggeris Asas	(*2 audit)
e. ** Bahasa Inggeris Umum	(**2)
f. Bahasa Inggeris Akademik	2
g. Tamadun Islam & Tamadun Asia/Budaya Malaysia	2
h. Hubungan Etnik / Pengajian Malaysia	2
i. Komunikasi dalam Perniagaan	3
j. Ko-kurikulum	3
JUMLAH	**122**

Jadual 1(d): Struktur Program Sarjana Muda Perniagaan (Perniagaan Antarabangsa)

SARJANA MUDA PERNIAGAAN (PERNIAGAAN ANTARABANGSA)	
KURSUS	**UNIT**
KURSUS TERAS PERNIAGAAN	74
ELEKTIF	30
KURSUS KEPERLUAN UNIVERSITI	20
a. Keusahawanan Kejuruteraan	2
b. Kemahiran Berfikir	2
c. Bahasa Melayu Universiti	2
d. *Bahasa Inggeris Asas	(* 2 audit)
e. ** Bahasa Inggeris Umum	(** 2)
f. Bahasa Inggeris Akademik	2
g. Tamadun Islam & Tamadun Asia/Budaya Malaysia	2
h. Hubungan Etnik / Pengajian Malaysia	2
i. Komunikasi dalam Perniagaan	3
j. Ko-kurikulum	3
JUMLAH	**124**

Jadual 1(e): Struktur Program Sarjana Muda Komunikasi Media Baharu

SARJANA MUDA KOMUNIKASI MEDIA BAHARU	
KURSUS	**UNIT**
KURSUS TERAS MEDIA BAHARU	87
ELEKTIF	15
KURSUS KEPERLUAN UNIVERSITI	20
a. Kemahiran Berfikir	2
b. Bahasa Melayu Universiti	3
c. *Bahasa Inggeris Asas	(* 2 audit)
d. **Bahasa Inggeris Umum	(** 2)
e. Bahasa Inggeris Akademik	2
f. Tamadun Islam & Tamadun Asia/Budaya Malaysia	2
g. Hubungan Etnik / Pengajian Malaysia	2
h. Bahasa Asing	4
i. Ko-kurikulum	3
JUMLAH	**122**

//*** diterangkan dalam bahagian Jenis-jenis Kursus*

JENIS-JENIS KURSUS

1. Kursus Keperluan Universiti

Kursus Keperluan Universiti ialah kursus-kursus di luar pengkhususan pelajar. Kursus-kursus ini ditawarkan oleh Pusat Pengajian Pembangunan Insan dan Teknokomunikasi (iKOM), Pusat Bahasa Antarabangsa dan Pusat Kokurikulum. Semua kursus ini wajib diambil dan pelajar perlu lulus dengan gred C sebagai syarat untuk pengijazahan. Kursus-kursus tersebut ialah:

a. Keusahawanan Kejuruteraan (UUW224) - (2 unit)

Semua pelajar wajib mengambil kursus Keusahawanan Kejuruteraan. Pelajar digalakkan mengambil kursus-kursus lain di dalam kategori 'keusahawanan', di mana unit yang dikumpul boleh dikira sebagai Kursus Opsyen.

b. Kemahiran Berfikir (UUW322) - (2 unit)

Semua pelajar wajib mengambil kursus Kemahiran Berfikir.



c. Bahasa Melayu Universiti (UVW410) - (2 unit)
Kursus Bahasa Melayu Universiti wajib diambil oleh semua pelajar.

d. Bahasa Inggeris Untuk Komunikasi Teknikal (UVW312)/Bahasa Inggeris Akademik (UVW313) - (2 unit)
Semua pelajar wajib mengambil kursus Bahasa Inggeris untuk Komunikasi Teknikal (bagi program Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan) atau kursus Bahasa Inggeris Akademik (bagi program Sarjana Muda Perniagaan dan Sarjana Muda Komunikasi Media Baharu). Bagaimanapun, bergantung kepada keputusan MUET, pelajar-pelajar diwajibkan mengikuti beberapa kursus Bahasa Inggeris lain terlebih dahulu sebelum dibenarkan mengambil kursus Bahasa Inggeris untuk Komunikasi Teknikal atau kursus Bahasa Inggeris Akademik seperti ditunjukkan dalam Jadual 2.

Pelajar yang memperolehi Band 1 atau 2 dalam MUET diwajibkan terlebih dahulu mengambil Bahasa Inggeris Asas (Foundation English) iaitu kursus 2 unit tidak berkredit (audit) dan perlu mendapat kelulusan minimum Gred C sebelum dibenarkan mengambil kursus Bahasa Inggeris Umum (English for General Purposes) sebanyak 2 unit dan kursus Bahasa Inggeris untuk Komunikasi Teknikal (English for Technical Communication) atau Bahasa Inggeris Akademik (English for Academic Purposes) sebanyak 2 unit. Gred Lulus minimum bagi semua kursus Bahasa Inggeris ialah gred C.

Bagi pelajar yang memperolehi Band 3 dalam MUET diwajibkan mengambil mengambil kursus Bahasa Inggeris Umum (English for General Purposes) iaitu kursus 2 unit sebelum dibenarkan mengambil kursus Bahasa Inggeris untuk Komunikasi Teknikal (English for Technical Communication) atau Bahasa Inggeris Akademik (English for Academic Purposes). Pelajar yang memperolehi Band 3 dalam MUET tidak perlu mengambil kursus Bahasa Inggeris Asas (Foundation English).

Pelajar yang memperolehi Band 4 atau 5 dalam MUET pula hanya diwajibkan mengambil kursus Bahasa Inggeris untuk Komunikasi Teknikal (English for Technical Communication) atau Bahasa Inggeris Akademik (English for Academic Purposes). Pelajar yang memperolehi Band 4 atau 5 dalam MUET tidak perlu mengambil Bahasa Inggeris Asas (Foundation English) atau kursus Bahasa Inggeris Umum (English for General Purposes).

Bagi pelajar yang mendapat Band 1, 2 dan 3, dua (2) unit yang diperolehi melalui kursus Bahasa Inggeris Umum (English for General Purposes) akan dikira sebagai Kursus Opsyen. Kursus Opsyen lain juga dibuka kepada pelajar yang mendapat MUET band 1,2 dan 3 untuk memberi nilai tambah kepada pelajar. Walau bagaimanapun, jumlah kredit bergraduat bagi pelajar yang mendapat MUET band 1,2 dan 3 yang mengambil Kursus Opsyen (selain kursus Bahasa Inggeris Umum yang telah dikira sebagai Kursus Opsyen) akan menjadi 139 unit bagi program Ijazah Kejuruteraan dan 144 unit bagi program Teknologi Kejuruteraan. Pelajar yang mendapat Band 4 dan 5 dalam MUET wajib mengambil Kursus Opsyen.

Jadual 2: Kursus Bahasa Inggeris Wajib

Band MUET	KURSUS BAHASA INGGERIS WAJIB			
	UVA111 Bahasa Inggeris Asas (Tidak Berkredit)	UVW211 Bahasa Inggeris Umum	UVW312 Bahasa Inggeris untuk Komunikasi Teknikal / UVW313 Bahasa Inggeris Akademik	Kursus Opsyen (Bahasa Asing)
BAND 1 & 2	/	/	/	Pendaftaran dibuka kepada para pelajar
BAND 3		/	/	
BAND 4			/	/

e. Tamadun Islam & Tamadun Asia (UUW233) / Budaya Malaysia (UUW237) - (2 unit)
Kursus Tamadun Islam & Tamadun Asia (UUW233) wajib diambil oleh semua pelajar tempatan manakala kursus Budaya Malaysia (UUW237) wajib diambil oleh semua pelajar antarabangsa.

f. Hubungan Etnik (UUW235) / Pengajian Malaysia (UUW239) - (2 unit)
Kursus Hubungan Etnik (UUW235) wajib diambil oleh semua pelajar tempatan manakala kursus Pengajian Malaysia (UUW239) pula wajib diambil oleh semua pelajar antarabangsa.

g. Kursus Opsyen
Kursus Opsyen terdiri daripada kursus-kursus yang ditawarkan oleh Pusat Pengajian Pembangunan Insan dan Teknokomunikasi (iKOM) dan Pusat Bahasa Antarabangsa untuk pelajar Program Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan bertujuan untuk memberi nilai tambah kepada pelajar.

h. Komunikasi Dalam Perniagaan (BUW123) - (3 unit)
Kursus Komunikasi dalam Perniagaan wajib diambil oleh semua pelajar program Sarjana Muda Perniagaan.

i. Program Ko-Kurikulum (3 unit)
Semua pelajar diwajibkan mengumpul 3 unit ko-kurikulum sepanjang pengajiannya di UniMAP. Dua (2) unit Badan Beruniform perlu diambil oleh pelajar secara berpakej iaitu 1 unit pada Semester I dan 1 unit lagi pada Semester II (dalam Tahun Pertama pengajian). Bagi kursus bukan Badan Beruniform, sebanyak 1 unit boleh diambil dalam mana-mana semester.

2. Kursus Teras (Sarjana Muda Kejuruteraan)
Kursus Teras terdiri daripada kursus-kursus Kejuruteraan yang wajib diambil oleh semua pelajar bidang Sarjana Muda Kejuruteraan. Kursus-kursus ini menjadi keperluan utama untuk pengijazahan. Pelajar yang gagal mana-mana kursus Teras Kejuruteraan mesti mengulanginya dan lulus sebelum layak dipertimbangkan untuk pengijazahan.

3. Kursus Teras (Sarjana Muda Teknologi Kejuruteraan)
Kursus Teras terdiri daripada kursus-kursus Teknologi Kejuruteraan yang wajib diambil oleh semua pelajar bidang Teknologi Kejuruteraan. Kursus-kursus ini menjadi sebahagian keperluan untuk pengijazahan. Pelajar yang gagal mana-mana kursus Teras Teknologi Kejuruteraan mesti mengulanginya sebelum layak dipertimbangkan untuk pengijazahan

4. Kursus Teras (Sarjana Muda Perniagaan)
Kursus Teras bagi Program Sarjana Muda Perniagaan UniMAP dibahagikan kepada dua kumpulan iaitu Kursus Teras Perniagaan dan Kursus Teras Program.

Kursus Teras Perniagaan terdiri daripada kursus-kursus kontemporari dalam bidang perniagaan yang wajib diambil oleh semua pelajar program Sarjana Muda Perniagaan di UniMAP manakala Kursus Teras Program ditawarkan mengikut pengkhususan yang dipilih oleh pelajar.

Kursus-kursus Teras ini menjadi sebahagian keperluan untuk pengijazahan. Pelajar yang gagal mana-mana Kursus Teras mesti mengulanginya sebelum layak dipertimbangkan untuk pengijazahan.

5. Kursus Elektif (Sarjana Muda Perniagaan)
Pelajar Sarjana Muda Perniagaan boleh memilih kursus Elektif berdasarkan minat mereka dalam bidang-bidang tertentu.

6. Kursus Pra-Syarat
Kursus Pra-syarat merupakan kursus yang wajib diambil dan lulus oleh pelajar, sebelum dibenarkan mendaftar kursus yang berikutnya. Pelajar yang gagal dalam kursus pra-syarat boleh mengambil semula kursus pra-syarat tersebut seiring dengan kursus yang berikutnya (dalam semester sama), namun hendaklah memohon dan mendapatkan kelulusan Dekan Pusat Pengajian.

SISTEM UNIT

Setiap kursus diberikan nilai yang dikenali sebagai UNIT. Unit diberikan berdasarkan skop dan kedalaman kursus berkenaan. Kecuali dalam kes-kes tertentu, nilai unit bagi kursus yang mempunyai unit adalah seperti Jadual 3:

Jadual 3 : Penilaian Unit bagi setiap minggu untuk Semester 14 Minggu

BENTUK PERTEMUAN	NILAI UNIT	JUMLAH PERTEMUAN SETIAP MINGGU
Kuliah	1	1 jam
Makmal/Tutorial	1	2 jam
Pembelajaran berbantu melibatkan mod penyampaian lain seperti Problem-based Learning (PBL), pembelajaran-e (e-learning modules), lawatan kerja dll.	1	3 jam
Latihan Industri	1*	Bergantung kepada program pengajian

** Nota: Nilai 1 unit bagi Latihan Industri adalah setara dengan 2 minggu latihan*

PENDEKATAN PENGAJARAN DAN PEMBELAJARAN DI UniMAP

Kebanyakan Kursus Teras yang ditawarkan merangkumi komponen teori dan komponen praktikal dengan nilaian jam pertemuan seperti berikut:

1. **Komponen Teori**
   Satu (1) unit komponen Teori adalah bersamaan dengan 1 jam kuliah/tutorial/bacaan seminggu atau 14 jam dalam satu semester.

2. **Komponen Praktikal**
   Satu (1) unit komponen Praktikal bagi program Kejuruteraan adalah bersamaan 2 jam pertemuan dalam seminggu atau 28 jam pertemuan dalam 1 semester. Satu (1) unit komponen Praktikal bagi program Teknologi Kejuruteraan adalah bersamaan 3 jam pertemuan dalam seminggu atau 42 jam pertemuan dalam 1 semester.

Bagi kebanyakan Kursus Teras, pelajar perlu menjalani projek mini dan menduduki peperiksaan atau viva pada penghujung semester.

Komponen praktikal terdiri daripada bentuk-bentuk pengajaran dan pembelajaran berikut:

1. **Pembelajaran di dalam makmal** - sepasukan pelajar yang terdiri dari 2-3 orang, menjalankan satu eksperimen. Di dalam beberapa program makmal asas, setiap pelajar menjalankan eksperimen secara individu (1:1) dan bukannya dalam pasukan.

2. **Pembelajaran menggunakan Teaching Factory** – sepasukan pelajar yang terdiri dari 5-6 orang menjalankan sesebuah larian proses (*process run*) dengan menggunakan peralatan skala sebenar yang digunakan di industri.

3. **E-pembelajaran** – pendekatan pembelajaran yang diperkukuhkan dengan ICT, yang melengkapkan pendekatan pembelajaran konvensional. Pelajar mempelajari kursus atau topik-topik tertentu menggunakan modul yang boleh diakses dari laman web UniMAP. Modul mengandungi nota kuliah dalam bentuk multimedia, yang merangkumi audio, video, grafik, animasi, simulasi, permainan, dan pelbagai lagi aktiviti berbentuk interaksi.

4. **Pendedahan kepada industri** – pelajar menjalankan lawatan ke industri selama tempoh masa tertentu beberapa kali sepanjang pengajiannya di UniMAP. Ini termasuklah program IndEx (Pendedahan kepada Industri), InTra (Latihan Industri), Keusahawanan Industri, dan lain-lain lagi.

LATIHAN INDUSTRI

Latihan Industri merupakan kursus 4 unit bagi pelajar Sarjana Muda Kejuruteraan, 12 unit bagi pelajar Sarjana Muda Teknologi Kejuruteraan, 6 unit bagi pelajar Sarjana Muda Perniagaan dan 6 unit bagi pelajar Sarjana Muda Komunikasi Media Baharu.

Pelajar Sarjana Muda Kejuruteraan Tahun 3 dikehendaki untuk menjalani 10 minggu Latihan Industri untuk mendapatkan 4 kredit, pelajar Sarjana Muda Teknologi Kejuruteraan Tahun 4 pula dikehendaki untuk menjalani 24 minggu Latihan Industri untuk mendapatkan 12 kredit manakala pelajar Tahun 3 program Sarjana Muda Komunikasi Media Baharu pula dikehendaki menjalani 12 minggu Latihan Industri untuk mendapatkan 6 kredit untuk kursus ini.

Pelajar program Sarjana Muda Perniagaan (Perniagaan Antarabangsa) pula akan mengikuti Latihan Industri pada Semester ke-2 dan ke-4, mengikut Pilihan Pertama iaitu (2+2) atau Pilihan Kedua (3+1). Bagi Pilihan Pertama (2+2), pelajar akan mengikuti 2 fasa (2 bulan + 2 bulan) Latihan Industri di syarikat-syarikat di Malaysia dan bagi Pilihan Kedua (3+1), pelajar akan menjalani 3 bulan Latihan Industri di syarikat di Malaysia dan 1 bulan lawatan sambil belajar di luar negara (International Business Field Trips).

Pelajar program Sarjana Muda Perniagaan Keusahawanan Kejuruteraan) akan mengambil bahagian dalam program Perniagaan Inkubator selama 10 minggu. Mereka akan mendapat 6 jam kredit selepas Semester ke-4.

Purata pertemuan selama 8 jam sehari selama 5 hari dalam seminggu, di mana 8 jam sehari x 5 hari = 40 jam seminggu, dianggap sebagai jam penilaian (waktu bekerja yang ditetapkan oleh organisasi/ syarikat).

Tujuan utama Latihan Industri ialah:-

√ Menyemai sikap profesional di kalangan pelajar.

√ Menyedarkan pelajar tentang kepentingan dan kaitan yang kuat antara latihan industri, makmal/amali dan teori kejuruteraan.

√ Memberi pendedahan awal kepada pelajar tentang persekitaran dan keadaan di industri serta amalannya. Para pelajar berpeluang melengkapkan diri sebagai bekalan untuk menghadapi pengalaman akan datang, baik di dalam pengajian akademik mahupun latihan-latihan seterusnya.

Pusat Kerjasama Industri dan Agensi Kerajaan (CIGC) bersama-sama PTj yang terlibat akan menyelaraskan kursus-kursus yang melibatkan industri seperti di bawah:

1. Bengkel Kepimpinan Latihan Industri (InTra)

a. Program singkat 1 hari
b. Pakar-pakar, pengurus dan jurutera-jurutera dari industri dijemput untuk mengadakan taklimat, demonstrasi dan dialog mengikut jadual yang disediakan
c. Pendedahan sebelum pelajar menjalani latihan industri

PROGRAM INKUBATOR PERNIAGAAN

Pendekatan Pengajaran dan Pembelajaran (P&P) untuk program Sarjana Muda Perniagaan (Kepujian) (Keusahawanan Kejuruteraan) bukan sahaja meliputi kuliah dan tutorial tetapi juga latihan praktikal melalui Program Inkubator Perniagaan. Selepas semester ke-4, pelajar akan mengambil bahagian dalam Program Perniagaan Inkubator selama 10 minggu. Mereka akan mendapat 6 jam kredit.

Melalui Program Inkubator Perniagaan ini, para pelajar akan dibimbing oleh syarikat-syarikat yang terlibat secara langsung dalam penghasilan dan pembangunan produk yang mungkin membawa kepada pengkomersilan. Lebih menarik lagi, syarikat-syarikat yang terlibat ini adalah tergolong dalam kategori "start up" dengan melibatkan perniagaan baru, perniagaan yang mempunyai perkembangan yang pantas dan perniagaan yang bertujuan untuk membawa produk inovatif ke pasaran sedia ada. Para pelajar dapat mengetahui bagaimana idea dan inovasi boleh membawa kepada proses penghasilan sesuatu produk. Pada akhir Program



Inkubator Perniagaan, pelajar dikehendaki menyediakan satu laporan mengenai pengalaman mereka sepanjang Program Inkubator Perniagaan yang telah mereka jalani dalam syarikat-syarikat "start up" terpilih.

Program Inkubator Perniagaan ini mempunyai jalinan kerjasama yang rapat dengan "National Incubator Network Association (NINA)" dan turut bergabung dengan Association of Asean Business Incubation (AABI). Antara ahli-ahli pertubuhan ini termasuklah Technology Park Malaysia, Perbadanan Pembangunan Teknologi Malaysia, SIRIM dan Kulim Technology Park Corporation. UniMAP bekerjasama rapat dengan pertubuhan-pertubuhan ini untuk menjamin kejayaan program tersebut.

PROGRAM LAWATAN KERJA UNTUK PERNIAGAAN ANTARABANGSA (*INTERNATIONAL BUSINESS FIELD TRIPS*)

Pada semester ke-2 dan ke-4, pelajar Sarjana Muda Perniagaan (Kepujian) (Perniagaan Antarabangsa) pula akan mengikuti Latihan Industri mengikut Pilihan Pertama (2+2) atau Pilihan Kedua (3+1).

Bagi Pilihan Pertama (2+2), pelajar akan mengikuti 2 fasa (2 bulan + 2 bulan) Latihan Industri di syarikat-syarikat di Malaysia dan penyelarasannya dilaksanakan dengan kerjasama Pusat Kerjasama Industri dan Agensi Kerajaan (CIGC) UniMAP.

Bagi Pilihan Kedua (3 +1), pelajar akan menjalani Latihan Industri di syarikat-syarikat yang terpilih di Malaysia untuk 3 bulan pertama dan kemudian meneruskan lawatan sambil belajar di luar negara selama 1 bulan lagi. Pelajar diberi kebebasan untuk memilih mana-mana dua pilihan yang diberikan untuk Latihan Industri mengikut minat dan kemampuan kewangan mereka.

Menerusi program ini pelajar juga berpeluang menimba pengalaman berkerja di negara – negara lain seperti Indonesia, Thailand, Singapura, Japan, China, Turki, Arab Saudi dan banyak lagi. Pengalaman berkerja di luar negara dapat membantu dan mendedahkan pelajar dalam menghadapi kepelbagaian budaya dan persekitaran antarabangsa.

KOD KURSUS

Setiap kursus yang ditawarkan mempunyai kod yang tersendiri. Untuk pengajian program Kejuruteraan, Teknologi Kejuruteraan, Perniagaan dan Komunikasi Media Baharu, kod bagi sesebuah kursus diringkaskan dalam Jadual 4(a), 4(b) dan 4(c) di bawah:

Jadual 4(a): Abjad Pertama;
Peringkat Pengajian/Jenis program yang ditawarkan di peringkat Sarjana Muda

ABJAD PERTAMA DI DALAM KOD	JENIS PROGRAM
E	Sarjana Muda Kejuruteraan
B	Sarjana Muda Perniagaan
P	Sarjana Muda Teknologi Kejuruteraan
K	Sarjana Muda Komunikasi Media Baharu
U	Kursus Umum (Subjek ini boleh diambil oleh pelajar dari semua program pengajian)

Jadual 4(b): Abjad Kedua;
Pusat Pengajian yang Menawarkan Kursus

ABJAD KEDUA DI DALAM KOD	PUSAT PENGAJIAN
E	PPK Sistem Elektrik
M	PPK Mikroelektronik
K	PPK Komputer & Perhubungan
N	PPK Mekatronik
B	PPK Bahan
P	PPK Pembuatan
R	PPK Bioproses
A	PPK Alam Sekitar
D	Pusat Pengajian Teknologi Kejuruteraan Mekanikal
G	Pusat Pengajian Teknologi Kejuruteraan Elektronik
L	Pusat Pengajian Teknologi Kejuruteraan Elektrik

ABJAD KEDUA DI DALAM KOD	PUSAT PENGAJIAN
S	Pusat Pengajian Teknologi Kejuruteraan Awam
T	Pusat Pengajian Teknologi Kejuruteraan Kimia
C	Pusat Kejuruteraan
Q	Institut Matematik Kejuruteraan
I	Pusat Kerjasama Industri dan Agensi Kerajaan
F	Pusat Pengajian Inovasi Perniagaan & Teknousahawan
U	Pusat Pengajian Pembangunan Insan dan Teknokomunikasi
V	Pusat Bahasa Antarabangsa
Z	Pusat Ko-kurikulum

Jadual 4(c): Abjad Ketiga;
Kursus Teras atau Kursus Keperluan Universiti;

ABJAD KETIGA DI DALAM KOD	JENIS KURSUS
T	Kursus Teras/Elektif
W	Kursus Keperluan Universiti
A	Kursus Audit
M	Kursus Mobiliti

Tiga angka terakhir bagi sesebuah kod kursus mewakili perkara-perkara berikut iaitu angka pertama adalah tahap kursus (1 = subjek Tahun 1, 2 = subjek Tahun 2, dsb); angka kedua dan ketiga adalah nombor kursus.

Kod bagi sesebuah kursus diringkaskan dalam **Jadual 5** di bawah:

Jadual 5: Kod Kursus

A	B	C	1	2	3	4	ANGKA	DESKRIPSI
↓	↓	↓	↓	↓	↓	↓		
↓	↓	↓	↓	↓	↓	→	4	Unit/Kredit
↓	↓	↓	↓	↓	∟	→	3	Kelompok Kursus. (Penentuan kelompok kursus ditentukan oleh Pusat Pengajian masing-masing)
↓	↓	↓	↓	∟	→	→	2	
I	I	I	∟	→	→	→	1	Aras / Tahap Kursus program Sarjana Muda: • 1=subjek Tahun 1, • 2= subjek Tahun 2, • 3= subjek Tahun 3, • 4= subjek Tahun 4,

A	B	C	1	2	3	4	ANGKA	DESKRIPSI
↓	↓	∟	→	→	→	→	JENIS KURSUS	Sila rujuk **Jadual 3(c)**
↓	∟	→	→	→	→	→	PUSAT PENGAJIAN	Sila rujuk **Jadual 3(b)**
∟	→	→	→	→	→	→	PERINGKAT PENGAJIAN	Sila rujuk **Jadual 3(a)**

PRA-PENDAFTARAN KURSUS

Pra-pendaftaran kursus adalah suatu sistem yang membolehkan pelajar membuat pra-pendaftaran ''atas talian'' untuk kursus-kursus di semester seterusnya pada tempoh masa yang lebih awal. Tempoh masa yang ditetapkan untuk pra-pendaftaran ini adalah sebelum bermula cuti semester pada semester semasa. Semua pelajar (Aktif / Percubaan / Berhutang) DIWAJIBKAN melakukan proses pra-pendaftaran ini.

Pelajar dikehendaki mendaftar pada tarikh yang ditetapkan. Kursus yang perlu didaftarkan adalah kursus yang akan diambil pada semester akan datang (semua kursus termasuk Ko-kurikulum). Pelajar dikehendaki berjumpa Rakan Pendamping Siswa (RPS) terlebih dahulu sebelum membuat Pra-pendaftaran kursus secara atas talian. Pelajar yang gagal mendaftar dalam tempoh yang ditetapkan, akan menyebabkan pendaftaran rasmi kursus bagi semester hadapan terjejas berikutan keutamaan pendaftaran kursus diberi kepada pelajar yang membuat proses pra-pendaftaran. Pelajar digalakkan untuk mencetak slip pra-pendaftaran ini sebagai bukti pendaftaran dan tidak perlu mendapatkan pengesahan daripada RPS.

PENDAFTARAN KURSUS

Semua pelajar yang aktif adalah diwajibkan mendaftar kursus untuk setiap semester. Pendaftaran kursus ini dilakukan secara dalam talian (online) oleh semua pelajar. Pendaftaran kursus mesti dibuat mengikut tarikh yang telah ditetapkan seperti hebahan yang dikeluarkan oleh Unit Kemasukan dan Rekod Pelajar melalui emel dan portal.



Pelajar adalah diwajibkan untuk bertemu dan berbincang dengan Rakan Pendamping Siswa (RPS) berkaitan kursus-kursus yang perlu didaftar. Pelajar perlu membawa bersama slip pendaftaran kursus untuk disahkan oleh RPS dalam sistem pada sesi tersebut. Kursus-kursus yang didaftarkan tanpa mendapat pengesahan dari RPS adalah dianggap tidak sah. Sekiranya berlaku perubahan pada pendaftaran kursus sama ada pelajar menambah, menggugur atau tarik diri kursus dalam tempoh yang ditetapkan, pelajar perlu mendapatkan pengesahan semula daripada RPS.

Pelajar yang gagal mendaftar kursus dalam tempoh masa yang ditetapkan adalah tertakluk kepada penalti berjumlah RM50. Pendaftaran lewat tidak boleh melebihi minggu ketiga (3) semester. Pelajar perlu mengisi Borang HEA-09 (Borang Permohonan Kursus Lewat) dan mesti memperolehi kelulusan daripada Dekan Pusat Pengajian.

Manakala pelajar yang baru mendaftar bagi satu-satu sidang akademik baru akan mendaftar secara online pada tarikh yang dinyatakan pada Minggu Suaikenal mengikut Pusat Pengajian masing-masing. Pelajar akan diberi taklimat tentang kursus, dalam Minggu Suaikenal tersebut di Pusat Pengajian masing-masing.

Adalah menjadi tanggungjawab pelajar untuk menyemak dan memastikan bahawa semua butir-butir yang dinyatakan dalam Slip Pendaftaran Kursus adalah betul. Sebarang permohonan pendaftaran kursus/ penambahan kursus / pengguguran kursus / tarik diri di luar tempoh yang ditetapkan tanpa sebab-sebab yang boleh diterima oleh Universiti, boleh dikenakan denda kecuali pelajar yang mempunyai alasan yang tertentu sahaja akan dipertimbangkan oleh Dekan Pusat Pengajian. Pelajar tidak dibenarkan membuat pendaftaran kursus/ penambahan kursus/pengguguran kursus/tarik diri kursus semasa minggu peperiksaan.

Pelajar yang tidak mendaftar kursus maksimum 2 semester berturut-turut tanpa sebarang alasan boleh ditamatkan pengajian dengan menggunakan Borang HEA-20 (Borang Penamatan Pengajian Pelajar).

Pelajar yang telah ditamatkan pengajian dan merayu untuk menyambung semula pengajian perlu menulis surat rayuan permohonan kemasukan kepada Naib Canselor melalui Dekan Pusat Pengajian (perakuan Dekan diperlukan). Penalti RM100 akan dikenakan kepada pelajar bagi setiap rayuan kemasukan semula yang diluluskan.

1. Pendaftaran Kursus Pelajar Berstatus Aktif

Pelajar berstatus Aktif boleh mendaftar kursus secara online tidak melebihi 22 unit dan tidak kurang daripada 10 unit kecuali pelajar yang mengikuti Latihan Industri dan pelajar Semester Akhir yang akan menamatkan pengajian. Pelajar yang ingin mendaftar melebihi 22 unit perlu mendapatkan kebenaran daripada RPS dengan kelulusan daripada Dekan Pusat Pengajian.

Keterangan mengenai Pendaftaran Kursus pelajar berstatus Aktif diringkaskan seperti di Jadual 6 di bawah:

Jadual 6: Ringkasan Pendaftaran Kursus Pelajar Berstatus Aktif

STATUS PELAJAR	UNIT MINIMUM	UNIT MAKSIMUM
Pelajar Aktif	10	22
Pelajar Aktif yang mengambil kursus Latihan Indutri (LI) atau Projek Tahun Akhir (FYP)	10	28

** Pelajar yang tidak mengambil kursus LI atau FYP boleh mengambil kursus melebihi 22 unit dengan kelulusan Dekan Pusat Pengajian terlebih dahulu dan mengisi Borang HEA-09a (Borang Pendaftaran Kursus).*

2. Pendaftaran Kursus Pelajar Percubaan [P]

Pelajar dengan status Percubaan tidak dibenarkan untuk mendaftar sendiri secara dalam talian (online). Pelajar ini perlu bertemu dengan RPS mereka untuk mendapatkan nasihat dan pengesahan daripada Dekan serta perlu juga mengisi Borang HEA-09b [Borang Pendaftaran Kursus-Berstatus Percubaan (P)] sebelum menyerahkannya kepada Penolong Pendaftar Pusat Pengajian untuk didaftarkan. Hanya Penolong Pendaftar Pusat Pengajian atau Jabatan Pendaftar

sahaja yang boleh mendaftarkan kursus bagi pelajar ini. Jumlah unit yang dibenarkan untuk Pelajar Percubaan adalah seperti Jadual 7 berikut:

Jadual 7: Ringkasan Pendaftaran Kursus Pelajar Percubaan [P]

STATUS PELAJAR	UNIT MINIMUM	UNIT MAKSIMUM
Percubaan (P1)	10	12
Percubaan (P2)	8	10

PENAMBAHAN / PENGGUGURAN / TARIK DIRI KURSUS

1. Tambah Kursus

a) Tempoh yang dibenarkan untuk penambahan kursus adalah sehingga minggu ke-2 minggu pembelajaran

b) Pelajar perlu mengisi Borang HEA-11 (Borang Tambah Kursus) dan menyerahkannya kepada Penolong Pendaftar Pusat Pengajian untuk dikemaskini dalam sistem

2. Gugur Kursus

a) Tempoh yang dibenarkan untuk menggugurkan kursus adalah sehingga minggu ke-6 minggu pembelajaran.

b) Pelajar perlu mengisi Borang HEA-10 (Borang Gugur Kursus). Borang perlu ditandatangani oleh pensyarah kursus, Dekan Pusat Pengajian dan diserahkan kepada Penolong Pendaftar Pusat Pengajian untuk dikemaskini dalam sistem.

3. Tarik Diri Kursus (TD)

a) Pelajar dengan persetujuan Pensyarah Kursus dan Dekan Pusat Pengajian boleh memohon untuk menarik diri daripada kursus yang telah didaftarkan pada semester yang berkenaan tidak lewat dari hari akhir bekerja pada minggu ke-12 minggu pembelajaran.Pelajar yang ingin menarik diri daripada kursus perlulah mengisi Borang HEA-19 (Borang Tarik Diri Kursus).

b) Kebenaran untuk pelajar menarik diri daripada mengikuti sesuatu kursus adalah tertakluk kepada jumlah unit minimum, kecuali dengan kebenaran Dekan.

c) Status Tarik Diri (TD) akan dicatatkan dalam rekod pendaftaran kursus dan transkrip akademik pelajar. Walau bagaimanapun, gred tidak akan diambil kira dalam pengiraan PNG dan PNGK.

PERTUKARAN PROGRAM PENGAJIAN

Pertukaran program pengajian bermaksud pelajar menukar program pengajiannya kepada sesuatu program pengajian yang lain atas sebab-sebab tertentu yang dipersetujui oleh kedua-dua Dekan sekarang dan Dekan Pusat Pengajian yang dipohon.

Pertukaran program pengajian tidak dibenarkan kerana ia melibatkan penukaran agihan sumber yang sudah dirancang dengan rapi pada awal sesuatu sidang akademik. Walau bagaimanapun, permohonan rayuan pertukaran program pengajian boleh dipertimbangkan dengan alasan-alasan yang kukuh sahaja dan tertakluk kepada syarat-syarat seperti berikut:

1. Permohonan hanya boleh dibuat oleh pelajar setelah tamat sekurang-kurangnya satu semester pengajian. Pelajar perlu mengisi Borang Permohonan Pertukaran Program Pengajian (HEA-12) dengan lengkap. Borang permohonan boleh didapati di Jabatan Pendaftar atau di Pusat Pengajian. Walau bagaimanapun, bagi kes-kes tertentu, permohonan pelajar untuk pertukaran program pengajian pada permulaan pengajian boleh dipertimbangkan dengan kelulusan Naib Canselor/ Timbalan Naib Canselor (Akademik & Antarabangsa).

2. Permohonan perlu dikemukakan dalam masa dua minggu pertama semester bermula. Borang permohonan mestilah disertakan dengan salinan keputusan peperiksaan semester yang terkini atau keputusan pada peringkat Matrikulasi/STPM/Diploma.

3. Pelajar hanya boleh memohon bertukar program pengajian tidak melewati 2 Semester Pertama pengajian di UniMAP. Permohonan setelah masuk semester ketiga pengajian tidak akan dipertimbangkan.



4. Setiap permohonan perlu disertakan dengan sebab-sebab pertukaran program pengajian yang kukuh secara bertulis. Permohonan perlu mendapat perakuan dan kelulusan Rakan Pendamping Siswa (RPS) (program asal dan program dipohon), Dekan Pusat Pengajian (program asal dan program dipohon), Dekan Pengurusan Akademik dan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa).

5. Bagi pelajar yang mendapat biasiswa/PTPTN atau sebagainya, pelajar mestilah mendapat kelulusan dari penaja masing-masing. Pelajar perlu berurusan secara terus dengan pihak penaja. Penerangan boleh diperolehi daripada Jabatan Hal Ehwal Pelajar dan Alumni.

6. Sekiranya permohonan diluluskan, pelajar perlu mengambil tindakan untuk mendaftar kursus-kursus baru yang ditawarkan dalam program pengajian baru tersebut.

7. Pelajar yang bertukar program pengajian dalam bidang yang sama boleh memohon pemindahan kredit bagi kursus teras dan kursus wajib universiti atau kursus yang sama dalam kurikulum program pengajian baru. Walau bagaimanapun, semua kursus lain yang tidak berkaitan dengan kurikulum program pengajian baru akan kekal dalam transkrip akademik tetapi tidak akan diambil kira dalam pengiraan PNG/PNGK dan kredit.

8. Pelajar yang bertukar program pengajian dalam bidang yang berlainan hanya boleh memohon pemindahan kredit bagi kursus wajib universiti sahaja atau kursus yang sama dalam kurikulum program pengajian baru. Walau bagaimanapun, semua kursus lain yang tidak berkaitan dengan kurikulum program pengajian baru akan kekal dalam transkrip akademik tetapi dan kredit tidak akan diambil kira dalam pengiraan PNG/PNGK.

PENANGGUHAN PENGAJIAN

Penangguhan pengajian adalah kebenaran kepada pelajar untuk tidak mengikuti pengajian pada sesuatu semester atas alasan-alasan tertentu yang dibenarkan Universiti.

Permohonan penangguhan pengajian dibenarkan kepada pelajar yang mempunyai masalah kesihatan dan disahkan sakit oleh Hospital Kerajaan/Doktor Panel Universiti / Pusat Kesihatan UniMAP sahaja. Bagi kes-kes tertentu sijil sakit yang bukan daripada Hospital Kerajaan atau Doktor Panel Universiti perlu mendapat perakuan Pusat Kesihatan UniMAP. Permohonan yang diasaskan selain daripada masalah kesihatan boleh dipertimbangkan sekiranya mempunyai alasan yang munasabah dan mendapat kelulusan Naib Canselor/ Timbalan Naib Canselor (Akademik & Antarabangsa).

Pelajar yang memohon untuk menangguhkan pengajian perlu mengisi Borang Penangguhan Pengajian (HEA/ HEP-13) yang boleh didapati di Pusat Pengajian. Permohonan perlu mendapat perakuan dan kelulusan yang berikut:

1. Perakuan Rakan Pendamping Siswa (RPS),
2. Perakuan Dekan Pusat Pengajian,
3. Perakuan Dekan Jabatan Hal Ehwal Pelajar & Alumni,
4. Perakuan Kaunselor (jika perlu)
5. Perakuan Dekan Pengurusan Akademik, dan
6. Kelulusan Naib Canselor atau Timbalan Naib Canselor (Akademik & Antarabangsa)

Borang pemohonan penangguhan pengajian pelajar perlu dikemukakan sebelum minggu ketujuh (7) pengajian. Pemohonan selepas minggu ketujuh (7) hanya dibenarkan atas sebab kesihatan atau kes-kes tertentu yang mendapat kelulusan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa).

Pelajar tidak dibenarkan menangguhkan pengajian melebihi 2 semester berturut-turut kecuali dengan kelulusan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa). Bagi kes selain sebab kesihatan, pelajar hanya dibenarkan pulang/keluar daripada universiti setelah permohonan penangguhan pengajian mendapat kelulusan universiti. Sekiranya pelajar telah pulang sebelum kelulusan diperoleh, ia adalah di bawah tanggungjawab pelajar sendiri.

Bagi pelajar yang menangguhkan pengajian atas sebab kesihatan/sakit atau untuk alasan-alasan yang dibenarkan, semester berkenaan tidak akan diambil kira dalam pengiraan semester yang digunakan untuk pengijazahan (Tanpa Penalti). Bagi kes Tanpa Penalti, kursus yang didaftarkan pada semester tersebut akan digugurkan, dan sekiranya terdapat keputusan peperiksaan yang telah disahkan pada peringkat Majlis Peperiksaan Universiti (MPU), keputusan peperiksaan tersebut juga akan terbatal.

Pelajar yang menangguhkan pengajian atas sebab selain daripada sebab kesihatan, semester berkenaan akan diambil kira dalam pengiraan semester yang digunakan untuk pengijazahan (Dengan Penalti) kecuali dengan kebenaran Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa). Bagi kes Dengan Penalti, kursus yang didaftarkan pada semester tersebut tidak akan digugurkan dan akan diambil kira dalam semester. Sebarang keputusan peperiksaan yang telah disahkan pada peringkat MPU juga tidak terbatal dan akan tertera dalam transkrip akademik pelajar.

Pelajar akan diberikan amaran secara bertulis oleh Pusat Pengajian sekiranya didapati tidak mendaftar pada sesuatu semester tanpa memberi sebarang permohonan penangguhan pengajian. Pelajar yang tidak memberi sebarang maklum balas dalam sesuatu tempoh yang diberikan boleh dikeluarkan dari senarai nama pelajar berdaftar Universiti/ditamatkan dan disahkan berhenti dari Universiti.

PENTARAFAN PELAJAR

Taraf akademik pelajar diukur dengan sistem Purata Nilai Gred (PNG) sepanjang pengajian di universiti. Seseorang pelajar yang berjaya mendapat sekurang-kurangnya 2.00 bagi PNG pada satu-satu semester diberi taraf 'Aktif' (A) dan boleh meneruskan pengajian dalam semester yang berikutnya. Pelajar juga dikehendaki mendapatkan Purata Nilai Gred Kumulatif (PNGK) sekurang-kurangnya 2.00 untuk berijazah.

Bagi pelajar tahun akhir yang dibenarkan mengambil Kursus Kuratif, keputusan peperiksaan Kursus-kursus Kuratif akan dicantumkan dengan keputusan peperiksaan Semester 2 sidang berkenaan untuk menentukan markah PNG dan taraf akademik pelajar. Jika purata gabungan adalah lebih baik, maka pelajar akan diberi taraf terbaharunya tetapi jika purata gabungan adalah kurang baik, maka taraf Semester 2 dikekalkan.

Pelajar dengan PNG kurang daripada 2.00 pada satu-satu semester akan di beri taraf PERCUBAAN 1 (P1). Taraf PERCUBAAN 2 (P2) pula diberikan kepada pelajar yang mendapat PNG kurang daripada 2.00 bagi dua semester berturut-turut. Jika pelajar masih mendapat kurang dari 2.00 bagi PNG semester berikutnya pula, pelajar berkenaan tidak dibenarkan meneruskan pengajian, melainkan PNGK pelajar tersebut melebihi 2.00 dan pihak universiti memperakukannya. Pihak universiti berkuasa menamatkan pengajian mana-mana pelajar yang didapati tidak memenuhi prestasi dan kemajuan akademik yang ditetapkan.

TEMPOH MINIMUM / MAKSIMUM PENGAJIAN PELAJAR

Pelajar Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan perlu menamatkan program pengajian dalam tempoh masa yang telah ditetapkan, iaitu minimum 8 semester (4 tahun) dan tempoh maksimum 14 semester (7 tahun). Walau bagaimanapun, bagi pelajar yang memperolehi pengecualian kredit, tempoh maksimum yang dibenarkan adalah tidak boleh kurang daripada 6 semester (3 tahun) dan tidak lebih daripada 12 semester (6 tahun). Manakala pelajar Sarjana Muda Perniagaan dan Sarjana Muda Komunikasi Media Baharu pula, perlu menamatkan program pengajian dalam tempoh masa minimum 6 semester (3 tahun) dan tempoh maksimum 10 semester (5 tahun).
Tempoh Minimum atau Maksimum pengajian pelajar adalah seperti berikut:

PROGRAM PENGAJIAN	MINIMUM (SEMESTER)	MAKSIMUM (SEMESTER)
Sarjana Muda Kejuruteraan	8	14
Sarjana Muda Teknologi Kejuruteraan	8	14
Sarjana Muda Perniagaan	6	10
Sarjana Muda Komunikasi Media Baharu	6	10

KURSUS KURATIF

Kursus Kuratif diadakan selepas Semester 2. Permohonan bagi Kursus Kuratif adalah amat terhad dan tertakluk kepada penawaran semula kursus tersebut oleh Pusat Pengajian dengan kelulusan Senat. Pelajar hanya dibenarkan mengambil maksimum 10 unit (3 jenis) Kursus Kuratif pada satu-satu masa. Pengajaran-pembelajaran adalah dalam bentuk tutorial sahaja. Kursus Kuratif biasanya mengandungi 2 minggu pembelajaran dan 1 minggu peperiksaan. Syarat-Syarat kelayakan mengikuti Kursus Kuratif adalah:

1. Pelajar tahun akhir yang akan bergraduat dan mendapat;
   a) Gred C-/ D+/ D/ D-/ F dan DK untuk Kursus Keperluan Universiti;
   b) Gred C-/ D+/ D/ D-/ F dan DK untuk Kursus Teras dan Elektif Universiti;
2. Pelajar yang telah mengulang satu kursus ulangan dengan syarat kursus tersebut telah diambil setiap kali ianya ditawarkan pada semester lazim/biasa.
3. Pelajar yang gagal dalam kerja kursus tidak layak untuk mengikuti kursus kuratif.

PENGECUALIAN KREDIT

Pengecualian kredit ditakrifkan sebagai pengecualian daripada pendaftaran dan mengikuti kursus yang ditetapkan untuk sesuatu program pengajian berdasarkan kursus yang diambil oleh pelajar sebelum diterima masuk ke program pengajian universiti ini sebagaimana yang diluluskan oleh Dekan Pusat Pengajian/Dekan Pengurusan Akademik.

Pengecualian kredit diberi kepada pelajar yang telah mendapat sekurang-kurangnya C dalam kursus tertentu, mengikut sistem penggredan Universiti dan tertakluk kepada terma-terma dan syarat-syarat yang ditetapkan oleh universiti. Pengecualian kredit diberi kepada pelajar yang telah mengambil satu kursus yang sama atau setara dengan 80% kandungan pembelajarannya adalah sama. Ianya juga terpakai untuk kursus-kursus berkaitan yang boleh digabungkan (2 kursus atau lebih) bagi satu kursus di UniMAP untuk diberi pengecualian.

Pengecualian kredit bagi kursus-kursus yang tertentu bergantung kepada senarai kursus yang diluluskan oleh Pusat Pengajian masing-masing yang telah diluluskan oleh Senat.

SISTEM PEPERIKSAAN DAN PENILAIAN

Peperiksaan bertulis diadakan pada hujung semester. Setiap pelajar mestilah terlebih dahulu memenuhi syarat-syarat kuliah, tutorial, amali dan sebagainya sebelum layak menduduki peperiksaan. Tempoh peperiksaan adalah seperti berikut :

Jadual 8: Tempoh Peperiksaan

NILAI KURSUS	TEMPOH PEPERIKSAAN
1 unit	2 jam
2 – 4 unit	3 jam

Keputusan peperiksaan pelajar ditentukan berdasarkan penilaian secara berterusan dari komponen kerja kursus dan peperiksaan bertulis. Sumbangan kerja kursus adalah 100% jika sesebuah kursus itu keseluruhannya berbentuk makmal. Kerja kursus biasanya merangkumi tugasan, laporan makmal dan ujian. Penilaian prestasi pelajar adalah berdasarkan kepada gred abjad dan mata penilaian seperti berikut:

Jadual 9: Gred Abjad dan Mata Penilaian

GRED	MATA NILAI	STATUS
A	4.00	LULUS
A-	3.75	
B+	3.50	
B	3.00	
B-	2.75	
C+	2.50	
C	2.00	
C-	1.75	TIDAK LULUS
D+	1.50	
D	1.00	
D-	0.75	
F	0.00	

Gred **LULUS** untuk sesuatu kursus adalah tertakluk kepada keperluan kursus seperti yang berikut:-

1. Gred **LULUS** untuk semua kursus ialah Gred C dan ke atas
2. Gred **TIDAK LULUS** adalah Gred C- hingga Gred F
3. Sekiranya pelajar memperolehi PNGK (CGPA) $\geq$ 2.00 dan mendapat Gred C- atau Gred D+ untuk Kursus Teras, ianya adalah dikira sebagai **LULUS**.

Jadual 10: Pengiraan GPA dan CGPA:

	KURSUS	UNIT	NILAI GRED [NG]	GRED [G]	JUMLAH NG
	EKT121	3	3.75	A-	11.25
	EMT102	4	2.50	C+	10.00
	EMT111	4	3.50	B+	14.00
	EMT112	4	4.00	A	16.00
	EQT102	3	1.75	C-	5.25
	EUT122	2	2.75	B-	5.50
		20			62.00
	PNG	= 62.00/20 = 3.10			
	ECT200	3	3.50	B+	10.50
	EKT212	4	2.00	C	8.00
	EKT230	4	4.00	A	16.00
	EKT240	4	3.50	B+	14.00
	EQT203	3	3.75	A-	11.25
		18			59.75
	PNG	= 59.75/18 = 3.32			
	PNGK	= Jumlah NG Terkumpul..... Jumlah Bil. Unit Terkumpul = 62.00 + 59.75 20 + 18 = 3.20			

RAYUAN PENYEMAKAN SEMULA KEPUTUSAN PEPERIKSAAN

Atas sebab-sebab tertentu, pelajar mungkin ingin memohon untuk penyemakan dijalankan ke atas keputusan peperiksaan akhir semester pelajar. Pelajar hanya dibenarkan memohon menyemak semula keputusan peperiksaan akhir semester dalam tempoh 15 hari selepas keputusan rasmi peperiksaan dikeluarkan oleh Jabatan Pendaftar. Permohonan selepas tempoh ini tidak akan dipertimbangkan.

Pelajar perlu menghantar borang HEA-15m [Borang Rayuan Penyemakan Semula Keputusan Peperiksaan] kepada Unit Peperiksaan & Pengijazahan, Bahagian Pengurusan Akademik, Jabatan Pendaftar. Borang rayuan hendaklah dikemukakan dalam tempoh 15 hari selepas keputusan rasmi diumumkan. Pelajar perlu mengisi borang dalam dua (2) salinan. Satu (1) salinan adalah untuk simpanan pelajar.

Kadar bayaran rayuan ialah RM50 untuk setiap kursus. Pembayaran secara tunai atau Wang Pos/Pos Malaysia / Draf Bank / Cek atas nama BENDAHARI UNIMAP.

PENGGUNAAN BAHASA INGGERIS

Bahasa Melayu adalah bahasa rasmi universiti. Walau bagaimanapun Bahasa Inggeris digunakan secara meluas dalam proses pengajaran dan pembelajaran. Ini adalah untuk membantu pelajar dalam kerjaya mereka. Bagi kursus-kursus yang diajar dalam bahasa Inggeris, peperiksaan akan dijalankan dalam bahasa yang sama.

SISTEM RAKAN PENDAMPING SISWA (RPS)

Sistem Penasihatan Akademik menjadi penghubung antara pelajar dengan pensyarah untuk berbincang dan membuat keputusan berkenaan rancangan pengajian pelajar. Walaupun pelajar mendaftar sendiri secara dalam talian (*on-line),* pelajar perlu berjumpa dengan Rakan Pendamping Siswa (RPS) untuk mendapatkan nasihat semasa tempoh pendaftaran.



RPS adalah satu sistem di mana staf akademik menyelia sekumpulan kecil pelajar sepanjang tempoh pengajian pelajar di UniMAP. 'Penyeliaan' di sini melibatkan perjumpaan yang kerap secara tidak formal, di mana pelajar boleh bersantai dengan staf yang berperanan sebagai "'rakan" bagi membincangkan isu-isu akademik dan sosial yang berkenaan dengan mereka. Pelajar yang mempunyai prestasi akademik yang tidak memuaskan boleh merujuk kepada RPS sebagai 'mentor', dan pelajar tersebut menjadi 'mentee', di mana ini akan benar-benar membantu pelajar dalam setiap perkara yang memerlukan penyelesaian.

PUSAT-PUSAT PEMANTAPAN AKADEMIK

Pusat-pusat ini ditubuhkan untuk menyokong pencapaian akademik pelajar UniMAP:

1. Pusat Pengajian Pembangunan Insan dan Teknokomunikasi (iKOM)

Pusat Pengajian Pembangunan Insan dan Teknokomunikasi (iKOM) menawarkan kursus-kursus Keperluan Universiti dan pelbagai kursus yang menyalurkan pengetahuan sosial dan kemanusiaan yang berkaitan dengan semua bidang pengajian di UniMAP. Selain itu iKOM berperanan untuk meningkatkan kemahiran generik pelajar dan kemahiran insaniah *(soft skills)* yang merangkumi komunikasi, bahasa, ICT dan sosio-kemanusiaan dalam menghadapi cabaran dinamik dunia global.

2. Pusat Kejuruteraan

Pusat Kejuruteraan ditubuhkan bagi mengendalikan makmal dan bengkel umum (gunasama) yang diperlukan oleh pelbagai program yang ditawarkan di UniMAP.

Pusat ini juga menyokong aktiviti penyelidikan dan pembangunan di UniMAP serta menjadi pusat mereka bentuk dan menghasilkan produk-produk kejuruteraan yang inovatif. Pusat Kejuruteraan juga menawarkan kemudahan bagi kursus-kursus yang memerlukan latihan dan kemahiran teknikal, selari dengan standard industri.

3. Institut Matematik Kejuruteraan

Institut Matematik Kejuruteraan (IMK) adalah pusat yang merancang dan mengendalikan kurikulum Matematik Kejuruteraan di UniMAP. Ia berperanan sebagai pusat rujukan dalam menyediakan kepakaran dalam kaedah penyelidikan matematik, simulasi dan kaedah statistik. Pusat ini juga berfungsi sebagai pusat latihan dalam kampus dan personel luar kampus dalam bidang yang berkaitan dengan matematik.

4. Pusat Bahasa Antarabangsa

Pusat Bahasa Antarabangsa menyediakan kursus-kursus bahasa Keperluan Universiti untuk semua pelajar UniMAP bagi program pengajian peringkat Diploma dan Ijazah Sarjana Muda. Pusat ini menawarkan bukan sahaja kursus Bahasa Melayu dan kursus Bahasa Inggeris tetapi juga menawarkan kursus-kursus bahasa asing lain seperti Bahasa Arab, Bahasa Jerman, Bahasa Jepun, Bahasa Mandarin, Bahasa Korea, Bahasa Rusia dan Bahasa Thai.

5. Pusat Ko-kurikulum

Pusat Ko-kurikulum menawarkan pelbagai kursus Ko-kurikulum dan Badan-badan Beruniform. Semua pelajar wajib untuk mengambil 3 unit kursus Ko-kurikulum. Pusat ini menawarkan 147 jenis kursus untuk pelajar tanpa mengira program akademik mereka.

6. Pusat Kerjasama Industri dan Agensi Kerajaan

Pusat Kerjasama Industri dan Agensi Kerajaan (CIGC) berperanan menjalin hubungan dengan pihak industri dan agensi kerajaan dalam pelbagai aspek, terutama dalam program yang berkaitan terus dengan pembelajaran pelajar. Program seperti pendedahan kepada industri, forum bersama industri dan Latihan Perindustrian Staf, diselia dan diselaraskan oleh pusat ini. Sesetengah daripada program ini wajib diambil oleh semua pelajar.

BAHAGIAN PENGURUSAN AKADEMIK, JABATAN PENDAFTAR

Bahagian Pengurusan Akademik ini bertanggungjawab untuk mengendalikan urusan-urusan yang berkaitan kemasukan pelajar, pemprosesan data dan rekod pelajar, peperiksaan dan pengijazahan pelajar dan Senat Universiti.

Unit-unit yang terdapat di Bahagian Pengurusan Akademik, Jabatan Pendaftar terbahagi kepada:

1. Unit Kemasukan dan Rekod Pelajar

Unit Kemasukan dan Rekod Pelajar bertanggungjawab untuk mengendalikan urusan yang berkaitan dengan kemasukan pelajar dan pemprosesan data dan rekod pelajar. Antara tugas dan tanggungjawab unit ini adalah:

i. Mengendalikan secara keseluruhan proses pengambilan dan pendaftaran pelajar dalam negara pada peringkat ijazah pertama dan diploma.
ii. Mengendalikan proses pengambilan dan pendaftaran pelajar antarabangsa pada peringkat ijazah pertama.
iii. Mengurus dan mengendalikan aspek pemprosesan data dalam Sistem Maklumat Pelajar.
iv. Menguruskan rekod peribadi pelajar dan status pelajar termasuk permohonan penangguhan pengajian dan pertukaran program pengajian pelajar.
v. Menguruskan pendaftaran kursus pelajar secara *online* bagi setiap semester pengajian.
vi. Menguruskan proses pengecualian unit dan pemindahan kredit pelajar.

2. Unit Peperiksaan dan Pengijazahan

Unit Peperiksaan dan Pengijazahan bertanggungjawab untuk mengendalikan dan memantau perjalanan Peperiksaan Akhir Semester dan perkara-perkara yang berkaitan dengannya. Antara tugas dan tanggungjawab unit ini adalah seperti berikut:

i. Mengeluarkan Pekeliling Peperiksaan kepada Pusat Pengajian/ Pusat/Institut.
ii. Mengeluarkan Jadual Waktu Peperiksaan untuk Program Diploma dan Ijazah.
iii. Menguruskan Peperiksaan Akhir Semester dalam jangkamasa yang ditetapkan.
iv. Menjadi Sekretariat kepada Majlis Peperiksaan Universiti.
v. Menguruskan pemprosesan data peperiksaan mengunakan Sistem Maklumat Pelajar.
vi. Mengeluarkan keputusan peperiksaan akhir semester.
vii. Menguruskan proses rayuan pelajar untuk menyemak semula keputusan peperiksaan.
viii. Mengeluarkan Transkrip Akademik selepas Konvokesyen.

Bagi fungsi pengijazahan, unit ini mengendalikan urusan pengijzahan dan konvokesyen pelajar. Antara bidang tugas unit ini adalah seperti berikut:

i. Menyemak kelayakan pengijazahan untuk pelajar tahun akhir serta mengeluarkan surat penamatan pengajian dan kelayakan pengijazahan untuk pelajar yang layak bergraduat.
ii. Sekretariat konvokesyen universiti
iii. Menyelaraskan jemputan serta pinjaman dan pemulangan pakaian konvokesyen
iv. Mengendalikan urusan peminjaman dan pemulangan jubah staf akademik
v. Menguruskan proses penyediaan dan penyerahan skrol pengijazahan kepada graduan.
vi. Merekod dan mengemaskini data siswazah.

3. Unit Senat

Unit Senat bertanggungjawab untuk mengendalikan urusan yang berkaitan dengan Senat Universiti. Antara tugas dan tanggungjawab yang dijalankan adalah:

i. Merancang aktiviti Senat dan Jawatankuasa di bawahnya, untuk memberi khidmat Urusetia dan menyelaraskannya dengan pihak-pihak lain yang berkaitan, dalam penawaran program-program sedia ada dan baru.

ii. Menyediakan Kalendar Akademik, menguruskan senarai penawaran kursus serta berurusan dengan Kementerian Pendidikan Malaysia (KPM) dan Jabatan Perkhidmatan Awam (JPA) mengenai penawaran program baru, penubuhan pusat pengajian/Jabatan dan Unit.
iii. Menguruskan pencalonan penerima Ijazah Kehormat

Alamat:

BAHAGIAN PENGURUSAN AKADEMIK
Jabatan Pendaftar
Universiti Malaysia Perlis
Tingkat 3, Bangunan KWSP
Jalan Bukit Lagi
01000 Kangar, PERLIS.

DIREKTORI

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iii. Unit SENAT	+6(04) 979 8561
• Pusat Hal Ehwal Antarabangsa	+6(04) 988 5340
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• Jabatan Bendahari	+6(04) 979 8203

ACADEMIC CALENDAR 2017 / 2018 SESSION

ACTIVITIES	SEMESTER 1 4 September 2017 – 14 January 2018 (19 Weeks)			
	DATE		PERIOD	NOTE
New Intake Registration / Orientation	26th August 2017	02nd September 2017	5 Days	**Orientation** 26th - 30th August 2017 **National Day** 31st August 2017 **Hari Raya Aidiladha** 01st September & 02nd September 2017
Lecture	4th September 2017	15th October 2017	6 Weeks	**Malaysia Day** 16th September 2017 **Awal Muharam** 22nd September 2017
Mid Semester Break	16th October 2017	22nd October 2017	1 Week	**Deepavali** 18th October 2017
Lecture	23rd October 2017	17th December 2017	8 Weeks	**Convocation** 28th -30th October 2017 **Maulidur Rasul** 01st December 2017
Study Week	18th December 2017	24th December 2017	1 Week	-
Examination	25th December 2017	14th January 2018	3 Weeks	**Christmas** 25 December 2017
Semester Break	15th January 2018	11th February 2018	4 Weeks	-



ACADEMIC CALENDAR 2017/2018 SESSION

ACTIVITIES	SEMESTER 2 12th February 2018 – 24th June 2018 (19 Weeks)			
	DATE		PERIOD	NOTE
Lecture	12th February 2018	01st April 2018	7 Weeks	**Chinese New Year** 16th February & 17th February 2018
Mid Semester Break	02nd April 2018	8th April 2018	1 Week	
Lecture	09th April 2018	27th May 2018	7 Weeks	**Israk Mikraj** 14th April 2018 **Labour Day** 01st May 2018 **Birthday of DYMM Tuanku Raja Perlis** 17th May 2018
Study Week	28th May 2018	03th June 2018	1 Week	**Wesak Day** 29th May 2018
Examination Week	04th June 2018	24th June 2018	3 Weeks	**Nuzul Al-Quran** 02th June 2018 **Hari Raya Aidilfitri** 15th & 16th June 2018
Semester Break / Industrial Training	25th June 2018	02nd September 2018	10 Weeks *Industrial Training	**Birthday of SPB Yang Di-Pertuan Agung** 28 July 2018 **Hari Raya Aidiladha** 22nd & 23rd August 2018 **National Day** 31st August 2018

** Industrial Training for 3rd year students of Bachelor Of Engineering, students of Bachelor Of New Media Communication and 2nd year students of Bachelor of Business (Entrepreneurship Engineering) will start from 26th June until 3rd September 2018 (10 weeks)*

** Industrial training for 4th year student of Bachelor of Engineering Technology will start from 16th January until 30th Jun 2018 (24 Weeks)*

ACADEMIC SYSTEM

The Bachelor of Engineering and The Bachelor of Engineering Technology curriculum are designed to be completed in 4 years while the Bachelor in Business and the Bachelor of New Media Communication are to be completed in 3 years with each academic year divided into Semester I and Semester II. Each semester consists of 14 study weeks. Examination will be held at the end of the semester. Courses are divided into four levels which are levels 100, 200, 300, and 400.

For the graduation purposes, Bachelor of Engineering students must complete 120 units of Core Courses and the Bachelor of Engineering Technology students will have to complete 123 units of Core Courses. Bachelor of Business students must complete 72 or 74 units of Core Courses (based on specialization) and 30 units of Elective Courses while the Bachelor of New Media Communication students must complete 87 units of Core Courses and 15 units Elective Courses.

Students are also required to complete University Requirement Courses of 17 units for Bachelor of Engineering Degree, 19 units for Bachelor of Engineering Technology Degree, 20 units for Bachelor of Business Degree and 18 units for Bachelor of New Media Communication.

To graduate, students also need to pass all courses and obtain the required number of credits according to their respective study programmes as well as a GCPA of at least 2.00.

PROGRAMME STRUCTURE

The programme structures for the Bachelor of Engineering, Bachelor of Engineering Technology, Bachelor of Business and Bachelor of New Media Communication programme are shown in Tables 1 (a), 1 (b), 1 (c), 1 (d) and 1 (e). Students are required to complete 137 units for Bachelor of Engineering, 142 units for Bachelor of Engineering Technology, 122 or 124 units for Bachelor of Business and 122 units for Bachelor of New Media Communication in order to graduate.

Table 1(a): Programme Structure for Bachelor of Engineering

BACHELOR OF ENGINEERING	
COURSES	**UNIT (S)**
ENGINEERING CORE COURSES	**120**
UNIVERSITY REQUIREMENT COURSES	**17**
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. *Foundation English	(*2 audit)
e. **English for General Purposes	(**2)
f. English for Technical Communication	2
g. Islamic and Asian Civilization/Malaysian Cultures	2
h. Ethnic Relations/Malaysian Studies	2
i. Co- Curriculum	3
j. ***Optional Course	(***2)
TOTAL	**137**

Table 1(b): Programme Structure for Bachelor of Engineering Technology

BACHELOR OF ENGINEERING TECHNOLOGY	
COURSES	**UNIT (S)**
ENGINEERING TECHNOLOGY CORE COURSES	**123**
UNIVERSITY REQUIREMENT COURSES	**19**
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. *Foundation English	(*2 audit)
e. **English for General Purposes	(**2)
f. English for Technical Communication	2
g. Islamic and Asian Civilization/Malaysian Cultures	2
h. Ethnic Relations/Malaysian Studies	2
i. Skills and Technology in Communication	2
j. Co- Curriculum	3
k. ***Optional Course	(***2)
TOTAL	**142**



Table 1(c): Programme Structure for Bachelor of Business (Engineering Entrepreneurship)

BACHELOR OF BUSINESS (ENGINEERING ENTREPRENEURSHIP)	
COURSES	**UNIT (S)**
BUSINESS CORE COURSES	**72**
ELECTIVES	**30**
UNIVERSITY REQUIREMENT COURSES	**20**
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. *Foundation English	(*2 audit)
e. **English for General Purposes	(**2)
f. English for Academic Purposes	2
g. Islamic and Asian Civilization/Malaysian Cultures	2
h. Ethnic Relations/Malaysian Studies	2
i. Business Communication	3
j. Co- Curriculum	3
TOTAL	**122**

Table 1(d): Programme Structure for Bachelor of Business (International Business)

BACHELOR OF BUSINESS (INTERNATIONAL BUSINESS)	
COURSES	**UNIT**
BUSINESS CORE COURSES	**74**
ELECTIVES	**30**
UNIVERSITY REQUIREMENT COURSES	**20**
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. *Foundation English	(*2 audit)
e. **English for General Purposes	(**2)
f. English for Academic Purposes	2
g. Islamic and Asian Civilization/Malaysian Cultures	2
h. Ethnic Relations/Malaysian Studies	2
i. Business Communication	3
j. Co- Curriculum	3
TOTAL	**124**

Table 1(e): Programme Structure for Bachelor of New Media Communication

BACHELOR OF NEW MEDIA COMMUNICATION	
COURSES	**UNIT**
NEW MEDIA COMMUNICATION CORE COURSES	**87**
ELECTIVES	**15**
UNIVERSITY REQUIREMENT COURSES	**20**
a. Thinking Skills	2
b. University Malay Language	3
c. *Foundation English	(*2 audit)
d. **English for General Purposes	(**2)
e. English for Academic Purposes	2
f. Islamic and Asian Civilization/Malaysian Cultures	2
g. Ethnic Relations/Malaysian Studies	2
h. Foreign Language	4
i. Co- Curriculum	3
TOTAL	**122**

*/**/*** - *descriptions are in the part of Types of Courses*

TYPES OF COURSES

1. University Core Courses

University Core Courses are courses which are NOT the student's major. These courses are offered by the School of Human Development and Techonocommunication (iKOM), the Centre of International Languages (CIL) and the Co-Curriculum Centre. All these courses are compulsory and students need to pass with grade C to graduate. The University Core Courses are:

a. Engineering Entrepreneurship (UUW224) - (2 units)

All students are required to take Engineering Entrepreneurship course. Students are also advised to take other courses in the entrepreneurship category, where the units collected will cover the Optional Course requirement.

b. Thinking Skills (UUW322) - (2 units)

Thinking Skills is compulsory for all students.

c. University Malay Language (UVW410) - (2 units)
University Malay Language is compulsory for all students.

d. English for Technical Communication (UVW312) / English for Academic Purposes (UVW313) - (2 units)
All students are required to take English for Technical Communication (Bachelor of Engineering and Bachelor of Engineering Technology) or English for Academic Purposes (for the Bachelor of Business and Bachelor of Communication New Media) courses. However, depending on their MUET results, students are required to attend some other English language courses before they are allowed to take English for Technical Communication or English for Academic Purposes as shown in Table 2.

Students who obtained Band 1 or 2 in MUET, must first take Foundation English which is 2 units not credited (audit) courses and must be passed by a minimum of Grade C, before they are being allowed to take 2 units of English for General Purposes and another 2 units of English for Technical Communication or English for Academic Purposes. A minimum pass grade for all courses in English is grade C.

For students who obtained Band 3 in MUET, they are required to take 2 units of English for General Purposes before being allowed to take English for Technical Communication or English for Academic Purposes. Students who obtained Band 3 in MUET, not need to take Foundation English course.

Students who obtained Band 4 or 5 in MUET are only required to take English for Technical Communication or English for Academic Purposes. Students who obtained Band 4 or 5 in MUET do not have to take Foundation English or English for General Purposes.

For students who obtained Band 1, 2 and 3, two (2) units obtained through the English for General Purposes) will be calculated as an Optional Course. The other Optional Courses are also open to students with MUET band 1,2 and 3 to give value added to the students. However, number of credits for graduation for students with MUET band 1,2 and 3 who are taking Optional Courses (other than English for General Purpose which have been counted as an Optional Course before) will be 139 units for Engineering program and 144 units for Engineering Technology program. Students who have obtained Band 4 and 5 in MUET must take any Optional Courses.

Table 2: English Compulsory Courses

MUET's Band	ENGLISH COMPULSORY COURSES			
	UVA111 Foundation English (Non Credited)	UVW211 English for General Purposes	UVW312 English for Technical Communication / UVW313 English for Academic Purposes.	Optional Courses (Foreign Languages)
BAND 1 & 2	/	/	/	Registration is open to students
BAND 3		/	/	
BAND 4			/	/

e. Islamic and Asian Civilization (UUW233) / Malaysian Cultures (UUW237) - (2 units)
Islamic and Asian Civilization (UUW233) is compulsory for all local students, while Malaysian Cultures (UUW237) is compulsory for all international students.

f. Ethnic Relations (UUW235) / Malaysian Studies (UUW239) - (2 units)
Ethnic Relations (UUW235) is compulsory for all local students, while Malaysian Studies (UUW239) is compulsory for all international students.



g. Business Communication (BUW123) - (3 units)
Business Communication is compulsory for all students of Bachelor of Business.

h. Co-Curriculum Programme (3 units)
All students are required to collect 3 units for Co-Curriculum during their study at UniMAP. Two (2) units are to be collected from Uniformed Bodies, where the 1st unit needs to be taken in Semester I and another 1 unit in Semester II (in the First Year of study), while the other 1 unit can be collected from any other Co-Curriculum courses in any semester.

2. Core Courses (Bachelor of Engineering)
Core Courses are courses that must be taken by Bachelor of Engineering students. These courses are part of the requirements for graduation. Students who fail Core Courses must repeat them and pass before they can graduate.

3. Core Courses (Bachelor of Engineering Technology)
Core Courses are courses that must be taken by Bachelor of Engineering Technology students. These courses are part of the requirements for graduation. Students who fail Core Courses must repeat them and pass before they can graduate.

4. Core Courses (Bachelor of Business)
There are two types of Core Courses for the Bachelor of Business:

a. Business Core Course: Business Core Courses are contemporary courses in the business field. It is compulsory for Bachelor of Business students to take these courses.

b. Programme Core Courses: Programme Core Courses meanwhile are offered based on the students' major.

These courses are part of graduation requirement. Students who fail any of the Core Courses must repeat them and pass before they can graduate.

5. Elective Courses (Bachelor of Business)
Students can choose Elective Courses based on their interests.

6. Optional Courses
Optional Courses are courses which are offered by the School of Human Development and Techonocommunication (iKOM) and The Centre for International Languages for the students of Engineering and Engineering Technology. Two (2) units of Optional Courses have to be taken by students of Bachelor of Engineering and Engineering Technology students, during their study in UniMAP.

7. Prerequisite Courses
All students MUST take and pass prerequisite courses set before registering for any subsequent courses. Student who fail the prerequisite courses and intend to take them together with the subsequent courses in the same semester, must apply to and obtain the approval of the Dean of schools. Note, however, that prerequisite and subsequent courses cannot be taken together in the same semester for language courses.

UNIT SYSTEM

Each course is given a value known as the UNIT. The unit is based on the scope and the depth of a course. With the exception of certain cases, the value of a unit for each Teaching & Learning mode is in Table 3:

Table 3: Unit Evaluation per Week for 14-Week Semester

FORM OF CONTACT	UNIT VALUE	TOTAL CONTACT/ WEEK
Lecture	1	1 hour
Laboratory/Tutorial	1	2 hours
Assisted Learning involving delivery mode such as Problem Based Learning (PBL), e-learning modules, visits ect....	1	3 hours
Industrial Training	1*	Depending on the programme of study

** Note: The value of 1 unit of the Industrial Training is equivalent to 2 weeks of training.*

TEACHING AND LEARNING APPROACHES AT UniMAP

Many of the Core Courses offered include Theory Component and Practical Component, the value of contact hours for which is detailed below:

1. **Theory Component**
   One (1) unit of Theory Component is equivalent to 1 hour of lecture/ tutorial/reading per week or 14 hours per semester.

2. **Practical Component**
   One (1) unit of Practical Component for Engineering programme is equivalent to 2 contact hours per week or 28 hours per semester. One (1) unit of Practical Component for Engineering Technology programme is equivalent to 3 contact hours per week or 42 hours per semester.

   For most of the Core Courses, students are required to complete a mini project and sit for an examination or a *Viva Voce* at the end of the semester.

   The Practical Components consist of the following teaching and learning modes:

1. **Lab Intensive Learning** – two or three students carry out an experiment in a group. In some basic lab intensive programmes, each student will conduct an experiment individually (1:1) and not in a group.

2. **Teaching Factory Learning** – five to six students carry out a process run in a group using actual scale equipment used in industry.

3. **E- Learning** – Learning approach that is reinforced using ICT, complementing the conventional approach. Through the UniMAP website, students obtain access to course modules and topics. The modules consist of lecture notes in multimedia format such as audio, video, graphic, animation, simulation, games and other interactive activites.

4. **Exposure to Industry** – Students will make multiple visits to industry for a certain period of time throughout their study at UniMAP. These include IndEx (Industrial Exposure) programmes, InTra (Industrial Training), Industrial Entrepreneurship Exposure (IndEnt) and others.

INDUSTRIAL TRAINING

Industrial Training is a course, carrying 4 units for Bachelor of Engineering students, 12 units for Bachelor of Engineering Technology students, 6 units for Bachelor of Business and Bachelor of New Media Communication students.

Third (3rd) Year Bachelor of Engineering students are required to undergo 10 weeks of Industrial Training in order to collect 4 credits for this course while 4th Year of Bachelor of Engineering Technology students are required to undergo 24 weeks of Industrial Training in order to collect 12 credits for this course. Third year students Bachelor of New Media Communication required to undergo 12 weeks of Industrial Training in order to collect 12 credits for this course.

Students of Bachelor of Business (International Business) are required to do Industrial Training during the 2nd and 4th semester. Students have two options to choose from, Option 1 (2+2) or Option 2 (3+1). For Option 1 (2+2), students will undergo two phases (2 months + 2 months) of Industrial Training in selected companies in Malaysia. For Option 2 (3+1), students will undergo 3 months Industrial Training in the selected companies in Malaysia, followed by an educational trip abroad (International Business Field Trips) for 1 month.

Bachelor of Business (Engineering Entrepreneurship) students will undergo practical training via the Business Incubator programme for 10 weeks. They will earn 6 credits hours after the 4th semester.



Contact hours evaluation is calculated based on an average of 8 contact hours per day for 5 days in a week, where 8 hours per day x 5 days = 40 hours per week (working hours for designated organization/corporation).

The main objectives of the Industrial Training are to:

√ Instill professionalism in students
√ Raise students' awareness on the importance and connection between industrial training, lab - intensive and engineering theories.
√ Provide students with early exposure to industrial environment and practices. Students also are given the opportunity to equip themselves with the necessary skills and knowledge needed in their respective academic and training fields.

The Centre for Industrial and Governmental Collaboration (CIGC) coordinates programmes which require the involvement of industry and government's agencies with relevant units and centres:

1. Industrial Training Workshop (InTra)

a. 1 day short program
b. Experts, managers and engineers from the industry are invited to hold briefings, demonstrations and dialogs on the schedule provided
c. Exposure before students undergo industrial training

BUSINESS INCUBATOR PROGRAMME

The teaching and learning approach for Bachelor of Business (Hons) (Engineering Entrepreneurship) program not only covers lectures and tutorials but also practical training through the Business Incubator Program. After the 4th semester, students will participate in a 10-week Business Incubator Program which accounted for 6 credit hours.

Through this Business Incubator Program, students will be guided by companies directly involved in product development that may potentially lead to commercialization. Furthermore, companies involved are in the "start-up" category involving new businesses, fast-paced businesses and businesses aimed at bringing innovative products to the existing markets. Students can find out how ideas and innovations can lead to a product development process. At the end of the Business Incubator Program, students are required to provide a report on their experience throughout the Business Incubator Program that they have undergone in selected start-up companies.

The Business Incubator Program has close collaboration with the National Incubator Network Association (NINA) and also collaborates with the Association of Asean Business Incubation (AABI). Participating bodies in this establishment include Technology Park Malaysia, Malaysia Technology Development Corporation, SIRIM and Kulim Technology Park Corporation. UniMAP works closely with these organizations to ensure the success of the program.

INTERNATIONAL BUSINESS FIELD TRIPS

In the 2nd and 4th semester, Bachelor of Business (Honours) (International Business) students will undergo Industrial Training according to either the First Option (2 + 2) or the Second Option (3 + 1).

For the First Option (2 + 2), students will undergo two phases (2 months + 2 months) of Industrial Training at selected companies in Malaysia and this will be coordinated through collaboration with the Centre for Industrial and Government Collaboration (CIGC), UniMAP.

For the Second Option (3 +1), students will undergo Industrial Training at selected companies in Malaysia for the first 3 months and then proceed for an educational trip overseas for another 1 month. Students are given the freedom to choose any of the two options provided for their Industrial Training according to their interest and financial abilities.

This program allows students to gain experience in other countries such as Indonesia, Thailand, Singapore, Japan, China, Turkey, Saudi Arabia and many others. Working abroad can help and expose students to diverse culture and the international environment.

COURSE CODE

Each course is assigned a code. For Bachelor of Engineering, Bachelor of Engineering Technology, Bachelor of Business and Bachelor of New Media Communications programme, the codes are summarized in Tables 4(a), 4(b) and 4(c) below:

Table 4(a): First Alphabet; Type of programme offered at the Bachelor Degree level.

FIRST ALPHABET IN THE CODE	TYPE OF PROGRAMME OFFERED
E	Bachelor of Engineering
B	Bachelor of Business
P	Bachelor of Engineering Technology
K	Bachelor of New Media Communication
U	General Course (This subject can be taken by students from all programmes)

Table 4(b): Second Alphabet; Courses offered by faculties

SECOND ALPHABET IN THE CODE	FACULTY OFFERING COURSES
E	School of Electrical Systems Engineering
M	School of Microelectronic Engineering
K	School of Computer & Communication Engineering
N	School of Mechatronic Engineering
B	School of Material Engineering
P	School of Manufacturing Engineering
R	School of Bioprocess Engineering
A	School of Environmental Engineering
D	School of Mechanical Engineering Technology
G	School of Electronic Engineering Technology
L	School of Electrical Engineering Technology
S	School of Civil Engineering Technology
T	School of Chemical Engineering Technology
C	Engineering Centre
Q	Institute of Engineering Mathematics
I	Centre for Industrial and Governmental Collaboration
F	Centre of Business Innovation and Technopreneurship (PPIPT)
U	School of Human Development and Techonocommunication (iKOM)
V	Centre for International Languages
Z	Co-Curriculum Centre

Table 4(c): Third Alphabet; University's Requirements and Core Courses;

THIRD ALPHABET IN THE CODE	TYPES OF COURSES (UNIVERSITY REQUIREMENT OR CORE COURSES)
T	Core Courses
W	University Requirements Courses
A	Audit Courses
M	Mobility Courses

The three numbers which follow the Alphabet Codes represent the following; The first number represents the level of course. The second and third represent numbers assigned to the course. The codes are simplified in **Table 5.**

Table 5: Course Code

A	B	C	1	2	3	4	NUMBERS	DESCRIPTION
↓	↓	↓	↓	↓	↓	→	4	Units/Credits
↓	↓	↓	↓	↓	∟	→	3	Course numbers. (The course number is determined by each School)
↓	↓	↓	↓	∟	→	→	2	
|	|	|	∟	→	→	→	1	Level of courses: • 1= 1st year subjects, • 2= 2nd year subjects, • 3= 3rd year subjects, • 4= 4th year subjects,
↓	↓	∟	→	→	→	→	TYPE OF COURSE	Refer Table **3(c)**
↓	∟	→	→	→	→	→	FACULTIES	Refer Table **3(b)**
∟	→	→	→	→	→	→	TYPE OF PROGRAMME	Refer Table **3(a)**

BAHASA INGGERIS (ENGLISH)



PRE-REGISTRATION

Pre-registration is a system that enable students to pre-register their courses via online for all the courses to be taken in the following semesters at an earlier period. The period set for the pre-registration is before the semester break of each semester. All students (Active/ P1 or P2 Status/ With Outstanding Fees) **ARE REQUIRED** to perform the preregistration process.

Students **MUST** register within the deadline set. Courses to be registered are courses to be taken in the following semester (all courses including Curriculum Courses). Students are encouraged to consult with their Rakan Pendamping Siswa (RPS) before pre-registering their courses online. Students who fail to pre-register their courses within the period set, run the risk of their official registration to be affected as priority is given to those who have pre-registered. Students are encouraged to print pre-registration slip as proof of registration and verification from their RPS is not required for this stage.

COURSE REGISTRATION

All active students are required to register for courses for each semester. The course registration is done online by all students. Course registration must be completed within the dates specified by the Student Admissions and Records Unit via email and portal.

Students are required to discuss with their Rakan Pendamping Siswa (RPS) regarding courses that they will have to register for each semester. Students must bring the registration slip for verification by RPS in the system during the discussion session. Registration of courses without the RPS verification is considered INVALID. If there are any changes in student course registration, i.e add, drop or withdraw courses within the prescribed period, the student must also obtain verification from the RPS.

Students who fail to register within the prescribed period shall be subject to a penalty of RM50. Late registration must not exceed the 3rd week of the semester. Students must complete form HEA-09 (Late Registration Form) and obtain the approval from the Dean.

New students will register online on the specified date during the orientation week according to their School. Students will be briefed by their school about courses in their programme of study during the orientation week.

Students are responsible to check and ensure that all the particulars stated in the Course Registration Slip are correct. Student who apply to add/ drop/ withdraw registration after the prescribed period without reasons accepted by the university, may be fined. Registration after the prescribed period will only be considered by the Dean of the School for students with specific reasons. Students are not allowed to register add/drop/withdraw during the examination week.

Students who do not register for a maximum of 2 consecutive semesters without any reason can be terminated through the submission of form HEA-20 (Termination of Study Form).

Students who have been terminated and wish to place an appeal to resume their studies may do so by submitting an appeal letter to the Vice-Chancellor through the Dean (Dean's verification required). A penalty of RM100 will be imposed on the student whose application for re-admission has been approved.

1. Active Student Course Registration

All "Active" students are allowed to register not more than 22 units and not less than ten 10 units except for those who are involved in Industrial Training and the Final Year Project. Student who wish to register more than 22 units, need to obtain approval from their RPS and verification by the Dean. Table 6 below summarises units that students can register for each semester based on their status:

Table 6: Summary of Units for Active Student

STUDENT STATUS	MINIMUM UNIT	MAXIMUM UNIT
Active Student	10	22
Active student with Industrial Training (LI) and Final Year Project (FYP)	10	28

**** Students who do not take FYP or LI can take more than 22 units but with the approval from the Dean and must also fill the HEA-09a form (Course Registration Form).*

2. Probation Student Course Registration (P)

Student with the "Probation" status are not allowed to register online by themselves. The students must meet up with their RPS to obtain confirmation from the Dean. They also need to fill up form HEA-09b (Course Registration Form-Probation (P)) before handing it to the Assistant Registrar. Only the Assistant Registrar of School/Registrar Office is allowed to register the subjects for the students in this case. The numbers of units allowed is as in Table 7 below:

Table 7: Summary of Units for Probation Student

STUDENT STATUS	MINIMUM UNIT	MAXIMUM UNIT
Probation (P1)	10	12
Probation (P2)	8	10

ADD COURSES / DROP COURSES / COURSE WITHDRAWAL

1. Adding Courses

a. The period of time allowed for the adding of courses is up to week 2 (week of study).
b. Students are required to fill in Form HEA-11 (Adding Course Form) before submitting it to the Assistant Registrar of the School to be updated in the system.

2. Dropping Courses

a. The period of time allowed to drop courses is up to the week 6 (week of study).
b. Students must use Form HEA-10 (Dropping Courses Form), to be signed by the course lecturer, Dean of the School and submit it to the Assistant Registrar of the School to be updated in the system.

3. Course Withdrawal (TD)

a. With the consent of Course Lecturer and Dean of the School, a student may apply to withdraw from a course registered in a semester not later than the last day of work at week 12 (week of study). To apply to withdraw from a course, student must fill in Form HEA-19 (Course Withdrawal Form).
b. Permission to allow students to withdraw a course is subject to the minimum unit allowed except with permission of the Dean.
c. Withdrawal status (TD) will be recorded in the record of registration and academic transcript. However, the grade will not be included to contribute towards the GPA and CGPA.

CHANGE OF PROGRAMME

Change of programme refer to the changing of a programme of study to another, for reason agreed by both of the current Dean and Dean of school offering the intended programme.

Students are not encouraged to change programmes as it involves distribution of resources that have been planned at the beginning of each academic session. However, an appeal to change programme can be considered based on certain conditions:

1. An application can only be made by students upon completion of at least one semester of study. The students will have to complete form HEA-12 *(Change of Programme Application Form)*. The application form is available at the Registry Department or at Schools. However, for certain cases, change of programme at the beginning of study, may be considered with approval by the Vice Chancellor or Deputy Vice Chancellor (Academic & International).

2. The application must be submitted within the first 2 weeks of the semester. The application form must be attached together with a copy of the latest semester result or Matriculation/STPM/Diploma result.



3. Students can only apply for change of programme no later than the first 2 semesters of study at UniMAP. An application made into the 3rd semester of study will not be considered.

4. Every application for change of programme must be justified with strong reasons for the change.The application must be approved by the RPS (the current and intended programme), Dean of the school (the current and intended programme), the Dean of Academic Management and Vice Chancellor / Deputy Vice Chancellor (Academic & International).

5. For students who have obtained scholarships or PTPTN or other types of sponsorships, must obtained approval from their respective sponsors. Students need to deal directly with their sponsors. Further advice may be obtained from the Student Affairs and Alumni Department.

6. If the application is successful, the student must register for new courses offered in the new programme.

7. Students who change programmes in the same field can apply for credit transfer for Core Courses and University Core Courses or a similar course in the curriculum of the new programme. While the other courses which have been taken but not related to the curriculum of the new programme will remain in academic transcript, the GPA/CGPA and credit amassed will not be taken into account.

8. Student who change programmes across different fields of study can only apply for credit transfer for University Core Course or similar courses in the curriculum of the new programme. While other courses which have been taken but are not related to the curriculum of the new programme will remain in academic transcript, the GPA/CGPA and credits amassed will not be taken into account.

POSTPONEMENT OF STUDY

Postponement of study is permission granted to students for not attending studies in a semester for reasons permitted by the university.

Postponement of study is permitted for students who have health problems and whose illness is verified by government hospitals or University panel doctors or Pusat Kesihatan UniMAP. For certain cases, students who present medical certificate from hospitals other than that mentioned, must obtain endorsement by Pusat Kesihatan UniMAP. An application made due to reasons other than ill health may be considered if it is reasonable and approved by the Vice Chancellor / Deputy Vice Chancellor (Academic and International).

Students can apply for postponement of study by filling in Form HEA/HEP-13 (*Borang Penangguhan Pengajian / Postponement of Study Application Form*) which can be obtained from The Registry Department or schools. Application must be:

1. Recommended by the Rakan Pendamping Siswa (RPS)
2. Recommended by the Dean of School
3. Recommended by the Dean of Student Affairs and Alumni
4. Recommended by the counsellor (if applicable)
5. Recommended by the Dean of Academic Management and
6. Approved by the Vice Chancellor / Deputy Vice Chancellor (Academic and International).

Application for postponement of study should be submitted before the 7th week of an academic session. Application made after that period will only be allowed for medical reasons and other reasons with the approval of the the Vice Chancellor / Deputy Vice Chancellor (Academic and International).

Students are not allowed to postpone their studies for more than 2 semesters consecutively except with the approval of the Vice Chancellor / Deputy Vice Chancellor (Academic and International). In cases not related to

health, students are only allowed to leave the university after the application for postponement is approved by the university. Student who leave university before the approval is granted, do so is at their own risk.

For students who postpone their studies due to health problem, the current semester in which s/he is registered will not be counted for graduation (without penalty). For case without penalty, courses registered in the particular semester will be dropped and results verified by the Majlis Peperiksaan Universiti (MPU) (if any), will be cancelled.

Students who postpone their study due to reasons OTHER than health, the current semester in which s/he is registered will be taken into account for graduation (with penalty) unless permitted with the approval of the Vice Chancellor / Deputy Vice Chancellor (Academic and International). For cases with penalties, courses registered in the particular semester will not be dropped and will be taken into account for that semester. Results verified by the Majlis Peperiksaan Universiti (MPU) are valid and will appear in the academic transcript.

A warning letter will be issued to students who do not register for the present semester without submitting any application to postpone their studies. Student who fail to submit an application for the postponement of studies within a period of time will be terminated from the university. Their names will be dropped from the list of Registered Students and verified as having quit from the university.

STUDENT GRADING

A student's academic performance is measured using the Grade Point Average (GPA) system throughout the university academic session. A student who obtains at least a 2.00 for their GPA in a semester will be awarded the 'Active' (A) status and will be allowed to continue with the next semester. Students are also required to obtain minimum Cumulative Grade Point Average (CGPA) of 2.00 in order to graduate.

For final year students who are allowed to take the Curative Course (course offered during long semester break), the examination results will be combined with their Semester 2 examination results in that session, in order to determine the GPA and student academic status. If the combined average is better then the result for Semester 2, then the student will be given a new status, but if the combined average is less than the result for Semester 2, then the status of Semester 2 will be maintained.

Students with GPA lower than 2.00 in a semester, will be given the Probation 1 (P1) status. The Probation 2 (P2) status is given to students with GPA lower than 2.00 for two consecutive semesters. If the GPA of the student is still lower than 2.00 for the following semester, the student will not be allowed to continue his/her studies, unless the CGPA of those students exceeded 2.00 and with the University approval. The University authorities have the right to terminate any student who does not perform and fulfil the academic requirements stated by the university.

MINIMUM AND MAXIMUM PERIOD OF STUDY

Bachelor of Engineering and Bachelor of Engineering Technology students have to complete their study within the duration given, which is a minimum 8 semesters (4 years) or the maximum 14 semesters (7 years). However, for students who are given credit exemptions, the duration given to complete their study cannot be less than 6 semesters (3 years) and not more than 12 semesters (6 years). Bachelor of Business and Bachelor of New Media Communication students should complete their studies within a minimum of 6 semesters (3 years) and a maximum of 10 semesters (5 years).

The minimum and maximum period of study is as follow:



PROGRAMME	MINIMUM (SEMESTER)	MAXIMUM (SEMESTER)
Bachelor of Engineering	8	14
Bachelor of Engineering Technology	8	14
Bachelor of Business	6	10
Bachelor of New Media Communication	6	10

CURATIVE COURSES

Curative Courses are held after Semester 2 of each academic session. Registration for Curative Courses is very limited and depends on whether the particular course is offered by the school and is approved by the Senate. Students are only allowed to take a maximum of 10 units (3 courses) at one time. Only tutorials will be conducted for these courses. Curative course normally comprises 2 weeks of tutorials and a week of examinations. Conditions to take Curative Course are:

1. Final year students who will be graduating and getting;
   a) Grade C- / D + / D / D / F and DK for University Requirement Courses;
   b) Grade C- / D + / D / D / F and DK for University Core Course and Electives;
2. Students who repeat a course on the condition of the course was taken each time it is offered
3. Students who failed the course work are not eligible for Curative Course.

CREDIT EXEMPTION

Credit Exemption is defined as an exemption from registration and study of a course prescribed for a programme, based on the course taken by the student before being accepted into the university programme, as approved by the Dean of a School/ Dean of Academic Management.

Credit Exemption is given to students who have obtained at least a C in certain courses, according to the grading system of the University and subject to the terms and conditions set by the university. Credit Exemption is given to students who have taken a course that is the same as, or contain at least 80% similarities to a course for which exemption is applied. Two or more courses can also be combined for the purpose of credit exemption for one course offered at UniMAP.

Credit exemption for certain courses depend on the list of courses approved by the respective School and has been approved by the Senate.

EXAMINATION AND EVALUATION SYSTEM

Written examination is conducted at the end of the semester. Every student must fulfil the requirements for lecture, tutorial, practicum and other requirements before being eligible to sit for an exam. The duration for the exams is as follows:

Table 8: Examination Duration

COURSE VALUE	EXAMINATION DURATION
1 unit	2 hours
2 - 4 units	3 hours

Students' examination results are based on course work component and written examination. A course work carries the value of 100% if the entire course is lab structured. Coursework consists of assignments, lab reports and test. Students' achievement is based on letter grades and points as follows:

Table 9: Letter Grades and Points

GRADE	GRADE POINT	STATUS
A	4.00	PASS
A-	3.75	
B+	3.50	
B	3.00	
B-	2.75	
C+	2.50	
C	2.00	
C-	1.75	FAIL
D+	1.50	
D	1.00	
D-	0.75	
F	0.00	

The passing grade of a course is subject to the requirement of the course as follows;

1. The PASSING grade for all courses is Grade C and above
2. The FAILING grade is C- to F
3. If students were to obtain a CGPA of ≥ 2.00 and has obtained C-/D+ in his/her Core Course, they would be considered as having PASSED.

Table 10: Calculation of GPA and CGPA:

	COURSE	UNIT	GRADE VALUE [NG]	GRADE [G]	TOTAL NG
	EKT121	3	3.75	A-	11.25
	EMT102	4	2.50	C+	10.00
	EMT111	4	3.50	B+	14.00
	EMT112	4	4.00	A	16.00
	EQT102	3	1.75	C-	5.25
	EUT122	2	2.75	B-	5.50
		20			62.00
	GPA = 62.00/20 = 3.10				
	ECT200	3	3.50	B+	10.50
	EKT212	4	2.00	C	8.00
	EKT230	4	4.00	A	16.00
	EKT240	4	3.50	B+	14.00
	EQT203	3	3.75	A-	11.25
		18			59.75
	GPA = 59.75/18 = 3.32				
	CGPA = Total Accumulated Grade Value / Total Accumulated Unit = 62.00 + 59.75 / 20 + 18 = 3.20				

APPEAL FOR EXAMINATION RESULTS REVISION

In certain cases, a student might wish to apply for a revision of their examination results. Students are only allowed to appeal for a revision within the duration of 15 days after the examination results are officially released by the Registrar. Application after this duration will not be considered.

Students must submit form HEA-15m (Examination Results Review Appeal Form) to the Examination & Graduation Unit, Academic Management Division, and Registry Department. The appeal form must be submitted within the period of 15 days after the official result is announced. Students will have to fill in their details in two (2) copies, one of which is the student copy.

Students will be charged RM50 per course for each course appealed. Payment shall be made in cash or using Money Order / Pos Malaysia / Bank Draft / Cheque in the name BENDAHARI UniMAP.

ENGLISH LANGUAGE USE

Malay is the official language of the university. However English is used widely in the teaching and learning process at UniMAP. This is to help students in their future career. For courses that are taught in English, the examination will be conducted in the same language.

BUDDY SYSTEM (*RAKAN PENDAMPING SISWA*)

Buddy System (*Rakan Pendamping Siswa*) or RPS is a system which connects students and lecturers to allow them to discuss and decide on students' study plan. Even though course registration is done online by students, they are advised to meet with their RPS during the registration exercise for advisory purposes.

In the system, an academic staff supervises a small group of students for the whole duration of the students' study period in UniMAP. 'Supervision' here entails frequent



meetings under informal settings, where students are able to discuss about academic and social issues with their lecturers who act as a 'buddy' to them. Students who have unsatisfactory academic performance may refer to RPS as a mentor, and the student is a 'mentee'.

ACADEMIC SUPPORT CENTRES

These centres are established to support UniMAP students' academic achievement.

1. **School of Human Development and Techonocommunication (iKOM)**
   School of Human Development and Technocommunication (iKOM) offers University Core Courses and various other courses, focusing on the social sciences and humanities, which complement UniMAP academic programmes. iKOM serves to enhance students' generic skills and soft skills which include communication, language, ICT and socio-humanitarian, preparing them to face the dynamic global challenges.

2. **Engineering Centre**
   The Engineering Centre was established to manage laboratories and workshops which are vitally needed for various programmes in UniMAP.

   Besides managing laboratories and workshops, this centre also supports research and development activities in UniMAP and aspires to be a centre for designing and creating innovative engineering products. The Engineering Centre also offers facilities for courses which require training and technical skills, conforming to industry standard.

3. **Institute of Engineering Mathematics (IMK)**
   The Institute of Engineering Mathematics is a centre which plans and handles engineering mathematics curriculum in UniMAP. It also serves as as a reference centre in providing expertise in mathematical research methods, simulation and statistical methods. IMK also serves as a training center for in-campus and off-campus personnel in fields related to mathematics.

4. **Centre for International Languages (CIL)**
   The Centre for International Languages (CIL) provide language courses which are a requirement for students enrolled in all UniMAP programmes, at both diploma and undergraduate degree levels. CIL offers not only Bahasa Melayu and English but also foreign languages such as Arabic, German, Japanese, Mandarin, Korean, Russian and Thai language.

5. **Co-curriculum Centre**
   The Co-curriculum Centre offers many co-curricular and uniform bodies courses. It is compulsory for all undergraduate students to take co-curricular courses. This centre offers up to 147 co-curricular courses for students irrespective of their academic programmes.

6. **Centre for Industrial and Governmental Collaboration (CIGC)**
   The Centre for Industrial and Governmental Collaboration (CIGC) liaises with industrial sectors in various aspects, especially in programmes directly related to students' learning. Programmes such as exposure to industry, industrial forum, staff industrial training and others are handled by this centre. Some of these programmes are compulsory for all students.

ACADEMIC MANAGEMENT DIVISION, REGISTRAR'S DEPARTMENT

Academic Management Division of the Registrar Department serve a service-oriented function and is responsible for managing undergraduate affairs including admission and student records, examination and graduation. The Division also function as secreteriat for the University Senate.

Academic Management Division of the Registrar Department consist of:

1. Admissions and Student Records Unit

This unit is responsible for handling matters relating to the admission and student records. Some of its functions are:

i. Handling recruitment and enrollment of local students for first degree and diploma
ii. Handling recruitment and enrollment of international students for first degree and diploma
iii. Managing admission process, updating academic data and student records in the Student Information System.
iv. Managing the process of quitting study, deferment of study and exchange of programs
v. Managing student course registration for each semester.
vi. Managing credit exemption process.

2. Examinations and Graduation Unit

This unit is responsible for examination and graduation. For examination this unit operate and monitor the Final Examinations and matters related to it. Some of its duties are as follows:

i. Issuing Examination Circular to Schools/ Centres/ Institutes.
ii. Issuing Examination Schedules for Diploma and Degree Programs.
iii. Managing the Final Examination within a specified timeframe
iv. Manage the processing of exam data using the Student Information System.
v. Secretariat to the University Examination Council.
vi. Release the result of a Final Examination.
vii. Managing student appeal process to revise the result of examination.
viii. Issuing academic transcripts after the Convocation.

For the purpose of graduation, this unit handles student graduation and convocation. Some of its duties are as follows:

i. Check the graduation eligibility for final year students and issue a confirmation letter graduation and qualification of graduate students eligible for graduation.
ii. Convocation secretariat.
iii. Manage invitation as well as borrowing and returning process of convocation robe.
iv. Manage the process of preparation and submission of garduation scrolls to graduates.
v. Record and update graduate data

3. The Senate Unit

This unit acts as secretariat to the Senate in dealing with matters relating to the affairs of the Senate. Some of its duties are:

i. Committees of the Senate and plan activities under it, in addtion to co-ordinate matters relating to the other parties concerned.
ii. Academic Calendar provides for recognition ind approval of the Senate
iii. Managing the nomination of honorary Degree recipients



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SCHOOL OF MICROELECTRONIC ENGINEERING

PROGRAMMES OFFERED

- Bachelor of Engineering (Hons.) (Microelectronic Engineering)
- Bachelor of Engineering (Hons.) (Electronic Engineering)
- Bachelor of Engineering (Hons.) (Photonic Engineering)
- M.Sc. (Microelectronic System Design Engineering)
- M.Sc. (Microelectronic Engineering)
- Ph.D. (Microelectronic Engineering)

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INTRODUCTION

School of Microelectronic Engineering (SoME), among the pioneer schools established in UniMAP, is a comprehensive institution, offering formative undergraduate degrees with research and design elements. Our undergraduate degrees provide the opportunity to gain knowledge and develop personal skills on an intensive high-quality programme at the cutting edge of technology.

Our undergraduate degrees are offered based on demands from the industry and fulfilled the requirement of professional bodies. In SoME, creating the environment in which forefront teaching and learning process can flourish and highly demanded expertise can be produced is always our top priority. As a SoME undergraduate student, you will have the opportunity to take advantage of our great study environment and best quality facilities of industrial standards.

Some of the facilities available at SoME:

- Award winning Micro Fabrication Cleanroom
- State of the art Nano Fabrication Cleanroom
- IC Design Laboratory
- Failure Analysis Laboratory
- Photonics Laboratory
- Tun Abdul Razak Laser Laboratory (TARELL)
- Microprocessor Laboratory

Come and reinvent yourself, join our B.Eng. programmes and create your future at SoME.

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BACHELOR OF ENGINEERING (HONOURS) (MICROELECTRONIC ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of electronic engineering or chosen field as demonstrated through career advancement.

PEO2:
Graduates who are members of and contribute to professional society.

PEO3:
Graduates who engaged in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAM OUTCOMES (PO)

PO1:
Ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problem.

PO2:
Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3:
Ability to solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4:
Ability to cconduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5:
Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

PO6:
Ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7:
Ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO8:
Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9:
Ability to demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO10:
Ability to ccommunicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11:
Ability to rrecognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12:
Ability to demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (MICROELECTRONIC ENGINEERING)

YEAR	YEAR 1		YEAR 2		YEAR 3			YEAR 4	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core	EMT114/3 Introduction to Electric Circuits	EMT124/3 Fundamental of Electrical Engineering	EMT282/3 Principles of Engineering Materials	EMT243/3 Introduction to IC Design	EMT353/3 Digital Integrated Circuit Design	EMT360/3 Control Engineering	EIT 302/4 Industrial Training & Engineering Innovation	EMT445/2 Final Year Project	EMT446/4 Final Year Project
	ECT111/3 Engineering Skills	EMT125/3 Digital Electronic Principles I	EMT235/3 Digital Electronic Principles II	EMT245/3 Introduction to Microprocessor Design	EMT357/3 Fundamental of Microelectronic Fabrication	EMT367/3 Microelectronic Fabrication		EMT470/3 Semiconductor Packaging	EMT454/3 Nanoelectronic Engineering
	EMT181/3 Physics for Electronics	EMT115/3 Programming Language	EMT272/3 Semiconductor Fundamental	EMT293/3 Signal Analysis	EMT358/3 Communication Engineering	EMT369/3 Power Electronic		EMT475/3 Computer Organization Architecture	**EMTXXX/3 Elective course
	EMT116/3 Electronic Devices	EMT182/3 Analog Electronic I	EMT238/3 Electromagnetic Theory	EMT283/3 Analog Electronic II	EMT352/3 Advanced Devices	EMT381/4 Microelectronic Design Project		EMT478/3 Instrumentation	EMT480/3 Reliability and Failure Analysis
								EMT490/3 Micro-Electro-Mechanical Systems	
Non-Eng.	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics				EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
		UUT122/2 Skills and Technology in Communication							
University Required (17)	UVW410/2 University Malay Language	*UVA111/2 Foundation English	UVW211/2 English for General Purposes	UVW312/2 English for Technical Communication	UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures			
	UZWXXX/1 Co-Curiculum	UZWXXX/1 Co-Curiculum	UZWXXX/1 Co-Curiculum		UUW322/2 Thinking Skills	UUW224/2 Engineering Entrepreneurship			
140	18	18	18	17	16	17		16	16

*Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW211 English for General Purposes.
**EMT462/3 Optoelectronic Systems or EMT488/3 Digital Signal Processing

BACHELOR OF ENGINEERING (HONOURS) (ELECTRONIC ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of electronic engineering or chosen field as demonstrated through career advancement.

PEO2:
Graduates who are members of and contribute to professional society.

PEO3:
Graduates who engaged in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAM OUTCOMES (PO)

PO1:
Ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problem.

PO2:
Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3:
Ability to solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4:
Ability to cconduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5:
Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

PO6:
Ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7:
Ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO8:
Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9:
Ability to demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO10:
Ability to ccommunicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11:
Ability to rrecognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12:
Ability to demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (ELECTRONIC ENGINEERING)

YEAR	YEAR 1		YEAR 2		YEAR 3			YEAR 4	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core	EMT114/3 Introduction to Electric Circuits	EMT124/3 Fundamental of Electrical Engineering	EMT 282/3 Principles of Engineering Materials	EMT243/3 Introduction to IC Design	EMT353/3 Digital Integrated Circuit Design	EMT360/3 Control Engineering	EIT 302/4 Industrial Training & Engineering Innovation	EMT445/2 Final Year Project	EMT446/4 Final Year Project
	ECT111/3 Engineering Skills	EMT125/3 Digital Electronic Principles I	EMT235/3 Digital Electronic Principles II	EMT245/3 Introduction to Microprocessor Design	EMT355/3 Microcontroller	EMT363/3 VLSI Design		EMT463/3 MEMS Design and Fabrication	EMT483/3 System on Chip
	EMT116/3 Electronic Devices	EMT115/3 Programming Language	EMT272/3 Semiconductor Fundamental	EMT293/3 Signal Analysis	EMT358/3 Communication Engineering	EMT369/3 Power Electronic		EMT475/3 Computer Organization Architecture	**EMTXXX/3 Elective course
	EMT181/3 Physics for Electronics	EMT182/3 Analog Electronic I	EMT238/3 Electromagnetic Theory	EMT 283/3 Analog Electronic II	EMT368/3 Reliability and Testability in Integrated Circuit Design	EMT382/4 Electronic Design Project		EMT478/3 Instrumentation	EMT488/3 Digital Signal Processing
								EMT479/3 Analogue Integrated Circuit Design	
Non - Eng.	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics				EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
		UUT122/2 Skills and Technology in Communication							
University Required (17)	UVW410/2 University Malay Language	*UVA111/2 Foundation English	UVW211/2 English for General Purposes	UVW312/2 English for Technical Communication	UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies	UUW233/2 Islamic & Asia Civilization or UUW 237/2 Malaysian Cultures			
	UZWXXX/1 Co-Curiculum	UZWXXX/1 Co-Curiculum	UZWXXX/1 Co-Curiculum		UUW322/2 Thinking Skills	UUW224/2 Engineering Entrepreneurship			
140	18	18	18	17	16	17	4	16	16

*Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW211 English for General Purposes.
**EMT462/3 Optoelectronic Systems or EMT480/3 Reliability and Failure Analysis

BACHELOR OF ENGINEERING (HONOURS) (PHOTONIC ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of electronic engineering or chosen field as demonstrated through career advancement.

PEO2:
Graduates who are members of and contribute to professional society.

PEO3:
Graduates who engaged in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAM OUTCOMES (PO)

PO1:
Ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problem.

PO2:
Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3:
Ability to solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4:
Ability to cconduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5:
Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

PO6:
Ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7:
Ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO8:
Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9:
Ability to demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO10:
Ability to ccommunicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11:
Ability to rrecognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12:
Ability to demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (PHOTONIC ENGINEERING)

YEAR	YEAR 1		YEAR 2		YEAR 3			YEAR 4	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core	EMT114/3 Introduction to Electric Circuit	EMT124/3 Fundamental of Electrical Engineering	EMT294/3 Principles of Optics	EMT283/3 Analog Electronic II	EMT393/3 Advanced Optics	EMT360/3 Control Engineering	EIT 302/4 Industrial Training & Engineering Innovation	EMT445/2 Final Year Project	EMT446/4 Final Year Project
	ECT111/3 Engineering Skills	EMT125/3 Digital Electronic Principles I	EMT235/3 Digital Electronic Principles II	EMT245/3 Introduction to Microprocessor Design	EMT394/3 Photonic Materials and Devices	EMT395/3 Photonic Fabrication Engineering		EMT496/3 Micro-Optical-Electro-Mechanical-System	EMT462/3 Optoelectronic Systems
	EMT116/3 Electronic Devices	EMT115/3 Programming Language	EMT295/3 Quantum Mechanics	EMT293/3 Signal Analysis	EMT358/3 Communication Engineering	EMT369/3 Power Electronic		EMT475/3 Computer Organization Architecture	EMT494/3 Optical Communication
	EMT181/3 Physics for Electronics	EMT182/3 Analog Electronic I	EMT238/3 Electromagnetic Theory	EMT297/3 Physics of Semiconductor	EMT396/3 Principles of Integrated Circuit Design	EMT383/4 Photonic Design Project		EMT478/3 Instrumentation	**EMTXXX/3 Elective Course
								EMT491/3 Optical Design	
Non-Eng.	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics				EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
		UUT122/2 Skills and Technology in Communication							
University Required (17)	UVW410/2 University Malay Language	*UVA111/2 Foundation English	UVW211/2 English for General Purposes	UVW312/2 English for Technical Communication	UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies	UUW233/2 Islamic & Asia Civilization or UUW 237/2 Malaysian Cultures			
	UZWXXX/1 Co-Curiculum	UZWXXX/1 Co-Curiculum	UZWXXX/1 Co-Curiculum		UUW322/2 Thinking Skills	UUW224/2 Engineering Entrepreneurship			
140	18	18	18	17	16	17	4	16	16

*Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW211 English for General Purposes.
** EMT488/3 Digital Signal Processing or EMT480/3 Reliability and Failure Analysis

LIST OF COURSES

- EMT114/3 INTRODUCTION TO ELECTRIC CIRCUITS
- EMT115/3 PROGRAMMING LANGUAGE
- EMT 116/3 ELECTRONIC DEVICES
- EMT 124/3 FUNDAMENTAL OF ELECTRICAL ENGINEERING
- EMT 125/3 DIGITAL ELECTRONIC PRINCIPLES I
- EMT181/3 PHYSICS FOR ELECTRONICS
- EMT 182/3 ANALOG ELECTRONICS I
- EMT 283/3 ANALOG ELECTRONICS II
- EMT 235/3 DIGITAL ELECTRONIC PRINCIPLES II
- EMT 238/3 ELECTROMAGNETIC THEORY
- EMT 243/3 INTRODUCTION TO IC DESIGN
- EMT 245/3 INTRODUCTION TO MICROPROCESSOR DESIGN
- EMT 272/3 SEMICONDUCTOR FUNDAMENTAL
- EMT282/3 PRINCIPLES OF ENGINEERING MATERIALS
- EMT 293/3 SIGNAL ANALYSIS
- EMT 294/3 PRINCIPLES OF OPTICS
- EMT 295/3 QUANTUM MECHANICS
- EMT 297/3 PHYSICS OF SEMICONDUCTOR
- EMT 352/3 ADVANCED DEVICES
- EMT 353/3 DIGITAL INTEGRATED CIRCUIT DESIGN
- EMT 355/3 MICROCONTROLLER
- EMT 357/3 FUNDAMENTAL OF MICROELECTRONIC FABRICATION
- EMT 358/3 COMMUNICATION ENGINEERING
- EMT 360/3 CONTROL ENGINEERING
- EMT 363/3 VLSI DESIGN
- EMT 367/3 MICROELECTRONIC FABRICATION
- EMT 368/3 RELIABILITY AND TESTABILITY IN INTEGRATED CIRCUIT DESIGN
- EMT 369/3 POWER ELECTRONIC
- EMT 381/382/383/3 MICROELECTRONIC/ELECTRONIC/ PHOTONIC DESIGN PROJECT
- EMT 393/3 ADVANCED OPTICS
- EMT 394/3 PHOTONIC MATERIALS & DEVICES
- EMT 395/3 PHOTONIC FABRICATION ENGINEERING
- EMT 396/3 PRINCIPLES OF INTEGRATED CIRCUIT DESIGN
- EMT 445/2 FINAL YEAR PROJECT
- EMT 446/4 FINAL YEAR PROJECT
- EMT 454/3 NANOELECTRONIC ENGINEERING
- EMT 462/3 OPTOELECTRONIC SYSTEM
- EMT 463/3 MEMS DESIGN AND FABRICATION
- EMT 470/3 SEMICONDUCTOR PACKAGING
- EMT 475/3 COMPUTER ORGANIZATION AND ARCHITECTURE
- EMT 478/3 INSTRUMENTATION
- EMT 479/3 ANALOG INTEGRATED CIRCUIT DESIGN
- EMT 480/3 RELIABILITY & FAILURE ANALYSIS
- EMT 483/3 SYSTEM ON CHIPS
- EMT 488/3 DIGITAL SIGNAL PROCESSING
- EMT 490/3 MICRO-ELECTRO-MECHANICAL-SYSTEMS
- EMT 491/3 OPTICAL DESIGN
- EMT 494/3 OPTICAL COMMUNICATION
- EMT 496/3 MICRO-OPTICAL-ELECTRO-MECHANICAL-SYSTEMS



COURSE SYLLABUS

EMT114/3
INTRODUCTION TO ELECTRIC CIRCUITS

COURSE SYNOPSIS

Introduction to Electric Circuit course introduce students the method of analysis for linear electrical circuits based on the direct current (DC) and alternating current (AC) circuit theorems. The course can be categorized into 2 parts. First part is focusing on DC circuit. It covers the fundamental laws & theorem, circuit analytical technique, passive & active elements. Second part, it emphasize on ac circuit. It is introduces phasors, sinusoidal state analysis, using previous analytical techniques, under sinusoidal state excitation, RLC circuits, AC power calculations & power factor correction, RMS values & 3-phase balanced systems. At the end of the course, the student should be able to apply the theorems and concepts in order to analyze any linear electric circuits.

COURSE OUTCOMES

1. Ability to explain knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in Circuit Theory.
2. Ability to identify and analyse complex engineering problems reaching substantiated conclusions in Circuit Theory using principles of mathematics, natural sciences and engineering sciences.
3. Ability to create, apply and select appropriate techniques, resources, and modern engineering to solve complex engineering problems in Circuit Theory.

REFERENCES

1. Alexander, C.K, Sadiku, M.N.O, Fundamental of Electric Circuit, 3rd Editions, Mc Graw-Hill, 2009.
2. Nilsson, J.W. Riedel, S.A, Electric Circuit, 6th Edition, Prentice Hall, 2001
3. Irwin, J.D, Nelms, R.M, Basic Engineering Circuit Analysis, 8th Edition, John Wiley, 2005.
4. Robbins, A.H, Miller, W.C, Circuit Analysis: Theory and Practice, 3rd Edition, Thomson/Delmar Learning, 2003.
5. Hyat, W.H, Durbin, S.M, Kimmerly, J.E, Engineering Circuit Analysis, 6th Edition, Mc Graw Hill, 2002.

EMT115/3
PROGRAMMING LANGUAGE

COURSE SYNOPSIS

Integrating hardware and software is one aspect to be a good engineer, thus an electronic engineer should be competence in programming. This course will focus on the computer software program development using C programming language which is widely used programming language for creating computer programs. The syllabus will cover the theory of programming concepts and principles in order to solve the engineering problems. The students will be exposed to the coding, executing and debugging techniques during C program development.

COURSE OUTCOMES

1. Ability to identify, formulate and analyse complex engineering problems reaching substantiated conclusions in programming language using principles of mathematics and engineering sciences.
2. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in programming language.
3. Ability to assess the need for, and have the preparation of programming language and ability to engage in independent and life-long learning in the broadest context of technological change.

REFERENCES

1. Paul Deitel, Harvey Deitel, "C: How to Program, 7th Edition", Prentice Hall, 2009.
2. Harry H. Cheng, "C for Engineers and Scientists, an Interpretive Approach", McGraw Hill, International Edition, 2010.
3. Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2006.
4. K.N. King, "C Programming: A Modern Approach, 2nd Edition", W. W. Norton & Company, 2008.
5. Noel Kalicharan, "C Programming - An Advanced Course", CreateSpace, 2008.

EMT 116/3
ELECTRONIC DEVICES

COURSE SYNOPSIS

This course will expose students to the basic electronic devices. The topic covered the fundamental concept of electronic devices. Students will expose to basic operation of diode and biasing circuits using data sheet. Students also will expose to diode application. The topics covered including Half wave rectifiers, Full wave rectifiers, Power Supply Filter and Regulators, Clipper and Clamper Diode circuits and Voltage Multipliers. Bipolar Junction Transistors

(BJTs) and various types of Field Effect Transistors (FETs) are also covered in this course. The topics focus on the transistor structure, basic operation, characteristics and parameters, biasing and troubleshooting.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in Electronic Device.
2. Ability to identify, formulate and analyse complex engineering problems reaching substantiated conclusions in Electronic Device using principles of mathematics, natural sciences and engineering sciences.
3. Ability to assess the need for, and have the preparation of electronic device and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. Floyd, T., Electronic Devices, 7th Edition, Prentice Hall, 2002.
2. Boylestad, R.L, Nashelsky, L., Electronic Devices and Circuit Theory, 8th Edition, Prentice Hall, 2002.
3. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 10th Edition, Prentice Hall, 2008.
4. Ben Streetman and Sanjay Banerjee, Solid State Electronic Devices (6th Edition), Prentice Hall, 2005.
5. Thomas L. Floyd, Electronics Fundamentals: Circuits, Devices and Applications, 7th Edition, Prentice Hall, 2006.

EMT 124/3
FUNDAMENTAL OF ELECTRICAL ENGINEERING

COURSE SYNOPSIS

This course focuses on the fundamental of electrical engineering and power electronics which consists of two parts; electrical machinery and instrumentation. This course will provide the basic knowledge in power transmission, machinery, power processing devices and metering. The topics covered in this course are transformers, AC and DC machines, AC and DC meters, AC and DC bridges, AC and DC converters, and sensors & transducers.

COURSE OUTCOMES

1. Ability to identify, formulate and analyse complex engineering problems reaching substantiated conclusions in fundamental of electrical engineering using principles of mathematics and engineering sciences.
2. Ability to understand and evaluate the sustainability and impact of electrical engineering work in the solution of complex engineering problems in societal and environment.
3. Ability to function effectively as an individual, and as a member or leader in diverse teams and multi-disciplinary.

REFERENCES

1. Chapman.S.J. (2005). Electric Machinery Fundamentals. 4th ed. Singapore: McGraw Hill.
2. Larry.D.Jomes and A.F. Chin. (1991). Electronic Instruments and Measurements. USA: Prentice Hall.
3. Z.A.Yamayee and J.L.Bala. (1993). Electromechanical Energy Devices & Power Systems. USA: Wiley & Sons.
4. C.S Rangan, G.R. Sarma & V.S. Mani, "Instrumentation Devices & System" Tata, McGraw-Hill Publishing Company Limited, 2004.
5. Bhas S. Guru & Huseyin R. Hiziroglu, "Electric Machinery and Transformers", 2001, Oxford University Press.

EMT 125/3
DIGITAL ELECTRONIC PRINCIPLES I

COURSE SYNOPSIS

This course provides introductory of digital concept mainly numbering system, operation & codes, Boolean Algebra, and basic logic gates. Students are exposed to logic design, particularly combinational logic functions and sequential circuit design.

COURSE OUTCOMES

1. Ability to apply and value necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in digital electronic principles.
2. Ability to identify, formulate, research literature and complex engineering problems reaching substantiated conclusions in digital electronic principles using first principles of mathematics, natural sciences and engineering sciences.
3. Ability to use techniques, resources, skills and necessary modern engineering tools for complex engineering practices so as to be easily adaptable to industrial needs in digital electronic principles.



REFERENCES

1. T. L. Floyd, "Digital Fundamentals", 10th Edition, Prentice Hall, 2009.
2. Rafikha Aliana, Norina Idris, Phak Len Eh Kan, Mohammad Nazri, Digital Electronics Design, 1st Ed. Prentice Hall, 2007.
3. R. H. Katz and G. Borriello, "Contemporary Logic Design", 2nd Edition, Prentice Hall, 2005.
4. R. J. Tocci, N. S.Widmer and G. L. Moss, "Digital Systems: Principles and Applications", 10th Edition, Prentice Hall, 2006.
5. Digital Design 4th Ed., M. M. Mano and M. D. Ciletti, Prentice Hall, 2008.

EMT181/3
PHYSICS FOR ELECTRONICS

COURSE SYNOPSIS

This course provides the principles of Physics, specifically as a foundation course for electronics, microelectronics and photonics. It is a calculus based course. The course is similar to undergraduate basic physics course consisting from classical physics of mechanics, thermodynamics, basic optics, electricity and magnetism, modern physics and the introductory to the electric conductivity for solid.

COURSE OUTCOMES

1. Ability to apply and value necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in physics for electronics.
2. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in physics for electronics using first principles of mathematics, natural sciences and engineering sciences.
3. Ability to recognize the need for, and have the preparation and engage in independent and life-long learning of physics for electronics in the broadest context of technological change.

REFERENCES

1. P.A. Tipler and G. Mosca, "Physics for Scientist and Engineers (with Modern Physics)", Freeman Company (2008).
2. Serway and Jewett, "Physics for Scientist and Engineers (with Modern Physics)", 9th ed., Brooks/Cole, (2013).
3. J.D. Cutnell, K.W. Johnson, and K.D. Fisher, "Physics", 9th Ed., John-Wiley & Sons, (2012).
4. D. Halliday and R. Resnick, "Fundamental of Physics", Ext. 7th Ed. Wiley, (2004).
5. A.D. Kraus, A.V-Cohen, "Design and Analysis of Heat Sinks (Thermal Management of Microelectronic and Electronic System Series)", Wiley-Interscience, (1995).

EMT 182/3
ANALOG ELECTRONICS I

COURSE SYNOPSIS

This course exposes the students to the basic knowledge in analogue circuits. The exposure encompasses amplifier design based on bipolar and field effect transistor, for single as well as multistage designs, power amplifiers, frequency response of amplifiers and also exposure to a few specialize device such as Shockley Diodes, SCS, Diac, Triac, SCR, Optotransistor, LASCR and Optocouplers. Emphasize is placed on basic designs aspects and applications. The course has been design to provide basic analogue electronics skills covering theories and practical.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in analog electronic circuit.
2. Ability to identify, formulate and analyse complex engineering problems in analog electronic circuit using principles of mathematics, natural sciences and engineering sciences.
3. Ability to apply and explain appropriate techniques, resources, and modern engineering, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.

REFERENCES

1. Donald A. Neamen, 'Microelectronic: Circuit Analysis & Design, 4th Ed.', McGraw Hill International Edition, 2012.
2. Thomas L. Floyd, 'Electronic devices: Conventional Current Version', 9th ed.', Prentice Hall, 2011
3. Robert L. Boylestead & Louis Nashelsky, 'Electronic Devices and Circuit Theory', 10th ed, Prentice Hall, 2011

EMT 283/3
ANALOG ELECTRONICS II

COURSE SYNOPSIS

This course offers the students an exposure to the Operational Amplifier: Operation, differential, common-mode, parameters, basic op-amp, practical op-amp circuits, op-amp datasheet; Applications of op-amp and frequency response: Summing amplifier, Voltage Follower, Comparator, Integrator,

Differentiator, frequency response and compensation; Feedback Circuits: Concepts of feedback, types of feedback connection, practical feedback circuit, feedback amplifier; Oscillator: Basic operating, principles of an oscillator, phase shift, Wien Bridge, Crystal oscillator, uni-junction; Active filter: Basic filter, filter response characteristics, low-pass filter, high-pass filter, band-pass filter, band-stop filter, frequency response measurement. Design of filter, Butterworth, Chebychev and Elliptic; Voltage regulators: Basic series and basic shunt regulators, IC regulators and applications.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in Analogue Electronic.
2. Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools in Analogue Electronic including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
3. Ability to assess the need for, and have the preparation of in Analogue Electronic and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. Donald A. Neaman, Electronic Circuit Analysis and Design, 2nd Ed., Mc-Graw Hill, 2006.
2. Floyd, T., Electronic Devices, 7th Ed., Pearson Education. Inc., 2005.
3. Boylestead, R.L, and Nashelsky, L., Electronic Devices and Circuit Theory, 7th Ed., Prentice-hall, 1999.

EMT 235/3
DIGITAL ELECTRONIC PRINCIPLES II

COURSE SYNOPSIS

This course exposes the students to Digital Systems Design Concepts, focusing on Sequential Systems, Computer Design Basics as well as the Memory Unit.

COURSE OUTCOMES

1. Ability to apply and decide the necessary knowledge of mathematics, engineering fundamentals and engineering specialization respectively to the solution of complex engineering problems in digital electronics. Ability to define, construct, and compare various types of counters; to interpret state tables, state diagrams (Finite State Machines, FSM), and Algorithmic State Machines (ASM) charts; and to construct sequential circuit designs.
2. Ability to design and recommend solutions for complex engineering problems and design systems, components or processes for digital electronics that meet specified needs with appropriate consideration for cultural, societal, and environment.
3. Ability to construct, select and apply appropriate techniques, resources, and modern engineering and IT tools with an understanding of the limitations to solve complex digital electronic engineering problems.

REFERENCES

1. M. M. Mano, Floyd - Digital Electronics Design, Prentice Hall. 2007.
2. Digital Fundamentals 10th Ed., Thomas L. Floyd, Pearson Prentice Hall, 2009.
3. Digital Principles and Design, Donald D. Givone, McGraw-Hill, 2002.
4. Digital Design 4th Ed., M. M. Mano and M. D. Ciletti, Prentice Hall, 2008.
5. Logic and Computer Design Fundamentals, M. Morris Mano and Charles R. Kime, Prentice Hall, 4th Ed., 2008.
6. Fundamentals of Digital Logic with Verilog/VHDL Design, Stephen Brown and Zvonko Vranesic, McGraw Hill 2009.
7. Digital Design – Principles and Practices 4th Ed., John F. Wakerley, Prentice Hall, 2007.

EMT 238/3
ELECTROMAGNETIC THEORY

COURSE SYNOPSIS

This purpose of this subject is to learn and understand the basic theory of electromagnetism. Students should be able to understand the core concepts of electrostatics and magnetism as well as the combined electromagnetism effect.

COURSE OUTCOMES

1. Ability to apply and determine necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in Electromagnetic Theory.Ability to evaluate the concepts and interaction of electromagnetism in media.
2. Ability to identify, formulate and analyse complex engineering problems reaching substantiated conclusions in Electromagnetic Theory using principles of mathematics, natural sciences and engineering sciences.
3. Ability to assess the need for, and have the preparation of electromagnetic theory and



engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. John D. Krauss & Daniel A. Fleisch, Electromagnetics with Applications, 5th ed., Mc Graw Hill
2. Matthew N.O.Sadiku, Elements of electromagnetics, Third Edition, Oxford University Press, 2001
3. Stewart, Joseph V, Intermediate Electromagnetic Theory, world Scientific, 2001
4. Branislav M. Notaros, Electromagnetics, Pearson 2011
5. William H. Hayt, John A. Buck, Emgineering Electromagnetics, Mc-Graw Hill 2011

EMT 243/3
INTRODUCTION TO IC DESIGN

COURSE SYNOPSIS

The course provides the students an exposure on basic logic circuits design, layout design, layout simulation of integrated circuits, as well as basic integrated circuits design techniques.

COURSE OUTCOMES

1. Ability to evaluate knowledge of mathematics, natural science, and engineering fundamentals in Integrated Circuit Design field to the solution of complex engineering problems.
2. Ability to design solutions for complex engineering problems and design systems in Integrated Circuit Design area that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to design investigations of complex problems in integrated circuit design area using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
4. Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

REFERENCES

1. Wolf, Rabeay, Jan M. Weste, Neil H.E, Compiled by Norina Idris, Norhawati Ahmad, Rizalafande Che Ismail, Muammar Mohamad Isa, Siti Zarina Md. Naziri, Muhammad Imran Ahmad, "CMOS VLSI; A Design Perspective", Pearson, 2008.
2. R. Jacob Baker, "CMOS Circuit Design, Layout, and Simulation, 3rd Edition (IEEE Press Series on Microelectronic Systems)", Wiley-IEEE Press, 2010.
3. Neil Weste, David Harris, "CMOS VLSI Design: A Circuits and Systems Perspective, 4th Edition", Addison Wesley, 2010.
4. Wayne Wolf, "Modern VLSI Design: IP-Based Design, 4th Edition", Prentice Hall, 2009.
5. Yuan Taur, Tak H. Ning, "Fundamentals of Modern VLSI Devices, 2nd Edition", Cambridge University Press, 2009.

EMT 245/3
INTRODUCTION TO MICROPROCESSOR DESIGN

COURSE SYNOPSIS

The aim of this course is to study the microprocessor architecture and relate that knowledge to the design of microprocessor based systems. This includes the design technique for memory, input and output for the systems. The study of microprocessor instruction set and various software development tools are also emphasized as the knowledge are needed in the design of the microprocessor-based systems

COURSE OUTCOMES

1. Ability to apply knowledge of engineering fundamentals based on microprocessor and assembly language for the solution of complex engineering problems.
2. Ability to conduct investigations of complex microprocessor problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems related to microprocessor design.

REFERENCES

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Prentice Hall, 2002
2. N Senthil Kumar, M Saravanan, S Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, USA, 2011
3. Richard C. Detmer, "Introduction to 80x86 Assembly Language and Computer Architecture", Jones & Bartlett Publishers, 2009
4. Barry B. Brey, "Intel Microprocessors, The (8th Edition)", Prentice Hall, 2008
5. Richard C. Detmer, "Introduction to 80x86 Assembly Language and Computer Architecture", Jones & Bartlett Publishers, 2009

6. John Crisp, "Introduction to Microprocessors and Microcontrollers", Newnes, 2004

EMT 272/3
SEMICONDUCTOR FUNDAMENTAL

COURSE SYNOPSIS

Introduction to semiconductor devices and technology, energy bands and carrier concentration in thermal equilibrium, carrier transport phenomena, p-n junction, bipolar transistor, MOS diode and MOSFET.

COURSE OUTCOMES

1. Ability to apply and value necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in semiconductor physics.
2. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in semiconductor physics using first principles of mathematics, natural sciences and engineering sciences.
3. Ability to recognize the need for, and have the preparation and engage in independent and life-long learning of semiconductor physics in the broadest context of technological change.

REFERENCES

1. S. M. Sze, K. K. Ng, Physics of semiconductor devices, John Wiley, 2007, USA.
2. F. P. Robert Advanced Semiconductor Fundamentals, 2nd ed. 2003, Prentice Hall, USA.
3. Peter Y. Yu, M. Cardona, Fundamental of Semiconductors: Physics and materials properties (advanced text in physics), Springer-Verlag, 2001, Germany.
4. G. G. Streetman, S. K. Banerjee, Solid State Electronic Devices, Prentice Hall, 2006, USA.
5. K. Kramer, W. Nicholas, G. Hitchon, Semiconductor Devices: A Simulation Approach, Prentice Hall, 1997, USA.
6. D. A. Neamen, Semiconductor physics and devices, McGraw Hill, 3rd ed. 2003, USA.

EMT282/3
PRINCIPLES OF ENGINEERING MATERIALS

COURSE SYNOPSIS

The course is tailored to give students a broad introduction to material properties and limitations. The subject will cover fundamental material structure, class of material properties, measurement of the properties, and knowledge to make material selection with better properties. The common micro-structural features of different material classes will be outlined in order to relate material with its characteristics.

COURSE OUTCOMES

1. Ability to apply and value necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in engineering materials.
2. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in engineering materials using first principles of mathematics, natural sciences and engineering sciences.
3. Ability to function effectively as individual, and as a member or leader in diverse teams and in multidisciplinary settings to solve engineering materials problem.

REFERENCES

1. Smith, W.F. and Hashemi, J. (2011). Foundations of Materials Science and Engineering, 5th Edition, Mc Graw Hill.
2. Ashby, M., Shercliff, H. and Cebon, D., A., (2007). Materials: engineering, science, processing, and design, Elsevier.
3. Ashby, M. and Jones, D.R.H. (2006). Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann.
4. Sharma, C.P. (2004). Engineering material properties and applications of metal and alloys, Prentice Hall, New Delhi.
5. Rajput, R.K. (2000). Engineering Materials. S. Chand & Companu, New Delhi

EMT 293/3
SIGNAL ANALYSIS

COURSE SYNOPSIS

This course aims to introduce students to the basics of signals and its analysis. To learn how certain input to a system will produce the required output. To understand signal spectra and the methods to analyze signal and its relations.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics and engineering fundamentals to solve the complex engineering problems in signal and system.



2. Ability to formulate and analyse complex engineering problems reaching substantiated conclusions in signal and system.
3. Ability to justify the need of signal and system, and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. Simon Haykin, Barry Van Veen "Signals and Systems", 2nd. Ed., Wiley, 2003
2. Bhagwandas Pannalal Lathi ,"Signal processing and linear systems", Oxford University Press, 2000
3. Charles L. Philips, John M. Parr, Eve A. Riskin, "Signals, Systems and Transforms", 3rd Ed., Prentice Hall International Edition, 2003
4. Fred J. Taylor, "Principles of Signals and Systems", McGraw Hill International Ed. 1994

EMT 294/3
PRINCIPLES OF OPTICS

COURSE SYNOPSIS

This course provides an introduction to Optics, specifically the classical optics as the foundation course to Advance Optics or the principle of photonics. It is a calculus and vector based course.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics and engineering fundamentals to solve the complex engineering problems in Optics.
2. Ability to construct and demonstrate appropriate techniques, resources, and modern engineering to solve complex engineering problems in optics.
3. Ability to justify the need for, and have the preparation of optics and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. Introduction to Optics, F. L. Pedrotti, L. M. Pedrotti, and L. S. Pedrotti, Third Edition, Benjamin Cummings (2006).
2. Jenkins, F.A. & White, H.E. Fundamentals of Optics (4th Ed.), McGraw-Hill, 2001.
3. Pain, H.J. The Physics of Vibration and Waves (6th Ed.), John Wiley & Sons, 2005.

EMT 295/3
QUANTUM MECHANICS

COURSE SYNOPSIS

This course provides an introduction to Quantum Physics from historical perspective and the barrier between classical and quantum approaches. It is a calculus, vector and differential equation based course. The understanding of quantum physics is the key foundation to understand the physics of semiconductor, advanced optics, photonic materials and devices, as well as the more advances photonic engineering courses.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in Quantum Mechanics.
2. Ability to act effectively as individual, and as a member or leader in diverse teams and in multidisciplinary settings to solve quantum mechanics problems.
3. Ability to justify the need for the need for, and have the preparation of quantum mechanics and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. A. Yariv, P. Yeh, "Photonics", Oxford University Press; 6th ed. 2006.
2. Liboff R.L. Introductory Quantum Mechanics, Addison Wesley, 2002.
3. A.C. Phillips, "Introduction to Quantum Mechanics", John Wiley & Sons, 2003.
4. A. Ghatak, "Optics", McGraw-Hill, 1 ed. 2009.
5. Pedrotti, "Introduction to Optics 3rd Edition". Addison Wesley, 2007

EMT 297/3
PHYSICS OF SEMICONDUCTOR

COURSE SYNOPSIS

Introduction to semiconductor devices and technology, energy bands and carrier concentration in thermal equilibrium, carrier transport phenomena, p-n junction, bipolar transistor, MOS diode and MOSFET.

COURSE OUTCOMES

1. Ability to apply and value necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in semiconductor physics.
2. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in semiconductor physics using first principles of mathematics, natural sciences and engineering sciences.

3. Ability to recognize the need for, and have the preparation and engage in independent and life-long learning of semiconductor physics in the broadest context of technological change.

REFERENCES

1. S. M. Sze, K. K. Ng, Physics of semiconductor devices, John Wiley, 2007, USA.
2. F. P. Robert Advanced Semiconductor Fundamentals, 2nd ed. 2003, Prentice Hall, USA.
3. Peter Y. Yu, M. Cardona, Fundamental of Semiconductors: Physics and materials properties (advanced text in physics), Springer-Verlag, 2001, Germany.
4. G. G. Streetman, S. K. Banerjee, Solid State Electronic Devices, Prentice Hall, 2006, USA.
5. K. Kramer, W. Nicholas, G. Hitchon, Semiconductor Devices: A Simulation Approach, Prentice Hall, 1997, USA.
6. D. A. Neamen, Semiconductor physics and devices, McGraw hill, 3rd ed. 2003, USA.

EMT 352/3
ADVANCED DEVICES

COURSE SYNOPSIS

This course provides extension knowledge on the operation of conventional MOSFETs and BJTs, including investigation of the physical mechanisms underlying the delays and speed limitations of the devices. Moreover, since advances in the electronic industry are rapid and fascinating, the aim of this course is to give sufficient background knowledge on the functioning of different semiconductor devices such as MESFETs, HEMTs, FinFETs, HBTs and BiCMOS.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in advanced electronic devices.
2. Ability to design, conduct and evaluate investigations of complex problems using research-based knowledge and research methods in advanced electronic devices to provide valid conclusions.
3. Ability to recognize and explain the need for, and have the preparation and engage in independent and lifelong learning in the broadest context of technological change in advanced electronic devices.

REFERENCES

1. B. G. Streetman, S. Banerjee, Solid State Electronic Devices, Prentice Hall International Editions.
2. Y. Tsividis, C. McAndrew, Operation and Modeling of the MOS Transistor, Oxford University Press.
3. S. M. Sze, K. K. Ng, Physics of Semiconductor Devices, John Wiley & Sons.
4. M. Shur, Physics of Semiconductor Devices, Prentice Hall.

EMT 353/3
DIGITAL INTEGRATED CIRCUIT DESIGN

COURSE SYNOPSIS

This course provides the students an exposure to hardware modelling using Verilog Hardware Description Language, as a means of design entry, simulation and verification of digital circuits. The ModelSim software is used.

COURSE OUTCOMES

1. Ability to apply necessary knowledge of an engineering fundamentals and engineering specialization to create solution of complex engineering problems in Digital IC Design.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in Digital IC Design that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to design and conduct investigations of complex problems using research-based knowledge and research methods in Digital IC Design to provide valid conclusions.

REFERENCES

1. Ciletti M. D., "Verilog 2001 for Beginners", Compiled by Norina Idris et al., Prentice Hall, 2008.
2. Ciletti M. D., "Modelling, Synthesis and Rapid Prototyping with the Verilog HDL", Prentice Hall, 1999.
3. Palnitkar S., "Verilog HDL, A Guide To Digital Design And Synthesis", Prentice Hall, 2003.
4. Vahid F. and Lysecky R., "Verilog for Digital Design", John Wiley & Sons, Inc., 2007.
5. Katz R. H. and Borriello G., "Contemporary Logic Design", 2nd Edition, Prentice Hall, 2005.

EMT 355/3
MICROCONTROLLER

COURSE SYNOPSIS

The aim or this course is to study the concept and requirement of embedded system. This includes the characteristic of embedded system, hardware and software development, single chip



microcontroller and programming technique in assembly language and C, basic multitasking concept, developing and embedded system application.

COURSE OUTCOMES

1. Ability to apply necessary knowledge of mathematics, engineering fundamentals and an engineering specialization to create the solution of complex engineering problems in Microcontroller.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in Microcontroller that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in Microcontroller

REFERENCES

1. Muhammad Ali Mazidi & Janice Gillispie Mazidi,The 8051 Microcontroller and Embedded Systems, Prentice Hall 2000
2. W. Kleitz, Microprocessor and Microcontroller Fundamentals: The 8085 and 8051 Hardware and Software, Prentice Hall, 1998.
3. James W. Stewart & Kai X. Miao, The 8051 Microcontroller: Hardware, Software and Interfacing, Prentice Hall 2nd Ed. 1999

EMT 357/3
FUNDAMENTAL OF MICROELECTRONIC FABRICATION

COURSE SYNOPSIS

This introductory course on microelectronic fabrication focuses on the concept and the basics of semiconductor materials, process technology and the fabrication processes of Integrated Circuits (ICs). Topics covered in this course are as follow Introduction to Microelectronic Fabrication, Cleanroom Technology, Safety & Protocol, Basics of Semiconductor, Wafer Manufacturing, Semiconductor Materials, Wafer Cleaning, Thermal Processes I: Oxidation, Thermal Processes II: Diffusion, Thermal Processes III: Ion Implantation & Annealing, Photolithography I, Photolithography II, Metallization I : CVD, Metallization II : PVD and Etching.

COURSE OUTCOMES

1. Ability to apply and value necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in microelectronic fabrication.
2. Ability to to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in microelectronic fabrication.
3. Ability to recognize the need for, and have the preparation and engage in independent and life-long learning of microelectronic fabrication in the broadest context of technological change.

REFERENCES

1. Hong Xiao. (2001). Introduction to Semiconductor Manufacturing Technology. Prentice Hall.
2. Peter Van lant. (2000). Microchip Fabrication: A Practical Guide to Semiconductor Processing. Mc Graw Hill.
3. Campbell, S. A. (2001). Science And Engineering of Microelectronics Fabrication. New York: Oxford University Press.
4. Handbook of Contamination Control in Microelectronics - Principle, Applications and Technology. Edited by Tolliver, D. (1998). Noyes Publications.
5. Introduction to Microelectronic Fabrication, Volume V, Second Edition, Richard C. Jaeger, Prentice Hall, 2002.
6. Semiconductor Devices, Physics and Technology, 2nd Edition, S.M. Sze, John Wiley & Sons, Inc, 2002.
7. Silicon VLSI Technology: Fundamentals, Practice and Modelling, James D. Plummer, Michael D. Deal and Peter B. Griffin, Prentice Hall, 2000.

EMT 358/3
COMMUNICATION ENGINEERING

COURSE SYNOPSIS

This course will cover all the basic principles and concepts of analogue and digital communication including the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and medium. In addition, introductions to signal propagations and calculations of signal to noise ratio are also introduced to relate the students with real world applications.

COURSE OUTCOMES

1. Ability to explain necessary knowledge of mathematics, natural science, engineering fundamentals

and an engineering specialization to the solution of complex engineering problems in analog and digital communication system.
2. Ability to to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in analog and digital communication system using mathematics, natural sciences and engineering sciences.
3. Ability to to function effectively as individual, and as a member or leader in diverse teams and in multidisciplinary settings to solve communication engineering problem.

REFERENCES

1. Wayne Tomasi," Electronic Communication System, Fundamental Through Advanced", 5th Ed. Pearson Prentice Hall,2004
2. Paul Young, Electronics Communications Techniques, 5th Edition, Prentice Hall, 2004
3. Mullet, "Basic Telecommunications: The Physical Layer", Thomson Learning, 2003.
4. S. Haykin, "Communication Systems", 5th Ed. Wiley, 2009.
5. B.P. Lathi, Zhi Ding, "Modern Digital and Analogue Communication Systems", 4th Ed. Oxford Univ Press, 2009.
6. A.B.Calson, P. Crilly, "Communication Systems", 5th Ed. McGraw Hill, 2009.

EMT 360/3
CONTROL ENGINEERING

COURSE SYNOPSIS

This is an introduction course to control systems engineering. Students will be exposed to the mathematical modelling for mechanical, electrical as well as electro-mechanical systems using transfer functions, signal-flow graphs and Mason's rule. They will conduct system performance analysis in time and frequency domain. System stability will also be studied along with root locus analysis. Finally the students will be introduced to system compensation design using PID and lead-lag controllers. The laboratory sessions will be conducted to enable the students to test the theory.

COURSE OUTCOMES

1. Ability to apply and determine necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in Control Engineering.
2. Ability to design solutions for complex Control Engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings to solve Control Engineering problem.

REFERENCES

1. Modern Control Systems 11th Edition, Richard C. Dorf and Robert H. Bishop, 2008
2. Control Systems Engineering 4th Edition, Norman S. Nise, John Wiley & Sons, 2004.
3. Modern Control Engineering 5th Edition, Ogata K., Prentice Hall, 2010
4. Automatic Control Systems Farid Golnaraghi and Benjamin Kuo, 2009.
5. Stubberud, I. William, J. DiStefano, "Schaum's Outline of Feedback and Control Systems", 4th Ed. McGraw Hill, 2006.

EMT 363/3
VLSI DESIGN

COURSE SYNOPSIS

This course will cover various important elements for VLSI design such as sequential circuit, clock tree, wire interconnect and power dissipation and low power design.

COURSE OUTCOMES

1. Ability to apply necessary knowledge of an engineering fundamentals and engineering specialization to create solution of complex engineering problems in VLSI Design.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in VLSI Design that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to estimate the need for, and have the preparation of VLSI Design and engage in independent and lifelong learning in the broadest context of technological change

REFERENCES

1. Niel H.E. Waste, David Harris (2005). CMOS VLSI Design: A Circuits and Systems Perspective, 3rd Edition Addison Wesley.
2. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic (2003). Digital Integrated Circuits: A Design Perspective. 2nd Edition. Prentice Hall.

3. Keating and Pierre Bricaud (2002). Reuse Methodology Manual for System-on-a-Chip Designs. 3rd Edition. Springer.
4. Surviving the SOC Revolution - A Guide to Platform-Based Design (1999). by Henry Chang, Lee Todd, Andrew McNelly, Grant Martin, Merrill Hunt, Larry Cooke. 1st Edition Springer
5. Wayne Wolf. (2002). Modern VLSI Design: System-on-Chip Design. 3rd ed. Prentice Hall PTR.

EMT 367/3
MICROELECTRONIC FABRICATION

COURSE SYNOPSIS

This course focuses on the fabrication process module of the CMOS technology. The students should be able to design, produce a mask, prepare the runcard (process flow of the MOSFET), fabricate the MOSFET, analyse and characterise the devices electrically. The students should also able to understand the important CMOS process modules such as well technology, isolation technology, multi level interconnect technology as well as related device issues mainly associated with the device miniaturisation.

Topics covered in this course are as follow:

1. Microelectronic fabrication overview
2. Standard CMOS process flow and cross section
3. CMOS process sub-integration module:
   i) Well technology
   ii) MOS device isolation technology
   iii) Gate oxide integrity and characterisation,
   iv) Multilevel interconnect technology (metallisation and multilevel dielectrics, planarisation, contact and via),
   v) MOS scaling effect; short channel effect, hot carrier effect, device characterisation;
   vi) IV and CV test.

COURSE OUTCOMES

1. Ability to design solutions for complex engineering problems and design systems, components or processes in final year project that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations in microelectronic fabrication.
2. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in microelectronic fabrication.
3. Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

REFERENCES

1. Hong Xiao. (2001). Introduction to Semiconductor manufacturing Technology. Prentice Hall.
2. Michael Quirk & Julian Serba. (2001). Semiconductor Manufacturing Technology. Prentice Hall.
3. S.Wolf & R.N. Tauber. (1986). Silicon processing for the VLSI Era – Volume 1 Process Technology.
4. S.Wolf & R.N. Tauber. (1986). Silicon processing for the VLSI Era – Volume 2 Process Integration.
5. S.Wolf & R.N. Tauber. (1986). Silicon processing for the VLSI Era – Volume 3 Submicron MOSFET.

EMT 368/3
RELIABILITY AND TESTABILITY IN INTEGRATED CIRCUIT DESIGN

COURSE SYNOPSIS

This course is basically divided into two areas: Reliability & testability. In the first section of Reliability, students will learn the concept of Reliability, its terms & definitions, the different types of Reliability Distributions and also the different types of Reliability Prediction Techniques. In the second section, which is testability, students will be exposed to overview of testing; components of design for testability such as ad hoc techniques, scan-path design, boundary scan testing (BScan) and built in self test (BIST).

COURSE OUTCOMES

1. Ability to explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems in Integrated Circuit Design Reliability and Testability.
2. Ability to function effectively as individual, and as a member or leader in diverse teams and in multidisciplinary settings to solve Integrated Circuit Design Reliability and Testability problem.
3. Ability to assess the need for, and have the preparation of Integrated Circuit Design Reliability and Testability and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. Parag K. Lala,Digital Circuit Testing and Testability, MO: Academic Press, 2002.

2. William K. Lam, Hardware Design Verification: Simulation and Formal Method-Based Approaches, Prentice Hall, 2005.
3. Janick Bergeron, Writing Testbenches: Functional Verification of HDL Models, Kluwer, 2003.
4. Alessandro Birolini, Reliability Engineering Theory and Practice, Springer (India), 2006.

EMT 369/3
POWER ELECTRONIC

COURSE SYNOPSIS

EMT 369 introduces Power Electronics as a Multidisciplinary & Interdisciplinary Applications Orientated Technology emphasising the main criterion of energy efficiency. AC-DC, AC-AC, DC-DC and DC-AC converter performance, including waveform analysis, is developed from theory. EMT 369 gives overview different types of power semiconductor devices and their switching characteristics and also covers the operation, characteristics and performance parameters of controlled rectifiers.

COURSE OUTCOMES

1. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in Power Electronic using first principles of mathematics, natural sciences and engineering sciences.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in Power Electronic that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to assess the need for, and have the preparation of Power Electronic and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. Mohan, Undeland, Robbins. (1995). Power Electronics: Converters, Applications & Design. 2nd ed. John Wiley and Sons, Inc.
2. Cyril W. Lander. (1993). Power Electronics. 3rd ed. McGraw-Hill.
3. Daniel W. Hart (1997), Introduction to Power Electronics, Prentice Hall International.
4. J.S. Chitode (2007), Power Electronics, Technical Publications Pune.
5. Issa Batarseh (2004), Power Electronic Circuits, John Wiley & Sons, Inc.

EMT 381/382/383/3
MICROELECTRONIC/ELECTRONIC/ PHOTONIC DESIGN PROJECT

COURSE SYNOPSIS

An exposure to the students in integrated design project. This project encompasses practical, innovation and invention elements in designing a solution to a specific engineering application. The students are expected to implements the knowledge and skills obtained in solving the specific engineering problem. The students are also need to practice their professional and social responsibilities in giving a sustainable solution via functioning in a multidisciplinary team.

COURSE OUTCOMES

1. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in Microelectronic/ Electronic/ Photonic Design Project using mathematics, natural sciences and engineering sciences.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in Microelectronic/Electronic/Photonic Design Project that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to conduct investigations of complex problems using research-based knowledge and research methods in Microelectronic/ Electronic/Photonic Design Project to provide valid conclusions.
4. Ability to apply reasoning informed by contextual knowledge in Microelectronic/ Electronic/ Photonic Design Project to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
5. Ability to understand and evaluate the sustainability and impact of professional engineering work in Microelectronic/ Electronic/ Photonic Design Project for the solution of complex engineering problems in societal and environmental contexts.
6. Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings to solve Microelectronic/ Electronic/ Photonic Design Project problem.
7. Ability to explain through effective communication on complex engineering activities related to Microelectronic Design Project with the engineering community and with society at large.



8. Ability to demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these in Microelectronic/Electronic/ Photonic Design Project.

EMT 393/3
ADVANCED OPTICS

COURSE SYNOPSIS

This course is intended to present essential of optics. Topics studied include light characters, light paths in several guides and interaction of photons with semiconductors. Various theories relating to optics such as light polarization, interferences, coupling and interfacing of photons with semiconductor crystals are introduced. Students will have the opportunity for analysis and simulation of waveguides, resonators and photonic crystals. In addition, the latest trend in optics also incorporated in this course

COURSE OUTCOMES

1. Ability to identify, formulate and analyse complex engineering problems reaching substantiated conclusions in advanced optics using first principles of mathematics, natural sciences and engineering sciences.
2. Ability to design and conduct investigations of complex problems using research-based knowledge and research methods in advanced optics to provide valid conclusions.
3. Ability to explain through effective communication on complex engineering activities related to advanced optics with the engineering community and with society at large.

REFERENCES

1. B.E.A. Saleh, "Fundamental of Photonics", Wiley-Interscience, 2007.
2. Jenkins, F.A. & White, H.E. Fundamentals of Optics (4th Ed.),McGraw-Hill, 2001

EMT 394/3 PHOTONIC MATERIALS & DEVICES

COURSE SYNOPSIS

This course is related to the materials used for photonics devices which involve fundamental understanding on optics in its first initial part, followed with physics of the photonics materials and finally a few examples of photonics devices with understanding on the operation.

COURSE OUTCOMES

1. Ability to to identify, formulate, and analyse complex engineering problems reaching substantiated conclusions in Photonic Materials and Devices using fundamental principles of mathematics, natural sciences and engineering sciences.
2. Ability to to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in Photonic Materials and Devices.
3. Ability to to perform effectively as individual, and as a member or leader in diverse teams and in multidisciplinary settings to solve Photonic materials Devices problems.

REFERENCES

1. B.E.A. Saleh, "Fundamental of Photonics", Wiley-Interscience, 2007.
2. Jenkins, F.A. & White, H.E. Fundamentals of Optics (4th Ed.),McGraw-Hill, 2001

EMT 395/3
PHOTONIC FABRICATION ENGINEERING

COURSE SYNOPSIS

This course is intended to give a broad understanding of various microfabrication techniques used in photonic and optoelectronic components. It covers epitaxial growth, lithography and processing steps of compound semiconductors frequently used in micro/nano-fabrication of optical and optoelectronic devices. Fabrication of waveguides and laser diodes and various integration techniques are also discussed.

COURSE OUTCOMES

1. Ability to apply necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems in photonic fabrication.
2. Ability to design and conduct investigations of complex problems using research-based knowledge and research methods in photonic fabrication to provide valid conclusions.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in photonic fabrication.

REFERENCES

1. Marc J. Madou, "Fundamentals of Microfabrication: The Science of Miniturization", Taylor & Francis Limited, 2011.
2. Hong Xiao, "Introduction to Semiconductor Manufacturing Technology" (SPIE Press) (2011).
3. Donald C. O'Shea, Thomas J. Suleski, Alan D. Kathman, Dennis W. Prather, "Diffractive Optics:

Design, Fabrication, and Test", SPIE Publications (December 29, 2003).
4. Alan R. Mickelson, Nagesh R. Basavanhally, Yung-Cheng Lee, "Optoelectronic Packaging" (Wiley Series in Microwave and Optical Engineering) (1997).
5. Sheng Liu and Xiaobing Luo, "LED Packaging for Lighting Applications: Design, Manufacturing, and Testing" Wiley; 1st edition (July 5, 2011).

EMT 396/3
PRINCIPLES OF INTEGRATED CIRCUIT DESIGN

COURSE SYNOPSIS

This course provides the students an exposure to the fundamentals of transistor-level CMOS integrated circuit (IC) design. The course starts with an overview of IC design that covers the basic logic circuits and the Netlist representation of circuits. Next, the students are introduce to the transistor-level schematic designs and proceed with the stick diagram, layout design, layout simulation of integrated circuits, as well as basic integrated circuits design techniques.

COURSE OUTCOMES

1. Ability to apply and decide the necessary knowledge of mathematics, engineering fundamentals and engineering specialization respectively to the solution of complex engineering problems in principle of integrated circuit design.
2. Ability to decide and conduct investigations of complex problems related to the principle of integrated circuit design using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
3. Ability to perform effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings to solve integrated circuit design problems.

REFERENCES

1. Wolf, Rabeay, Jan M. Weste, Neil H.E, Compiled by Norina Idris, Norhawati Ahmad, Rizalafande Che Ismail, Muammar Mohamad Isa, Siti Zarina Md. Naziri, Muhammad Imran Ahmad, "CMOS VLSI; A Design Perspective", Pearson, 2008.
2. R. Jacob Baker, "CMOS Circuit Design, Layout, and Simulation, 3rd Edition (IEEE Press Series on Microelectronic Systems)", Wiley-IEEE Press, 2010.
3. Neil Weste, David Harris, "CMOS VLSI Design: A Circuits and Systems Perspective, 4th Edition", Addison Wesley, 2010.
4. Wayne Wolf, "Modern VLSI Design: IP-Based Design, 4th Edition", Prentice Hall, 2009.
5. Yuan Taur, Tak H. Ning, "Fundamentals of Modern VLSI Devices, 2nd Edition", Cambridge University Press, 2009.

EMT 445/2
FINAL YEAR PROJECT

COURSE SYNOPSIS

An exposure to the students in microelectronic/electronic/photonic based research project.

COURSE OUTCOMES

1. Ability to apply and summarize necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems in final year project.
2. Ability to design and recommend solutions for complex engineering problems and design systems, components or processes in final year project that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to design, recommend and conduct investigations of complex problems using research-based knowledge and research methods in final year project to provide valid conclusions.
4. Ability to demonstrate and describe knowledge and understanding of engineering management principles and economic decision-making in multidisciplinary environments.

REFERENCES

Based on project title.

EMT 446/4
FINAL YEAR PROJECT

COURSE SYNOPSIS

An exposure to the students in microelectronic/electronic/photonic based research project.

COURSE OUTCOMES

1. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in final



year project using first principles of mathematics, natural sciences and engineering sciences.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in final year project that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to conduct investigations of complex problems in final year project using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
4. Ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions in final year project.
5. Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change in final year project.

REFERENCES

Based on project title

EMT 454/3
NANOELECTRONIC ENGINEERING

COURSE SYNOPSIS

The aim of this course is to study the underlying physical principles, the fabrication technologies, and applications of a broad range of nanoelectronic devices. This includes device scaling of standard MOSFETs into nanoscale dimensions, electron transport and quantum effects in nanostructures and their applications, nanocharacterization, and nanofabrication methods (e.g., submicron optical lithography and electron-beam lithography).

COURSE OUTCOMES

1. Ability to apply and determine necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problem in nanoelectronic engineering.
2. Ability to function effectively as an individual, and as a member or leader in diverse teams and on multi-disciplinary settings.
3. Ability to recognize the needs for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

REFERENCES

1. J. H. Davies, The Physics of Low-Dimensional Semiconductors: An Introduction, Cambridge University Press.
2. Y. Tsividis, C. McAndrew, Operation and Modeling of the MOS Transistor, Oxford University Press.
3. V. V. Mitin, V. A. Kochelap, M. A. Stroscio, Introduction to Nanoelectronics – Science, Nanotechnology, Engineering, and Applications, Cambridge University Press.

EMT 462/3 OPTOELECTRONIC SYSTEM

COURSE SYNOPSIS

The students studying this course will develop a basic understanding of the principles and practices of modern optoelectronic device includes fibre optic, semiconductor laser, photodiode and LED. The important functions for applications for these optoelectronic devices will acquire in optoelectronic system such as optical communication and display technology. Practical skills by using software in optical fibre systems and measurement will also be acquired.

COURSE OUTCOMES

1. Ability to apply necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in optoelectronic system..
2. Ability to design solutions for complex engineering problems and design systems, components or processes in optoelectronic system that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings to solve optoelectronic system problem.

REFERENCES

1. John Wilson and John Hawkes, Opto-Electronics: An Introduction, 3rd Edition, Prentice-Hall, 1998.
2. S.O. Kasap.Optoelectronics and Photonics, Principles and Practices, Prientice Hall, 2001.

3. Amnon Yariv, Pochi Yeh, Photonics: Optical electronics in Modern Communications, 2007.
4. Ghatak and Thyagarajan, Introduction to Fiber Optics, Cambridge University Press, 1998.
5. John M. Senior, Optical Fiber Communications; Principles and Practice, 2nd Edition, Prentice-Hall, 1992.

EMT 463/3
MEMS DESIGN AND FABRICATION

COURSE SYNOPSIS

The aim of this course is to provide the introduction and overview of MEMS market, scaling laws, MEMS devices and applications, MEMS materials and fabrication methods, and basic MEMS concepts including pressure and acceleration.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in MEMS.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in MEMS that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in MEMS.

REFERENCES

1. Nadim Maluf & Kirt Williams 'An Introduction to Microelectromechanical Systems Engineering",2nd edition, Artech House Inc, 2004
2. Tai-Ran Hsu, MEMS and Microsystems; Design and Manufacture, Boston, McGraw Hill 2000
3. Hong Xiao, Introduction to Semiconductor Manufacturing Technology, Prentice Hall, 2001
4. Tai-Ran Hsu. MEMS Packaging (2004). EMIS Processing Series 3. INSPEC.
5. James J. Allen. Micro Electro Mechanical System Design (2005). CRC Press. Taylor & Francis Group.

EMT 470/3
SEMICONDUCTOR PACKAGING

COURSE SYNOPSIS

Students will be exposed to Microsystems packaging, the role of packaging in microelectronics, fundamental of IC assembly, general semiconductor process flow, design for reliability, thermal management, sealing and encapsulation, packaging material and processes, and latest packaging technology trend via latest scientific papers. The students will also be exposed to identifying critical packaging parameters and interpreting data of their own designed experiment. Mathematical modelling in packaging are also introduced.

COURSE OUTCOMES

1. Ability to apply and determine necessary knowledge of science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in semiconductor packaging.
2. Ability to identify, formulate and analyse complex engineering problems reaching substantiated conclusions in semiconductor packaging using principles of mathematics, natural sciences and engineering sciences.
3. Ability to design and conduct investigations of complex problems using research-based knowledge and research methods in semiconductor packaging to provide valid conclusions.

REFERENCES

1. Rao Tummala. 2001. Fundamentals of Microsystem Packaging. Mc-Graw Hill Professional.
2. M. Datta, T.Osaka, J.W Schultze (Editor). 2005. "Microelectronic Packaging". CRC Press, Florida U.S
3. Glenn R. Blackweel, 2000. "The Electronic Packaging Handbook". CRC Press LLC. Florida U.S.
4. William D. Brown (Editor). 1999," Advanced Electronic Packaging with Emphasis on Multichip Modules", IEEE Press Series on Microelectronics Systems. The Institute of Electrical and Electronics Engineers, Inc. New York.

EMT 475/3
COMPUTER ORGANIZATION AND ARCHITECTURE

COURSE SYNOPSIS

This subject will focus on the computer system with various designs of interface techniques, organization and architecture. The syllabus will covered the theory of basic computer system, format of instruction set, memory organization and arithmetic logic unit as well as certain



issues of designing such as bus structure, parallel processing, pipelining and memory management.

COURSE OUTCOMES

1. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in Computer Organization and Architecture using first principles of engineering sciences.
2. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in Computer Organization and Architecture.

REFERENCES

1. William Stallings "Computer Organization and Architecture: Designing for Performance", 8th Edition, Prentice Hall, 2010
2. John L. Hennessy and David A. Patterson "Computer Architecture: A Quantitative Approach", 4th Edition, Morgan Kaufmann, 2006
3. Linda Null "The Essentials of Computer Organization and Architecture", Jones & Bartlett Pub., 2006
4. Miles J. Murdocca and Vincent P. Heuring "Computer Architecture and Organization: An Integrated Approach", Wiley, 2007

EMT 478/3
INSTRUMENTATION

COURSE SYNOPSIS

This course covers the fundamental of electronic instrumentation. This includes the working principle and transduction properties of sensors and transducers. Importance and techniques of signal conditioning is emphasized. Element and principle of data acquisition and their applications are discussed. Modern stand-alone and computer-based measurement instruments are covered.

COURSE OUTCOMES

1. Ability to apply and interpret necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in electronic instrumentation.
2. Ability to identify, formulate, research literature and evaluate complex engineering problems reaching substantiated conclusions in electronic instrumentation using mathematics, natural sciences and engineering sciences.
3. Ability to assess the need for, and have the preparation of electronic instrumentation and engage in independent and lifelong learning in the broadest context of technological change.

REFERENCES

1. Kalsi, H.S. "Electronic Instrumentation", Tata McGraw-Hill Publishing Co. Ltd., 2005
2. C.S. Rangan, G.R. Sarmaand V.S. Mani. "Instrumentation Devices & Systems", Tata McrGraw-Hill Publishing Co. Ltd., 2004
3. A.K. Sawhneyand P. Sawhney. "A Course in Electronic and Electrical Measurement and Instrumentation", Dhanpat Rai & Co. (P) Ltd., 2001

EMT 479/3
ANALOG INTEGRATED CIRCUIT DESIGN

COURSE SYNOPSIS

The course covers MOS characteristics, Second order effects, Basic Cells, Single stage Amplifier, Differential amplifier, MOS Op amp and Op-amp Application.

COURSE OUTCOMES

1. Ability to apply and explain necessary knowledge of mathematics, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in Analogue IC Design.
2. Ability to design and recommend solutions for complex engineering problems and design systems, components or processes in Analogue IC Design that meet specified needs with appropriate consideration for environmental considerations.
3. Ability to design and conduct investigations of complex problems using research-based knowledge and research methods in Analogue IC Design including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

REFERENCES

1. Behzad Razavi, Design of Analogue CMOS Integrated Circuit, McGraw-Hill, 2000.
2. Phillip E. Allen, Douglas R. Holberg, CMOS Analogue Circuit Design, Oxford University Press, 2002.
3. Paul R. Gray, Analysis and Desgn of Analogue Integrated Circuit, 4th Ed, Wiley.

4. R. Jacob Baker, CMOS Circuit Design, Layout, and Simulation, Revised Second Edition Wiley-IEEE Press; 2nd edition, 2007,
5. Niel H.E. Waste, David Harris. CMOS VLSI Design: A Circuits and Systems Perspective, Addison Wesley, 4th edition, 2010

EMT 480/3
RELIABILITY & FAILURE ANALYSIS

COURSE SYNOPSIS

This course is basically divided into two areas: Reliability & Failure Analysis. In the first section of Reliability, students will learn the concept of Reliability, its terms & definitions, the different types of Reliability Distributions and also the different types of Reliability Prediction Techniques such as FMEA & FTA. In the second section of Failure Analysis, students will be exposed to the different types of FA techniques commonly conducted on a failed semiconductor device and the test instrumentation associated with each technique.

COURSE OUTCOMES

1. Ability to apply and determine necessary knowledge of science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems in semiconductor reliability and failure analysis.
2. Ability to identify, formulate, research literature and evaluate complex engineering problems reaching substantiated conclusions in semiconductor reliability and failure analysis using mathematics, natural sciences and engineering sciences.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in semiconductor reliability and failure analysis.

REFERENCES

1. Patrick O'Connor (2002). Practical Reliability Engineering, Wiley
2. Ebeling, C. E. (1997). Reliability and Maintainability Engineering, McGraw Hill
3. Lawrence C. Wagner, (1999). Failure Analysis of Integrated Circuits: Tools and Techniques. Kluwer Academic Publishers.
4. Perry L. Martin (1999). Electronic Failure Analysis Handbook.: McGraw Hill
5. E. Ajith Amerasekera and Farid N. Najm (1997). Failure Mechanisms in Semiconductor Devices. 2nd Ed.: John Wiley & Sons
6. Friedrich Beck (1998). Integrated Circuit Failure Analysis: A Guide to Preparation Techniques. : John Wiley & Sons

EMT 483/3
SYSTEM ON CHIPS

COURSE SYNOPSIS

To expose the student with system on chip design methodology, IP design and platform-based design. The student will be learned various important elements for succesfull system-on-chip design implementation such as design flow requirement, system performance evaluation and system integration issues.

COURSE OUTCOMES

1. Ability to apply knowledge of mathematics, engineering fundamentals and an engineering specialization to the solution of complex engineering problems in System-On-Chip.
2. Ability to design solutions for complex engineering problems and design systems, components that meet specified needs in System-on-Chip with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering tools to complex engineering problems in System-On-Chip.

REFERENCES

1. Michael J. Flynn, Wayne Luk, "Computer System Design: System-on-Chip", John Wiley & Sons, Aug 8, 2011.
2. Youn-Long Steve Lin, "Essential Issues in SOC Design: Designing Complex Systems-on-Chip", Springer, 2006.
3. Michael Hübner, Jürgen Becker, "Multiprocessor System-on-Chip: Hardware Design and Tool Integration", Springer, Nov 25, 2010.
4. Rochit Rajsuman, "System-on-Chip: Design and Test", Artech House 2000.
5. Niel H.E. Waste, David Harris (2011). Integrated Circuit Design, 4th Edition, Addison Wesley.

EMT 488/3 DIGITAL SIGNAL PROCESSING

COURSE SYNOPSIS

This course is a continuation from introduction to signal analysis course that will more emphasize to digital signal analysis. This course will cover the topics related to Discrete Time Signal, Fourier Transform, Sampling process, IIR and FIR digital filter design.



COURSE OUTCOMES

1. Ability to apply necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to create the solution of complex engineering problems in Digital Signal Processing.
2. Ability to identify, formulate, research literature and analyse in complex engineering problems reaching substantiated conclusions in Digital Signal Processing using first principles of mathematics, natural sciences and engineering sciences.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering tools to solve complex engineering problems in Digital Signal Processing.

REFERENCES

1. Sanjit K. Mitra, Digital Signal Processing, A Computer-Based Approach, 4/e., McGraw Hill, 2005.
2. Proakis and Manolakis, Digital Signal Processing, Pearson, 4/e, 2006.
3. Ifeachor & Jervis,Digital Signal Processing: A Practical Approach, 2/e, Prentice Hall, 2001.
4. C.T. Chen, Digital Signal Processing, Oxford 2001.
5. Richard G. Lyons, Understanding Digital Signal Processing (3rd Edition), Prentice Hall, 2010.

EMT 490/3
MICRO-ELECTRO-MECHANICAL-SYSTEMS

COURSE SYNOPSIS

This course will focus on design and simulation of MEMS devices. The design will include various of analysis types such as structural, electrical and mechanical while the fabrication technology will focus on bulk and surface micromachining. This course will also discuss the application and technology of MEMS packaging in various fields.

COURSE OUTCOMES

1. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in MEMS using first principles of mathematics, natural sciences and engineering sciences.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in MEMS that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in MEMS.

REFERENCES

1. Chang Liu. Foundation of MEMS. Pearson International Edition (2006). Prentice Hall.
2. Tai-Ran Tsu. MEMS & Microsystems Design and Manufacture (2002). McGraw Hill.
3. Tai-Ran Hsu. MEMS Packaging (2004). EMIS Processing Series 3. INSPEC.
4. James J. Allen. Micro Electro Mechanical System Design (2005). CRC Press. Taylor & Francis Group.
5. Hong Xiao, Introduction to Semiconductor Manufacturing Technology, Prentice Hall, 2001

EMT 491/3
OPTICAL DESIGN

COURSE SYNOPSIS

To expose students to optical components and system design. The course covers Basic Optics & Optical System Specifications, Stops, Pupils, and Other Basic Principles, Diffraction, Aberrations, and Image Quality, The Concept of Optical Path Difference, Review of Specific Geometrical Aberrations, Material Selection, Spherical and Aspherical Surfaces, Design Forms & Processes, Gaussian Beam Imagery, Illumination System Design and Tolerancing, Producibility, Evaluation & Manufacturing. Students will be familiar with design softwares.

COURSE OUTCOMES

1. Ability to explain necessary knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization solve of complex engineering problems in Optical Design.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in Optical Design that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to construct, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in Optical design.

REFERENCES

1. Robert F. Fischer, Bijana Tadic, "Optical System Design", McGraw-Hill Professional; 1st edition (2000).
2. W. J. Smith, "Modern Lens Design", 2nd ed., McGraw-Hill, (2005).

3. D. Malabar, & Z. Malacara, "Handbook of Optical Design", 2nd ed., Marcel-Dekker, (2004).
4. Warren J. Smith, "Modern Optical Engineering", McGraw-Hill Professional; 3rd edition (2000)

EMT 494/3
OPTICAL COMMUNICATION

COURSE SYNOPSIS

This course is intended to present essential concepts involved in optical communications. Topics studied include communication, networks and signal processing which are main system elements in transmitting and receiving data. Various issues relating to signals propagation in optical fibers such as dispersion compensation, amplification, attenuation and nonlinear effects are presented. Students will have the opportunity for analysis and simulation of optical communication systems and be exposed to the latest trend in optical communication and signal processing engineering.

COURSE OUTCOMES

1. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in Optical Communication using first principles of mathematics, natural sciences and engineering sciences.
2. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in optical communication.
3. Ability to describe knowledge and understanding of optical communication principles and economic decision-making in multidisciplinary environments.

REFERENCES

1. G.Keiser, "Optical Fiber Communications", McGraw Hill (2015).
2. G.P. Agrawal, "Lightwave Technology: Telecommunication Systems", J.Wiley (2005).
3. G.P. Agrawal, "Fiber-Optic Communication Systems", J.Wiley (2002).
4. J.M. Senior, "Optical Fiber Communications: Principles and Practices", Pearson (2008).
5. R. Ramaswami, "Optical Networks", Morgan Kauffman (2009).

EMT 496/3
MICRO-OPTICAL-ELECTRO-MECHANICAL-SYSTEMS

COURSE SYNOPSIS

This course is an introductory about MOEMS in term of fabrication and its systems. MOEMS is related with the integration of micro-optic and Micro-Electro-Mechanical system (MEMS) which involves sensing or manipulating optical signals on a very small size scale using integrated mechanical, optical, and electrical systems. Both of these two technologies independently involve in batch processing similar to integrated circuits, and micromachining similar to fabrication of microsensor.

COURSE OUTCOMES

1. Ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions in MOEMS using first principles of mathematics, natural sciences and engineering sciences.
2. Ability to design solutions for complex engineering problems and design systems, components or processes in MOEMS that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
3. Ability to create, select and apply appropriate techniques, resources, and modern engineering to solve complex engineering problems in MOEMS.

REFERENCES

1. Manouchehr E. Motamedi (Author, Editor), "MOEMS: Micro-Opto-Electro-Mechanical Systems" SPIE Publications (April 1, 2005).
2. P. Rai-Choudhury, "MEMS and MOEMS: Technology and Applications", SPIE Press, 2000



CAREER OPPORTUNITIES

There are a lot of demand for microelectronic, electronic & photonic engineers that are capable either in the private or government sectors, mainly in the field of designing, fabrication & IC testing. Job prospects and careers for graduates are definitely great.

Among the electronic, microelectronic and photonic graduates specific abilities and skills that can be undertaken as a career are:

- Semiconductor/Microelectronic fabrication
- IC Design for digital, analogue, mixed signals & RF-IC
- IC Layout Design, System On Chip for digital, analogue, mix signal and RF-IC.
- Mask design
- ASICs (Application Specific ICs) design & VLSI (Very Large Scale Integration)
- MEMS (Micro Electro Mechanical Systems) design
- Photonic design
- Design based on Verilog HDL / VHDL (Very High-Speed IC Hardware Description Language)
- Fast-prototype device for IC fabrication
- Device & process simulation
- Failure analysis & testing
- IC Packaging
- IC Testing
- Reverse-Engineering on ICs
- Optical Communications design

SCHOOL OF COMPUTER AND COMMUNICATION ENGINEERING

PROGRAMMES OFFERED

- Doctor of Philosophy (Ph.D.)
- Master of Science (Computer Engineering)
- Master of Science (Communication Engineering)
- Master of Science (Embedded System Design Engineering)
- Bachelor of Engineering (Hons.) (Computer Engineering)
- Bachelor of Engineering (Hons.) (Communication Engineering)
- Bachelor of Engineering (Hons.) (Computer Network Engineering)

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INTRODUCTION

The School of Computer and Communication Engineering was established on 30th April 2002. The School of Computer and Communication Engineering adheres to the philosophy that emphasizes the importance of setting up Coppermine integration of knowledge, skills and practices that make the concept a true appreciation of science. The foundations of knowledge combined with good values of life that intellectual culture can be fostered and digested to form a way of life that is dynamic, progressive and civilized.

Based on the philosophy, the curriculum and programmes offered at the School of Computer and Communication Engineering are continually reviewed and updated on an ongoing basis by:

- Taking into consideration the opinion, concluded the study results and feedback from the community, especially in industry.
- Fulfilling the requirements of the professional advisory boards such as the Institute of Engineers Malaysia and Board of Engineers Malaysia.
- Ensuring a balance of theory and practical expertise.
- Ensuring that learning is always at world-class level.

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BACHELOR OF ENGINEERING (HONOURS) (COMPUTER ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of Computer engineering or chosen field as demonstrated via career advancement.

PEO2:
Graduates who are members of and contribute to professional society.

PEO3:
Graduates who engaged in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in computer engineering discipline to solve the complex engineering problem

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to have entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate the understanding of project management and finance principles.

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (COMPUTER ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (97)	EKT101/4 Electric Circuit Theory	EKT119/3 Electric Circuit II		EKT242/3 Electromagnetic Theory	EKT322/4 Embedded Systems Design	EKT333/3 Modern Operating System	EIT 302/4 Industrial Training	EKT445/2 Final Year Project I	EKT446/4 Final Year Project II
	EKT120/4 Computer Programming	EKT104/4 Analog Electronic Circuits I	EKT214/4 Analog Electronic Circuits II	EKT232/3 Signals and Systems	EKT358/3 Communication Systems	EKT318/3 Modern Control Systems		EKT424/4 Real-Time Systems	EKT421/3 Software Engineering
	EKT102/3 Basic Electronic Engineering	EKT124/3 Digital Electronics I	EKT221/4 Digital Electronics II	EKT222/4 Microprocessor Systems	EKT336/3 Computer Networks	EKT360/3 Group Design Project		Program Elective I /3	Open Elective/3
		EKT 103/3 Electrical Engineering	EKT224/3 Algorithm and Data Structures	EKT212/4 Principle of Measurement and Instrumentation	EKT353/3 Principle of Digital Signal Processing	EKT303/4 Principle of Computer Architecture		Program Elective II /3	
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II						EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
	UUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra	EQT272/3 Probability and Statistic					
University Required (17)	UZWXXX/1 Co-curriculum	UZWXXX/1 Co-curriculum	UZWXXX/1 Co-curriculum		UVW312/2 English for Technical Communication	UUW224/2 Engineering Entrepreneurship		UUW235/2* Ethnic Relations UUW239/2** Malaysian Studies	UUW322/2 Thinking Skills
			UVW211/2^ English for General Purposes UVWXXX/2^^ Option Subjects		UUW233/2* Islam & Asia Civilisations (TITAS) UUW237/2** Malaysian Cultures	UVW410/2* University Malay Language UVW110/2** Basic Malay Language			
133	17	17	17	17	17	17	4	17	14

Total Units for Graduation 133 + 4 (Industrial Training) = 137

Elective I & II (select any 2 courses): EKT460 Image Processing, EKT465 Optical Communication Systems, EKT472 Object Oriented Programming
Open Elective (select 1 course): EKT450 Mobile Communication System, EKT434 Network Programming, EKT473 Introduction to Data Analytic, EKT474 Internet of Things

Notes: * Applicable for Local Students ** Applicable for Foreign Students
UVA111/2 Foundation English: Pre-requisite for UVW211/2 English for General Purposes, Applicable for MUET Band 2, IEC Level "Below Intermediate.
This course is offered in the **second semester** of the first year.
UVW211/2^ English for General Purposes: Applicable for MUET Band 3, IEC Level "Intermediate and above", UVA111/2 Foundation English Grade "C and above"
UVWXXX/2^^ Option Subjects : Applicable for MUET Band 4 and above, TOEFL "525 and above", IELTS "5.5 and above"

BACHELOR OF ENGINEERING (HONOURS) (COMMUNICATION ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of Communication engineering or chosen field as demonstrated via career advancement.

PEO2:
Graduates who are members of and contribute to professional society.

PEO3:
Graduates who engaged in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in communication engineering discipline to solve the complex engineering problem

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to have entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large

PO11:
A Recognition of the need for, and an ability to engage in life-long learning

PO12:
Demonstrate the understanding of project management and finance principles

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (COMMUNICATION ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (97)	EKT101/4 Electric Circuit Theory	EKT119/3 Electric Circuit II		EKT242/3 Electromagnetic Theory	EKT314/4 Electronic Instrumentation	EKT357/3 Digital Communications	EIT 302/4 Industrial Training	EKT445/2 Final Year Project I	EKT446/4 Final Year Project II
	EKT120/4 Computer Programming	EKT104/4 Analog Electronic Circuits I	EKT214/4 Analog Electronic Circuits II	EKT232/3 Signals and Systems	EKT343/4 Principle of Communication Engineering	EKT318/3 Modern Control Systems		EKT440/4 Telecommunication Switching & Network	EKT450/3 Mobile Communication Systems
	EKT102/3 Basic Electronic Engineering	EKT124/3 Digital Electronics I	EKT221/4 Digital Electronics II	EKT222/4 Microprocessor Systems	EKT341/4 Antenna and Propagation	EKT 360/3 Group Design Project		Program Elective I /3	Program Elective II /3
		EKT 103/3 Electrical Engineering		EKT212/4 Principle of Measurement and Instrumentation	EKT353/3 Principle of Digital Signal Processing	EKT303/4 Principle of Computer Architecture		EKT 441/4 Microwave Communication	
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II						EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
	UUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra	EQT272/3 Probability and Statistic					
University Required (17)	UZWXXX/1 Co-curriculum	UZWXXX/1 Co-curriculum	UZWXXX/1 Co-curriculum		UVW312/2 English for Technical Communication	UUW224/2 Engineering Entrepreneurship		UUW235/2* Ethnic Relations UUW239/2** Malaysian Studies	UUW322/2 Thinking Skills
			UVW211/2^ English for General Purposes UVWXXX/2^^ Option Subjects			UVW410/2* University Malay Language UVW110/2** Basic Malay Language			
			UUW233/2* Islam & Asia Civilisations (TITAS) UUW237/2** Malaysian Cultures						
133	17	17	16	17	17	17	4	18	14

Total Units for Graduation 133 + 4 (Industrial Training) = 137

Elective I & II: EKT467 Radar Engineering, EKT460 Image Processing, EKT465 Optical Communication Systems, EKT473 Introduction to Data Analytic, EKT474 Internet of Things

Notes: * Applicable for Local Students ** Applicable for Foreign Students
UVA111/2 Foundation English: Pre-requisite for UVW211/2 English for General Purposes, Applicable for MUET Band 2, IEC Level "Below Intermediate. This course is offered in the **second semester** of the first year.
UVW211/2^ English for General Purposes: Applicable for MUET Band 3, IEC Level "Intermediate and above", UVA111/2 Foundation English Grade "C and above"
UVWXXX/2^^ Option Subjects: Applicable for MUET Band 4 and above, TOEFL "525 and above", IELTS "5.5 and above"

BACHELOR OF ENGINEERING (HONOURS) (COMPUTER NETWORK ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates are leaders in the field of Computer Network engineering or chosen field as demonstrated through career advancement.

PEO2:
Graduates who are members and contribute to professional society.

PEO3:
Graduates who engaged in life-long learning or continuous education opportunities.

PEO4:
Graduates make contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineer.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in Computer Network engineering discipline to solve the complex engineering problem.

PO2:
Ability to identify, formulate and solve engineering problems.

PO3:
Ability to design a system, solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to have entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO08:
Ability to understand professional and ethical responsibilities and commitment to the society.

PO09:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (COMPUTER NETWORK ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (97)	EKT101/4 Electric Circuit Theory	EKT119/3 Electric Circuit II		EKT242/3 Electromagnetic Theory	EKT335/3 Principles of Computer Network	EKT355/4 Advanced Computer Network	EIT 302/4 Industrial Training	EKT445/2 Final Year Project I	EKT446/4 Final Year Project II
	EKT120/4 Computer Programming	EKT104/4 Analog Electronic Circuits I	EKT214/4 Analog Electronic Circuits II	EKT232/3 Signals and Systems	EKT358/3 Communication Systems	EKT318/3 Modern Control Systems		EKT433/4 Network Modelling	EKT434/3 Network Programming
	EKT102/3 Basic Electronic Engineering	EKT124/3 Digital Electronics I	EKT221/4 Digital Electronics II	EKT222/4 Microprocessor Systems	EKT303/4 Principle of Computer Architecture	EKT333/3 Modern Operating Systems		Program Elective I /3	Open Elective /3
		EKT 103/3 Electrical Engineering	EKT 224/3 Algorithm and Data Structures	EKT212/4 Principle of Measurement and Instrumentation	EKT353/3 Principle of Digital Signal Processing	EKT360/3 Group Design Project		Program Elective II /3	
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II						EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
	UUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra	EQT272/3 Probability and Statistic					
University Required (17)	UZWXXX/1 Co-curriculum	UZWXXX/1 Co-curriculum	UZWXXX/1 Co-curriculum		UVW312/2 English for Technical Communication	UUW224/2 Engineering Entrepreneurship		UUW235/2* Ethnic Relations UUW239/2** Malaysian Studies	UUW233/2* Islam & Asia Civilisations (TITAS) UUW237/2** Malaysian Cultures
			UVW211/2^ English for General Purposes			UVW410/2* University Malay Language			
			UVWXXX/2^^ Option Subjects		UUW322/2 Thinking Skills	UVW110/2** Basic Malay Language			
133	17	17	17	17	17	17	4	17	14

Total Units for Graduation 133 + 4 (Industrial Training)= 137

Open Elective : Any 4th Year subjects offered by the school or other schools.
Elective I & II : EKT 421 Software Engineering, EKT 460 Image Processing, EKT465 Optical Communication Systems, EKT 450 Mobile Communication System, EKT 473 Introduction to Data Analytic, EKT 474 Internet of Things

Notes: * Applicable for Local Students ** Applicable for Foreign Students
UVA111/2 Foundation English : Pre-requisite for UVW211/2 English for General Purposes, Applicable for MUET Band 2, IEC Level "Below Intermediate. This course is offered in the **second semester** of the first year.
UVW211/2^ English for General Purposes : Applicable for MUET Band 3, IEC Level "Intermediate and above", UVA111/2 Foundation English Grade "C and above"
UVWXXX/2^^ Option Subjects : Applicable for MUET Band 4 and above, TOEFL "525 and above", IELTS "5.5 and above"



LIST OF COURSES

- EKT 101/4 ELECTRIC CIRCUIT THEORY
- EKT 102/3 BASIC ELECTRONIC ENGINEERING
- EKT 103/3 ELECTRICAL ENGINEERING
- EKT 104/4 ANALOG ELECTRIC CIRCUITS 1
- EKT 119/3 ELECTRIC CIRCUIT II
- EKT 120/4 COMPUTER PROGRAMMING
- EKT 124/3 DIGITAL ELECTRONICS I
- EKT 212/4 MEASUREMENT AND INSTRUMENTATION
- EKT 214/4 ANALOG ELECTRONIC CIRCUITS II
- EKT 221/4 DIGITAL ELECTRONICS II
- EKT 222/4 MICROPROCESSOR SYSTEM
- EKT 224/3 ALGORITHM AND DATA STRUCTURES
- EKT 232/3 SIGNALS AND SYSTEMS
- EKT 242/3 ELECTROMAGNETIC THEORY
- EKT 303/4 PRINCIPLES OF COMPUTER ARCHITECTURE
- EKT 314/4 INSTRUMENTATION ELECTRONICS
- EKT 318/3 MODERN CONTROL SYSTEMS
- EKT 322/4 EMBEDDED SYSTEM DESIGN
- EKT 333/3 MODERN OPERATING SYSTEM
- EKT 335/3 PRINCIPLES OF COMPUTER NETWORK
- EKT 336/3 COMPUTER NETWORK
- EKT 341/4 ANTENNA AND PROPAGATION
- EKT 343/4 PRINCIPLES OF COMMUNICATION ENGINEERING
- EKT 353/3 PRINCIPLE OF DIGITAL SIGNAL PROCESSING
- EKT 355/4 ADVANCED COMPUTER NETWORK
- EKT 357/3 DIGITAL COMMUNICATION ENGINEERING
- EKT 358/3 COMMUNICATION SYSTEMS
- EKT 421/3 SOFTWARE ENGINEERING
- EKT 424/4 REAL TIME SYSTEM
- EKT 433/4 NETWORK MODELING
- EKT 434/3 NETWORK PROGRAMMING
- EKT 440/4 TELECOMMUNICATION SWITCHING AND NETWORKS
- EKT 441/4 MICROWAVE COMMUNICATION
- EKT 450/3 MOBILE COMMUNICATION SYSTEMS
- EKT 445/2 FINAL YEAR PROJECT I
- EKT 446/4 FINAL YEAR PROJECT II
- EKT 360/3 GROUP DESIGN PROJECT
- EIT 302/4 INDUSTRIAL TRAINING

COURSE SYLLABUS

EKT 101/4
ELECTRIC CIRCUIT THEORY

COURSE SYNOPSIS

Basically this introductory circuit course can be divided into two parts. Part I, consisting of chapter 1 through 4, is devoted to DC circuits. It covers fundamental laws and theorems, circuit analytical techniques, passive and active elements. Part 2, consisting of chapter 5 through 8, deals with AC circuits. It introduces phasors, sinusoidal steady state analysis, using previous analytical techniques under sinusoidal steady state excitation, RLC circuits, AC power calculations and power factor correction, rms values and three-phase balanced systems.

COURSE OUTCOMES

1. Ability to derive important equations to solve problems in DC circuits
2. Ability to analyze the first and second order circuits containing passive elements, DC sources and switches using differential equations.
3. Ability to calculate circuits' parameters containing sinusoidal steady-state sources using complex impedances and phasor representations.

REFERENCES

1. Alexander, C.K., Sadiku, M.N.O., Fundamentals of Electric Circuits, 4th Editions, McGraw-Hill, 2008
2. Nilsson, J.W., Riedel, S.A., Electric Circuits, 9th Edition, Prentice Hall, 2010
3. Irwin, J.D., Nelms, R.M., Basic Engineering Circuit Analysis, 9th edition, John Wiley, 2008
4. Robbins, A.H, Miller, W.C., Circuit Analysis : Theory and Practice , 4th edition,Thomson/Delmar Learning, 2006
5. Hyat, W.H., Durbin, S.M., Kimmerly, J.E., Engineering Circuit Analysis, 7th Edition, McGraw Hill, 2007

EKT 102/3
BASIC ELECTRONIC ENGINEERING

COURSE SYNOPSIS

This course will expose the students to the basic electronic devices. The topic covered including introduction to semiconductor: Atomic Structures, Semiconductors, Conductors, and Insulators, Covalent Bonds, Conduction in Semiconductor, N -Type and P-Type Semiconductor, the Diode, Biasing the Diode, Voltage-Current characteristic of a Diode, Diode Models, Testing a Diode.

Students will also expose to the diode application. The topic covered including Half-Wave Rectifiers, Full-Wave Rectifiers, Power Supply Filters and Regulations, Diode Limiting and Clamping Circuits, Voltage Multipliers, The Diode Data Sheet, Troubleshooting, Special Purpose Diodes: Zener Diodes, Zener Diode Applications, Varactor Diodes, Optical Diodes, Other Types of Diodes and Troubleshooting.

Bipolar Junction Transistors (BJT's) and various types of FET are also covered in this course. The topics including Transistor Structure, Basic Transistor Operation, Transistor Characteristic and parameters. The Transistor as an Amplifier, The Transistor as a Switch, Transistor Packages and Terminal Identification, Troubleshooting, Transistor Bias Circuits: The DC Operating Points, Voltage Divider Bias, Other Bias Methods. Field-Effect Transistor (FETs), The JFET, JFET Characteristic & parameters, JFET Biasing, The MOSFET, MOSFET Characteristic and Parameters, MOSFET Biasing, Troubleshooting.

COURSE OUTCOMES

1. Ability to **acquire** and **explain** the fundamental concept of electronic devices.
2. Ability to **identify** and **apply** the basic operation of electronic devices such as diode, BJT and FET transistors.
3. Ability to **analyze** basic biasing techniques for electronic devices and solve the circuit parameters.

REFERENCES

1. Floyd, T., "Electronic Devices", 8th Edition, Prentice Hall, 2007
2. Boylestad, R.L., "Electronic Devices and Circuit Theory", 10th Edition, Prentice Hall, 2008.
3. Grob Bernard, Schultz Mitchel E., Basic Electronics, Student Edition with Multisim, 5th Edition, McGraw-Hill 2002.
4. U.S. Bureau of Naval Personnel, Basic Electronics, Dover Publications 1973.
5. McWhorter G., Evans A.J., Basic Electronics, Master Publishing 2004.

EKT 103/3
ELECTRICAL ENGINEERING

COURSE SYNOPSIS

This subject will expose the students to the basic electrical machines, electronic instrumentation and measurement and power quality. For the electrical machines and machine control, the topics covered include the Power Transformers, DC machines and AC machines. General concepts and basic principle of operation for each electrical machine are covered includes the characteristics and performance analysis. For the instrumentation part, the topics covered include general DC and AC meters, DC and AC bridges and sensors and transducers. Constructions and principles of operation for each part are covered in this part. In addition to that students are exposed to the principle of power quality.



COURSE OUTCOMES

1. Ability to **define** and **explain** the concept of single-phase and three-phase system
2. Ability to **explain** and **apply** the concept of magnetism and electromagnetism
3. Ability to **define and explain** the fundamental, **analyze** the operation and application of electrical transformer
4. Ability to **define and explain** the fundamental, **compare** and **analyze** the operation and application of dc machines and ac machines with respects to their efficiency, equivalent circuits and losses

REFERENCES

1. Chapman S.J.,"Electric Machinery Fundamentals", Fourth Edition, 2005, McGraw Hill, Singapore.
2. Z.A. Yamayee & J.L. Bala, " Electromechanical Energy Devices & Power Systems", 1993, Wiley & Sons, USA.
3. Larry D. Jomes & A.F. Chin, "Electronics Instruments and Measurement", 1991, Prentice Hall, USA.
4. Edward Hughes, John Hiley, Keith Brown, Ian McKenzie-Smith, "Electrical and Electronic Technology",10th Edition, Jun 2008.
5. Austin Hughes, "Electric Motors and Drives: Fundamentals, Types and Applications", Third edition 2006.

EKT 104/4
ANALOG ELECTRIC CIRCUITS 1

COURSE SYNOPSIS

This course exposes the student the basic knowledge in analog electronic. The exposure encompases amplifier design based on bipolar and field effect transistors, for single and multi stage, power amplifier, frequency response analysis of amplifiers and also exposure to a few specialized device such as Shockley diodes, SCS, Diac, Triac, SCR, Optotransistor, LASCR and Optocouplers. Emphasis is placed on basic design aspects and applications. The course has been designed to provide basic analog electronic skilss covering theories and practicals.

COURSE OUTCOMES

1. Ability to **analyze** dc,small-signal analysis and frequency performance of basic configurations of amplifier(BJT and FET)
2. Ability to **design** basic configurations of BJT and FET amplifiers
3. Ability to **analyze** and **perform** simple design of classes A,B and AB of BJT and FET] power amplifiers in term of their frequency response, equivalent circuit, thermal management and gain

REFERENCES

1. Donald A. Neamen, 'Electronic Circuit Analysis and Design, 4th Ed., McGraw-Hill, 2010.
2. Boylestad, R.L., Nashelsky, L., 'Electronic Devices and Circuit Theory', 10th Ed., Prentice Hall, 2009.
3. Floyd, T., 'Electronic Devices', 8th Ed., Pearson Education, Inc, 2008.
4. Bogart, T.F., 'Electronic Devices and Circuits',6th Ed., Prentice Hall, 2004.
5. Adel S. Sedra, Kenneth C. Smith, 'Microelectronic Circuits', 6th Ed., Oxford University Press, 2009.

EKT 119/3
ELECTRIC CIRCUIT II

COURSE SYNOPSIS

This is a core subject. Students will expose to the circuit analysis using Laplace Transform, Fourier Series and Fourier Transform techniques. Students also should be able to explain the concept of frequency response of AC circuit and two port network.

COURSE OUTCOMES

1. Ability to **explain** and **analyze** special types of circuit such as two part networks.
2. Ability to **analyze** electric circuits using Laplace Transform, Fourier Series and Fourier Transform for the circuit comprising passive elements.
3. Ability to **explain** concepts of frequency response for AC circuits and **construct** Bode plot for various types of transfer function.

REFERENCES

1. Sadiku, M. N. O, Alexander, C. K., Fundamentals of Electric Circuits, Singapore, 4th ed., McGraw-Hill, 2009.
2. Nilsson, J. W. and Riedel, S.A., Electric Circuits, 9th ed, Prentice Hall, 2011.
3. Boylestad, R.L, Introductory Circuit Analysis, 12th ed., Prentice Hall, 2010.
4. Dorf, R.C., Svodoba, J.A., Introduction to Electric Circuits, 8th ed., John Wiley, 2010.
5. Robins, A.H., Miller, W.C., Circuit Analysis: Theory and Practise, 2nd ed., Delmar Learning, 2006.

EKT 120/4
COMPUTER PROGRAMMING

COURSE SYNOPSIS

One of the aspects of a good engineer is to have the capability of integrating the hardware and the software, thus an electronic engineer should be competence in programming. This course introduces basic programming using high level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with the programming tools such as organization chart, IPO chart, flowchart and pseudo code and then to implement them by developing C program.

COURSE OUTCOMES

1. Ability to define and describe programming concepts and principles.
2. Ability to apply GNU/Linux for coding, compiling, executing and debugging computer programs.
3. Ability to analyze and solve engineering related problems using computer programming techniques.
4. Ability to select suitable programming techniques and tools to design computer programs.

REFERENCES

1. Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2006.
2. Cheng, H., "C for Engineers and Scientists", McGraw Hill, 2010.
3. Hanly, J.R. and Koffman, E.B., "C Program Design for Engineers", 2nd Ed., Addison-Wesley, 2001.
4. Tan, H.H. and D'Orazio, T.B., "C Programming for Engineering & Computer Science", McGraw Hill, 1999.
5. Sprankle and Maureen, "Problem Solving and Programming Concepts" 7th Ed., Prentice Hall, 2006.

EKT 124/3
DIGITAL ELECTRONICS I

COURSE SYNOPSIS

This course covers the introduction and discussion of the fundamental of digital circuit design and analysis. The lecture and laboratory exercise covers the following topics: Boolean Algebra, Numbering System, Basic Logic Gates, Combinational Circuit Design, Timing Diagram, Bi-Stable Memory Device and Sequential Circuit Design.

COURSE OUTCOMES

1. Ability to **identify** different numbering systems and to understand basic theory of binary system.
2. Ability to **apply** method of minimizing Boolean functions for digital logic circuit.
3. Ability to **design** and **evaluate** combinational logic circuit in terms of Boolean Function.
4. Ability to **design** and **evaluate** sequential logic circuit in terms of Boolean Function.

REFERENCES

1. Rafikha Aliana A Raof, Norina Idris, Phaklen Eh Kan, Mohammad Nazri Md. Noor. (2006). Digital Electronics Design. 1st Edition. Malaysia: Prentice Hall.
2. Floyd. TL. (2006). Digital Fundamentals. 9th Edition. New Jersey: Prentice Hall.
3. Ronald J. Tocci. (2003). Digital Systems – Principles and Applications. 7th Ed. New Jersey: Prentice Hall.
4. M. Morris Mano. (2005). Digital Design. 3rd Edition. Prentice Hall.
5. Fundamentals of Digital Logic and Microcomputer Design. Fifth Edition. John Wiley & sons, Inc.

EKT 212/4
MEASUREMENT AND INSTRUMENTATION

COURSE SYNOPSIS

This course covers Theory and Constructional details of Analog instruments. In this course, sources of errors in Energy Meter and their compensation are included together with different types of Power Factor Meters. This course also discusses the use of Cathode ray Oscilloscope and the importance of their components.

COURSE OUTCOMES

1. Ability to **explain** the primary elements of measurement and instrumentation.
2. Ability to **acquire, analyze, interpret** and **compare** related measurement instrument and methods.
3. Ability to **apply** the knowledge of principles of measurement and instrumentations.
4. Ability to **acquire** experimental competence on selected instrument and measurement through laboratory experiments.

REFERENCES

1. A.K. Ghosh. Introduction to Measurement and Instrumentation 2nd Ed., Prentice Hall of India, 2007.
2. A.J. Diefenderfer. Principles of Electronic Instrumentation 3rd Ed., Thomson, 1994.
3. H.S. Kalsi. Electronic Instrumentation, Tata McGraw-Hill Publishing Company Limited, 2005.
4. C.S. Rangan, G.R. Sarma and V.S. Mani. Instrumentation Devices & Systems, Tata McGraw-Hill Publishing Company Limited, 2004.
5. A.K. Sawhney and P. Sawhney. A Course in Electronic and Electrical Measurement and Instrumentation, Dhanpai Rai & Co. (P) Ltd., 2001

EKT 214/4
ANALOG ELECTRONIC CIRCUITS II

COURSE SYNOPSIS

This course offers the students an exposure to the operational amplifier: Operation, differential amplifier, common-mode, parameters, basic op-amp, practical op-amp circuits, op-amp datasheet, applications of op-amp and frequency response and compensation; feedback circuits: Concepts and feedback, types of feedback connection, practical feedback circuit, feedback amplifier; Oscillator : basic operating principles of an oscillator, phase shift,



Wien bridge, crystal oscillator, uni-juction; action filters : basic filter, filter response characteristics, low-pass filter, high-pass filter, band-pass filter, band-stop filter, frequency response measurement, design of filter, Butterworth, chebchev and Elliptic; Voltage regulators : Basic series and basic shunt regulators, basic switching regulator, IC regulators and applications

COURSE OUTCOMES

1. Ability to **define** and **describe** the fundamental, application and feedback concepts of OP-AMP.
2. Ability to **describe** the operation, **compare, analyze** and **design** an amplifiers, oscillators and filters.
3. Ability to **describe** the basic concept, principle of voltage regulators and **explain** their applications in circuits.

REFERENCES

1. Floyd, T., 'Electronic Devices', 8th Ed., Pearson Education, Inc, 2008.
2. Boylestad, R.L., Nashelsky, L., 'Electronic Devices and Circuit Theory', 10th Ed., Prentice Hall, 2009.
3. Malvino, A. (1999). Electronic Principles. 6th ed. Mc Graw Hill.
4. Bogart, T.F., 'Electronic Devices and Circuits', 6th Ed., Prentice Hall, 2004.
5. Kasap S.O. 'Principles of Electronics Materials and Devicies', McGraw-Hill Science/Engineering/Math; 3rd Ed., 2005.

EKT 221/4
DIGITAL ELECTRONICS II

COURSE SYNOPSIS

This course exposes the students to the Combinational Logic System Design, Sequential System, Memory and Programmable Logic Devices, Register Transfer and Data path, Sequencing and Control as well as Computer Organization.

COURSE OUTCOMES

1. Ability to **illustrate** a digital system in Register Transfer Language (RTL) form.
2. Ability to **design** sequential systems using Finite State Machine (FSM) and Algorithmic State Machine (ASM).
3. Ability to **design** a digital system with control unit.
4. Ability to **design** and **simulate** using software tool and synthesize a digital design to FPGA device.

REFERENCES

1. Rafikha Aliana A Raof, Norina Idris, Phaklen Eh Kan, Mohammad Nazri Md. Noor. (2006). Digital Electronics Design. 1st Edition. Malaysia: Prentice Hall.
2. Mano, M. Morris and Kime, Charles R. (2004). Logic and Computer Design Fundamentals. 3rd Edition. New Jersey: Prentice Hall.
3. Wakerly, John F. (2003). Digital Design – Principles & Practices. 3rd Edition. New Jersey: Prentice Hall.
4. M. Morris Mano. (2005). Digital Design. 3rd Edition. Prentice Hall.
5. Introduction to Digital Logic Design, 1st Edition (1993). Addison-Wesley Longman Publishing Co., USA.

EKT 222/4
MICROPROCESSOR SYSTEM

COURSE SYNOPSIS

The aim of this course is to study the Intel 8085 microprocessor architecture and relate that knowledge to the design of microprocessor based systems. This includes the design technique for interfacing memory, input and output for the systems. The study of 8085 instruction set and various software development tools are also emphasized as the knowledge are needed in the design of the microprocessor-based systems.

COURSE OUTCOMES

1. Ability to **discover** the theory and basic architecture of microprocessor.
2. Ability to **program** a microprocessor using assembly language.
3. Ability to **interface** the microprocessor with I/O devices.
4. Ability to **design** and **develop** a simple application on a microprocessor based system.

REFERENCES

1. R.S. Gaonkar (2002). Microprocessor Architecture, Programming, and Applications with the 8085. Prentice Hall, 5th Edition.
2. W. Kleitz. (1998). Microprocessor and Microcontroller Fundamentals: The 8085 and 8051 Hardware and Software. Prentice Hall.
3. B.B. Brey (1996). The 8085A Microprocessor: Software, Programming and Architecture. Prentice Hall, 2nd Edition.
4. J.A. Seeger. (1995). Introduction to Microprocessors with the INTEL 8085. Oxford University Press, USA
5. W. Routt.(2006). Microprocessor Architecture, Programming, And Systems Featuring The 8085. Delmar Cengage Learning.

EKT 224/3
ALGORITHM AND DATA STRUCTURES

COURSE SYNOPSIS

This course introduces data types, algorithm and data structures. The topics of array, pointers, structure and union in C are revisited. Then, the linear data structure i.e. stack, queue linked list and non linear data structure i.e. tree and graph are discussed in depth. In addition, sorting and searching algorithm are also included.

COURSE OUTCOMES

1. Ability to **analyze** algorithms correctness and time efficiency.

2. Ability to **design** and **implement** linear and nonlinear data structures.
3. Ability to **design** and **implement** searching and sorting algorithms.

REFERENCES

1. Fundamentals of Data Structures in C (2/E),Horowitz, Sahni & Anderson-Freed, P silicon Press, 2008, USA
2. Data Structures in C and C++, Vinu V. Dass, New Age International, 2006, India
3. Algorithms & Data Structures: The Science of Computing(Electrical and Computer Engineering Series), Douglas Baldwin & Greg W. Scragg, Computer Engineering Series, 2004, USA
4. Data Structure and Algorithm Analysis in C++(3rd Ed.), Mark Allen Weiss, 2006
5. The Algorithm Design Manual, Steven S. Skiena, Springer-Verlag London Limited, 2008.

EKT 232/3
SIGNALS AND SYSTEMS

COURSE SYNOPSIS

The course aims to introduce the concept of signals and systems analysis, the continuous signal and discrete signal functions and types of signal transformation. It begins with familiarization with different types of functions and relates them with convolution. To understand the Fourier series, Laplace-transform and Z-transform and familiarize with the properties involved, the transform and the inverse method. In general how the signals and systems are analyzed in the time and frequency domain.

COURSE OUTCOMES

1. Ability to **explain** and **apply** the concept of signal and system classifications, impulse response and convolution in both analog and discrete time domain.
2. Ability to **apply** and **analyze** the concept of Fourier representation of analog and discrete signals and learn about different forms and properties of Fourier transform, concept of frequency response in analog and discrete systems.
3. Ability to **apply** and **analyze** the concept of Laplace transform and its application in the analysis of linear and time-invariant analog systems.
4. Ability to analyze and evaluate z-transform and their applications in the analysis of linear and time- invariant discrete systems.

REFERENCES

1. Simon Haykin, Barry Van Veen. (2003). Signals and Systems. 2nd ed. John Wiley & Sons, Inc.
2. MJ Roberts. (2003). Signals and Systems, Analysis Using Transform Method and MATLAB. International Edition. McGraw-Hill
3. Charles L. Philips, John M. Parr, Eve A. Risking.(2003). Signals and Systems and Transforms. 3rd Edition. Prentice Hall International.
4. Alan V.Oppenheim and Alan S. Willsky. Signals and Systems, 2nd Edition Prentice Hall,1996.
5. Edward W. Kamen and Bonnie S. Heck. Fundamentals of Signals and Systems using the Web and Matlab Second Edition, Prentice Hall, 2000.

EKT 242/3
ELECTROMAGNETIC THEORY

COURSE SYNOPSIS

The purpose of this course is to learn the basic theory and analysis of electromagnetic. Student should be able to understand the basic concept of electrostatics, magnetostatics and their effects. Student should also understand the theory and application of transmission line.

COURSE OUTCOMES

1. Ability to **describe** different coordinate system and their interaction.
2. Ability to **define** and **calculate** the concept of electric field intensity and force on changes under different field configurations.
3. Ability to **analyze** the concept of electric current density and boundary conditions, magnetic flux density in a steady magnetic field and the basic laws of magnetic fields.
4. Ability to **analyze** and **evaluate** transmission lines as circuit components and Smith's chart for transmission line calculations and impedance matching design.

REFERENCES

1. Stuart M Wentworth. (2005). Fundamentals of Electromagnetics with Engineering Applications. Wiley Ed.
2. William H.Hayt, John A Buck.(2001). Engineering Electromagnetics. McGraw Hill, International Edition.
3. Fawwaz T Ulaby (2004). Fundamentals of Applied Electromagnetics. Pearson, Prentice Hall.
4. Roald K. Wangsness. (1987). Electromagnetic Fields, John Wiley and Sons, 1987.
5. Bo Thidé. (2009). Electromagnetic Field Theory Second Edition.

EKT 303/4
PRINCIPLES OF COMPUTER ARCHITECTURE

COURSE SYNOPSIS

This subject will focus on the computer system with various design of interface techniques, organization and architecture. The syllabus will covered the theory of basic computer system, format of instruction set, memory organization and arithmetic logic unit as well as certain issues of designing such as bus structure,



parallel processing, pipelining and memory management. The student are required to design a simple CPU during a Lab session by using Quartus II software provided by Altera. The lab session will complement the theories given in lectures. FPGA trainer board will be used as a design platform in the lab.

COURSE OUTCOMES

1. Ability to apply the theory and the architecture of a central processing unit(CPU)
2. Ability to analyze some of design issues in term of speed,technology,cost and performance
3. Ability to design a simple CPU with applying the theory and knowledge in the lecture
4. Ability to apply appropriate CAD tools to design,verify and test the CPU architecture

REFERENCES

1. William Stallings. Computer Organization and Architecture. Seventh Edition. Prentice-Hall.
2. M. Morris Mano. Computer System Architecture. Third Edition. Prentice-Hall.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky. Computer Organization. Fifth Edition. McGraw Hill.
4. Andrew S. Tanembaum. Structured Computer Organization. Fifth Edition.
5. Linda Null, The essentials of Computer Organization and Architecture. 2nd Edition. Jones and Bartlett Publishers.

EKT 314/4
INSTRUMENTATION ELECTRONICS

COURSE SYNOPSIS

Introduce students to the basic of electronic instrumentations, sensors and transducers that can be applied to the modern instrumentation systems; expose students to the elements and principles of data acquisition system with appropriate applications. Practical involves the use of virtual instrumentation software, development of transducer circuits and signal conditioning circuits, interfacing to the microprocessor and the execution of DAQ system.

COURSE OUTCOMES

1. Ability to acquire and apply knowledge of transducers in order to engineering problem
2. Ability to identify suitable signal conditioning requirement, formulate the method and solve the problem based on system requirements
3. Ability to design and conduct virtual instrument-based experiments,as well as to analyze and interpret data
4. Ability to design a complete instrumentation system based on the knowledge of transducers,signal conditioning and virtual instrumentation

REFERENCES

1. Kalsi, H.S. (2005). Electronic Instrumentation. Tata McGraw-Hill Publishing Company Limited.
2. Rangan, C.S., Sarma, G.R. and Mani, V.S. (2004). Instrumentation Devices & Systems. Tata McGraw-Hill Publishing Company Limited.
3. Sawhney, A.K. and Sawhney, P. (2001). A Course in Electronic and Electrical Measurement and Instrumentation. Dhanpat Rai & Co. (P) Ltd.
4. Bentley, J.P.(1995). Principles of Measurement Systems. Longman Singapore Publisher.
5. Kuphaldt T.R.(2009), Lessons in Industrial Instrumentation. Version 0.4 – 2009

EKT 318/3
MODERN CONTROL SYSTEMS

COURSE SYNOPSIS

The Objective of this course is to expose the students to the basic knowledge in the field of control systems. Students will be exposed to basic mathematical modeling of physical system using differential equation and state space representation, stability of linear systems, time response, root locus, frequency domain analysis, and design of control systems using lead and lag compensating networks.

COURSE OUTCOMES

1. Ability to obtain the mathematical model for electrical and mechanical systems and solve state equations
2. Ability to perform time domain analysis with response to test inputs and to determine the stability of the system
3. Ability to perform the frequency domain analysis of linear system and to evaluate its stability using frequency domain methods
4. Ability to design lag,lead,lead-lag compensators for linear control systems

REFERENCES

1. Nise , Norman S. , "Control Systems Engineering", John Wiley and Sons , Fourth Edition, 2004.
2. Kuo B.C., "Automatic Control Systems", Prentice Hall, 8th Edition, 1995.
3. Ogata, K, "Modern Control Engineering"Prentice Hall, 1999.
4. Richard C. Dorf and Robert H Bishop. Modern Control Systems (10th Edition) Prentice Hall; 10 edition 2004.
5. Katsuhiko Ogata. Modern Control Engineering. Publisher: Prentice Hall, 3 Sub edition 1996.

EKT 322/4
EMBEDDED SYSTEM DESIGN

COURSE SYNOPSIS

The aim of this course is to study the concept and requirement of embedded system. This includes the characteristic of embedded system, hardware and software development: single chip microcontroller and programming technique in assembly language and C, basic multitasking concept, developing an embedded system application.

COURSE OUTCOMES

1. Understand the concept and requirement of embedded system.
2. Understand and able to design an embedded system based on a single chip microcontroller
3. Able to develop and write a structured program in assembly and C languages for the embedded system application.
4. Able to develop a self-contained embedded system application.

REFERENCES

1. Muhammad Ali Mazidi & Janice Gillispie Mazidi. (2000). The 8051 Microcontroller and Embedded Systems. Prentice Hall 2000
2. James W. Stewart & Kai X. Miao. (1999). The 8051 Microcontroller: Hardware, Software and Interfacing. Prentice Hall 2nd Edition
3. Michael J. Pont (2001).Patterns for Time-Triggered Embedded System. Addison –Wesley.
4. Dreamtech Software Team Programming for Embedded Systems (2002). John Wiley
5. Scott Mackenzie and Raphael Chung-Wei Phan(2006). 8051 Microcontroller. 2006

EKT 333/3
MODERN OPERATING SYSTEM

COURSE SYNOPSIS

This course introduces the fundamental of operating systems. It also covers theoretical and practical issues underlying operating system design and implementation. The topics include inter process communication, process scheduling, deadlock, memory management, virtual memory and file management system. Formal principles are illustrated with examples and case studies of modern operating system.

COURSE OUTCOMES

1. Ability to **interpret** the major concepts of components of components which build up an operating system
2. Ability to **utilize** GNU/Linux operating system for coding, compile, execute and test C programming in simulating processes in operating system
3. Ability to **analyze** and **apply** processes, thread, file management, processor scheduler and memory management in operating system
4. Ability to **design** and **develop** the applications of operating system

REFERENCES

1. W. Stallings, Operating Systems: Internals and Design Principles, 6th Edition, Pearson Prentice Hall, 2005.
2. Silberchatz, Galvin & Gagne, Operating System Principles, 7th Edition. John Wiley, 2006.
3. A.S. Tanenbaum, A.S. Woodhull, Operating Systems Design and Implementation, 3rd Edition. Prrentice Hall. 2006.
4. Silberchatz, Galvin & Gagne, Operating System Concepts, 7th Edition. John Wiley, 2005.
5. I.M. Flynn and A.M. McHoes, Understanding Operating System, 2nd Edition. PWS Publishing Company, 1999.

EKT 335/3
PRINCIPLES OF COMPUTER NETWORK

COURSE SYNOPSIS

This course exposes students with the fundamental knowledge of computer networks. Principles of computer network cover so many aspects and it is expanding rigorously. Therefore, this course focuses on the fundamental concept and theories, applications and advantages of computer networks. The topics covered are the application, transport and the network layers which setup the Internet network over the internet.

COURSE OUTCOMES

1. Ability to **analyze** and apply the application layer program over the Internet
2. Ability to **develop** and **implement** the transport layer protocol which set up the Internet Network
3. Ability to **design** and **develop** the IPs which are needed to transfer data from the sender to the receiver

REFERENCES

1. J.F. Kurose, Computer Networking A Top-Down Approach, 4th Edition. Addison Wesley, USA, 2008.
2. A. S. Tanenbaum. Computer Networks, 5th Edition, Prentice Hall, 2011.
3. Leon-Garcia and A. Widjaja, Communication Networks: Fundamental Concepts and Key Architectures. 2nd Edition. McGraw Hill Publication, 2004.
4. William Stallings, Data & Computer Communications, 6th Edition, Prentice Hall, 2000.
5. Behrouz Forouzan, Introduction to Data Communications and Networking. Mc-Graw Hill, 1998.



EKT 336/3
COMPUTER NETWORK

COURSE SYNOPSIS

This course exposes students with the kind and knowledge of computer networks. Computer network technologies cover so many aspects and it is expanding rigorously. Therefore this course focuses on the fundamental concept and theories, applications and advantages of computer networks. Related technologies such as Local Area Network, Wide Area Network and techniques use in data transmission as well as latest technologies use are introduced. Practical exercises such as design, install and testing of a simple computer internetworking which improve understanding and develop skills on networking are integrated in laboratories exercises.

COURSE OUTCOMES

1. Ability to **explain, discuss** and **apply** the concepts and principles of computer networking.
2. Ability to **identify, analyze** and **solve** network problems using software tool.
3. Ability to **design** and **evaluate** the performance of computer networks.

REFERENCES

1. A. L. Garcia and A. Widjaja. (2004). Communication Networks: Fundamental Concepts and Key Architectures. 2nd Edition. McGraw Hill Publication.
2. A. S. Tanenbaum. (2003). Computer Networks. Prentice Hall.
3. K. C. Mansfield Jr. and J. L. Antonakos (2002). An Introduction to Computer Network, Prentice Hall.
4. J.F. Kurose and K.W.Ross.(2002), Computer Networking: A Top-Down Approach Featuring the Internet. 2nd Edition. Addison Wesley, USA.
5. B. Forouzan, (2006), Data Communications and Networking. Mc-Graw Hill.

EKT 341/4
ANTENNA AND PROPAGATION

COURSE SYNOPSIS

The purpose of this course is to introduce the fundamental principle of the functions, types and characteristics of antenna. Student should be able to analyze the characteristics of wave and waveguide. Student should also have ability to explain the characteristics of radio wave propagation.

COURSE OUTCOMES

1. Ability to define and explain the electromagnetic wave concept and principle.
2. Ability to design and analyze different types of antenna and explore its propagation characteristics.
3. Ability to define, explain and apply the radio wave propagation characteristics to the antenna.

REFERENCES

1. C.A. Balanis. (2005). Antenna Theory: Analysis and Design. 3rd Edition. Wiley Interscience.
2. Stuart M Wentworth (2005). Fundamentals of Electromagnetics with Engineering Applications. Wiley Edition.
3. Kraus, Marhefka. (2003). Antennas: For All Applications. International Edition. McGraw Hill.
4. Simon R. Saunders & Alejandro Aragón-Zavala. (2007). Antennas and Propagation for Wireless Communication Systems. Second Edition, published by John Wiley & Sons.
5. William Gosling. (1998). Radio Antennas and Propagation: Radio Engineering Fundamentals.

EKT 343/4
PRINCIPLES OF COMMUNICATION ENGINEERING

COURSE SYNOPSIS

This subject will cover all the basic principles and concepts of communication system including the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and medium. In addition, introductions to signal propagations and calculations of signal to noise ratio are also introduced to relate the students with real world applications.

COURSE OUTCOMES

1. Ability to describe and analyze basic principles of communication Engineering and analog communication systems
2. Ability to produce and compare amplitude modulated signals and angle modulated signals
3. Ability to apply analog to digital conversion through sampling process and generate pulse modulated signals
4. Ability to analyze and develop analog and digital modulated signals and communication systems in the presence of random signals

REFERENCES

1. Wayne Tomasi. (2004). Electronic Communication System, Fundamental Through Advanced. 5th Ed. Pearson Prentice Hall. (Text)
2. K. Sam Shanmugan. (2002). Analog and Digital Communication. Wiley.
3. Simon Haykin. (2001). Communication Systems. 4th Ed. John Wiley.
4. J.M. Wozencraft and I.M. Jacobs. (2005). Principles of Communications Engineering.
5. Umesh Sinha. (2009). Principles Of Communication Engineering. Publisher, Satya Prakashan.

EKT 353/3
PRINCIPLE OF DIGITAL SIGNAL PROCESSING

COURSE SYNOPSIS

Digital Signal Processing (DSP) has continued to have a major and increasing impact in many key areas of technology including telecommunication, computer vision, biomedicine, VLSI design etc. DSP is now at the core of many new emerging digital products and applications in the information society and is a core subject in most electronic/computer/ communication engineering curricula. This course is three hour lecture per week and is designed to give students the necessary mathematical tools to analyze discrete time signals and systems. The course also includes various techniques for the design and analyzing of digital filters and their application for multimedia signal processing e.g: speech and image.

COURSE OUTCOMES

1. Ability to **apply** the mathematical tools for **analyzing** and **evaluating** discrete time filters
2. Ability to **calculate** and **explain** Discrete Fourier Transform and properly apply FFT algorithm for the evaluation of DFT
3. Ability to **design** and **implement** digital FIR and IIR filters
4. Ability to **realize** digital filter structures and **describe** the effect of finite word length
5. Ability to **evaluate** and **compare** various compression techniques and analysis of multimedia signal.

REFERENCES

1. Ifeachor & Jervis. Digital Signal Processing: a practical Approach. 2/e, Prentice Hall.
2. Sanjit K. Mitra (2006) Digital Signal Processing, A Computer-Based Approach, 3/e. McGraw Hill
3. Proakis and Manolakis. Digital Signal Processing. Pearson. 4/e
4. S. Orfanidis. (1996). Introduction to Signal Processing. Prentica Hall.
5. C.T. Chen (2001). Digital Signal Processing. Oxford.
6. B.P. Lathi. Signal Processing and Linear Systems. Oxford

EKT 355/4
ADVANCED COMPUTER NETWORK

COURSE SYNOPSIS

Comprehensive overview of communications software and hardware involved in wide area networks and their relationship to local area networks are introduces. The course is designed for computer networking majors.
The students are able to identify the major components of the WANSs (Asynchronous Transfer Mode, Integrated Services Digital Network, Synchronous Optical Network, etc.) and the flow of data between the bridges and routers.

COURSE OUTCOMES

1. Ability to analyze and apply the components that is setting up the data link and LANs in the OSI layer
2. Ability to design and setting up the wireless and mobile network over the Internet
3. Ability to develop and implement multimedia networking for streaming data application over the Internet
4. Ability to evaluate and manage the network security and administration to support the huge number of Internet users

REFERENCES

1. A. L. Garcia and A. Widjaja, (2004). Communication Networks: Fundamental Concepts and Key Architectures, 2nd Edition, McGraw Hill Publication.
2. A. S. Tanenbaum, (2003). Computer Networks. Prentice Hall.
3. K. C. Mansfield Jr. and J. L. Antonakos (2002), An Introduction to Computer Network, Prentice Hall
4. J.F. Kurose and K.W.Ross, (2002), Computer Networking: A Top-Down Approach Featuring the Internet, 2nd Edition, Addison Wesley, USA.
5. B. Forouzan, (2006), Data Communications and Networking, Mc-Graw Hill.

EKT 357/3
DIGITAL COMMUNICATION ENGINEERING

COURSE SYNOPSIS

This subject will cover all the principles and concepts of digital communications including signal analysis and transmission through channel, pulse modulations, speech signal digitization, base band transmission, digital modulation techniques and performance, spread spectrum communications. In addition, the basic telephony system also will be introduced to relate the students with the real application.

COURSE OUTCOMES

1. Ability to explain digital modulation systems
2. Ability to analyze the transmission of digital signals through noisy communication channels
3. Ability to design digital modulators and demodulators
4. Ability to describe and evaluate various error correction and detection codes

REFERENCES

1. Skalar B. (2005). Digital Communications, Fundamentals and Applications. 2nd Ed. IE Prentice Hall.
2. Pursely M.B. (2005). Introduction to Digital Communications. IE Prentice Hall.
3. M.Schwartz. (2003). Information Transmission, Modulation and Noise. 3rd Ed. McGraw Hill.

4. Proakis, John G. (1995). Digital Communications. 3rd Ed. International Ed. - New York; Singapore. McGraw Hill.
5. John Proakis and Masoud Salehi. (2007). Digital Communications. 5th edition, McGraw-Hill.

EKT 358/3
COMMUNICATION SYSTEMS

COURSE SYNOPSIS

This course is intended to cover the basic principles and concepts of communication engineering systems. It includes the theory of Amplitude modulation and Angle modulation. Basic digital modulation technique such as Pulse Amplitude Modulation (PAM), Pulse Position Modulation (PPM), Pulse Width Modulation (PWM) and Pulse Code Modulation (PCM) are also included in the course. Performance of communication system in the presence of noise is also considered.

COURSE OUTCOMES

1. Ability to **assess** the performance of communication system in the presence of random signals.
2. Ability to **analyze**, **formulate** and **apply** amplitude modulated signals.
3. Ability to **evaluate**, **predict** and **generate** angle modulated signals.
4. Ability to **apply** analog to digital conversion through sampling process and **generate** pulse modulated signals.

REFERENCES

1. Wayne Tomasi, "Electronic Communication Systems Fundamental through Advanced", Pearson Prentice Hall 2004.
2. Louis E. Frenzel, "Principles of Electronic Communication Systems, Mc Graw Hill 2007
3. B.P. Lathi, "Modern Digital and Analog Communication Systems", Oxford University Press 2009.
4. K. Sam Shanmugam, " Analog and Digital Communication", Wiley 2002
5. Simon Haykin, "Communication Systems", John Wiley, 2009.

EKT 360/3
GROUP DESIGN PROJECT

COURSE SYNOPSIS

In this course, students will be divided into small groups working on design-based projects. Each group (consists of 3-4 students) will work on a discipline-related project which involves a complex engineering problem and design system, components or processes which integrates core areas and meeting the specified needs.

Upon completion of the course, students should be able to design one advanced electronic system component using related tools. Moreover, students are exposed to the method of problem solving, design process, and data analysis, with appropriate consideration for public health and safety, cultural, societal, and environmental.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical which has been studied to solve the complex engineering problems.
2. Ability to design with consideration of a public health and safety, cultural, societal, and environmental.
3. Ability to produce a complete group project in a form of technical report, present and justify/ defend the project's fact.
4. Ability to implement project management and finance principles by developing a Gantt Chart and project testing.

EKT 421/3
SOFTWARE ENGINEERING

COURSE SYNOPSIS

The course shall introduce principles and technique in software engineering, management integration concept, method or process and software metrics. In addition, this course exposes presentation and discussion on specific software engineering method, documentation and tools. It also covers object based need analysis and modeling. This course explains about relevant method to verify and validate prototype developed.

COURSE OUTCOMES

1. Ability to derive and apply knowledge from this course to different field
2. Ability to analyze and develop problems in software engineering project via implementing Software Development Life Cycle phases
3. Ability to generate software specification and design via Unified Modeling Language (UML) tool
4. Ability to plan and justify software development projects.

REFERENCES

1. Lethbridge, T.C., Laganiere, R. [2005]. "Object Oriented Software Engineering". 2nd Edition, Mc-Graw Hill.
2. Schach, S.R .[2007]. "Classical and Object Oriented Software Engineering". 7th Edition, Mc-Graw Hill.
3. Sommerville, I. [2007], "Software Engineering". 8th Edition, Addison Wesley Publication.
4. Pressman, R.S. [2007], "Software Engineering". 6th Edition, Mc-Graw-Hill Publication.
5. Larman, C. [2004], "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development ". 3rd Edition, Prentice Hall PTR.

EKT 424/4
REAL TIME SYSTEM

COURSE SYNOPSIS

The course shall discuss concepts relevant to real time system and concept which differentiates ordinary operating system and real time operating system. Focus and in depth coverage shall be on techniques on developing real time system application which incorporates concurrent and synchronize process on a target embedded board which runs POSIX compliant open source operating system.

COURSE OUTCOMES

1. Ability to interpret the major concept relevant to real time system and describe, differentiate and explain the different characteristics of OS and RTOS
2. Ability to design and evaluate algorithms which involves various RTOS concepts including RTS scheduling, IPC, synchronization, shared memory and timer
3. Ability to construct real time applications and benchmark them

REFERENCES

1. Jane W.S. Liu (2000). Real Time Systems. University of Illinois at Urbana-Campaign . Prentice Hall.
2. Sriram V Iyer. (2004). Embedded Real Time Systems. Tata McGraw Hill.
3. Glass, Graham and Ables, King. (1999). UNIX for programmers and users. Prentice Hall.
4. Bill Gallmeister. (1995) POSIX.4. Programming for the Real-World. O'Reilly and Associates.

COURSE SYLLABUS

5. Qing Lin and Caroline Yao (2003). Real-Time Concepts for Embedded Systems. CMP Books.

EKT 433/4
NETWORK MODELING

COURSE SYNOPSIS

This course introduces the principle and technique in modeling and analyzing the computer network using software and discrete event simulator technique. The simulation technique is a powerful tool to analyze the network without the possibilities to destroy the real network. The students are able to understand the concept of network model, develop and analyze the computer network using this simulation technique.

COURSE OUTCOMES

1. Ability to define and explain components that are setting up of an Internet network
2. Ability to apply the usefulness of Internet network applications practically
3. Ability to analyze and apply the knowledge of computer network which can connect the client and server efficiently
4. Ability to utilize network simulation tools which are able to analyze, develop and design the network protocols over the Internet

REFERENCE

1. Hall, J. Banks, J. Carson, B. L. Nelson, D. Nicol, "Discrete-Event System Simulation, Fourth Edition, Prentice Hall 2005.
2. M. S. Obaidat, G. I. Papadimitriou, "Applied System Simulation: Methodologies and Applications", Springer 2003.
3. M. Gen, R, Cheng & L. Lin, "Network Models and Optimization", Springer, 2008.
4. D. P. Bertsekas, " Network Optimization – Continuous and Discrete Models", Athena Scientific,1998.
5. S. Evans, "Telecommunications Network Modeling, Planning and Design", British Communication Technology, 2008

EKT 434/3
NETWORK PROGRAMMING

COURSE SYNOPSIS

The aims of this course are to introduce the students of the programming in computer network and get familiar with the mechanism of protocols that consists in the network. The skills to programme the network protocols to works properly to transfer data from the sender to the receiver are exposed. The students are able to analyze, test, develop and design the protocols that are setting up a network.

COURSE OUTCOMES

1. Ability to programme the TCP,UDP and STMP into network socket
2. Ability to design and setting up elementary network programming
3. Ability to develop and implement the advanced socket into the network programming

REFERENCE

1. Harvey M. Deitel, Paul J. Deitel and Sean E. Santry, [2002], "Advanced Java™ 2 Platform How to Program" 2nd Edition, Prentice Hall.
2. Marty Hall and Larry Brown, " Core Web Programming: The Sun Microsystems Press JAVA Series" 2nd Edition, Prentice Hall, 2004
3. Jan Graba, "An Introduction to Network Programming with Java", 2nd Edition, Springer, 2007.
4. W. R. Steven, "Unix Network Programming, Networking APIs :Sockets and XTI", 2nd Edition, Addition-Wesley, 2004
5. E. R. Harold, "Java Network Programming", O'Reilly, 2005.



EKT 440/4
TELECOMMUNICATION SWITCHING AND NETWORKS

COURSE SYNOPSIS

This course is about telecommunication and data networks which highlight fundamental knowledge of computer network and its applications. Its main objective is to provide to the students solid understanding of the main characteristics of several important switching systems. In addition, it also gives exposure to Local Area Network (LAN), Wide Area Network (WAN) and also data transmission techniques.

COURSE OUTCOMES

1. Ability to **discuss** the need for switching systems and their evolution from analogue to digital.
2. Ability to **apply** the concept and compare the performance of telecommunication network.
3. Ability to **describe** and **evaluate** technique of packet switching and issues in data transmission.

REFERENCES

1. L. Garcia and A. Widjaja. (2004). Communication Networks: Fundamental Concepts and Key Architectures. 2nd Edition. McGraw Hill Publication.
2. S. Tanenbaum. (2003). Computer Networks. Prentice Hall.
3. K. C. Mansfield Jr. and J. L. Antonakos (2002). An Introduction to Computer Network. Prentice.
4. P.Gnanasivam. (2008). Telecommunication Switching and Networks" New Age Publications (Academic).
5. Viswanathan Thiagarajan (2010). Telecommunication Switching Systems And Networks Phi Learning Publication.

EKT 441/4
MICROWAVE COMMUNICATION

COURSE SYNOPSIS

This course aims to expose students with basic concept of parameters that are being used in microwave communication network. Analysis the device characteristics for microwave. To explain the importance and applications of microwave communication system. Additionally, the students are introduced how to design microwave's filters and amplifiers.

COURSE OUTCOMES

1. Ability to evaluate the performance of microwave transmission lines and matching network parameters in terms of signal loss, reflection, and stading wave
2. Ability to analyze, formulate and characterize two-port networks using microwave analysis technique such as y-, z-, h-, ABCD- and scattering parameters.
3. Ability to design and evaluate passive microwave filter using various techniques and **apply** on planar transmission lines.
4. Ability to analyze, characterize and evaluate the properties of the passive microwave devices (power dividers and couplers) and the performance of active microwave device (amplifier)

REFERENCES

1. David M. Pozar, 'Microwave Engineering ', 4th Ed., Wiley, 2012.
2. Jia Sheng Hong & M. J. Lancester, "Microstrip Filters For RF/Microwave Applications", 2nd Ed., John Wiley & Sons, Inc., 2011.
3. Peter C.L. Yip, " High Frequency Circuit Design and Masurements", Chapman & Hall, 2012.
4. Annapurna Das, Sisir K Das, " Microwave Engineering", 2nd edition, International Ed. McGraw Hill, 2008.
5. Glover, Pennock, Shepherd, " Microwave devices, circuits and subsystem for communication engineering", Wiley, 2005.

EKT 450/3
MOBILE COMMUNICATION SYSTEMS

COURSE SYNOPSIS

The course aims to provide knowledge in mobile communications, especially different system characteristics and their effect on wireless network performance. The mobility puts high requirements on the communication system and these requirements together with possible solutions are an essential part of the course. The course focuses on basic mechanism of mobile radio wave propagation and scattering in different kinds of environment consisting obstacles and interfaces, implementation of modulation techniques, methods to improve wireless network performance, cellular network planning and modeling, radio resource and mobility management, and wireless data networking.

COURSE OUTCOMES

1. Ability to identify the important components and functions of a mobile communication system
2. Ability to explain, evaluate and compare the differences in characteristics and areas of applications between different types of mobile communication systems
3. Ability to apply and analyze the issues in mobile communication system
4. Ability to identify and describe the latest techniques and standards in mobile communication system

REFERENCES

1. David Tse, Pramod Viswanath, Foundamentals of Wireless Communications, Cambridge Press, 2005.

2. G. L. Stuber, Principles of Mobile Communication, Kluwer Acdemic, 1996.
3. J. G. Proakis, Digital Communications, McGraw-Hill, 1995.
4. T. S. Rappaport, Wireless Communications: Principles and Practice, Prentice Hall, 1996.
5. W. C. Jakes, Microwave Mobile Communications , IEEE Press, 1974.
6. K. Feher, Wireless Digital Communications - Modulation & Spread Spectrum Applications , Prentice Hall, 1995.

EKT 445/2
FINAL YEAR PROJECT I

COURSE SYNOPSIS

This course aims to expose students the method of problem solving, data analysis, prototype design and research in computer and communication engineering fields. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical which has been studied to solve the engineering problems.
2. Ability to develop the suitable research methodology for the project.
3. Ability to present and justify defend the project proposal.

EKT446/4
FINAL YEAR PROJECT II

COURSE SYNOPSIS

This course aims to expose students the method of problem solving, data analysis, prototype design and research in computer and communication engineering fields. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical which has been studied to solve the engineering problems.
2. Ability to develop new design or upgrade the existing design.
3. Ability to develop the suitable research methodology for the project.
4. Ability to produce a complete project in a technical report (distraction), present and justify/ defend the project's fact.

EKT 360/3
GROUP DESIGN PROJECT

COURSE SYNOPSIS

In this course, students will be divided into small groups working on design-based projects. Each group (consists of 3-4 students) will work on a discipline-related project which involves a complex engineering problem and design system, components or processes which integrates core areas and meeting the specified needs.

Upon completion of the course, students should be able to design one advanced electronic system component using related tools. Moreover, students are exposed to the method of problem solving, design process, and data analysis, with appropriate consideration for public health and safety, cultural, societal, and environmental.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical which has been studied to solve the complex engineering problems.
2. Ability to design with consideration of a public health and safety, cultural, societal, and environmental.
3. Ability to produce a complete group project in a form of technical report, present and justify/ defend the project's fact.
4. Ability to implement project management and finance principles by developing a Gantt Chart and project testing.

EIT 302/4
INDUSTRIAL TRAINING

COURSE SYNOPSIS

The course will expose to technical and application aspect as well as other aspect such as company organization structure, company operation, department function, work procedure, safety procedure, management, communication, technical skills, project management and presentation. The students also required to submit their log book and final report at the end of Industrial Training. Overall, the course is a practical-based.

COURSE OUTCOMES

1. Ability to display good work performance and adapt to the working environment during training period
2. Ability to demonstrate good communication skills, leadership and work ethics during training period
3. Ability to perform assigned task given by the host company.

REFERENCE

1. UniMAP Industrial Training Guideline Rev A (July 2008)
2. UniMAP Industrial Training Log Book



CAREER OPPORTUNITIES

Employment and career prospects of graduates upon graduation are very encouraging. The graduates can work in the industry in the following areas:

- Product design and digital control system based on microcontroller systems.
- Design equipment components for optical telecommunication systems, wired and wireless.
- Research and Development of electronic-based Industry, University, MIMOS, SIRIM,
- National Remote Sensing Centre, Statutory Authorities and Government.

CAREERS CAN BE PURSUED

- Electronic Engineers
- Product Engineer
- Telecommunications Engineer
- Design Engineer
- System Engineer
- Network Engineer
- Research & Development
- Engineer
- Executive Engineer
- Tech Entrepreneur

SCHOOL OF MECHATRONIC ENGINEERING

PROGRAMME OFFERED

- Bachelor of Engineering (Hons.) (Mechatronic)
- Bachelor of Engineering (Hons.) (Mechanical)
- Bachelor of Engineering (Hons.) (Biomedical Electronic)
- Master of Science (Mechatronic Engineering)
- Master of Science (Mechanical Engineering)
- Master of Science (Biomedical Electronic Engineering)
- Master of Science (Biomedical Engineering)
- Doctor of Philosophy (Mechatronic Engineering)
- Doctor of Philosophy (Mechanical Engineering)
- Doctor of Philosophy (Biomedical Electronic Engineering)
- Doctor of Philosophy (Biomedical Engineering)

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INTRODUCTION

School of Mechatronic Engineering was established in 2003 to meet the nation growing needs of professionals – particularly in the field of mechatronic, mechanical and biomedical electronics engineering. This is in-line industrial demand and consistent with Malaysian Industrial Master Plan 2, 1996-2005 (Laporan Pelan Induk Perindustrian 2). The academic curriculums are designed with balanced emphasis in both engineering sciences and practical elements. Additionally, the teaching and learning activities are conducted by embedding theoretical knowledge with suitable laboratory sessions supported by advanced equipments. This approach to engineering education will greatly benefit UniMAP students and ensuring them in keeping abreast with latest technological development.

School of Mechatronic Engineering at UniMAP offers three degree programmes – namely Mechatronic Engineering Programme, Mechanical Engineering Programme and Biomedical Electronic Programme. The curriculum of each programme is designed to produce graduate professionals who equipped with necessary analytical skills and ability to work in multidisciplinary engineering fields and industries. Furthermore, learning environment is enjoyable and competitive with a good mixture of local and international students.

Mechatronic Engineering programme emphasis on multi-disciplinary field that is synergistic of electrical, mechanical, electronics, control and computer engineering disciplines. This enables its graduates to have good analytical and design knowledge of integrated mechatronic systems to cater for the needs in the robotics and automation industry.

Mechanical Engineering programme stress on the design and synthesis of mechanical components and systems. Mechanical engineers are usually involved in research and development, design and manufacturing, engine and thermal energy systems and also machinery. Mechanical engineering graduates are highly flexible and could work in almost every industrial engineering sector.

Biomedical Electronic engineering programme combines knowledge of electrical, electronic and mechanical engineering, as well as medical sciences – such as anatomy and physiology – with a strong emphasis in medical instrumentation and design. Combination of the knowledge in these areas enables engineers to understand principles in instrumentation and design of medical devices, and foster advances in medical technologies to cater for the needs in the biomedical industry.

Additionally, School of Mechatronics Engineering also offers postgraduate programmes by research.

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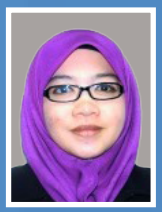
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BACHELOR OF ENGINEERING (HONOURS) (MECHATRONIC ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who have advanced in their career in mechatronic or relevant engineering fields.

PEO2:
Graduates who are members of, or contribute to engineering professional society.

PEO3:
Graduates who engage in lifelong learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in mechatronic engineering discipline to the solution of complex engineering problem.

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyse and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



SCHOOL OF MECHATRONIC ENGINEERING

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (MECHATRONIC ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (101)	ENT187/3 Electric Circuit Theory	ENT162/4 Analog Electronics	ENT286/3 Instrumentation & Measurements	ENT267/3 Design of Machinery	ENT365/3 Control Engineering I	ENT375/4 Control Engineering II	EIT302/4 Industrial Training	ENT445/2 Final Year Project I	ENT446/4 Final Year Project II
	ENT141/3 Engineering Statics	ENT142/3 Engineering Dynamics	ENT281/3 Signals & Systems	ENT222/3 Electromagnetic Field Theory	ENT366/3 Machine Vision	ENT376/3 Mechatronic Systems Design I		ENT476/4 Mechatronic Systems Design II	ENT490/3 Management Production & Control of Quality
	ECT111/3 Engineering Skills	ENT186/3 Computer Aided Drawing	ENT262/4 Digital Logic Design	ENT269/4 Embedded System and Interfacing	ENT367/3 Fluid Power Systems	ENT383/3 Network & Communication Engineering		ENT471/4 Automation	Elective II/3
	ENT189/3 Computer Programming		ENT266/3 Principles of Engineering Materials	ENT270/3 Principles of Thermofluids	ENT368/4 Electrical Machines & Power Systems	ENT377/3 Robotic Systems		Elective I/3	
Non-Engineering Core (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT 271/3 Engineering Statistics				EUT442/2 Professional Engineers	EUT444/3 Management for Engineers
	UUT122/2 Skills and Technology in Communication								
University Requirement (17)	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum	UVW312/2 English for Technical Communication	UVW410/2 University Malay Language or ***UVW110/2 Basic Malay Language	UUW322/2 Thinking Skills			
	*UVA111/2 Foundation English	UUWXXX/2 Option or **UVW211/2 English for General Purposes			UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relations or ***UUW239/2 Malaysian Studies		UUW233/2 Islamic & Asian Civilisations or ***UUW237/2 Malaysian Cultures	
	18	16	17	18	17	17	4	17	13

Total Units for Graduation 137

Electives:
Elective I: ENT493/3 Advanced Control System/ ENT469/3 Vibration Control/ ENT477/3 Power Electronics/ ENT486/3 Mobile Robotics/ ENT491/3 Robotic Control
Elective II: ENT479/3 Advanced Sensing/ ENT499/3 Digital Signal Processing & Applications/ ENT497/3 Artificial Intelligence in Engineering/ ENT478/3 Computational Intelligence/ ENT480/3 Machine Learning

* Uncredited. Compulsory to students with MUET Band 1 and 2 only. This course is a prerequisite to UVW211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW312 English for Technical Communication.
***For international students only.

BACHELOR OF ENGINEERING (HONOURS) (MECHANICAL ENGINEERING)

PROGRAMME OBJECTIVES (PO)

PEO1:
Graduates who effectively demonstrate engineering knowledge and entrepreneurial skills by providing practical solutions.

PEO2:
Graduates who effectively demonstrate professionalism in multi-disciplinary engineering environment, leadership quality and teamwork.

PEO3:
Graduates who make contributions to knowledge and establish best engineering practice through research and development.

PEO4:
Graduates who demonstrate an ethical commitment to the community and the profession through involvement with professional organizations and society.

PEO5:
Graduates who engage in life-long learning as demonstrated through career advancement.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in mechanical engineering discipline to the solution of complex engineering problem.

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyse and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



SCHOOL OF MECHATRONIC ENGINEERING

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (MECHANICAL ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (101)	ENT141/3 Engineering Statics	ENT142/3 Engineering Dynamics	ENT242/3 Solid Mechanics I	ENT 246/3 Solid Mechanics II	ENT332/3 Mechanisms & Machines	ENT346/3 Vibration Mechanics	EIT 302/4 Industrial Training	ENT445/2 Final Year Project I	ENT446/4 Final Year Project II
	ENT150/3 Engineering Graphic & Computer Aided Drafting	ENT147/3 Engineering Materials	ENT241/3 Fluid Mechanics I	ENT 248/4 Design Process	ENT334/4 Component Design	ENT335/4 System Design		ENT440/4 Design Project	ENT457/3 Management, Production & Operations
	ENT146/3 Machining	ENT143/3 Thermodynamics I	ENT243/3 Thermodynamics II	ENT247/3 Fluid Mechanics II	ENT333/3 Heat Transfer	ENT336/3 Fluid Machinery		ENT385/3 Control Engineering	ENT4XX/3 Elective II
	ENT189/3 Computer Programming		ENT249/3 Electrical Circuit & Machine	ENT244/3 Manufacturing Processes	ENT286/3 Instrumentations & Measurements	ENT 337/3 Electronics & Microprocessors		ENT4XX/3 Elective I	ENT4XX/3 Elective III
Non Engineering Core (19)	EQT 101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics					
	EUT122/2 Skills and Technology in Communication					EUT444/3 Management for Engineers		EUT442/2 Professional Engineers	
University Requirement (17)	UVA111/0 Foundation English	UUWXXX/2 Option or UVW211/2 English for General Purpose	UUW233/2 Islamic & Asian Civilisations or ***UUW237/2 Malaysian Cultures	UVW312/2 English for Technical Communication	UVW410/2 University Malay Language or UVW110/2 Basic Malay Language	UUW322/2 Thinking Skills		UUW235/2 Ethnic Relations or ***UUW239/2 Malaysian Studies	
	UUWXXX/1 Co-curriculum	UUWXXX/1 Co-curriculum	UUWXXX/1 Co-curriculum		UUW224/2 Engineering Entrepreneurship				
	18	15	18	18	17	18	4	16	13

Total Units for Graduation 137

Elective:
Elective I : ENT464/3 Fracture Mechanics / ENT465/3 Rapid Engineering / ENT431/3 Refrigeration & Air Conditioning / ENT347/3 Finite Element Methods
Elective II : ENT434/3 Composite Materials / ENT466/3 Design Optimization / ENT461/3 Renewable Energy / ENT 342/3 Computational Fluid Dynamics
Elective III : ENT435/3 Acoustic & Noise Control / ENT436/3 Internal Combustion Engine / ENT437/3 Additive Manufacturing

BACHELOR OF ENGINEERING (HONOURS) (BIOMEDICAL ELECTRONIC ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who effectively demonstrate engineering knowledge and entrepreneurial skills by providing practical solutions.

PEO2:
Graduates who effectively demonstrate professionalism in multi-disciplinary engineering environment, leadership quality and teamwork.

PEO3:
Graduates who make contributions to knowledge and establish best engineering practice through research and development.

PEO4:
Graduates who demonstrate an ethical commitment to the community and the profession through involvement with professional organizations and society.

PEO5:
Graduates who engage in life-long learning as demonstrated through career advancement.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in biomedical electronic engineering discipline to the solution of complex engineering problem.

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyse and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (BIOMEDICAL ELECTRONIC ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (90)	ENT114/3 Circuit Theory	ENT115/3 Analogue Electronics I	ENT207/3 Engineering Mechanics	ENT218/3 Biomechanics	ENT 320/3 Mechanics of Materials	ENT316/3 Principles of Communication Systems	EIT 302/4 Industrial Training	ENT445/2 Final Year Project I	ENT446/4 Final Year Project II
	ECT111/3 Engineering Skills	ENT116/3 Digital Electronic Principles	ENT216/3 Analogue Electronics II	ENT222/3 Electromagnetic Field Theory	ENT310/4 Linear Control System	ENT323/3 Electrical Machines & Drives		ENTXXX/3 Elective I	ENTXXX/3 Elective II
			ENT217/3 Principles of Signals & Systems	ENT265/4 Microcontrollers & Interfaces	ENT321/3 Biomedical Acts, Standards & Safety	ENT390/3 Bioinstrumentations I		ENT415/3 Bioinstrumentations II	ENT417/3 Design Project II
				ENT219/3 Biomaterials	ENT315/4 Medical Signal Processing	ENT318/3 Artificial Organs		ENT413/3 Medical Imaging	
					ENT319/3 Thermofluids			ENT416/2 Design Project I	
Non Engineering Core (30)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III			EQT271/3 Engineering Statistics		EUT442/2 Professional Engineers	EUT444/3 Management for Engineers
	ENT 120/4 Computer Programming	ENT111/4 Anatomy & Physiology	ENT 210/3 Biochemistry						
	UUT122/2 Skills and Technology in Communication								
University Requirement (17)	UVA111 Foundation English*	UUWXXX/2 Option or UVW211/2 English for General Purposes		UVW312/2 English for Technical Communication		UVW410/2 University Malay Language of UVW110/2 Basic Malay Language			
	UUW233/2 Islamic & Asian Civilisations or **UUW237/2 Malaysian Cultures	UUW235/2 Ethnic Relations or **UUW239/2 Malaysian Studies	UUW224/2 Engineering Entrepreneurship	UUW322/2 Thinking Skills					
	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum						
	18	18	18	17	17	17	4	15	13

Total Units for Graduation 137

Elective I (Medical Computing): ENT402/3 Medical Image Processing, ENT403/3 Artificial Intelligent Systems, ENT4XX/3 Human Machine Interfaces, ENT4XX/3 Biological System Modeling
Elective II (Medical Instrumentation): ENT406/3 Medical Robotics , ENT405/3 Biosensors & BioMEMS, ENT4XX/3 Computed Tomography & Applications, ENT4XX/3 Clinical Engineering
*: Uncredited
**: For international student only

LIST OF COURSES:

- **ENT 111/4 ANATOMY & PHYSIOLOGY**
- **ENT 114/3 CIRCUIT THEORY**
- **ENT 115/3 ANALOGUE ELECTRONICS I**
- **ENT 116/3 DIGITAL ELECTRONIC PRINCIPLES**
- **ENT 120/4 COMPUTER PROGRAMMING**
- **ENT 141/3 ENGINEERING STATICS**
- **ENT 142/3 ENGINEERING DYNAMICS**
  (Prerequisite: ENT 141/3 Engineering Statics)
- **ENT 143/3 THERMODYNAMICS I**
- **ENT 146/3 MACHINING**
- **ENT 147/3 ENGINEERING MATERIALS**
- **ENT 150/3 ENGINEERING GRAPHICS & COMPUTER AIDED DRAFTING**
- **ENT 162/4 ANALOG ELECTRONICS**
- **ENT 187/3 ELECTRIC CIRCUIT THEORY**
- **ENT 186/3 COMPUTER AIDED DRAWING**
- **ENT 188/3 ELECTRICAL TECHNOLOGY**
- **ENT 189/3 COMPUTER PROGRAMMING**
- **ENT 207/3 ENGINEERING MECHANICS**
- **ENT 210/3 BIOCHEMISTRY**
- **ENT 216/3 ANALOGUE ELECTRONICS II**
  (Prerequisite: ENT 115/3 Analogue Electronics 1)
- **ENT 217/3 PRINCIPLES OF SIGNALS & SYSTEMS**
- **ENT 218/3 BIOMECHANICS**
  (Prerequisite: ENT 117/3 Engineering Mechanics)
- **ENT 219/3 BIOMATERIALS**
- **ENT 310/4 LINEAR CONTROL SYSTEMS**
- **ENT 321/3 BIOMEDICAL ACTS, STANDARDS & SAFETY**
- **ENT 222/3 ELECTROMAGNETIC FIELD THEORY**
- **ENT 323/3 MACHINES & ELECTRICAL DRIVES**
- **ENT 241/3 FLUID MECHANICS I**
- **ENT 242/3 SOLID MECHANICS I**
  (Prerequisite: ENT 141/3 Engineering Statics)
- **ENT 243/3 THERMODYNAMICS II**
  (Prerequisite: ENT 143/3 Thermodynamics I)
- **ENT 244/3 MANUFACTURING PROCESSES**
- **ENT 246/3 SOLID MECHANICS II**
- **ENT 247/3 FLUID MECHANICS II**
  (Prerequisite: ENT 241/3 Fluid Mechanics I)
- **ENT 248/3 DESIGN PROCESS**
- **ENT 249/3 ELECTRICAL CIRCUIT & MACHINE**
- **ENT 262/4 DIGITAL LOGIC DESIGN**
  (Prerequisite: ENT 162/4 Analog Electronics)
- **ENT 265/4 MICROCONTROLLER & INTERFACES**
- **ENT 266/3 ENGINEERING MATERIALS**
- **ENT 267/3 DESIGN OF MACHINERY**
- **ENT 269/4 EMBEDDED SYSTEM AND INTERFACING**
  (Pre-requisite: ENT 262/4 Digital Logic Design)
- **ENT 270/3 PRINCIPLE OF THERMOFLUIDS**
- **ENT 281/3 SIGNALS AND SYSTEMS**
- **ENT 286/3 INSTRUMENTATIONS AND MEASUREMENTS**
- **ENT 315/4 MEDICAL SIGNAL PROCESSING**
  (Prerequisite: ENT 217/3 Principles of Signal and System)
- **ENT 316/3 PRINCIPLES OF COMMUNICATION SYSTEMS**
- **ENT 318/3 ARTIFICIAL ORGANS**
- **ENT 319/3 THERMOFLUIDS**
- **ENT 320/3 MECHANICS OF MATERIALS**
- **ENT 332/3 MECHANISMS & MACHINES**
- **ENT 333/3 HEAT TRANSFER**
- **ENT 334/3 COMPONENT DESIGN**
- **ENT 335/3 SYSTEM DESIGN**
- **ENT 336/3 FLUID MACHINERY**
- **ENT 337/3 ELECTRONICS & MICROPROCESSORS**
- **ENT 346/3 VIBRATION MECHANICS**
- **ENT 365/3 CONTROL ENGINEERING I**
- **ENT 366/3 MACHINE VISION**
- **ENT 367/3 FLUID POWER SYSTEMS**
- **ENT 368/4 ELECTRICAL MACHINES & POWER SYSTEMS**
- **ENT 375/4 CONTROL ENGINEERING II**
  (Prerequisite: ENT 365/3 Control Engineering I)
- **ENT 376/3 MECHATRONIC SYSTEMS DESIGN I**
- **ENT 377/4 ROBOTICS SYSTEMS**
- **ENT 383/3 NETWORK & COMMUNICATION ENGINEERING**
- **ENT 390/3 BIOINSTRUMENTATIONS I**
- **ENT 415/3 BIOINSTRUMENTATIONS II**
- **ENT 416/2 DESIGN PROJECT I**
- **ENT 417/3 DESIGN PROJECT II**
- **ENT 413/3 MEDICAL IMAGING**
- **ENT 440/4 DESIGN PROJECT**
- **ENT 445/2 FINAL YEAR PROJECT I**
- **ENT 446/4 FINAL YEAR PROJECT II**
- **ENT 457/3 MANAGEMENT, PRODUCTION & OPERATIONS**
- **ENT 471/4 AUTOMATION**
  (Prerequisite: ENT 289/3 Drive and Power Electronics)
- **ENT 476/4 MECHATRONIC SYSTEMS DESIGN II**
- **ENT 490/3 MANAGEMENT PRODUCTION AND QUALITY CONTROL**



ELECTIVE COURSES:

- **ENT 342/3 COMPUTATIONAL FLUID DYNAMICS**
- **ENT 347/3 FINITE ELEMENT METHODS**
- **ENT 420/4 BIOLOGICAL SYSTEM MODELING**
- **ENT 426/4 COMPUTED TOMOGRAPHY AND APPLICATIONS**
- **ENT 431/3 REFRIGERATION AND AIR CONDITIONING**
- **ENT 434/3 COMPOSITE MATERIALS**
- **ENT 435/3 ACOUSTIC & NOICE CONTROL**
- **ENT 436/3 INTERNAL COMBUSTION ENGINE**
- **ENT 437/3 ADDITIVE MANUFACTURING**
- **ENT 461/3 RENEWABLE ENERGY**
- **ENT 464/3 FRACTURE MECHANICS**
- **ENT 465/3 RAPID ENGINEERING**
- **ENT 466/3 DESIGN OPTIMIZATION**
- **ENT 474/3 INTELLIGENT MECHATRONIC SYSTEMS**
- **ENT 488/3 MOBILE ROBOTICS**
- **ENT 491/3 ROBOTIC CONTROL**
- **ENT 493/3 ADVANCED CONTROL SYSTEMS**
  (Prerequisite: ENT 386/3 Modern Control Engineering)
- **ENT 497/3 ARTIFICIAL INTELLIGENCE IN ENGINEERING**
- **ENT 499/3 DIGITAL SIGNAL PROCESSING & APPLICATIONS**
  (Prerequisite: ENT 281/3 Signals and Systems)

COURSE SYLLABUS

ENT 111/4
ANATOMY & PHYSIOLOGY

COURSE SYNOPSIS

An introductory course to human anatomy and physiology, the students will be exposed to the basic knowledge on cell and tissues, skin and appendages, circulatory and cardiovascular system, the respiratory system, nervous system, special senses, the musculoskeletal system, digestive system and metabolism, lymphatic and immune system, the endocrine system, and the urinary system. At the end of the course, the students are expected to have a good grip of basic anatomical and physiological aspects of the human body and able to apply in biomedical engineering problem solving.

COURSE OUTCOMES

1. Ability to discuss anatomical and physiological function of various systems in human body.
2. Ability to discuss homeostasis in human body and distinguish the homeostatic imbalance.
3. Ability to measure and discuss basic physiological signals and parameters.

REFERENCES

1. Seely, R. R., Stephens, T.D., & Tate, P. (2005). Essentials of Anatomy and Physiology. 5th Ed. McGraw Hill.
2. Tortora, G.J., Grabowski, S.R. (2002). Principles of Anatomy and Physiology. 10th Ed. Wiley.
3. Marieb, E. (2000). Human Anatomy & Physiology. 5th Ed. Benjamin-Cummings.
4. Van Wynsberghe, D. M., Noback, C.R., & Carola, R. (1995). Human Anatomy and Physiology. 3rd Ed. Mc-Graw Hill.
5. Marieb, E.N (2009), "Essentials of Human Anatomy & Physiology", 9th Ed., Benjamin-Cummings.

ENT 114/3
CIRCUIT THEORY

COURSE SYNOPSIS

This course provide the fundamentals of electrical elements, basic laws such as Kirchorff's law, Nodal analysis, Thevenin's law and also circuit theorem i.e. mesh analysis, nodal analysis and superposition theorem. Calculate current, voltage and power in ac circuits using phasor approach. Study the mutual Inductance and transient response in RC, RL and RLC circuits.

COURSE OUTCOMES

1. Ability to distinguish between voltage and current sources and between the behaviour of resistors, capacitors and inductors in both DC and AC circuits.
2. Ability to analyze simple DC and AC circuits using basic circuit laws.
3. Ability to analyze more complex DC and AC circuits using techniques of network analysis.
4. Ability to design and evaluate basic circuits to meet specifications.

REFERENCES

1. Robert L. Boylestad. (2007). Introductory Circuit Analysis. 11th Ed. Prentice Hall.
2. Alexander, C.K. and Sadiku, M.N.O. (2007). Fundamental of Electric Circuits. 3rd Edition, McGraw-Hill.
3. Nilssen, J.W. and Riedel, S.(2008), Electric Circuits, 8th Edition, Addison Wesley.
4. Dorf, R.C. and Svoboda, J.A.(1996), Introduction to Electric Circuits, Wiley.

ENT 115/3
ANALOGUE ELECTRONICS I

COURSE SYNOPSIS

This course provides fundamental knowledge on analogue electronics. The student will be exposed to the basic structure of semiconductor materials, principle operation of selected electronic components and fundamental of electronic circuit design. Students will be introduced with several types of selected electronic components which are Diode, Bipolar Junction Transistor (BJT), Field Effect Transistor (FET) and Thyristors.

COURSE OUTCOMES

1. Ability to explain the theory of semiconductor materials and selected electronic devices.
2. Ability to illustrate the operation and application of selected electronic devices.
3. Ability to design and evaluate diode circuit and biasing of BJT and FET.

REFERENCES

1. Floyd, T. (2008). Electronic Devices. 8th ed. Prentice Hall.
2. Boylestad, R.L., and Nashelsky, L. (2008). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
3. Cathey, J.J. (2002), Schaum's outline of theory and problems of electronic devices and circuits, 2nd edition, McGraw-Hill.
4. Salivahanan, S., Kumar, N.S., Vallavaraj, A(1998)., Electronic Devices and Circuits, Tata McGraw-Hill.
5. Robert A. Pease (2008). Analogue Circuits: World Class Designs. Elsevier.

5. Robert A. Pease (2008). Analogue Circuits: World Class Designs. Elsevier.

ENT 116/3
DIGITAL ELECTRONIC PRINCIPLES

COURSE SYNOPSIS

In this course, the students will be exposed to the basic principle digital systems, digital circuit design and analysis. Lecture and practical will cover Algebra Boolean, Numbering system, Basic Logic Gate, Combinational Logic Circuit Design, Bi-stable Memory Devices, Sequential Circuits Design, Programmable Logic Devices, Signal Interfacing and Processing.

COURSE OUTCOMES

1. Able to analyze the combinational and sequential logic circuits
2. Be able to design and construct simple circuits and system of basic digital electronics

REFERENCES

1. Floyd, T. (2009). Digital Fundamentals. 10th ed. Prentice Hall.
2. Mano, M.M. (2002). Digital Design. 3rd ed. Prentice Hall.
3. Tocci, R.J. (2001). Digital Systems: Principles and Applications. 8th ed. Prentice Hall.
4. Balaniaban, N. and Carlson, B. Digital Logic Design Principles. 1st ed. Wiley.
5. Donald D. Givone (2003). 'Digital Principles and Design', 1st Ed., Mcgraw-Hill.

ENT 117/3
ENGINEERING MECHANICS

COURSE SYNOPSIS

The course provides a foundation for the students to analyze mechanical problems using simple and logical methods. The syllabus is designed to enable non-mechanical engineering students to have strong fundamental to solve mechanical problems.

COURSE OUTCOMES

1. Ability to study and explain fundamental laws in engineering mechanics and solve problems related to resultant force and moment.
2. Ability to study, explain and apply equilibrium equations to solve problems of structure with and without friction.
3. Ability to study, measure and analyze the relationship of kinematics and kinetics of a particle and rigid body.

REFERENCES

1. Hibbler, R.C. (2010). Engineering Mechanics: Statics. 12th ed. Prentice Hall.
2. Hibbler, R.C. (2010). Engineering Mechanics: Dynamics. 12th ed. Prentice Hall.
3. Ferdinand P. Beer, E. Russell Johnston & William E.C (2007)., "Vector Mechanics for Engineers: Statics.", 8th ed., Mc Graw Hill.
4. Ferdinand P. Beer, E. Russell Johnston & William E.C.(2007), "Vector Mechanics for Engineers: Dynamics.", 8th ed., Mc Graw Hill.
5. Anthony M. Bedford and Wallace Fowler (2007). Engineering Mechanics: Statics & Dynamics, 5th Edition, Prentice Hall.

ENT 141/3
ENGINEERING STATICS

COURSE SYNOPSIS

The objective of the course is to evaluate problems related to concept of mechanics in static conditions. It covers topics of equilibrium force analysis of a particle in static conditions, equilibrium force analysis for rigid body, structural analysis, friction analysis, centre gravity and centroid analysis, and moment of inertia analysis.

COURSE OUTCOMES

1. Ability to evaluate problems related to static equilibrium force, concepts of mechanics and vector mechanics.
2. Ability to evaluate problems related to moment of a force, equilibrium in rigid body and forces acting on structures.
3. Ability to evaluate problems related to frictions, centre of gravity, centre of mass for a system and moment of inertia of an area.

REFERENCES

1. R.C. Hibbeler. (2010). *Engineering Mechanics: Statics.* 12th ed., Prentice Hall.
2. Beer and E.R. Johnson Jr. (2005). *Vector Mechanics tor Engineer: Statics*. 7th Ed. In SI Units, McGraw Hill.
3. J.L. Meriam L.G. Kraige (2003). *Engineering Mechanics: Statics*. 7th ed., John Wiley and Sons.

ENT 142/3
ENGINEERING DYNAMICS
(Prerequisite: ENT 141/3 Engineering Statics)

COURSE SYNOPSIS

The objective of the course is to enable students to evaluate problems related to mechanics concepts in dynamic condition. The course covers topics of force and acceleration, work and energy, and also impulse and momentum for both kinematics of a particle and planar kinetics of a rigid body problems.

COURSE OUTCOMES

1. Ability to analyze problems related to rectilinear kinematics, law of motions, and also concepts mechanics and vector mechanics.
2. Ability to evaluate problems related to kinematics of particle, involving force and acceleration, work and energy, and also impulse and momentum.
3. Ability to evaluate problems related to planar kinetics or a rigid body, involving force and acceleration, work and energy and also impulse and momentum.

REFERENCES

1. R. C. Hibbler (2009). *Engineering Mechanics: Dynamics*. 12th edition, Pearson / Prentice Hall.
2. Anthony Bedford and Wallace Fowler (2008). *Engineering Mechanics: Dynamics*. 5th edition in SI unit, Prentice Hall.
3. R.C Hibbeler (2006). *Engineering Mechanics: Principles of dynamics*. Pearson/Prentice.
4. Wan Abd Rahman Assyahid dan Suhaimi Ilyas (2006). *Engineering Mechanics (EPT 101)*. Penerbit KUKUM, Perlis.

ENT 143/3
THERMODYNAMICS I

COURSE SYNOPSIS

To introduce the concepts and basic knowledge of thermodynamics to the students of mechanical engineering. Emphasis will be given to the first and second laws of thermodynamics, physical properties, pure substances, enthalpy, entropy, ideal and real gas, and energy.

COURSE OUTCOMES

1. Ability to identify, apply the basic concepts of thermodynamics; the concept of energy transfer, the First Law of Thermodynamics and evaluate them.
2. Ability to calculate the properties of pure substances and solve problems related to energy evaluate for close and open systems.
3. Ability to identify, explain the Second Law of Thermodynamics, apply it to reversible, irreversible processes and analyze energy. Ability to evaluate the entropy of a system undergoing a process.

REFERENCES

1. Y.A. Cengel and M.A. Boles (2009). *Thermodynamics: An Engineering. Approach,* 6th edition, McGraw-Hill.
2. Kurt C. Rolle (2005). *Thermodynamics and Heat Power.* University of Wisconsin-Platteville.
3. Davin Dunn (2001). *Fundamental Engineering Thermodynamics.* Illustrate edition, Longman Group, United Kingdom.

ENT 146/3
MACHINING

COURSE SYNOPSIS

The objective of this course is to introduce and provide the students with theoretical and practical skills that are required in fabricating and manufacturing mechanical parts or components. At the end of this course the students will be able appreciate various skills and technology in manufacturing processes include Manufacturing Metrology, Welding, Conventional Machining, CNC Machining and EDM Machining.

COURSE OUTCOMES

1. Ability to describe and choose the proper measurement tools and the safety procedures to complete a particular manufacturing process.
2. Ability to construct and describe the proper manufacturing process to complete a finish product.
3. Ability to decide and organize the use of proper machine to complete a particular manufacturing process.

REFERENCES

1. S.K.Garg (2006). *Workshop Technology: Manufacturing processes*. 2nd Edition, Laxmi Publications.
2. Krar, Steve F., Gill, Arthur R., Smid, Peter (2005). *Technology of Machine Tools*. 6th Ed., McGraw Hill.
3. Groover, M. P. (2002). *Fundamental of Modern Manufacturing*. Prentice Hall.
4. Schey, J.A. (2000). *Introduction to Manufacturing Processes*. 3rd Ed., Mc Graw-Hill.



ENT 147/3
ENGINEERING MATERIALS

COURSE SYNOPSIS

This course provides concept that relates to process selection and metal structure in materials engineering. The course topics involve investigating the relationships that exist between the structures and properties of materials.

COURSE OUTCOMES

1. Ability to analyze problems related to engineering materials including materials behavior, atomic structure, materials selection and processing of metals.
2. Ability to discuss mechanical properties of metals.
3. Ability to identify and analyze problems related to material failure.

REFERENCES

1. William F. Smith and Javad Hashemi, Foundations of Materials Science and Engineering 5 Ed., McGraw Hill, 2011.
2. William D Callister, Materials Science and Engineering an Introduction 8 Ed. John Wiley & Sons, 2010.
3. James F. Shackelford, Introduction to Materials Science for Engineers 8 Ed., Pearson, 2014.
4. Kenneth G. Budinski, Michael K. Budinski, Engineering Materials: Properties and Selection 9 Ed., Prentice Hall, 2010.
5. Jean P Mercier, Gerald Zambelli, Wilfried Kurz, Introduction To Materials Science: Series in applied chemistry and materials sciences, Elsevier, 2012.

ENT 150/3
ENGINEERING GRAPHICS & COMPUTER AIDED DRAFTING

COURSE SYNOPSIS

The aim of this course is to expose mechanical engineering student to basic concepts and applications of engineering graphics and computer aided drafting.

COURSE OUTCOMES

1. Ability to design and reproduce drafting and technical drawings using proper techniques.
2. Ability to design and reproduce 2-dimensional drawings to 3-dimensional drawings and vice versa.
3. Ability to realize basic concepts of drafting and to design engineering projects using computer aided drafting software

REFERENCES

1. Gary R. Bertoline and Eric N. Wiebe (2008). *Technical Graphics Communication*. 5th Ed., McGraw-Hill.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill and James E. Novak (2009). *Technical Drawing*. 13th Ed., Prentice Hall.
3. Timothy Sean Sykes (2002). *AutoCAD 2002 One Step at a Time*. Prentice Hall,.
4. Ralph Grabowski (2002). *Using AutoCAD 2002*. Thomson Learning.

ENT 162/4
ANALOG ELECTRONICS

COURSE SYNOPSIS

This course is designed to introduce basic concepts of semiconductor electronics and its applications. The course helps students to apply analogue theories for testing, designing and developing of electronic circuits.

COURSE OUTCOMES

1. Ability to perform the analysis on characteristics of semiconductor devices.
2. Ability to design and evaluate analogue circuits by using semiconductor devices.
3. Ability to solve circuitry problems in a group.

REFERENCES

1. Floyd T., "Electronic Devices", 8th Edition, Pearson Prentice Hall, 2008.
2. Boylested R L and Nashelsky L., "Electronics Devices and Circuit Theory", 7th Edition, Prentice Hall, 1999.
3. Schuler C A., "Electronics-Principles and Applications", 6th Edition, Prentice Hall, 2003.
4. Aminian, A., and Kazimierczuk, M., "Electronic Devices- A Design Approach", Pearson Prentice Hall, 2004.
5. Salivahanans S., Kumar N., Vallavaraj A., "Electronic Devices and Circuits", McGrawHill, 2007.

ENT 187/3
ELECTRIC CIRCUIT THEORY

COURSE SYNOPSIS

This course provide the fundamentals of electrical elements, basic laws such as Kirchorff's law, Nodal analysis, Thevenin's law and also circuit theorem i.e. mesh analysis, nodal analysis and superposition theorem. The syllabus covers a calculation of current, voltage and power in ac circuits by using phasor approach,

and follows by the study of the mutual Inductance and transient response in RC, RL and RLC circuits.

COURSE OUTCOMES

1. Ability to solve DC problems using basic laws and circuit theorem.
2. Ability to solve AC problems using basic laws and circuit theorem.
3. Ability to design and evaluate basic circuits to meet specifications.

REFERENCES

1. Alexander, C.K. and Sadiku, M.N.O. (2013) *Fundamental of Electric Circuits, 5th Edition,* McGraw-Hill.
2. Robert L. Boylestad. (2010) *Introductory Circuit Analysis*. 12th Ed. Pearson.
3. Nilssen, J.W. and Riedel, S.(2015) *Electric Circuits, 10th Edition,* Pearson.

ENT 186/3
COMPUTER AIDED DRAWING

COURSE SYNOPSIS

This course provides the foundation for mechatronic engineering students to acquire and apply the language of engineering graphics to visibly communicate engineering intent that follow good engineering conventions and practices. In this course, drafting technique using CAD software will be introduced to model 2-D and 3-D engineering drawings which including sketching techniques, multi-view projections, pictorial, sectional and auxiliary view representation and dimensioning techniques. The use of solid modeling software to capture design intent and generate engineering drawings gives the opportunity to apply this knowledge for engineering design projects.

COURSE OUTCOMES

1. Ability to draft technical drawings using computer aided design software.
2. Ability to design and construct 3D model using computer aided design software.
3. Ability to analyze the designed models.

REFERENCES

1. Gary R. Bertoline, Eric N. Wiebe,"Technical Graphics Communication", 5th Ed., McGraw-Hill, 2008
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E. Novak "Technical Drawing", 13th Ed., Prentice Hall, 2009
3. Curtis Waguespack," Mastering Autodesk Inventor 2013 and Autodesk Inventor LT 2013", Sybex, 2012.

ENT 188/3
ELECTRICAL TECHNOLOGY

COURSE SYNOPSIS

The objective of the course is to introduce the students with the fundamentals concept of electric circuits, electric supply system and installation, magnetic and electromagnetic, inductance, capacitance and AC circuit, three-phase system, basic principles of electrical machines, DC and AC electrical machines, transformer and electrical safety. The laboratory will be used to aid the students understanding of the concept introduced.

COURSE OUTCOMES

1. Ability to analyze electrical circuits to solve engineering problems.
2. Ability to analyze AC Circuits.
3. Ability to analyze the characteristics three-phase circuits and electromagnetic.
4. Ability to analyze the operation of Electrical Machines and their applications.

REFERENCES

1. Alexander, C.K. and Sadiku, M.N.O. (2013) *Fundamental of Electric Circuits, 5th Edition,* McGraw-Hill.
2. Nilssen, J.W. and Riedel, S. (2015) *Electric Circuits, 10th Edition,* Pearson.
3. Wildi, T (2006). *Electrical Machines, Drives and Power Systems, 6th Edition*, Prentice Hall.

ENT 189/3
COMPUTER PROGRAMMING

COURSE SYNOPSIS

This course is designed to introduce the fundamentals of Computer Programming. It provides an introduction to the principles of procedural programming, data types, control structures, data structures and functions, data representation on the machine level. This course also introduces the basic concepts of object oriented programming. At the end of this course students should be able to write, debug and document well-structured C applications applied to Mechatronic Engineering

COURSE OUTCOMES

1. Ability to define the basic programming techniques.
2. Ability to apply suitable programming technique to solve a given problem.
3. Ability to develop and analyze computer program in C and C++ for Mechatronic Applications.



REFERENCES

1. Deitel & Deitel, (2013). *C How To Programme, 7th Edition*. Pearson.
2. Ivor Horton's (2014). *Beginning visual C++ 2013*. Wiley Publishing Inc.
3. Tan & D Orazio (1999). *C Programming for Engineering & Computer Science*. McGraw Hill.

ENT 216/3
ANALOGUE ELECTRONICS II
(Prerequisite: ENT 115/3 Analogue Electronics 1)

COURSE SYNOPSIS

This course provides further knowledge on analogue electronics. The student will be exposed to the concept and operation of amplifiers including cascade amplifier, power amplifier and the operational amplifier. Students will also be introduced with the operating principles of active filters, feedback circuits, oscillators and voltage regulators.

COURSE OUTCOMES

1. Ability to analyze the operation, application and frequency response of power amplifiers and operational amplifiers.
2. Ability to analyze the principles of active filters, feedback circuits, oscillators and voltage regulators in electronic applications.
3. Ability to design amplifiers, active filters and oscillators.

REFERENCES

1. Floyd, T. (2008). Electronic Devices. 8th ed. Prentice Hall.
2. Boylestad, R.L., and Nashelsky, L. (2008). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
3. Cathey, J.J. (2002), "Schaum's outline of theory and problems of electronic devices and circuits", 2nd edition, McGraw-Hill.
4. Salivahanan, S., Kumar, N.S., Vallavaraj, A. (1998), "Electronic Devices and Circuits", Tata McGraw-Hill.
5. Robert A. Pease (2008). Analogue Circuits: World Class Designs. Elsevier.

ENT 217/3
PRINCIPLES OF SIGNALS & SYSTEMS

COURSE SYNOPSIS

This course introduces the different types of signals and networks present in an engineering systems. Signal and system representations are discussed for both time (Fourier Series) and frequency domains (Fourier and Laplace transform). The concept of transfer function is introduced and other applications of the Laplace transform such as for the solution of differential equations, and circuit analyses are presented. The application of z-transform is introduced in the analysis of signals and systems. At the end of this course, the students are able to analyze different types of signals using numerous transformation techniques and evaluate its performance.

COURSE OUTCOMES

1. Ability to explain and analyze the application of Fourier Series in signals and Systems.
2. Ability to explain and analyze the application of Laplace Transform in Signals and Systems.
3. Ability to explain and analyze the application of z-transform in Signals and Systems.
4. Ability to communicate clearly and to use modern engineering tools for solving engineering problems.

REFERENCES

1. B.P. Lathi. (2005). Linear System & Signals. Oxford University Press.
2. C.L. Phillips, J.M. Parr, E.A. Riskin. (2003). Signals, Systems & Transforms. 3rd Ed. Prentice Hall.
3. B.P. Lathi (1998). 'Signal Processing & Linear Systems', Oxford University Press.
4. M.J. Roberts (2003). 'Signals & Systems', McGraw Hill.
5. Charles L.Philips (2007). Signals, Systems and Transforms. 4th Edition. Prentice Hall.

ENT 218/3
BIOMECHANICS
(Prerequisite: ENT 117/3 Engineering Mechanics)

COURSE SYNOPSIS

The course aims to introduce the fundamental of biomechanics which covers the engineering mechanics, anatomy and basic applications on the analysis of the human body as mechanical systems.

COURSE OUTCOMES

1. Ability to define, explain and compare the biomechanics and anatomy terminologies and their relationships
2. Ability to differentiate and analyze the relationship of kinematics and kinetics of a particle and rigid body.
3. Ability to solve engineering problems by choosing appropriate method that related to statics and dynamics.

REFERENCES

1. Susan J.H. (2007). Basic Biomechanics. 5th Ed.
2. Iwan W.G. (2006). Principles of biomechanics & Motion Analysis. 3rd Ed.

3. Ellen Kreighbaum and Katharine M Barthels (1996), "Biomechanics: A qualitative approach for studying human movement", 4th Edition.
4. David A.W. (2005), "Biomechanics and Motor Control of Human Movement", 3rd Edition.
5. Joseph H., Kathleen M.K (2003), "Biomechanical Basis of Human Movements", 2nd Edition.

ENT 219/3
BIOMATERIALS

COURSE SYNOPSIS

This course is designed to provide a fundamental knowledge of materials that are commonly utilized in engineering and biomedical field specifically. Various types of materials currently being utilized for biomedical applications and their biocompatibility with references to the biological environments will be discussed.

COURSE OUTCOMES

1. Ability to describe the concept of biocompatibility, analyze and follow basic properties of materials in medical applications.
2. Ability to propose the suitable materials for specific biomedical applications and explain and display their effects with respect to biocompatibility.
3. Ability to assess tissue reactions to implanted biomaterials.
4. Ability to illustrate the main components of biomedical implants, describe their function and justify the important characteristics of the implanted materials.

REFERENCES

1. Temenoff, J.S. and Mikos, A.G. (2008). Biomaterials: The Intersection of Biology and Material Science. Prentice Hall.
2. Callister W.D., "Fundamentals of Materials Science and Engineering: An Integrated Approach", 3rd ed., John Wiley, 2008.
3. Ratner, B.D., Hoffman, A.S., Schoen, F.J., Lemons, J.E. (2004). Biomaterials Science: An Introduction to Materials in Medicine. 2nd Ed. Academic Press.
4. Park, J.B., Bronzino, J.D. (2002). Biomaterials: Principles and Applications. CRC Press.
5. Shi, D. (2004). Biomaterials and Tissue Engineering. Springer.

ENT 220/3
LINEAR CONTROL SYSTEMS

COURSE SYNOPSIS

This course will introduce students to linear control system techniques for analysis and design; includes mathematical modeling of electrical, mechanical and biomedical systems, stability analysis, time domain analysis and frequency domain analysis. PID and lead-lag controllers design using root locus will be discussed. The controller performance will be evaluated both in time and frequency domains. MATLAB software will be used for the analysis and design. At the end of the course, the students should be able to analyze, design and evaluate controlled systems.

COURSE OUTCOMES

1. Ability to analyze basic concepts of control theory applications (including biomedical systems).
2. Ability to analyze system response, and stability in time domain.
3. Ability to analyze system response, and stability in frequency domain.
4. Ability to design PID and lead-lag controllers.

REFERENCES

1. Nise, N.S, (2009). Control Systems Engineering. 4th Ed. Wiley.
2. Ogata, K. (2002). Modern Control Engineering. 4th ed. Prentice Hall.
3. Gopal, M. (1995). Control Systems: Principles and Design. 2nd Ed. Tata McGraw-Hill.
4. Khandpur, R.S. (2003), "Handbook of Biomedical Instrumentation", 2nd Ed. Tata McGraw-Hill.
5. Carr, J.J., Brown, J.M.(2001), "Introduction to Biomedical Equipment Technology", 4th Ed. Prentice Hall.

ENT 221/3
BIOMEDICAL ACTS, STANDARDS & SAFETY

COURSE SYNOPSIS

The course provides an introduction to the acts and standards used in biomedical engineering. This includes ethical issues and the power system safety of electrical appliances especially medical equipments. The course also focuses on the safety issues in the healthcare institution which particularly emphasized on medical devices and their interrelation with the hospital's environment. At the end of this course, students will appreciate on how acts and standards are established with the requirements in compliance with the acts and standards. Safety aspects and measures will be emphasized so that students will be able to control and be prepared in any situation involving human life.



COURSE OUTCOMES

1. Ability to employ regulatory standards in ensuring safety and reliability of medical technology.
2. Ability to demonstrate safety awareness in dealing with hazards from medical equipment.
3. Ability to manage healthcare technology and demonstrate ethical responsibility in the field of biomedical engineering.

REFERENCES

1. Reese, C.D. (2003). Occupational Health and Safety Management: A Practical Approach. Lewis Publishers.
2. Carr, J.J. (2000). Introduction to Biomedical Equipment Technology. 4th Ed. Prentice Hall.
3. Lusardi, M.M., Nielsen, C.C. (2000). Orthotics and Prosthetics in Rehabilitation. Butterworth-Heinneman.
4. Joseph D.B. (2006). Medical Devices and Systems, Biomedical Engineering Handbook. 3rd Ed. Taylor and Francis.
5. Daniel, A.V.(2007), "Biomedical Ethics for Engineers", Elsevier.

ENT 222/3
ELECTROMAGNETIC FIELD THEORY

COURSE SYNOPSIS

The course provides a fundamental knowledge on electromagnetic. Student will be exposed to basic postulates of electrostatic and electromagnetic fields and able to solve related problems. On completion of this course, students should have a firm grasp of basic electromagnetic and identify their characteristic in different situations.

COURSE OUTCOMES

1. Ability to define and explain basic theory of electromagnetism.
2. Ability to apply the fundamental mathematics of vector analysis and Maxwell's equations to solve and analyze electromagnetic problems.
3. Ability to identify and differentiate the differences of magnetic materials and relate the EM properties of materials.
4. Ability to analyze the characteristic and mechanism of electromagnetic wave in different situation.

REFERENCES

1. William H. Hayt, Jr and John A. Buck "Engineering Electromagnetics", 7th Ed., McGraw Hill International Ed. 2006.
2. Ulaby, F.T. (2003). Fundamental of Applied Electromagnetics. Prentice Hall.
3. Kraus, J.D., Fleisch, D.A. (1999). Electromagnetics. 5th ed. McGraw-Hill.
4. Cheng D.K. (1992). Fundamental of Engineering Electromagnetics. Prentice Hall.
5. Dragan Poljak, "Human Exposure to Electromagnetic Fields", WIT Press, 2004.

ENT 223/3
MACHINES & ELECTRICAL DRIVES

COURSE SYNOPSIS

This course provides the students both theories and applications of electrical machines and drives which include different types of motor, generator and transformer. This course allows the students to identify and select a suitable electrical machines and drives for various applications.

COURSE OUTCOMES

1. Ability to explain the principle and operation of different types of electrical machines.
2. Ability to compare and analyze the performance characteristics of electrical machines.
3. Ability to explain and compare the different types of electrical drives.
4. Ability to select and design suitable electronic drives for speed control of electrical machines.

REFERENCES

1. Theodore Wildi (2006). Electrical Machines, Drives, and Power Systems. 6th Edition.
2. S.J. Chapman (2005), Electric Machinery Fundamentals, 4th Edition, McGraw Hill.
3. Leonard L. Gigsby (2007), Electric Power Engineering Handbook, 2nd Edition, CRC Press.
4. J.F. Gieras (2008). Advancements in Electric Machines (Power Systems), Springer.
5. Andre Veltman (2007). Fundamentals of Electrical Drives (Power Systems), Springer.

ENT 241/3
FLUID MECHANICS I

COURSE SYNOPSIS

This course aims to develop the student basic knowledge on the principles of fluid mechanics and the application of these principles to practical, applied problems. Emphasis is on fluid properties, fluid statics, flow of fluids in pipes, and in non-circular conduits. The students shall also be introduced on momentum analysis and its application in engineering problems.

COURSE OUTCOMES

1. Ability to identify and calculate various properties of fluids.
2. Ability to respond and analyze problems related to fluids statics, fluids kinematics, and conservation of mass and Bernoulli equation.
3. Ability to analyze momentum of flow systems, identify moments acting on a control volume and use control volume analysis to determine the forces associated with fluid flow.

REFERENCES

1. Yunus A. Cengel and John M. Cimbala (2008). *Fluids Mechanics: Fundamentals and Applications*. Int'l Edition, McGraw-Hill.
2. Robert L. Mott (2006). *Applied Fluid Mechanics*. 6th Edition, Pearson.
3. M.C.Potter and D.C. Wiggert (2002). *Mechanics of Fluids*, 3rd Edition, Brooks/Cole.
4. Robert W. Fox and A.T. McDonald (1998). *Introduction to Fluid Mechanics*. 5th Edition, John Wiley and Sons.
5. JF Douglas, JM Gasiorek, JA Swaffield and LB Jack (2005). *Fluid Mechanics*. 5th Edition, Prentice Hall.

ENT 242/3
SOLID MECHANICS I
(Prerequisite: ENT 141/3 Engineering Statics)

COURSE SYNOPSIS

The objective of the course is to introduce the fundamental theories of solid mechanics. The basic of mechanics that have been learned in static and dynamic subjects will be extended and emphasized on solid materials. The course covers the law of mechanics, the concept of stress and strain, torsion and bending. The theoretical knowledge will be emphasized with practical in the lab. The tests of tensile and torsion will be performed. The testing of materials will be referred to international standards so that the students have a proper knowledge of material testing.

COURSE OUTCOMES

1. Ability to apply the fundamental theory of solid mechanics (mechanical properties, the relation between stress and strain).
2. Ability to identify, calculate and analyze cases of axial loading, torsion, bending.
3. Ability to apply and solve the combination cases by using the stress and strain transformation.

REFERENCES

1. Hibbeler, R.C. (2008). *Mechanics of Materials*. 7th ed., Prentice Hall.
2. Ferdinand P. Beer (2006). *Mechanics of Materials*. 4rd ed., McGraw-Hill.
3. Barber, J.R. (2001). *Intermediate Mechanics of Materials*. McGraw-Hill.
4. Madhuhar Vable (2002) *Mechanics of Materials*. Oxford.
5. Raymond Parnes (2001). *Solid Mechanics in Engineering*. John Willey & Sons.

ENT 243/3
THERMODYNAMICS II
(Prerequisite: ENT 143/3 Thermodynamics I)

COURSE SYNOPSIS

To introduce the concepts and the applications of thermodynamics to the students of mechanical engineering. Emphasis will be given to the gas power cycles, vapour power cycles, refrigeration cycles, gas mixture, gas vapour mixtures and air-conditioning, chemical reactions, compressible flow and the applications in industry and in everyday life.

COURSE OUTCOMES

1. Ability to identify, describe, and illustrate the concepts of gas and vapour power cycles and their applications. Ability to evaluate and solve the related problems.
2. Ability to explain refrigeration cycles, heat pumps and refrigerant selection. Ability to calculate and evaluate problems of refrigeration cycles.
3. Ability to describe, apply, evaluate and solve the problems of gas mixtures, gas–vapour mixture and air conditioning.
4. Ability to explain, interpret and determine the chemical reactions, reacting systems and the adiabatic flame temperature. Ability to explain the concepts of compressible flow and evaluate problems on stagnation, Mach. No., isentropic flow, shock wave and expansion wave.

REFERENCES

1. Y.A. Cengel and M.A. Boles (2009). *Thermodynamics: An Engineering Approach*. 6th edition, McGraw-Hill.
2. Kurt C. Rolle (2005). *Thermodynamics and Heat Power*. University of Wisconsin-Platteville.
3. Davin Dunn (2001). *Fundamental Engineering Thermodynamics*. Illustrate edition, Longman Group, United Kingdom.
4. W.Z. Black and J.G. Hartley (1996). *Thermodynamics*. English/SI version, 3rd edition, Prentice-Hall.
5. M.J. Moran and H.N. Shapiro (1998). *Fundamentals of Engineering Thermodynamics*. 3rd Edition, John Wiley & Sons.

6. R. Sonntag, C. Borgnakke and G. Van Wylen (1998). *Fundamentals of Thermodynamics*. 5th Edition, John Wiley and Sons.

ENT 244/3
MANUFACTURING PROCESSES

COURSE SYNOPSIS

This course is an introduction of manufacturing processes and techniques used in industry to convert raw materials into finished or semi-finished part. This includes the study on the characteristics of manufacturing processes such as forming, casting, moulding, rapid prototyping, non-conventional machining and welding, soldering and mechanical fasteners. The influence of materials and processing parameters in understanding individual processes are also highlighted

COURSE OUTCOMES

1. Ability to describe and choose the right raw materials for selected manufacturing processes.
2. Ability to describe, display and analyze the manufacturing processes for a finished product.
3. Ability to choose, compare and evaluate the use of proper machine to complete a particular manufacturing process.

REFERENCES

1. S. Kalpakjian and S.R. Schmid (2006). *Manufacturing Engineering and Technology*. 5th ed., Prentice Hall International.
2. S.K. Garg (2006). *Workshop Technology: Manufacturing processes*. 2nd Edition, Laxmi Publications.
3. Krar, Steve F., Gill, Arthur R. and Smid, Peter (2005). *Technology Of Machine Tools*. 6th Ed., McGraw Hill.
4. Groover, M.P. (2002). *Fundamental of Modern Manufacturing*. Prentice Hall.
5. Zainal Abidin Ahmad (1999). *Proses Pembuatan*. Penerbit UTM, Johor.

ENT 246/3
SOLID MECHANICS II

COURSE SYNOPSIS

The objective of the course is to enhance the understanding of the topics that have been learned in Solid Mechanics I. The topics is extended and emphasized on stress transformation occur in beam, shaft and member. It is also covered an introduction on buckling and energy method theory.

COURSE OUTCOMES

1. Ability to analyze shaft, beam and member subjected to various loadings and develop a stress strain transformation analysis.
2. Ability to recognize, calculate and solve deflection in structural analysis, calculate buckling and strain energy applied by various loadings.
3. Ability to calculate buckling and strain energy applied by various loadings.

REFERENCES

1. Hibbeler, R.C. (2009). *Mechanics of Materials*. 12th ed., Prentice Hall.
2. Pytel. Kiusalaas (2001). *Mechanics of Materials*. 3rd ed., McGraw-Hill.
3. Barber, J.R. (2001). *Intermediate Mechanics of Materials*. McGraw-Hill.
4. Madhuhar Vable (2002). *Mechanics of Materials*. Oxford.
5. Raymond Parnes (2001). *Solid Mechanics in Engineering*. John Willey & Sons.

ENT 247/3
FLUID MECHANICS II
(Prerequisite: ENT 241/3 Fluid Mechanics I)

COURSE SYNOPSIS

This course is to develop the knowledge of student on dimensional analysis and modelling. Emphasis is given to explain equations of motion, and inviscid flow. Some basic, plane potential flows with their superposition are analyzed. Compressible fluid flow and particle mechanics are also covered in this course. At last will be exposed to the concept and analyze of turbo machinery.

COURSE OUTCOMES

1. Ability to analyze dimensional analysis, modelling, and problems related to losses in pipe flows and flow over bodies.
2. Ability to evaluate the consequences of compressibility in gas flow and/or the effect of area changes for one dimensional isentropic subsonic and supersonic flows.
3. Ability to develop analytical techniques for particle mechanics problems based on Stoke's law/Darcy's law/Carmen-Kozeny equation in fluid systems.
4. Ability to analyze different type of turbomachinery.

REFERENCES

1. Yunus A. Cengel and John M. Cimbala (2008). *Fluids Mechanics: Fundamentals and Applications*. Int'l Edition, McGraw-Hill.
2. Robert L. Mott (2006). *Applied Fluid Mechanics*. 6th Edition, Pearson.
3. M.C. Potter and D.C. Wiggert (2002). *Mechanics of Fluids*. 3rd Edition, Brooks/Cole.

4. Robert W. Fox and A.T. McDonald (1998). *Introduction to Fluid Mechanics.* 5th Edition, John Wiley and Sons.
5. J.F. Douglas, J.M. Gasiorek, J.A. Swaffield and L.B. Jack (2005). *Fluid Mechanics*. 5th Edition, Prentice Hall.

ENT 248/3
DESIGN PROCESS

COURSE SYNOPSIS

The objective of this course is to present in a clear and detailed way a set of product development methods aimed at bringing together the marketing, design, and manufacturing functions of the enterprise. This course aims to develop an understanding of customer's needs and product marketability through the subject theme of "Customers/User Centred Design". Student will use appropriate engineering approaches and methods to analyze user needs and formulate solution to the design problems.

COURSE OUTCOMES

1. Ability to identify design requirements from general problem descriptions.
2. Ability to develop systematically a design from concept to prototype.
3. Ability to communicate clearly design ideas and information.
4. Ability to evaluate critically the designs using engineering criteria and predictive usage.

REFERENCES

1. K.T. Ulrich and S. D. Eppinger (2008). *Product Design and Development*, 4th Edition, McGraw-Hill.
2. Richard Budynas and J. Keith Nisbett (2008). *Shigley's Mechanical Engineering Design*. Eighth Edition, McGraw Hill.
3. Joseph E. Shigle and Charles R. Mischke (2001). *Mechanical Engineering Design*. Sixth Metric Edition.
4. Karl T. Ulrich and Steven D. Eppinger (2004). *Product Design and Development*, 3rd Edition, McGraw-Hill.
5. David G. Ullman and David Ullman (2003). *Mechanical Design Process*. 3rd Edition, McGraw Hill.

ENT 262/4
DIGITAL LOGIC DESIGN
(Prerequisite: ENT 162/4 Analog Electronics)

COURSE SYNOPSIS

This course is designed to introduce the basic principle of digital systems and digital circuit design with analysis. Lecture and practical will cover the following: Algebra Boolean, Numbering system, Basic Logic Gate, Combinational Logic Circuit Design, Bi-stable Memory Devices and Sequential Circuits Design.

COURSE OUTCOMES

1. Ability to explain the concepts of digital electronic system.
2. Ability to analyze the combinational logic circuit.
3. Ability to analyze the sequential logic circuit.
4. Ability to apply the digital electronic components in Mechatronic engineering applications.

REFERENCES

1. Flyod, T.L., "Digital Fundamentals", 11th. Ed., Prentice Hall 2014.
2. M.M. Mano, "Digital Design", 3rd Ed., Prentice-Hall 2002.
3. Tocci, R.J., "Digital systems: Principles and Applications", 8th Ed., Prentice Hall 2001.

ENT 266/3
ENGINEERING MATERIALS

COURSE SYNOPSIS

This course introduces students to the engineering materials fundamentals including the engineering materials application, atomic bonding, crystal structure, mechanical and physical properties, corrosion mechanism, microstructural analysis, phase diagram, ferrous and non-ferrous alloys, polymer and advance materials.

COURSE OUTCOMES

1. Ability to compare types of material families (metal, polymer, ceramic, and composite) and describe material structure.
2. Ability to analyze, calculate, and compare various material characteristic and properties such as mechanical, electrical, magnetic, and optical properties.
3. Ability to analyze material reliability in terms of material life cycle, oxidation and corrosion mechanism.

REFERENCES

1. William D. C., David G. R., Fundamentals of Materials Science and Engineering, John Wiley, 4th Edition, 2012.
2. Hibbeler R.C., Mechanics of Materials, Prentice Hall, 8th Edition, 2011.

ENT 267/3
DESIGN OF MACHINERY

COURSE SYNOPSIS

This course enables the students to comprehend and identify theoretical design as well as the machine elements that need to be considered in machine design process. This course also



encourages the students to think as a machine designer. The concept and principle of machine design taught will be applied in designing machine, focusing on the outcome of innovative student thinking.

COURSE OUTCOMES

1. Ability to discuss, apply, and organize the concept and principle of design process.
2. Ability to discuss, apply, and organize machine elements and analyze position, velocity and acceleration of a point in a linkage.
3. Ability to analyze, and construct machine elements to develop a mechanism.
4. Ability to apply, analyze and sketch mechanism design (linkage synthesis).

REFERENCES

1. Robert L. Norton (2008). *Design of Machinery*. 5rd Ed., McGraw Hill.
2. David H. Myszka (2005). *Machine & Mechanisms: Applied Kinematic Analysis*. Prentice Hall.
3. Richard G. Budynas and J. Keith Nisbet (2008). *Shigley's Mechanical Engineering Design*. 8th Ed., McGraw Hall.
4. Robert L. Mott (2006). *Machine Elements in Mechanical Design.* 4th Ed. in SI Units, Prentice-Hall.
5. Charles E. Wilson and J. Peter Sandler (2006). *Kinematics and Dynamics of Machinery.* 3rd Ed., Pearson Prentice-Hall.

ENT 269/4
EMBEDDED SYSTEM AND INTERFACING
(Pre-requisite ENT 262/4 Digital Logic Design)

COURSE SYNOPSIS

The aim of this course is to enable the students to learn the concepts and requirements, as well as design a self-contained embedded system. This includes the study on the characteristics of embedded systems, hardware and software development, single chip microcontroller and programming techniques in C language and developing an embedded system application.

COURSE OUTCOMES

1. Ability to comprehend the theory and basic architecture of embedded system.
2. Ability to write a structured program in C language for embedded system application.
3. Ability to choose and apply input output devices to embedded system for interfacing.
4. Ability to evaluate and develop a self-contained embedded system application.

REFERENCES

1. Muhammad Ali Mazidi, Rolin D. Mckinlay& Danny Causey. "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", Pearson Prentice Hall, 2008.
2. Barry B. Brey. "Applying PIC18 Microcontrollers: Architecture, Programming, and Interfacing using C and Assembly", Pearson Prentice Hall, 2008.
3. Richard H. Barnett, Sarah Cox & Larry O'Cull. "Embedded C Programming and the Microchip PIC, Thomson &Delmar Learning", 2004.

ENT 270/3
PRINCIPLE OF THERMOFLUIDS

COURSE SYNOPSIS

The objective of the course is to expose the students to the fundamental principles of fluid mechanic, thermodynamic and heat transfer. In Fluid Mechanics attention will be given to the fundamental principles of fluid mechanics and definition, fluid statics, fluid dynamics, and flow over bodies. In Thermodynamics focus is on the fundamental principles of thermodynamics and definition, the Zeroth law, the first law and the 2nd law. In Heat Transfer, different modes through conduction, convection and radiation to be covered.

COURSE OUTCOMES

1. Ability to explain and analyze the fundamental principles of fluid mechanics.
2. Ability to explain and solve fundamental principles of thermodynamics related problems
3. Ability to analyze the fundamental principles of heat transfer.

REFERENCES

1. Yunus Cengel, Robert Turner, John Cimbala, Fundamentals of Thermal-Fluid Sciences, McGraw-Hill, 4th Edition, 2011.
2. Potter Scott, "Thermal Sciences-An introduction to Thermodynamics, Fluid Mechanics, and Heat Transfer", Thomson Brooks/Cole, 2004.
3. Robert L. Mott, "Applied Fluid Mechanics", 6th Edition, Prentice Hall, 2006.

ENT 281/3
SIGNALS AND SYSTEMS

COURSE SYNOPSIS

This course provides the basics of different types of signals, transformation techniques and communication system. In addition, the students are also exposed to the design of Linear Time Invariant system and its characteristics in this course. Various signal transformation methods on two different domains (time and frequency) such as Fourier series, Fourier transform, Z Transform and Laplace transform is also studied. At the end of this course, the students are able to analyze different types of signals using numerous transformation techniques and evaluate its performance.

COURSE OUTCOMES

1. Ability to comprehend the concept and identify specific type of signals and systems.
2. Ability to analyze the signal using time and frequency domain techniques.
3. Ability to develop and formulate a system using both time-domain and frequency-domain techniques.

REFERENCES

1. Simon Haykin and Barry Van Veen, "Signals and Systems", Wiley, 2nd Edition, 2002.
2. John G. Proakis and Masoud Salehi, "Fundamentals of Communication System", Prentice- Hall, 2005.
3. Charles L. Phillips, John M. Parr, Eve A. Riskin; "Signals, Systems and Transforms", Prentice Hall, Fourth Edition, 2009.

ENT 286/3
INSTRUMENTATIONS AND MEASUREMENTS

COURSE SYNOPSIS

This course provides the knowledge of measurement and instrumentation with various transducers and techniques involving physical phenomena. This includes an overview of general measurement system, errors and signal characteristics, followed by diverse type of sensors and their application in measuring electronics signal, temperatures, humidity, displacement as well as velocity and acceleration, force, torques strain and stress and also the flow rate measurement. The use of computer for interfacing application is also covered in this course.

COURSE OUTCOMES

1. Ability to explain basic concepts of transducers, sensors and measurement techniques and errors in measurement.
2. Ability to apply interfacing concept between transducers, computer and signals obtained from measurement techniques.
3. Ability to design measurement system using suitable sensors and transducers.

REFERENCES

1. Anthony J.W., Ahmad R.G., "Introduction to Engineering Experimentation", 3rd Ed., Prentice Hall, 2010
2. Bentley, J.P., "Principles of Measurement Systems", 4th Edition, Prentice Hall, 2005.
3. Johnson, C., "Process Control Instrumentation Technology", 8th Edition, Prentice Hall, 2006.
4. Doebelin, E.O., "Measurement System: Application and Design", Mc Graw Hill, 2004.
5. Sinclair, I., "Sensors and Transducers", 3rd Edition, Newnes, 2001.

ENT 315/4
MEDICAL SIGNAL PROCESSING
(Prerequisite: ENT 217/3 Principles of Signal and System)

COURSE SYNOPSIS

This course is an introduction to classification of digital signals and systems and also explains the application of different types of transform domains in the analysis of discrete signals and systems. The course covers the application of discrete Fourier transform (DFT) and fast Fourier transform (FFT) to analyze the digital signals. This course also covers the design of finite impulse response (FIR) filters and infinite impulse response (IIR) filters for analyzing biomedical signals. Finally, this course discusses the application of digital signal processing and digital signal processors. MATLAB software is used in the laboratory sessions.

COURSE OUTCOMES

1. Ability to explain the basic concept of DSP and acquisition signal process.
2. Ability to explain on the filter used and its design.
3. Ability to discuss on image processing method.
4. Ability to discuss the tools used for DSP.

REFERENCES

1. Proakis J.G. and Manolakis D.G., (2007), "Digital Signal Processing: Principles, Algorithms and Applications" 4th edition, Prentice Hall

2. Lyons R.G., (2004), "Understanding Digital Signal Processing", 2nd ed, Prentice Hall
3. Mitra S.K., (2006), "Digital Signal Processing", McGraw-Hill
4. Charles L.Byrne (2005). Signal Processing: A Mathematical Approach, Wellesley.
5. Steven Smith (2003). Digital Signal Processing: A Practical Guide for Engineers and Scientists, Elsevier.

ENT 316/3
PRINCIPLES OF COMMUNICATION SYSTEMS

COURSE SYNOPSIS

This course is designed to introduce the principles of communication system and its applications in communication, broadcasting and other modern equipments. At the end of the course, the students are expected to provide clear understanding in fundamental communication system, relate the principles to various applications in engineering field and propose a conceptual model of a communication setup.

COURSE OUTCOMES

1. Ability to analyze mathematical function of communication system model.
2. Ability to evaluate performance of elements in communication device.
3. Ability to propose a conceptual setup of a communication system based on specific requirement.

REFERENCES

1. Louis E. Frenzel (2008), "Principles of Electronic Communication Systems", 3rd Ed., McGraw-Hill, 2008.
2. N. Benvenuto, R. Corvaja, T. Erseghe, N. Laurenti (2007), Communication Systems – Fundamentals and Design Methods, Willey.
3. Wayne Tomasi (2004), "Electronic Communication System, Fundamental Through Advanced",5th Ed., Pearson Prentice Hall.
4. William L. Schweber (2002), "Electronic Communication Systems: A Complete Course", 4th Edition, Prentice Hall.
5. Mullet (2003),"Basic Telecommunications: The Physical Layer", Thomson Learning.

ENT 317/4
MEDICAL ELECTRONICS & BIOINSTRUMENTATION

COURSE SYNOPSIS

This course provides an intensive introduction to medical electronics and bioinstrumentation. It will covers sensors and instrumentation for medical applications, as well as measurement of biosignals, such as electrocardiogram (ECG), electroencephalography (EEG), blood pressure and respiratory system. At the end of the course, the students are expected to provide clear understanding in various medical instrumentation principles and demonstrate the ability to apply basic sensors and design basic electronic circuits for medical applications.

COURSE OUTCOMES

1. Ability to define, discuss, apply, distinguish and assemble basic sensors and transducers in a medical instrumentation system.
2. Ability to apply, analyze, design, evaluate and assemble instrumentation amplifiers and analogue filter circuits in medical instrumentation.
3. Ability to discuss, explain, apply and analyze medical devices involved in the measurement of cardiovascular and respiratory system.
4. Ability to discuss, explain, apply and analyze fundamental concepts in cardiac therapeutic devices and basic medical imaging modalities.

REFERENCES

1. Webster, J.G. (2010). Medical Instrumentation: Application and Design. 3rd Ed. Wiley.
2. Webster, J.G. (2003). Bioinstrumentation. Wiley.
3. Perez, R. (2002). Design of Medical Electronic Devices. Academic Press.
4. Carr, J.J. (2000). Introduction to Biomedical Equipment Technology. 4th Ed. Prentice Hall.
5. Khandpur, R.S (2007).'Handbook of Biomedical Instrumentation', 2nd Edition, Tata McGraw-Hill.

ENT 318/3
ARTIFICIAL ORGANS

COURSE SYNOPSIS

This course covers the artificial organ for the heart, kidney, lung, pancreas and ear. These topics focus on the implementation of artificial organs by understanding the anatomical, physiological and biological transport aspects as well as mathematical concepts of the respective organs. At the end of the course, students are expected to have the ability to apply the fundamental principles of the artificial organs, perform simple modeling and able to propose the suitable methods/ devices for each problematic organ.

COURSE OUTCOMES

1. Ability to describe concepts, fundamental principle and problems regarding artificial organs.

2. Ability to analyze mathematical concepts of human physiology, biotransport and artificial organs.
3. Ability to illustrate modelling and simulation of human physiological system and artificial organs.

REFERENCES

1. Marieb E.N. (2006), "Essentials of Human Anatomy and Physiology", 8th Edition, Pearson Benjamin Cummings.
2. Lee Waite, (2006), "Biofluid Mechanics in Cardiovascular System", Mc Graw Hill.
3. Truskey G.A., Fan Yuan, Katz D.F., (2004) "Transport Phenomena in Biological System", Prentice Hall.
4. Dayan P., Abbott L.F., (2001) "Theoretical Neuroscience", MIT Press.
5. Ritter A.B., Reisman S., Michniak B.B., (2005), "Biomedical Engineering Principles", CRC Press.

ENT 319/3
THERMOFLUIDS

COURSE SYNOPSIS

The objective of the course is to expose the students to the fundamental principles of fluid mechanic, thermodynamic, heat transfer, and also fundamental application of fluid mechanics in Biomedical Engineering. In Fluid Mechanics attention will be given to the fundamental principles of fluid mechanics and definition, fluid statics, fluid dynamics, and flow over bodies. In Thermodynamics focus is on the fundamental principles of thermodynamics and definition, the Zeroth law, the first law and the 2nd law. In Heat Transfer, different modes through conduction, convection and radiation to be covered.

COURSE OUTCOMES

1. Ability to define, explain and analyze the fundamental principles of thermofluids.
2. Ability to define, explain and analyze the fundamental principles of thermodynamics.
3. Ability to define, explain and analyze the fundamental principles of heat transfer.

REFERENCES

1. Massoud, M. (2005). Engineering Thermofluids: Thermodynamics, Fluid Mechanics, and Heat Transfer. 1st Ed. Springer.
2. Cengel Y.A, Boles M.A. (2001). Thermodynamics: an engineering approach. 4th Ed. McGraw Hill.
3. Marquand, C. (2000). Thermofluids: an integrated approach to thermodynamics and fluids mechanics principles. John Willey.
4. Y.A Cengel and R.H Turner. (2008). Fundamental of Thermal Fluid Sciences. 3nd Edition, Mc Graw Hill.
5. Lee Waite (2006), "Biofluid Mechanics in Cardiovascular System", Mc Graw Hill.

ENT 332/3
MECHANISMS & MACHINES

COURSE SYNOPSIS

This course is intended for undergraduate level taking basic courses in mechanism and machine theory. Basic principles of analysis and synthesis of mechanisms with lower and higher pairs are both included considering both kinematic and kinetic aspects. The course will emphasize on the analytical design techniques used to evaluate machine elements and machinery in mechanical engineering.

COURSE OUTCOMES

1. Ability to analyze kinematics and kinetics mechanisms of machine.
2. Ability to analyze the problems for different modes of heat transfer in industries applications.
3 Ability to analyze experimental results by designing and conducting heat transfer experiments.

REFERENCES

1. R.L. Norton: Kinematics and Dynamics of Machinery, 2nd Edition in SI units, McGraw Hill, 2009.
2. Dan B. Marghitu. Kinematic Chains and Machine Components Design. Academic Press, 2005.
3. R. L. Mott. Machine Elements in Mechanical Design, 4th Edition in SI units, Pearson Prentice Hall, 2006.
4. John J. Uicker,Jr., Gordon R. Pennock, Joseph E. Shigley. Theory of machines and mechanisms. Oxford University Press, USA, 2003.
5. David H. Myszka, Machines and mechanisms: applied kinematic analysis. Prentice Hall, 2005.

ENT 333/3
HEAT TRANSFER

COURSE SYNOPSIS

The objective of this course is to introduce the concepts and applications of heat transfer modes to the students of mechanical engineering. Emphasis will be given to solve and evaluate the problems through comprehensive study of the modes of heat transfer: conduction, convection, radiation, boiling, condensation, and application to heat exchanger. At the end of this course students can formulate necessary equations and solve the problems of heat transfer. Problem solving will be focused for industries applications.



COURSE OUTCOMES

1. Ability to formulate the necessary equations related to the problems of heat transfer.
2. Ability to analyze the problems for different modes of heat transfer in industries applications.
3 Ability to analyze experimental results by designing and conducting heat transfer experiments.

REFERENCES

1. Cengel, Y.A., "Heat and Mass Transfer: Fundamentals and Applications", 4th ed. In SI Units, McGraw-Hill, Copyright @ 2011.
2. J. P. Holman, "Heat Transfer", 10th ed, McGraw-Hill, 2009.
3. Incropera, F.P., DeWitt, D. P., Bergman T. L., Lavine A. S., "Introduction to Heat Transfer", 6th ed., John Wiley & Sons, 2011.
4. Lienhard, J.H., "A Heat Transfer Textbook", 4th ed., Phlogiston Press, 2011.
5. Kreith F., Bohn M.S., "Principles of Heat Transfer", 7th ed., Brooks/Cole, 2010.

ENT 334/3
COMPONENT DESIGN

COURSE SYNOPSIS

The objective of this course is to introduce the concepts and principles of mechanical components design. Student should have ability to design mechanical components of mechanical systems. The course begins with understanding of design fundamental and followed by the component selection, stress analysis, failure theories, and designing mechanical components. It consists of screws and fasteners, mechanical springs, bearings, gears, clutches, brakes and flexible mechanical elements. The knowledge of mechanical design will be implemented in a mini project as a laboratory assignment by utilizing suitable 3D softwares.

COURSE OUTCOMES

1. Ability to design of mechanical components in mechanical systems.
2. Ability to analyze failure prevention under static and variable loading.
3. Ability to evaluate mechanical components for selected mechanical systems.

REFERENCES

1. Richard G. Budynas, J. Keith Nisbett, Shigley's Mechanical Engineering Design. Ninth Edition, McGraw Hill, 2011.
2. Robert L. Mott, John Tang, Machine Elements in Mechanical Design, 4th Edition in SI Units, Pearson Prentice Hall, 2004.
3. David G. Ullman, David Ullman, Mechanical Design Process, 3rd Edition, McGraw Hill, 2003, ISBN 0072-37338-5.
4. Karl T. Ulrich and Steven D. Eppinger, Product Design and Development, 3rd Edition, McGraw-Hill, 2004, ISBN 007-247146-8.
5. Joseph Edward Shigley, Mechanical Engineering Design, 6th Edition, McGraw-Hill, 2001.
6. Ashby, M.F, Materials Selection in Mechanical Design, 2nd Edition, Buttherworth-Heinemann, 1999.

ENT 335/3
SYSTEM DESIGN

COURSE SYNOPSIS

This course is intended as an advanced knowledge of mechanical system design for undergraduate level. Bringing together analytical and graphical techniques from previous courses to accomplish the design of a complete mechanism, machine or mechanical system. The course will emphasize on the analytical design techniques used to evaluate machine elements and machinery in mechanical engineering. This course will utilize Computer Aided Engineering (CAE) software as a tool in analyzing and solving mechanical system design problems.

COURSE OUTCOMES

1. Ability to design a mechanical system based on kinematics analysis.
2. Ability to evaluate machinery dynamics of a mechanical system.
3. Ability to analyze balancing of machinery.

REFERENCES

1. R.L. Norton: Kinematics and Dynamics of Machinery, 2nd Edition in SI units, McGraw Hill, 2009.
2. Dan B. Marghitu. "Kinematic Chains and Machine Components Design". Academic Press,2005.
3. R. L. Mott. "Machine Elements in Mechanical Design", 4th Edition in SI units, Pearson Prentice Hall, 2006.
4. John J. Uicker,Jr., Gordon R. Pennock, Joseph E. Shigley. "Theory of machines and mechanisms". Oxford University Press, USA, 2003.
5. David H. Myszka."Machines and mechanisms : applied kinematic analysis,". Prentice Hall, 2005.

ENT 336/3
FLUID MACHINERY

COURSE SYNOPSIS

This course introduces the operating principles of different types of pumps, compressors and conventional prime movers used in power generation. Their analyses and design characteristic

considerations are also considered. Upon completion of this course, students will be able to select proper fluid machines for specific applications and solve related fluid machinery problems.

COURSE OUTCOMES

1. Ability to analyze the performance of different pumps, fans, and compressors and select them properly for specific applications.
2. Ability to analyze the performance of different hydraulic turbines and select them properly for specific applications.
3. Ability to explain the operating principles of thermal turbines (steam/ gas turbines) and evaluate their performance.

REFERENCES

1. W.W. Peng, Fundamentals of Turbomachinery, John wiley & Sons, 2008.
2. Y.A. Cengel and J.M. Cimbala, Fluid Mechanics- Fundamentals and Applications, 3rd Ed. McGraw Hill, 2013.
3. S.L. Dixon, Fluid mechanics and Thermodynamics of Turbomachinery, 5th Ed., Pergamon, Oxford, 1998.
4. B.R. Munson, D.F. Young, and T.H. Okiishi, Fundamentals of Fluid Mechanics, 5th Ed., John Wiley & Sons, 2006.
5. H. Cohen, GFC Rogers, and HIH Saravanamuttoo, Gas Turbine Theory, 4th Ed., Longman, 1996

ENT 337/3
ELECTRONICS & MICROPROCESSORS

COURSE SYNOPSIS

This course is designed to introduce the basic concepts of electronics and its applications which cover both analogue and digital devices. This course helps the student to apply the theory to develop and test electronic equipments. This course also introduces the microprocessor architecture and relates that knowledge to the design of microprocessor based systems. This includes evaluation of a simple application on a microprocessor-based system.

COURSE OUTCOMES

1. Ability to describe and analyze analogue electronics circuits.
2. Ability to describe and analyze digital electronics circuits.
3. Ability to evaluate a simple application on a microprocessor-based system.

REFERENCES

1. Floyd T. (2005). *Electronic Devices*. 7th Edition, Pearson Prentice Hall.
2. Storey, N. (2006). *Electronics: A System Approach*. 3rd Ed., Prentice Hall.
3. Schuler, C. (2008). *Electronics: Principles & Applications*. 7th Ed., Mc Graw Hill.
4. Muhammad Ali Mazidi, Rolin D. Mckinlay & Danny Causey, PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18, Pearson Prentice Hall 2008.
5. Barry B. Brey, Applying PIC18 Microcontrollers: Architecture, Programming, and Interfacing using C and Assembly, Pearson Prentice Hall 2008.

ENT 346/3
VIBRATION MECHANICS

COURSE SYNOPSIS

The objective of the course is to introduce the students with the skills and knowledge in vibrations disciplines. The syllabus covers the fundamental of vibration and oscillation motion, free vibration, force vibration, transient vibration, two degree of freedom systems and multiple degree of freedom systems. The students will be well prepared towards industrial application elements such as vibration control, vibration measurement and signal analysis methods.

COURSE OUTCOMES

1. Ability to describe basic concept of vibrations and its applications, analyze simple-harmonic motion, measure free and force vibration for single degree of freedom.
2. Ability to analyze and measure the response of various systems (two degree and multi degrees of freedom) to various inputs (free and force excitation).
3. Ability to develop a model and assess vibration system parameter and estimate effectiveness of vibration isolation.
4. Ability to develop the operating measurement and analyze the vibration signals.

REFERENCES

1. Singiresu S. Rao (2000). *Mechanical Vibration*. Fourth Edition, Prentice Hall.
2. W. Thomson (2004). *Theory of Vibration With Application*. Prentice Hall.
3. W. J. Palm III (2005). *Mechanical Vibration*, John Wiley & Sons.



ENT 365/3
CONTROL ENGINEERING I

COURSE SYNOPSIS

This is an introduction course to control systems engineering. Students will be exposed to the mathematical modelling for mechanical, electrical as well as electro-mechanical systems using transfer functions, signal-flow graphs and Mason's rule. They will conduct system performance analysis in time and frequency domain. System stability will also be studied along with the root locus analysis. Finally the students will be introduced to system compensation design using PID and lead-lag controllers. The laboratory sessions will be conducted to enable the students to test the theory.

COURSE OUTCOMES

1. The ability to obtain the mathematical model for electrical and mechanical systems.
2. Ability to perform system response analysis and stability in time domain.
3. Ability to perform system response analysis and stability in frequency domain.
4. Ability to evaluate P,PI, PD, PID, lead, lag controllers based on the analysis of the system's response in time and frequency domain.

REFERENCES

1. Nise, N.S., "Control Systems Engineering", 6th Ed., Wiley, 2011.
2. Kuo B.C. "Automatic Control System" 8th Edition, Prentice Hall, 1995.
3. Ogata, K., "Modern Control Engineering", 4th Ed. Prentice Hall, 2002.
4. Gopal, M., "Control Systems: Principles and Design", 2nd Ed. Tata McGraw-Hill, 2002.

ENT 366/3
MACHINE VISION

COURSE SYNOPSIS

This course is designed to introduce the basic concepts of machine vision and provide an understanding of the basic concepts of vision and image acquisition and processing. The course also helps the students to develop the ability of designing machine vision systems for Industrial Applications.

COURSE OUTCOMES

1. Ability to perform analysis on image acquisition and processing concepts.
2. Ability to perform analysis on image feature extraction techniques.
3. Ability to design simple machine vision modules.

REFERENCES

1. Ramesh Jain, Rangachar Kasturi and Brain G Schunck (1995). *Machine Vision.* International edition, McGraw-Hill.
2. Horn, Berthold K. P (1986). *Robot Vision*. Cambridge, MA: MIT Press/ McGraw-Hill.
3. Robert M. Haralick and Linda G. Shapiro (1993). *Computer and Robot Vision*. Addison Wesley Publishing Company Inc. U.S.A.
4. David Forsyth and Jean Ponce (2003). *Computer Vision: A modern approach*. Prentice Hall.
5. Milan Sonka, Vaclav Hlavac and Roger Boyle (1999). Image Processing Analysis and Machine Vision. Brooks/ Cole Publishing Company. U.S.A.
6. S.N. Sivanandham and M. Paulraj. 'Introduction to Artificial Neural Networks'. Vikas Publications, India, 2003

ENT 367/3
FLUID POWER SYSTEMS

COURSE SYNOPSIS

This course provides the fundamentals of fluid power fluid systems that are divided into two parts i.e., hydraulics and pneumatics. Applications of fluid power will be discussed. The syllabus covers the physical properties of hydraulic fluids, energy and power in hydraulic and pneumatic systems, and frictional losses in pipelines. Main components of hydraulic and pneumatic systems will be analyzed. At the end of the course the students are expected to understand the concepts and applications of fluid power systems in industry.

COURSE OUTCOMES

1. Ability to understand and analyze main components of hydraulic and pneumatic systems
2. Ability to analyze energy and power in hydraulic and pneumatic systems
3. Ability to understand and apply hydraulic and pneumatic circuits

REFERENCES

1. Anthony Esposito. *Fluid Power with Applications*. Seventh Edition. Pearson Education Limited. 2014.
2. John Watton. Modelling. *Monitoring and Diagnostic Techniques for Fluid Power Systems*. Springer-Verlag 2007.
3. *Fluid Power Circuits*, 2002. CRC Press.

ENT 368/4
ELECTRICAL MACHINES & POWER SYSTEMS

COURSE SYNOPSIS

This course is intended to introduce to the Mechatronic students both theories and applications of electromechanical drives, which consists of DC & AC machines and stepper motor. This course aim to provide concepts of power systems which include three phase system, transmission line, distribution line, power transformer, power flow, fault analysis and system protection. At the end of the course, students should be able to know components of electrical systems, analyze its characteristic and evaluate the performance of the whole system.

COURSE OUTCOMES

1. Ability to describe component, operating principle of a particular drive system and analyze performance characteristics of a particular drive system.
2. Ability to design a drive system for a specific application.
3. Ability to analyze the characteristic of electrical power systems components and evaluate the performance of electrical power systems
4. Ability to design system protection in a power systems network.

REFERENCES

1. Theodore Wildi. *Electrical Machines, Drives, and Power Systems*. Sixth Edition, 2006
2. Anthony Esposito. *Fluid Power with applications*. Sixth Edition, 2003
3. Charles E. Wilson and J. Peter Sadler. *Kinematics and Dynamics of Machinery*. Third Edition in SI Units, 2006.

ENT 375/4
CONTROL ENGINEERING II
(Prerequisite: ENT 385/3 Control Engineering I)

COURSE SYNOPSIS

This course aims to convey the knowledge of classical control systems, advanced classical control method, state space representation of continuous-time system, continuous-time response and performance, specifications, state space analysis and design, advanced state space control system, projects based on problems drawn from mechatronics and manufacturing.

COURSE OUTCOMES

1. Ability to analyze the concepts of state-space design, non-linear system and digital control.
2. Ability to apply the concept of controllability and observability
3. Ability to analyze the non linear system.
4. Ability to design the digital control.

REFERENCES

1. Norman S. Nise, "Control System Engineering", 4th Edition, Wiley, 2004
2. Katsuhiko Ogata; "Modern Control Engineering", 4th Edition, Prentice-Hall, 2002.
3. Benjamin C. Kuo; "Automatic Control Systems", 8th Edition, John Wiley, 2003.
4. Richard C. Dorf, Robert H. Bishop; "Modern control System", 9th Edition, Prentice Hall, 2001
5. Richard Dorf and R.H. Bishop "Modern Control Systems", Addison-Wesley, 1998.

ENT376/3
MECHATRONIC SYSTEMS DESIGN I

COURSE SYNOPSIS

This course focuses on the methodologies, processes and elements for the design an integrated mechatronic system. It covers the philosophy mechatronic system design and evaluates all related design tools for a mechatronics system. It reviews all elements of a mechatronic system and introduces the first part of the mechatronic system design project.

COURSE OUTCOMES

1. Ability to design, develop and evaluate measurement, instrumentation and actuation systems.
2. Ability to design and evaluate a mechatronic system using a microcontroller.
3. Ability to identify customer need and conduct evaluation based on economic, ethical and sustainable factors for the mechatronic system.

REFERENCES

1. Bolton, W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition, Addison Wesley Longman: Essex England, 2003.
2. D. G. Alciatore and M. B. Histand, Introduction to Mechatronics and Measurement Systems. 3rd edition, McGrawHill.
3. D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997.
4. Godfrey C. Onwubolu, "Mechatronics: Principles and Applications",Butterworth-Heinemann 2005.
5. R. Isermann, Mechatronic Systems: Fundamentals, Springer-Verlag: Great Britain, 2003



ENT 377/4
ROBOTICS SYSTEMS

COURSE SYNOPSIS

This course is designed to introduce various aspects of Robotics such as the Types of robots, Capabilities, Characteristics, Robot Control Systems and Software, Kinematic Analysis, Principles of Inverse Kinematics, Robot Sensors and Drive mechanisms, Robot Work Dell design and Various industrial Applications.

COURSE OUTCOMES

1. Ability to choose suitable robots for specific industrial applications.
2. Ability to analyze object manipulations by robots for an industrial manufacturing.
3. Ability of designing sensor integrated robot control system.
4. Ability of designing and scheduling a robot work cell for a maximum productivity.

REFERENCES

1. Saeed B Niku (2001). *Introduction to Robotics*. Prentice hall.
2. M. P. Groover (1999). *Industrial Robotics*. McGraw Hill.
3. K. H. Low (2003). *Robotics : Principles and System Modelling*. Prentice hall.
4. Man Zhihong (2005). *Robotics*. Prentice Hall.
5. R. D. Klaffer, T. A. Chmielewski and M. Negin (2006). *Robotic Engineering: An Integrated Approach*. Prentice-Hall, India.

ENT 383/3
NETWORK & COMMUNICATION ENGINEERING

COURSE SYNOPSIS

This subject will cover all the basic principles and concepts of communication system including the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and medium. In addition, introductions to signal propagations and calculations of signal to noise ratio are also introduced to relate the students with real world applications.

COURSE OUTCOMES

1. Ability to explain the principle of network and communication systems
2. Ability to obtain mathematical model of modulation.
3. Ability to apply principle of various types of network and communication systems.
4. Ability to select equipments for the industrial network and communication technology.

REFERENCES

1. George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems: Concepts & Design", 4th Ed., Pearson Education Limited, 2005
2. Richard Zurawski, editor "The Industrial Communication Technology Handbook", CRC Press, 2005.
3. Andrew S. Tanenbaum, Maarten van Steen, "Distributed System: Principles and Paradigms", Prentice-Hall, 2002.
4. Behrouz A. Forouzan, "Data Communications and Networking", 4th Ed., Mc-Graw Hill, 2007.
5. William Stallings, "Data and Computer Communications", 7th Ed., Prentice-Hall, 2004.

ENT 413/3
MEDICAL IMAGING

COURSE SYNOPSIS

In this course the students are introduced to the basic principle of medical imaging modalities. This will provide them the understanding of various types of diagnostic radiology such as general X-Ray, Mammography, Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). Upon completion, students will be able to apply the fundamental principles and evaluate the efficiency of the medical imaging modalities that have been used in healthcare industry.

COURSE OUTCOMES

1. Ability to explain the concept of medical imaging modalities used in clinical application.
2. Ability to distinguish and explain the sources of energy in medical imaging modalities.
3. Ability to discuss and predict tissue reactions to radiation and propose the solution to reduce the radiation by applying Radiation Protection concept.
4. Ability to select the most suitable modalities for successful diagnostic.

REFERENCES

1. Walter Huda (2003), "Review of Radiologic Physics", Lippincott Williams & Wilkins.
2. Suetens, P. (2002). Fundamental of Medical Imaging. Cambridge University Press.
3. Bushberg,J.T. (2006). The essential physics of medical imaging. 3rd ed. William & Wilkins
4. Prince, J.L. (2006), Medical Imaging Signals and System, Prentice Hall.
5. Glenn F. Knoll (2000)."Radiation Detection and Measurement", John Wiley and Sons.

ENT 427/4
BIOMEDICAL INSTRUMENTATION DESIGN

COURSE SYNOPSIS

An advanced course to medical electronics & bioinstrumentation, the students will be exposed to the knowledge of designing bioelectrical amplifier and filters, application of microcontrollers in a data acquisition system, and platforms for telemedicine applications. Their theoretical knowledge will be tested in designing instrumentation for biomedical applications.

COURSE OUTCOMES

1. Ability to design an instrumentation circuit to acquire biomedical signals
2. Ability to develop a PC-based data acquisition device which is capable of acquiring biomedical signals.
3. Ability to demonstrate the project needs, design contsraints and requirement for the selected project in Biomedical Electronic Engineering field.

REFERENCES

1. Webster, J.G. 'Medical Instrumentation: Application and Design', 4th Ed., Wiley, 2010.
2. Khandpur, R.S. 'Handbook of Biomedical Instrumentation', 2nd Edition, Tata McGraw-Hill, 2007.
3. Webster, J.G. 'Bioinstrumentation', Wiley, 2003.
4. Cromwell, L. 'Biomedical Instrumentation and Measurements', 2nd Ed. Prentice-Hall, 2002.
5. Perez, R. 'Design of Medical Electronic Devices', Academic Press, 2002.
6. Carr, J.J. 'Introduction to Biomedical Equipment Technology', 4th Ed. Prentice Hall, 2000.

ENT 438/3
BIOMEDICAL DESIGN PROJECT

COURSE SYNOPSIS

This course will focus on the design of a biomedical instrumentation for medical applications. Students will utilised their theoretical knowledge in various aspects of bioinstrumentation to solve a biomedical related problem by identifying problem needs, and developing potential designs as well as construct and testing prototypes. Students will be introduced to the principle of engineering design process at the beginning of the course, followed by selection of the project theme. This course provides the opportunity for the students to apply and develop their design, executing project management and polished their interpersonal and communication skill.

COURSE OUTCOMES

1. Apply technical knowledge and problem-solving skills to serve community, society and profession.
2. Ability to design and evaluate the specific sub-system in the design device and system.
3. Ability to conduct economic evaluation of the selected project in Biomedical Engineering field.

REFERENCES

1. Biomedical Engineering & Design Handbook, Volumes I and II
2. Handbook of Biomedical Instrumentation, Khandpur
3. Bioinstrumentation, J.G. Webster
4. Medical Instrumentation, Application and Design, J.G Webster
5. Engineering Design Methods: Strategies for Product Design by Nigel Cross
6. Engineering Design Principles by Ken Hurst
7. Biomedical Instrumentation Systems, S. Chatterjee
8. Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer

ENT 440/4
DESIGN PROJECT

COURSE SYNOPSIS

Mechanical design project integrates mathematics, engineering and basic sciences and complementary studies in developing elements, systems, and processes to meet specific needs. It is a creative, iterative, and often open-ended process subject to constraints which may be governed by standards or legislation to varying degrees within mechanical engineering discipline. This course will require students to work in a group environment and collaborate with other members of group to arrive at good design decisions and then to provide proper reports on these decisions upon completion. The students are expected to work on selected project to design a project with current issues related to public health and safety/cultural/societal/ environmental as well as the economic considerations.

COURSE OUTCOMES

1. Ability to design and solve complex mechanical engineering problem.
2. Ability to acquire information from a variety of sources and apply design process to develop solutions based on knowledge and constraints using engineering analysis tools and software
3. Ability to evaluate solution that meets customer and financial needs with consideration to patents/codes/ standards for a design safety/ cultural/ societal/ environmental/and human factors.



4. Ability to communicate effectively via written, oral presentation and demonstration of the design solution.
5. Ability to function in a team for the successful delivery of design project.

REFERENCES

None

ENT 445/2
FINAL YEAR PROJECT I

COURSE SYNOPSIS

In this course, students will be applying the knowledge they have learned throughout this programme by implementing them in a research project which is carried out for two semesters. In the first semester, focus is given on the preparation of work schedule, identifying the objectives, and writing the research methodology. Students are expected to begin project work according to the planned schedule.

COURSE OUTCOMES

1. Ability to evaluate engineering issue(s)/problem(s) in proposed Final Year Project.
2. Ability to propose methodology for proposed Final Year Project.
3. Ability to perform audio visual presentations.

REFERENCES

None

ENT 446/4
FINAL YEAR PROJECT II

COURSE SYNOPSIS

In this course, students will be applying the knowledge they have learned throughout this programme by implementing them in a research project which is carried out for two semesters. In the second semester, focus is given on the project work (experiments, simulation, etc), analysis of results and final report writing. Students are expected to complete project work according to the planned schedule.

COURSE OUTCOMES

1. Ability to evaluate engineering deliverable via system / prototype / algorithm / software / simulation / experimental analysis.
2. Ability to demonstrate project management skills (such as problem solving & interest, creativity, independence and entrepreneurship) in order to achieve project objectives.
3. Ability to present the findings of project using audio visual presentations.

REFERENCES

None

ENT 457/3
MANAGEMENT, PRODUCTION & OPERATIONS

COURSE SYNOPSIS

This course offers comprehensive contents about production and operation management in manufacturing and services. Production and operation management is the process of managing people and resources in order to create a product or a service. This course also introduces students to project management, forecasting theory, goods and services design, process strategy and capacity planning, location and layout strategies, supply chain management, inventory management theory, aggregate planning theory, Material Requirements Planning (MRP) and scheduling theory.

COURSE OUTCOMES

1. Ability to analyze operations management in operations, productivity, project management and forecasting.
2. Ability to design operations in goods and services, process control, capacity planning, location and layout strategies.
3. Ability to manage operations in supply-chain management, inventory management, aggregate planning, material requirements planning, operations scheduling, maintenance and reliability.

REFERENCES

1. Jay Heizer and Barry Render (2010). *Operations Management.* 10th Edition, Person.
2. Steven Nahmias (2009). *Production and Operations Analysis*. McGraw Hill.
3. Russell and Taylor (2009). *Operations Management: Along The Supply Chain*. 6th Edition, John Wiley & Sons.
4. Stephen Chapman (2004). *Fundamentals of Production Planning and Control*. Prentice Hall.
5. R. Dan Reid and Nada R. Sanders (2005). *Operation Management: An Integrated Approach*. 2nd Edition, John Wiley & Sons.
6. Faridah Maarof, Maslin Masrom and Mohd Yunus Majid (1998). *Penyelidikan Operasi: Penggunaan dan Algoritma*. Penerbit Universiti Teknologi Malaysia, Johor.

ENT 471/4
AUTOMATION
(Prerequisite: ENT 289/3 Drive and Power Electronics)

COURSE SYNOPSIS

This course aims to convey the knowledge of automation technologies. It combines the automation technology principles and its relationship with assembly process and system, the element of sensor, actuator and drive technology as an input/output component in automation technology. It also covers automation technology and technique in terms of hardware and software control, the automation technology issues in design, engineering analysis, planning, tooling and manufacturing.

COURSE OUTCOMES

1. Ability to perform analyzes on automation in a production system.
2. Ability to perform analyzes and evaluate on elements of an automation system.
3. Ability to design and evaluate the automation system for an optimum performance in various applications.

REFERENCES

1. Mikell P. Groover (2001), "Automation, Production Systems, and Computer-Integrated Manufacturing" 2nd Edition, Prentice Hall
2. Jon Stenerson (2003), "Industrial Automation and Process Control" 1st Edition, Prentice Hall
3. Frank D. Petruzella (1999), "Programmable Logic Controllers" 2nd Edition, Glencoe/McGraw-Hill
4. Ridley, J.E (1999), "Introduction to Programmable Logic Controller"

ENT 476/4
MECHATRONIC SYSTEMS DESIGN II

COURSE SYNOPSIS

This course focuses on the design of an integrated mechatronic system and it is a continuation from Mechatronic System Design I. The students are expected to design a mechatronic system to solve real engineering problems on selected predefined scope, including economic and sustainability analysis, under the guidance of project supervisor.

COURSE OUTCOMES

1. Ability to evaluate the design concept and requirement for a mechatronic system.
2. Ability to apply relevant design concept, requirement and tools for the design of a mechatronic system.
3. Ability to design and evaluate specific subsystems and processes in a mechatronic system.
4. Ability to conduct economic evaluation, ethical and sustainable analysis for the mechatronic system.

REFERENCES

1. Bolton, W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition, Addison Wesley Longman: Essex England, 2003.
2. D. G. Alciatore and M. B. Histand, Introduction to Mechatronics and Measurement Systems. 3rd edition, McGrawHill.
3. D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997.
4. Godfrey C. Onwubolu, "Mechatronics: Principles and Applications",Butterworth-Heinemann 2005.
5. R. Isermann, Mechatronic Systems: Fundamentals, Springer-Verlag: Great Britain, 2003

ENT 490/3
MANAGEMENT PRODUCTION AND QUALITY CONTROL

COURSE SYNOPSIS

This course introduces productivity management such as competitiveness, ratios, work study, learning rates, and linear programming. It also introduces definitions of quality, its dimensions and views, concepts and techniques of total quality control such as statistical process control, process capability, acceptance sampling, and the relationships between productivity and quality. Where applicable, appropriate operations management software will be introduced.

COURSE OUTCOMES

1. To understand the productivity concepts from different aspects of management,
2. To understand the Six Sigma management tools.
3. To be able to understand the statistical methods used in quality control and improvement,
4. To understand the methods on how labour can improve their productivity and the measurements used to measure the labour productivity.

REFERENCES

1. Evans, J.R & Lindsay, W.M. (2007). The Management and Control of Quality. 7th Edition. Thompson Learning.
2. Foster, (2006). Managing Quality. 2nd ed. Prentice Hall.
3. Kolarik, W.J. (2005). Creating Quality Concepts, Systems, Strategies, and Tools. McGraw Hill.

4. Besterfield, Dale H. Quality control 7th Edition. Upper Saddle River, New Jersey: Pearson Prentice-Hall, Inc.: 2006
5. C. M. Creveling,, J. L. Slutsky, D. Antis, Jr. Design for Six Sigma in Technology and Product Development, Prentice Hall, 2003

ELECTIVE COURSES

ENT 342/3
COMPUTATIONAL FLUID DYNAMICS

COURSE SYNOPSIS

This course offers comprehensive contents about computational fluid dynamics. It introduces to finite difference and finite volume methods in the analysis of linear and nonlinear problems. This course discusses inviscid incompressible and compressible fluid flow governed by Euler equations and also incompressible and compressible viscous flows governed by boundary layer and Navier-Stokes equations and explain the concept of simple turbulence modelling.

COURSE OUTCOMES

1. Ability to formulate the mathematic equations to fluid mechanics problem.
2. Ability to analyze the CFD results using different types of elements.
3. Ability to apply the CFD technique to some applications concerning fluid flow and heat transfer problems.

REFERENCES

1. Pradip Niyogi, S.K. Chakrabartty and M.K. Laha (2005). *Introduction to Computational Fluid Dynamics*. Pearson.
2. Versteeg, Versteeg, Malalasekra and Malalasekra (2007). *An introduction to Computational Fluid Dynamics: The Finite Volume Method*. 2nd Ed., Pearson.
3. Oleg Zikanov (2010). *Essential Computational Fluid Dynamics*. John Wiley.
4. H.K. Versteeg and W. Malalasekera (1996). *An introduction to Computational Fluid Dynamics: The Finite Volume Method*. 2nd Ed., Longman Scientific & Technical.
5. John D. Anderson, Jr. (1995). *Computational Fluid Dynamics: The Basics with Applications*. McGraw-Hill International editions.
6. Jiyuan Tu, Guan Heng Yeoh and Chaoqun Liu (2008). *Computational fluid dynamics: a practical approach*. Amsterdam: Butterworth-Heinemann.

ENT 347/3
FINITE ELEMENT METHODS

COURSE SYNOPSIS

The objective of this course is to introduce finite element methods for approximate numerical solutions to engineering problems. The course concentrates on solution of structural problems, but also provides the basis for expanding to other engineering filed problem. The formulation and solution of the finite element system equations for 1, 2 and 3 dimensional elements will be discussed including on how to assemble the finite element equations and applying boundary conditions. Analyses will be conducted using computer programming and commercial FEA software.

COURSE OUTCOMES

1. Ability to understand the fundamental of finite element analysis concepts
2. Ability to derive global stiffness matrices for plane frame elements.
3. Ability to develop computer programme to solve beam and frame problems by using finite element analysis.
4. Ability to model and analyze structural problem by using commercial FEM software.

REFERENCES

1. Tirupathi R. Chandrupatla and Ashok D. Belegundu (2009). *Introduction to Finite Elements in Engineering*. Third edition, Prentice Hall.
2. David V. Hutton (2004). *Fundamental of Finite Element Analysis*. 1st Edition, McGraw-Hill.
3. S. S. Bhavikati (2005). *Finite Element Analysis*. New Age International Publisher.
4. I. M. Smith and D.V. Griffiths (2004). *Programming the Finite Element Method*. 4th Edition, John Wiley & Sons Ltd.
5. Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom (2001). *The Finite Element Method for Engineers*. 4th edition, John Wiley & Sons.

ENT 420/4
BIOLOGICAL SYSTEM MODELING

COURSE SYNOPSIS

The course aims to develop quantitative engineering models describing biological systems at the cellular and tissue scale. Students will be introduced to the process of developing engineering models of biological systems, and to use simulation software for the solution of the mathematical equations describing the system behaviour.

COURSE OUTCOMES

1. Ability to calculate the linear and non-linear system using ordinary differential equation (ODE).
2. Ability to analyze the knowledge about mathematical equation into biological system.
3. Ability to construct and analyze the mathematical modelling of biological system.

REFERENCES

1. Alon, U. (2007). An Introduction to Systems Biology. CRC Press.
2. Klipp, E. (2005). Systems Biology in Practice. Wiley.
3. Allen, L.J.S. (2007). An Introduction to Mathematical Modelling. Prentice-Hall.
4. Edelstein-Kesher, L. (2005). Mathematical Models in Biology. SIAM.
5. Murray, J.D. (2002). Mathematical Biology. Springer.

ENT 426/4
COMPUTED TOMOGRAPHY AND APPLICATIONS

COURSE SYNOPSIS

This is an advanced course to biomedical instrumentation. Students will be exposed to the knowledge of tomography systems, principles and applications. Several types of tomography systems, its theoretical concept and algorithm will be discussed. This course is related to that some clinical applications and safety aspects.

COURSE OUTCOMES

1. Ability to discuss, explain, analyze and judge the concept of tomography and its suitable applications.
2. Ability to explain, discuss and analyze the suitable reconstruction algorithm of a tomography system.
3. Ability to discuss, explain and analyze the measurements of projection data of a tomography system.
4. Ability to discuss, explain and compare the algebraic reconstruction algorithms for suitable tomography applications.

REFERENCES

1. W. A. Kalender (2006), Computed Tomography; Fundamentals, System Technology, Image Quality and Applications, Wiley.
2. A. C. Kak and Malcolm Slaney (2001), Principles of Computerized Tomographic Imaging, Society of Industrial and Applied Mathematics.
3. S. C. Bushon (2000) Computed Tomography, McGraw Hill.
4. C. B. Grossman (⁎1991), "Magnetic Resonance Imaging and Computed Tomography of the Head and Spine", Williams & Wilkins.
5. T. Grumme, W. Kluge, K. Kretzschmar and A. Roesler (1998), "Cerebral and Spinal Computed Tomography", 3rd ed. Blackwell Science.

ENT 431/3
REFRIGERATION AND AIR CONDITIONING

COURSE SYNOPSIS

This course discusses about Refrigerants, Refrigeration cycles including multipressure systems and their application for industrial transport and food refrigeration. It also covers the application of Psychrometry to Air Conditioning Processes and the method of cooling load calculations for proper selection of Air Conditioners

COURSE OUTCOMES

1. Ability to analyze different refrigeration cycles and apply them properly for practical applications.
2. Ability to apply Psychometry to Air Conditioning Processes and evaluate the cooling loads for proper selection of Air Conditioners.

REFERENCES

1. Ahmadul Ameen, "Refrigeration and Air Conditioning", Prentice Hall of India, 2006.
2. C. P. Arora, "Refrigeration and Air conditioning", Second Edition, Mc Graw Hill, 2001
3. R. Miller and M. R. Miller, "Air Conditioning and Refrigeration", Second Edition, Mc Graw Hill, 2012
4. S. Wang, "Handbook of Air Conditioning and Refrigeration", Mc Graw Hill, 2000.
5. S. N. Sapali, "Refrigeration and Air conditioning", PHI Learning Pvt. Ltd., 2009.

ENT 434/3
COMPOSITE MATERIALS

COURSE SYNOPSIS

The aim of the module is to enable students to understand fundamental principles of engineering mechanics of composite materials, to know basic methods to characterise, model, and predict mechanical properties of composite materials, and to design virtually engineering composites with given mechanical properties. Several failure criteria of laminates are also to be introduced in the course. After completing this course, students should be able to fundamentally understand the role of constituents in overall response of lamina (micromechanics) and how a set of laminae with different configurations



affect the overall properties and response of laminates (macromechanics). Students will be able to apply these concepts to analyze and design composite structures for engineering applications.

COURSE OUTCOMES

1. Ability to describe the concepts and elaborate the characteristics of composite materials including their processing methods.
2. Ability to evaluate micromechanic of elastic behaviour of composite lamina.
3. Ability to discuss the micromechanics of failure including failure mechanisms and prediction of strength.

REFERENCES

1. I.M. Daniel, O. Ishai, Engineering Mechanics of Composite Materials."2nd ed Oxford University Press, 2007.
2. D. Hull, T. W. Clyne, An Introduction to Composite Materials, 2nd Ed. Cambridge Press, 1996.
3. Bhagwan D. Agarwal and Lawrence J. Broutman, Analysis and Performance of Fibre Composites, 3rd Ed. 2006.

ENT 435/3
ACOUSTIC & NOICE CONTROL

COURSE SYNOPSIS

The aim of this course is to enable students to understand fundamental principles of engineering acoustics. Several acoustics criterias, meaurements and noise control guidances required for design and construction of those features related to noise also to be introduced in the course. After completing this course, students should be able to fundamentally understand the acoustics which are important for noise control practice as well as the basic concepts of acoustic measurements and the use and application of acoustic signal analysis for particular application in noise control.

COURSE OUTCOMES

1. Ability to describe the conceptual and fundamental of engineering acoustics.
2. Ability to explain the principles and techniques of noise and their applications in controlling noise.
3. Ability to evaluate the various methods for controlling exposure to noise.

REFERENCES

1. Randall F. Barron, "Industrial Noise Control and Acoustics", CRC Press, 2002.
2. R.J. Peters, "Acoustics and Noise Control", Routledge, 2013.
3. Lawrence E. Kinsler, Austin R. Frey, Alan B. Coppens, James V. Sanders, "Fundamentals of Acoustics 4th Ed.", Wiley India Pvt. Limited, 2009.
4. David A. Bies, Colin H. Hansen, "Engineering Noise Control: Theory and Practice, 4th Ed", CRC Press, 2009.
5. Malcolm J. Croker, "Handbook of Noise and Vibration Control" , John Wiley & Sons, 2007.

ENT 436/3
INTERNAL COMBUSTION ENGINE

COURSE SYNOPSIS

The objective of the course is to look into the fundamentals of operation on internal combustion engines in term of their performance, operation, fuel requirements, and environmental impact. The topics include fluid flow, thermodynamics, combustion, heat transfer and fuel properties, with reference to engine power, efficiency, and emissions. Students will learn about the features and operating characteristics of different types of internal combustion engines, spark-ignition, diesel, stratified-charge, and mixed-cycle engines. At the end of this course, students should be able to understand real world engine issues and able to optimize future engine designs for specific sets of constraints (fuel economy, performance, emissions).

COURSE OUTCOMES

1. Ability to evaluate the basic concept of operating characteristics of modern internal combustion engines
2. Ability to apply analytical techniques to the engineering problems and performance analysis of internal combustion engines
3. Ability to evaluate the relationship of the internal combustion process in term of the thermodynamics, combustion, heat transfer, friction and other factors affecting engine power, efficiency and emissions

REFERENCES

1. Pulkrabek W.W., Engineering Fundamentals of the Internal Combustion Engine, Pearson. 2nd Edition, 2003.

ENT 437/3
ADDITIVE MANUFACTURING

COURSE SYNOPSIS

This course covers the principles and applications of reverse engineering and additive manufacturing as related to design and manufacturing. It will detail the synchronized approach consideration of functional design, analysis and manufacturing that support the integration of reverse engineering and additive manufacturing. It will

discuss the importance of additive manufacturing in manufacturing and other industries. The course will address additive manufacturing principles, variety and their concept; and scope of additive manufacturing with application areas. Upon completion, students will have the ability to select the proper additive manufacturing techniques for product design and manufacturing which include using commercial software for digitizing free-form geometry, capturing digital data from a difficult to design object and make a manufactured model, create the design of an object suitable for additive manufacturing processes, compare traditional versus next generation manufacturing, defining and applying criterion for selecting appropriate additive manufacturing process for any given application, investigating application domain of additive manufacturing and learning the important process parameters and determining suitable additive technique for selected industries such as aerospace, medical devices, remote sensing, UAS/UAV, automotive in case study relevant to mass customized manufacturing, and some of the important research challenges associated with AM and its data processing tools.

COURSE OUTCOMES

1. Ability to identify and describe the processes of reverse engineering (RE), rapid prototyping (RP), and additive manufacturing (AM) in product design.
2. Ability to identify and describe various computer aided design and reverse engineering issues for additive manufacturing and the advantages and limitations of AM technologies in developing new products for mass production and customization.
3. Ability to select and evaluate the proper additive manufacturing techniques in terms of hardware and software technologies for product design and manufacturing in various industries a finished product .

REFERENCES

1. Gibson, I, Rosen, D W., and Stucker, B., Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2nd Ed. (2015), Springer Publ. 2015.
2. Gebhardt,A., Hotter, JS. Additive Manufacturing: 3D Printing for prototyping and Manufacturing, 2016, Hanser Publications.
3. C. K. Chua, K. F. Leong, C. S. Lim, "Rapid Prototyping: Principle and Applications" 3nd Edition, World Scientific Publishing, Singapore. 2010.
4. Lipson, Hod; Kurman, M., "Fabricated: The New World of 3D Printing", Wiley, 2013.
5. Barnatt, C., "3D Printing: The Next Industrial Revolution", CreateSpace Independent Publishing Platform, 2013.

ENT 461/3
RENEWABLE ENERGY

COURSE SYNOPSIS

The objective of this course is to introduce the concepts of Renewable Energy to students, emphasising on the fundamentals principles, and as well as applications of some renewable energy (Biomass, Wind, Solar, and Hydrogen) and the other energy resources available today for sustainable development.

COURSE OUTCOMES

1. Ability to interpret and evaluate the basic concepts and principles of renewable energy technologies and energy resources available today for sustainable development.
2. Ability to analyze and evaluate the conversion of Biomass, Wind, Solar and Hydrogen energies to mechanical, thermal and electrical power.
3. Ability to discuss and evaluate energy and power in the Geothermal, Tidal, Micro Hydro and other renewable energy.
4. Ability to describe and evaluate the relationships of renewable energies in the field, and their environmental impact.

REFERENCES

1. Gevorkian, Peter (2009). *Sustainable Energy Systems Engineering*. The McGraw Hill companies, New York.
2. GN Tiwari and MK Ghosal (2008). *Renewable Energy Resources*. Alpha Science International Ltd. Harrow, UK.
3. Tester, Drake, Driscoll, Golay and Peters (2000). *Sustainable Energy*. The MIT Press, Cambridge, Massachusetts London, England.
4. Dewulf, Van Langenhove (2006). *Renewable based technology*. John Wiley & Sons Ltd.
5. Z. Lubosny (2003). *Wind Turbine Operation in Electrical Power Systems*. Springer Verlag Berlin Heidelberg.

ENT 464/3
FRACTURE MECHANICS

COURSE SYNOPSIS

This course contains the theory of principles and application of fracture mechanics. The fracture mechanics have a wide range of engineering design applications, including the analysis of brittle fracture of low-toughness structural materials and many non-metallic, and quantitative prediction of fatigue crack growth in a wide range of engineering materials. It will emphasize on the mathematical principles of linear



elastic fracture mechanics and their application to engineering design. Student will conduct laboratory work with experiments using servo hydraulic fatigue testing machines and scanning electron microscopy.

COURSE OUTCOMES

1. Ability to describe the principles of fracture mechanics in engineering materials and examine the related problem under dynamic load.
2. Ability to identify the specimen configuration to use experiment in fracture toughness testing of metals/ non-metals and predict fatigue strength and fatigue life using Stress versus Number of cycles curves.
3. Ability to estimate fatigue crack growth in metals on the fracture surface, and evaluate fatigue crack growth experiment using CT specimen.
4. Ability to identify the effect of varies environment on the surface fracture and estimate corrosion fatigue in environment.
5. Ability to identify cleavage fracture, intergranular fracture and ductile fracture in the fractography, and calculate cohesive strength of solids.

REFERENCES

1. T. L. Anderson (2005). *Fracture Mechanic Fundamentals and Applications*. 37th Edition, Taylor & Francis Groul.
2. E. E. Gdoutos (2005). *Fracture Mechanics and Introduction*. 2nd Edition, Springer.
3. R, J, Sanford (2003). *Principle of Fracture Mechanics*.1st Edition, Prentice Hall.
4. G, E, Dieter (1986). *Mechanical Metallurgy*. 3rd Edition, McGraw-Hill.

ENT 465/3
RAPID ENGINEERING

COURSE SYNOPSIS

This is an introductory course on several rapid engineering techniques. It combines engineering prototype design theory, reverse engineering, solid freeform technology, rapid prototyping (RP) including liquid, powder and solid based process, and rapid tooling in manufacturing and the various applications of rapid engineering.

COURSE OUTCOMES

1. Ability to organize the development of product prototyping design to construct the rapid prototype model.
2. Ability to select and describe the rapid prototyping processes for a finished product.
3. Ability to select the proper rapid prototyping tools and techniques in terms of hardware and software technologies to construct a finished product.

REFERENCES

1. Frank W. Liou (2007). *Rapid Prototyping and Engineering Applications: A Toolbox for Prototype Development*. Vol. 210, CRC Press, Dekker Mechanical Engineering Series.
2. Kenneth Cooper (2001). *Rapid Prototyping Technology: Selection and Application*. Vol. 133, CRC Press, Dekker Mechanical Engineering Series.
3. D.T. Pham and S.S. Dimov (2001). *Rapid Manufacturing: The technologies and applications of Rapid Prototyping and Rapid Tooling*. Springer, London.
4. C. K. Chua, K. F. Leong and C. S. Lim (2003). *Rapid Prototyping: Principle and Applications*. 2nd Edition, World Scientific Publishing.

ENT 466/3
DESIGN OPTIMIZATION

COURSE SYNOPSIS

This course introduces the traditional non-linear optimization methods that can be used to solve a wide range of problems across all engineering disciplines. By the end of the semester the student will have gained a basic knowledge of numerical optimization algorithms and will have sufficient understanding of the strengths and weakness of these algorithms to apply them appropriately in engineering design. Students will write simple code as well as use off-the-shelf routines to gain experience and appreciation.

COURSE OUTCOMES

1. Ability to apply basic theoretical of optimization in practical engineering design situations.
2. Ability to apply mathematical constructs and theoretical tools to solve linear and non-linear design problems.
3. Ability to formulate the optimization problem from the constraint associated with design.

REFERENCES

1. Vanderplaats, Garret N. *Numerical Optimization Techniques for Engineering Design: With Applications*. McGraw-Hill.
2. Arora, Jasbir S. *Introduction to Optimum Design*, McGraw-Hill.
3. Reklaitis, G.V., A. Ravindran, and D.M. Ragsdell, *Engineering Optimization-Methods and Applications*. John Wiley.

ENT 474/3
INTELLIGENT MECHATRONIC SYSTEMS

COURSE SYNOPSIS

This course introduces important concepts of Artificial Intelligence (AI) and their applications in mechatronic systems. The concepts include fuzzy logic, neural network, neuro-fuzzy, genetic algorithm and pattern recognition. The mechatronic systems encompass Industrial Automation, Industrial Robotics and Control of process systems.

COURSE OUTCOMES

1. Ability to organize Artificial Intelligence components in mechatronics systems.
2. Ability to display the concepts of pattern recognition and classification.
3. Ability to analyze intelligent control with optimal parameter search for complex industrial systems.
4. Ability to analyze simple expert system for specific requirements.

REFERENCES

1. Sivanandam S N., Paulraj M., "Introduction to Artificial Neural Networks", Second Edition, 2005, Vikas Publications.
2. Russell S.J., Norvig P., Canny J.F., "Artificial Intelligence: A Modern Approach", Prentice Hall, 2003
3. Rajasekaran. S., Pai G.A.V., "Neural Networks, Fuzzy Logic and Genetic Algorithms", 7th Edition, Prentice Hall India, 2007 By Mukaidono M., Kikuchi H., "Fuzzy Logic for Beginners", World Scientific, 2001.
4. Bolton, W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition, Addison Wesley Longman: Essex England, 2003.
5. D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997

ENT 488/3
MOBILE ROBOTICS

COURSE SYNOPSIS

This course introduces the students the concepts and design of wheeled and walking robot mechanisms with a study on their kinematics and dynamics aspects. The course also introduces the principles and applications of Autonomous Guided Vehicles (AGV).

COURSE OUTCOMES

1. Ability to apply various locomotion systems in mobile robotic applications.
2. Ability to analyze the force-torque requirements of the mobile robots and select the most suitable actuator.
3. Ability to solve the kinematics problems for mobile robots.
4. Ability to apply suitable sensors and control systems for the wheeled mobile robot mechanisms.
5. Ability to analyze various autonomous guidance systems in mobile robotics application.

REFERENCES

1. Thomas Braunl, "Embedded Robotics – Mobile robot design and applications with embedded systems", Springer, NY, 2006
2. H R Everett, "Sensors for mobile robots – Theory and Application" , A K Peters Ltd, Mass, USA, 1995.
3. M P Groover, "Automation, Production systems and Computer Integrated Manufacturing", Prentice hall, NJ, 1990
4. Phillp John McKerrow, "Introduction to Robotics", Addison Wesley, NY, 1998
5. Man Zhihong, ' Robotics", Pearson Prentice Hall, Singapore, 2005

ENT 491/3
ROBOTIC CONTROL

COURSE SYNOPSIS

The objective of this course is to impart knowledge in the application and design aspect of mechatronic system. The course topics include the applications of sensors and transducers, signal conditioning, pneumatic, hydraulic, mechanical and electrical actuators, input and output interfacing, communication systems, programmable logic controllers, microprocessors and fault analysis.

COURSE OUTCOMES

1. Ability to design, develop and construct industrial measurement and instrumentation systems.
2. Ability to design and develop industrial actuation systems.
3. Ability to evaluate, design and construct analog and digital control system using PLC and Microcontroller.
4. Ability to design, construct and evaluate simple mechatronic systems that combine electrical/electronic and mechanical components.

REFERENCES

1. Bolton, W., *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition,* Addison Wesley Longman: Essex England, 2003.
2. D. G. Alciatore and M. B. Histand, *Introduction to Mechatronics and Measurement Systems.* 3rd edition, McGrawHill.

3. D. Shetty and R. A. Kolk, *Mechatronics System Design*, PWS Publishing Co., Boston, MA, 1997.
4. Godfrey C. Onwubolu, "Mechatronics: Principles and Applications", Butterworth-Heinemann 2005.
5. R. Isermann, *Mechatronic Systems: Fundamentals*, Springer-Verlag: Great Britain, 2003.

ENT 493/3
ADVANCED CONTROL SYSTEMS
(Prerequisite: ENT 386/3 Modern Control Engineering)

COURSE SYNOPSIS

The aim of this course is to introduce state-space design, non-linear system and digital control. Students also will be exposed to other control methods, like robust control, predictive control and optimal control.

COURSE OUTCOMES

1. Ability to analyze the concepts of state-space design, non-linear system and digital control
2. Ability to derive state-space description from continuous-time and discrete-time systems.
3. Ability to design sate-feedback and digital controller.
4. Ability to evaluate Robust Control, Optimal Control methods.

REFERENCES

1. J R Leigh, "Control Theory", 2nd ed. IEE, 2004
2. Charles L. Philips, H. Troy Nagle, "Digital Control Systems Analysis and Design", 3rd ed. Prentice Hall, 1995
3. Gene F. Franklin, J. David Powell, Micheal Workman, "Digital Control of Dynamic Systems", 3rd ed. Addison-Wesley, 1998.
4. M. Gopal, "Digital Control and State Variable Methods", McGraw-Hill, 1997.
5. Kevin Warwick," An Introduction to Control Systems", 2nd ed. World Scientific, 1996

ENT 497/3
ARTIFICIAL INTELLIGENCE IN ENGINEERING

COURSE SYNOPSIS

This course is designed to introduce the fundamentals of Artificial Intelligence (AI). It provides an introduction to definitions of human and artificial intelligence. The students will be exposed to fuzzy systems, artificial neural networks and evolutionary computation. At the end of this course students should know a few major techniques in AI and ability to build simple intelligent systems applied to Mechatronic Engineering.

COURSE OUTCOMES

1. Ability to perform analysis and examine the right AI techniques for simple applications.
2. Ability to perform analysis on different types of AI techniques.
3. Ability to design and evaluate AI techniques for Mechatronics Applications.

REFERENCES

1. Negnevitsky M., (2004). *Artificial Intelligence: A guide to Intelligent System, 2nd Edition.* Addison Wesley.
2. Sivanandam S N., Paulraj M., (2005). *Introduction to Artificial Neural Networks, Second Edition.* Vikas Publications.
3. Russell S.J., Norvig P., Canny J.F., (2003). *Artificial Intelligence: A Modern Approach.* Prentice Hall.
4. Rajasekaran. S., Pai G.A.V., (2007), *Neural Networks, Fuzzy Logic and Genetic Algorithms, 7th Edition.* Prentice Hall India.
5. Mukaidono M., Kikuchi H., (2001). *Fuzzy Logic for Beginners*. World Scientific.

ENT 499/3
DIGITAL SIGNAL PROCESSING & APPLICATIONS
(Prerequisite: ENT 281/3 Signals and Systems)

COURSE SYNOPSIS

This course is designed to introduce the concepts of digital signal processing and to help the students to explore the theory and applications of digital signal processing. The course also helps the students to develop the ability of analyze and manipulate digital signals.

COURSE OUTCOMES

1. Ability to do the analisys of analogue and digital signals in time domain.
2. Ability to do analysis of analogue and digital signals in frequency domain.
3. Ability to design digital filter in signal processing
4. Ability to use signal processing tools in a specific signal processing application

REFERENCES

1. S.K. Mitra , 'Digital Signal Processing: A Computer Based Approach', Tata McGraw Hill , 2006.
2. E.C. Ifeachor and B.W. Jervis , ' Digital Signal Processing: A Practical Approach' Prentice Hall, Second Edition 2002.
3. Richard G. Lyons, 'Understanding Digital Signal Processing', Prentice Hall, Second Edition, 2004.

4. J. G. Proakis and D. G. Manolakis, 'Digital Signal Processing: Principles, Algorithms, and Applications', 1989.
5. Stephen W. Smith, 'The Scientist and Engineer's Guide to Digital Signal Processing', California Technical Publishing, 2nd Edition, 2003.
6. John G. Proakis , 'Digital Signal Processing', PEARSON Fourth Edition, 2007.



CAREER OPPORTUNITIES

Graduates in these areas will have the ability to engage in the design, research and development, consultancy, education, manufacturing, construction, maintenance, sales and management in many industries such as manufacturing, processing, automotive, aviation and shipping, mining and services, communications and building services and medical industries. Among of the firms that had offered employment opportunities to the graduates of these areas are as follows:

- Vehicle making and installation firms
- Home making appliances firms
- Electronic products firms
- Plant food processors
- Oil and gas companies
- High-tech firms
- Consultant firms
- Engineering & product development firms
- Automation system firms
- Bio-medical engineering firms
- Software development firms
- Research & development agencies
- Hospitals
- Companies, maintenance and repair firms of medical equipment
- Companies, marketing and sale firms of medical equipment
- Manufacturing industry of medical instrumentation

SCHOOL OF ELECTRICAL SYSTEM ENGINEERING

PROGRAMMES OFFERED

- Bachelor of Engineering (Hons.) (Electrical System Engineering)
- Bachelor of Engineering (Hons.) (Industrial Electronic Engineering)
- Bachelor of Engineering (Hons.) (Electrical Energy System Engineering)
- Master of Science (Electrical Systems Engineering) – Research Mode
- Master of Science (Electrical Power Engineering) – Mixed Mode
- Doctor of Philosophy (Ph.D.)

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INTRODUCTION

The School of Electrical System Engineering was established in 2003 to meet the growing needs of professionals in the electric power industry, power electronic systems, and electricity generation. The school currently offers three undergraduate programmes, namely Bachelor of Engineering (Hons.) (Electrical System Engineering), Bachelor of Engineering (Hons.) (Industrial Electronic Engineering), and Bachelor of Engineering (Hons.) (Electrical Energy Systems Engineering). These programmes are evaluated by the Engineering Accreditation Council (EAC) and have been accredited by the Board of Engineers Malaysia (BEM) in respective fields.

These programmes consist of fundamental courses in electrical and power engineering until the third year of studies, which provides a broad background in mathematics and computing, electric circuits and systems, analogue electronic circuits and components, digital systems, instrumentations, communications, electromagnetic, control, electrical system (generation, transmission & distribution) and power electronic. Students will undergo industrial training during the third year of study to gain practical knowledge from industries. Students will enhance practical skills and promotes innovative and creative ideas through the final year project during the fourth year of study.

The Vision and Mission of the School of Electrical System Engineering are stated below:

Vision
Academic institutions and research in electrical engineering that is competitive in the international arena.

Mission
Generating a perfect human capital development agenda and contribute to the competitiveness of national industries in the field of electrical engineering.

Electrical System Engineering (RK23)

This programme emphasizes on the major fields of power engineering, which includes electrical machines, power systems, and high voltage engineering. The final year project focuses mainly on the power system, high voltage, and electrical machine design.

Industrial Electronic Engineering (RK45)

This programme focuses on power electronic systems for industrial use with particular emphasis on industrial electronic control, electrical machine, and drives. In the third and fourth year, the students will major in the electrical system and power electronic system, which provides an in-depth technical study in the industrial electronic application.

Electrical Energy Systems Engineering (RK96)

This programme focuses on technological aspects and management of electricity generation including renewable energy and alternative energy sources. In the fourth year, students will enhance their understanding of electrical energy generation, and renewable energy applied in electrical power system.

Facilities

The School of Electrical System Engineering has excellent teaching facilities and well-equipped laboratories for effective teaching and learning purposes. The laboratory infrastructure is highly developed with a large number of networked PCs and power engineering workstations. These instruments are placed in several laboratories including:

- Digital Laboratory
- Electrical Technology Laboratory
- Instrumentation Laboratory
- Power System Simulation Laboratory
- Power System Transmission Laboratory
- Electrical Machine Laboratory
- Power Electronic Laboratory
- 11-kV Modular Substation Laboratory
- Electrical Workshop, and a few more.

Postgraduate Programmes

The School of Electrical System Engineering also offers the postgraduate programme to students who aspire to continue their studies at higher levels. The school offers full-time and part-time study via mixed mode and research mode for the following programmes:

- Master of Science (Electrical System Engineering)
  - Research Mode
- Master of Science (Electrical Power Engineering)
  - Mixed Mode
- Doctor of Philosophy (Ph.D.)

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BACHELOR OF ENGINEERING (HONOURS) (ELECTRICAL SYSTEM ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are outstanding and possess competency to practice fundamental knowledge of engineering principles in industries related to electrical engineering or other chosen fields.

PEO2:
Graduates who are involved in a professional body and society.

PEO3:
Graduates who are dedicated in advancing a culture of professional excellence and demonstrate achievements through life-long learning.

PEO4:
Graduates who contribute to research and development in engineering disciplines or relevant fields.

PEO5:
Graduates who are involved in entrepreneurship

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in electrical engineering discipline to the solution of complex engineering.

PO2:
Ability to identify, formulate and solve electrical engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, component or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (ELECTRICAL SYSTEMS ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Discipline Core (98)	EET111/2 Engineering Science	EET109/3 Electronic Devices	EET204/3 Instrumentation and Measurements	EET203/4 Microcontroller Systems Design	EET301/4 Power System Engineering	EET304/3 Communication System Engineering		EET460/2 Final Year Project I	***EET461/4 Final Year Project II
	EET140/3 Electric Circuit I	EET110/3 Computer Programming	EET205/4 Analog Electronics	EET207/3 Signals and Systems	EET302/3 Control Systems Engineering	EET308/3 Power System Analysis		***EET447/2 Engineering Team Project II	EET462/3 Electrical Installation Design
	EET142/2 Introduction to Electrical Engineering	***EET141/3 Electric Circuit II	EET209/4 Digital Electronics	EET208/3 Electrical Power Technology	EET303/3 Electromagnetic Theory	EET342/3 Sustainable Energy		EET412/3 Electrical Machine Design	EET411/3 Power System Operation & Control
			***EET240/3 Electric Circuit III		EET306/4 Electrical Machines	EET340/4 Power Electronics and Drives		EET417/3 High Voltage Engineering	
						EET334/1 Engineering Team Project I		****EETXXX/3 Elective I	****EETXXX/3 Elective II
Common Core (22)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EUT442/2 Professional Engineers	EUT444/3 Management for Engineers			
		ECT111/3 Engineering Skills		UUT122/2 Skills and Technology in Communication					
University Required (17)	**UUW233/2 Islamic and Asian Civilizations or UUW237/2 Malaysian Cultures	*UVW211/2 English for General Purpose		*UVW312/2 English for Technical Communication	*Option/2			UUW322/2 Thinking Skills	UUW224/2 Engineering Entrepreneurship
	UVW410/2 University Malay Language		UZWXXX/1 Co-curriculum						
	**UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies								
	*UVA111/2 Foundation English								
	UZWXXX/1 Uniform Body	UZWXXX/1 Uniform Body							
137	17	18	18	17	16 (or 18)	17	4	15	15
Total Units for Graduation 137									

EIT302/4 Industrial Training

*Compulsory and optional courses according to MUET Results

MUET	UVA111/2	UVW211/2	UVW312/2	Option/2
Band 2	Compulsory	Compulsory	Compulsory	Optional
Band 3		Compulsory	Compulsory	Optional
Band 4, 5 and 6			Compulsory	Compulsory

Band 2 & 3 students may take Option course but will graduate with 139 Credits.

** Course specific to local or international student

Local	International
UUW233/2 Islamic and Asian Civilizations	UUW237/2 Malaysian Cultures
UUW235/2 Ethnic Relations	UUW239/2 Malaysian Studies

***Courses with prerequisite

Course	Prerequisite
EET141/3	EET140/3
EET240/3	EET141/3
EET447/2	EET334/1
EET461/4	EET460/2

****Elective Courses (May change from time to time)

Elective I	*EET427/3 Industrial Electronic Control*
	EET434/3 Electrical Power Distribution System
Elective II	*EET414/3 Substation Design*
	EET418/3 Power Quality

BACHELOR OF ENGINEERING (HONOURS) (INDUSTRIAL ELECTRONIC ENGINEERING)

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PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



SCHOOL OF ELECTRICAL SYSTEM ENGINEERING

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (INDUSTRIAL ELECTRONIC ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Discipline Core (98)	EET111/2 Engineering Science	EET109/3 Electronic Devices	EET204/3 Instrumentation and Measurements	EET203/4 Microcontroller Systems Design	EET301/4 Power System Engineering	EET304/3 Communication System Engineering	EIT302/4 Industrial Training	EET470/2 Final Year Project I	***EET471/4 Final Year Project II
	EET140/3 Electric Circuit I	EET110/3 Computer Programming	EET205/4 Analog Electronics	EET207/3 Signals and Systems	EET302/3 Control Systems Engineering	EET307/4 Power Electronics I		***EET447/2 Engineering Team Project II	EET416/3 Electrical Drives
	EET142/2 Introduction to Electrical Engineering	***EET141/3 Electric Circuit II	EET209/4 Digital Electronics	EET208/3 Electrical Power Technology	EET303/3 Electromagnetic Theory	EET342/3 Sustainable Energy		EET429/3 Power Electronics II	EET472/3 Sensor and Actuator
			***EET240/3 Electric Circuit III		EET306/4 Electrical Machines	EET341/3 Power System Analysis & High Voltage Engineering		EET427/3 Industrial Electronic Control	
						EET334/1 Engineering Team Project I		****EETXXX/3 Elective I	****EETXXX/3 Elective II
Common Core (22)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EUT442/2 Professional Engineers	EUT444/3 Management for Engineers			
		ECT111/3 Engineering Skills		UUT122/2 Skills and Technology in Communication					
University Required (17)	**UUW233/2 Islamic and Asian Civilizations or UUW237/2 Malaysian Cultures	*UVW211/2 English for General Purpose		*UVW312/2 English for Technical Communication	*Option/2			UUW322/2 Thinking Skills	UUW224/2 Engineering Entrepreneurship
	UVW410/2 University Malay Language		UZWXXX/1 Co-curriculum						
	**UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies								
	*UVA111/2 Foundation English								
	UZWXXX/1 Uniform Body	UZWXXX/1 Uniform Body							
137	17	18	18	17	16 (or 18)	17	4	15	15
Total Units for Graduation 137									

*Compulsory and optional courses according to MUET Results

MUET	UVA111/2	UVW211/2	UVW312/2	Option/2
Band 2	Compulsory	Compulsory	Compulsory	Optional
Band 3		Compulsory	Compulsory	Optional
Band 4, 5 and 6			Compulsory	Compulsory

Band 2 & 3 students may take Option course but will graduate with 139 Credits.

** Course specific to local or international student

Local	International
UUW233/2 Islamic and Asian Civilizations	UUW237/2 Malaysian Cultures
UUW235/2 Ethnic Relations	UUW239/2 Malaysian Studies

***Courses with prerequisite

Course	Prerequisite
EET141/3	EET140/3
EET240/3	EET141/3
EET447/2	EET334/1
EET471/4	EET470/2

****Elective Courses (May change from time to time)

Elective I	*EET412/3 Electrical Machine Design*
	EET434/3 Electrical Power Distribution System
Elective II	*EET474/3 Switch Mode Power Supply*
	EET475/3 Artificial Intelligence

BACHELOR OF ENGINEERING (HONOURS) (ELECTRICAL ENERGY SYSTEMS ENGINEERING)

PROGRAMME OBJECTIVE (PEO)

PEO1:
Graduates who are outstanding and possess competency to practice fundamental knowledge of engineering principles in industries related to electrical engineering or other chosen fields.

PEO2:
Graduates who are involved in a professional body and society.

PEO3:
Graduates who are dedicated in advancing a culture of professional excellence and demonstrate achievements through life-long learning.

PEO4:
Graduates who contribute to research and development in engineering disciplines or relevant fields.

PEO5:
Graduates who are involved in entrepreneurship

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in electrical engineering discipline to the solution of complex engineering.

PO2:
Ability to identify, formulate and solve electrical engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, component or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (ELECTRICAL ENERGY SYSTEMS ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Discipline Core (98)	EET111/2 Engineering Science	EET109/3 Electronic Devices	EET204/3 Instrumentation and Measurements	EET203/4 Microcontroller Systems Design	EET301/4 Power System Engineering	EET304/3 Communication System Engineering	EIT302/4 Industrial Training	EET480/2 Final Year Project I	***EET481/4 Final Year Project II
	EET140/3 Electric Circuit I	EET110/3 Computer Programming	EET205/4 Analog Electronics	EET207/3 Signals and Systems	EET302/3 Control Systems Engineering	EET330/3 Energy Generation and Conversion		***EET447/2 Engineering Team Project II	EET432/3 Electrical Energy Utilization
	EET142/2 Introduction to Electrical Engineering	***EET141/3 Electric Circuit II	EET209/4 Digital Electronics	EET208/3 Electrical Power Technology	EET303/3 Electromagnetic Theory	EET340/4 Power Electronics and Drives		EET433/3 Renewable Energy System	EET436/3 Design and Integration of Renewable Energy System
			***EET240/3 Electric Circuit III		EET306/4 Electrical Machines	EET341/3 Power System Analysis & High Voltage Engineering		EET434/3 Electrical Power Distribution System	
						EET334/1 Engineering Team Project I		****EETXXX/3 Elective I	****EETXXX/3 Elective II
Common Core (22)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EUT442/2 Professional Engineers	EUT444/3 Management for Engineers			
		ECT111/3 Engineering Skills		UUT122/2 Skills and Technology in Communication					
University Required (17)	**UUW233/2 Islamic and Asian Civilizations or UUW237/2 Malaysian Cultures	*UVW211/2 English for General Purpose		*UVW312/2 English for Technical Communication	*Option/2			UUW322/2 Thinking Skills	UUW224/2 Engineering Entrepreneurship
	UVW410/2 University Malay Language		UZWXXX/1 Co-curriculum						
	**UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies								
	*UVA111/2 Foundation English								
	UZWXXX/1 Uniform Body	UZWXXX/1 Uniform Body							
137	17	18	18	17	16 (or 18)	17	4	15	15
Total Units for Graduation 137									

*Compulsory and optional courses according to MUET Results

MUET	UVA111/2	UVW211/2	UVW312/2	Option/2
Band 2	Compulsory	Compulsory	Compulsory	Optional
Band 3		Compulsory	Compulsory	Optional
Band 4, 5 and 6			Compulsory	Compulsory

Band 2 & 3 students may take Option course but will graduate with 139 Credits.

** Course specific to local or international student

Local	International
UUW233/2 Islamic and Asian Civilizations	UUW237/2 Malaysian Cultures
UUW235/2 Ethnic Relations	UUW239/2 Malaysian Studies

***Courses with prerequisite

Course	Prerequisite
EET141/3	EET140/3
EET240/3	EET141/3
EET447/2	EET334/1
EET481/4	EET480/2

****Elective Courses (May change from time to time)

Elective I	*EET412/3 Electrical Machine Design*
	EET427/3 Industrial Electronic Control
Elective II	*EET435/3 Power Plant Engineering*
	EET437/3 Photovoltaic Science and Engineering

LIST OF COURSES

- EET109/3 ELECTRONIC DEVICES
- EET110/3 COMPUTER PROGRAMMING
- EET111/2 ENGINEERING SCIENCE
- EET140/3 ELECTRIC CIRCUIT I
- EET141/3 ELECTRIC CIRCUIT II
- EET142/2 INTRODUCTION TO ELECTRICAL ENGINEERING
- EET203/4 MICROCONTROLLER SYSTEMS DESIGN
- EET204/3 INSTRUMENTATION AND MEASUREMENT
- EET205/4 ANALOG ELECTRONICS
- EET207/3 SIGNALS AND SYSTEMS
- EET208/3 ELECTRICAL POWER TECHNOLOGY
- EET209/4 DIGITAL ELECTRONICS
- EET240/3 ELECTRIC CIRCUIT III
- EET301/4 POWER SYSTEM ENGINEERING
- EET302/3 CONTROL SYSTEMS ENGINEERING
- EET303/3 ELECTROMAGNETIC THEORY
- EET304/3 COMMUNICATION SYSTEM ENGINEERING
- EET306/4 ELECTRICAL MACHINES
- EET307/4 POWER ELECTRONICS I
- EET308/4 POWER SYSTEM ANALYSIS
- EET330/3 ENERGY GENERATION AND CONVERSION
- EET334/1 ENGINEERING TEAM PROJECT I
- EET340/4 POWER ELECTRONICS AND DRIVES
- EET341/3 POWER SYSTEM ANALYSIS AND HIGH VOLTAGE ENGINEERING
- EET342/3 SUSTAINABLE ENERGY
- EET411/3 POWER SYSTEM OPERATION & CONTROL
- EET412/3 ELECTRICAL MACHINE DESIGN
- EET414/3 SUBSTATION DESIGN
- EET416/3 ELECTRICAL DRIVES
- EET417/3 HIGH VOLTAGE ENGINEERING
- EET418/3 POWER QUALITY
- EET427/3 INDUSTRIAL ELECTRONICS CONTROL
- EET429/3 POWER ELECTRONICS II
- EET432/3 ELECTRICAL ENERGY UTILIZATION
- EET433/3 RENEWABLE ENERGY SYSTEM
- EET434/3 ELECTRICAL POWER DISTRIBUTION SYSTEM
- EET435/3 POWER PLANT ENGINEERING
- EET436/3 DESIGN AND INTEGRATION OF RENEWABLE ENERGY SYSTEM
- EET437/3 PHOTOVOLTAIC SCIENCE AND ENGINEERING
- EET447/2 ENGINEERING TEAM PROJECT II
- EET460/2 FINAL YEAR PROJECT I (RK 23)
- EET461/4 FINAL YEAR PROJECT II (RK 23)
- EET462/3 ELECTRICAL INSTALLATION DESIGN
- EET470/2 FINAL YEAR PROJECT I (RK 45)
- EET471/4 FINAL YEAR PROJECT II (RK 45)
- EET472/3 SENSOR AND ACTUATOR
- EET474/3 SWITCH MODE POWER SUPPLY
- EET475/3 ARTIFICIAL INTELLIGENCE
- EET480/2 FINAL YEAR PROJECT I (RK 96)
- EET481/4 FINAL YEAR PROJECT II (RK 96)



COURSE SYLLABUS

EET109/3
ELECTRONIC DEVICES

COURSE SYNOPSIS

EET109 will expose the students with basic electronic devices. It provides a depth study on the concept of PN junction, operation and characteristics of the diode. The students will be emphasized to Half wave rectifiers, Full wave rectifiers, Power Supply Filter and Regulators, Clipper and Clamper Diode circuits and Voltage Multipliers. The students also will learn about the special-purpose of Zener diode in terms of its characteristics and applications. Bipolar Junction Transistors (BJTs) and various types of Field-Effect Transistor which are Junction Field-Effect Transistor (JFET) and the Metal Oxide Semiconductor Field-Effect Transistor (MOSFET) will be introduced in this course as well.

COURSE OUTCOMES

1. Ability to explain and differentiate the fundamental concepts of electronic Devices.
2. Ability to explain and calculate the basic operations of electronic devices such as diode, BJT and various types of FET.
3. Ability to analyse the basic biasing circuits using datasheet.

REFERENCES

1. Neamen Donald A. (2010). Microelectronics Circuit Analysis and Design. 4th Ed. McGraw Hill. Int. Ed.
2. Robert L. Boleystad. (2009). Electronic Devices and Circuit Theory. 10th Ed. Prentice Hall.
3. T. Robert Paynter. (2009). Introductory Electronic Devices and Circuits. 10th Ed. Prentice Hall.
4. Thomas L. Floyd. (2008). Electronic Devices: Conventional Current Version. 8th Ed. Prentice Hall.
5. Puspa Inayat Khalid, Rubita Sudirman, Siti Hawa Ruslan. (2001). Modul Pengajaran Elektronik 1. Edisi ke 3.

EET110/3
COMPUTER PROGRAMMING

COURSE SYNOPSIS

One of the aspects of a good engineer is to have the capability of integrating the hardware and the software, thus an electrical engineer should be competence in programming. This course introduces basic programming using high level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, familiarize with the programming tools such as organization chart, flowchart and pseudo code and then to implement them by developing C program.

COURSE OUTCOMES

1. Ability to differentiate programming concepts and principles.
2. Ability to solve engineering related problems using computer programming techniques.
3. Ability to design and evaluate computer programs by using programming techniques and tools.

REFERENCES

1. Cheng, H. (2010). C for Engineers and Scientists. McGraw Hill.
2. Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob. Y., (2006). C How To Program. Pearson-Prentice Hall.
3. Sprankle, Maureen. (2006). Problem Solving and Programing Concepts. 7th Edition. Prentice Hall.
4. Hanly, J.R. and Koffman, E.B. (2001). C Program Design for Engineers. 2nd Ed. Addison-Wesley.
5. Al Kelley, Ira Pohl. (2000). C by Dissection: The Essentials of C Programming. 4th ed. Addison-Wesley.

EET111/2
ENGINEERING SCIENCE

COURSE SYNOPSIS

This course aims to introduce to the Electrical Engineering students the knowledge on the principles of material engineering and thermal fluid. It includes aspects related to material engineering, thermodynamics and fluid mechanics.

COURSE OUTCOMES

1. Ability to describe, compare and analyze problems related to engineering materials including mechanical, electrical and magnetic properties.
2. Ability to analyze using concepts and principle of fluids and Bernoulli.
3. Ability to analyze using concepts and principle of First Law and Second Law of Thermodynamics.

REFERENCES

1. Yunus A. Cengel, Robert H. Turner. (2013). Fundamentals of Thermal-Fluid Sciences, 4th Edition. Int ed. McGraw-Hill.
2. William D. Callister, David G. Rethwisch. (2012). Fundamentals of Materials Science and Engineering: An Integrated Approach. John Wiley & Sons.
3. Robert A. Granger. (2012). Fluid Mechanics. Courier Dover Publications.

4. William F Smith, William Fortune Smith, Javad Hashemi. (2011). Foundations of Materials Science and Engineering (SI Units), MCGRAW-HILL Higher Education.
5. Sanford Klein, Gregory Nellis. (2011). Thermodynamics, Cambridge University Press, Technology & Engineering.

EET140/3
ELECTRIC CIRCUIT I

COURSE SYNOPSIS

This is an introductory circuit course that is devoted to DC circuits. It covers fundamental laws, resistive circuits, analytical techniques, passive and active elements. Students will be introduced to theorems such as Mesh, Nodal, Thevenin and Norton with dependent sources and special cases. The last chapter will cover the Magnetic Circuits principle.

COURSE OUTCOMES

1. Apply, calculate and measure the concepts of charge, current, voltage, power in electric circuits.
2. Apply, analyze or evaluate linear circuits using basic laws, methods of analysis, and circuit theorems.
3. Discuss, construct and simulate linear circuits using simulation tool.

REFERENCES

1. Alexander, C.K. and Sadiku, M.N.O. (2013). Fundamental of Electric Circuits, 5th Edition, McGraw-Hill.
2. Nilssen, J.W. and Riedel, S. (2008). Electric Circuits, 8th Edition, Addison Wesley.
3. Robert L. Boylestad. (2007). Introductory Circuit Analysis. 11th Ed. Prentice Hall.
4. David E. Jhonson. (1997). Electric Circuit Analysis, Prentice Hall.
5. Dorf, R.C. and Svoboda, J.A. (1996). Introduction to Electric Circuits, Wiley.

EET141/3
ELECTRIC CIRCUIT II

COURSE SYNOPSIS

Basically, this introductory circuit course is devoted to AC circuits. it covers fundamental concepts of passive and active elements in Chapter 1. Chapter 2 until Chapter 3 introduces phasors, sinusoidal steady state analysis using previous analytical techniques under sinusoidal steady state excitation, RLC circuits, AC power calculation and power factor corrections and RMS values. The concepts of mutual inductance and two ports also will be explained in remaining chapter.

COURSE OUTCOMES

1. Apply the concept of capacitors and inductors.
2. Evaluate complex circuit problem and perform sinusoidal steady state analysis and power calculation.
2. Solve electromagnetism problem and analyze its application in magnetic circuit.

REFERENCES

1. Charles K. Alexander & Matthew N.O.Sadiku. (2013). Fundamentals of Electric Circuits. International 5th Ed. McGraw-Hill.
2. Nilsson, J.W., Riedel, S.A. (2008). Electric Circuits. 8th Ed. Prentice Hall.
3. Irwin, J.D., Nelms, R.M. (2008). Basic Engineering Circuit Analysis. 9th Ed. John Wiley.
4. Hyat W.H., Durbin, S.M., Kimmerly, J.E. (2007). Engineering Circuit Analysis. 7th Ed. McGraw Hill.
5. Robbins, A.H, Miller, W.C. (2003). Circuit Analysis: Theory and Practice. 3rd Ed. Thomson/Delmar Learning.

EET142/2
INTRODUCTION TO ELECTRICAL ENGINEERING

COURSE SYNOPSIS

This course serves as a general introduction to electrical engineering programs offered by the School of Electrical Systems Engineering. In this course, students will be exposed to attributes of an electrical engineer from both academic and practical points of view. Some skills and knowledge that are necessary in the engineering world will be introduced here. Students will obtain a clearer overview of the benefits, excitements and challenges of being an electrical engineering student and a professional electrical engineer in the near future. Furthermore, students shall identify, discuss and analyze critically contemporary issues affecting mankind and his environment.

COURSE OUTCOMES

1. Ability to explore the career of an electrical engineer, scope, career advancement opportunity and contemporary issues in engineering.
2. Ability to communicate effectively through public speaking and technical report writing.
3. Ability to establish the background, procedure and output of the project undertaken.

REFERENCES

1. Engineering Accreditation Council. (2012). Engineering Programme Accreditation Manual 2012.

2. D. Ashby. (2011). Electrical Engineering 101: Everything You Should Have Learned in School...but Probably Didn't: Elsevier Science.
3. R. Giorgio. (2009). Fundamentals of Electrical Engineering. McGraw-Hill.
4. C.S. Rayudu. (2009). Communication. Himalaya Publishing House.
5. S. Jayaprakash. (2007). Technical Writing. Himalaya Publishing House.

EET203/4
MICROCONTROLLER SYSTEMS DESIGN

COURSE SYNOPSIS

The aims of this course is to study the PIC microcontroller architecture, its programming language and basic interfacing with input and output devices. These knowledge are gathered and applied to design a simple microcontroller based system.

COURSE OUTCOMES

1. Ability to identify and integrate peripheral devices with microcontroller based system.
2. Ability to analyze and write a microcontroller programming language in C program.
3. Ability to design and evaluate a microcontroller application.

REFERENCES

1. S. Katzen. (2010). The Essential PIC18® Microcontroller (Computer Communications and Networks). Springer.
2. M.A Mazidi, R.D Mckinlay, and D Causey. (2008). PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18. Prentice Hall.
3. B.B. Brey. (2008). Applying PIC18 Microcontroller: Architecture, Programming and Interfacing using C and Assembly. Prentice Hall.
4. M Bates. (2006). Interfacing PIC Microcontrollers: Embedded Design by Interactive Simulation. Newness.
5. H.W Huang. (2005). PIC Microcontroller: An Introduction to Software and Hardware Interfacing. Thomson & Delmar Learning.

EET204/3
INSTRUMENTATION AND MEASUREMENT

COURSE SYNOPSIS

The course is aimed at providing an overview of modern instrumentation and measurement techniques. It is divided into four main topics namely the fundamentals of electronic instrumentation and measurement systems; the working principles and application of sensors and transducers; principles and application of signal conditioning circuits including bridges, amplifiers and filters; and finally display, data acquisition and interfacing techniques.

COURSE OUTCOMES

1. Ability to identify, define and analyze the elements of a complete electronic instrumentation and measurement system
2. Ability to explain and design the working principles of various sensors and signal conditioning/processing techniques in instrumentation and measurements
3. Ability to describe and analyze display systems, data acquisition systems and computer interfacing techniques in instrumentation and measurements

REFERENCES

1. H.S Kalsi. (2012). Electronics Instrumentation. Tata Mc Graw Hill.
2. Wai Kai Chen. (2006). Passive, Active & Digital Filters. US, CRC Press.
3. Walt Jung. (2005). Op Amp Applications Handbook. UK, Elsevier.
4. Rajendra Prasad. (2004). Electrical Measurement and Measuring Instrument. Khanna Publishers, India.
5. J.Park & S.Mackay. (2003). Practical Data Acquisition for Instrumentation and Control Systems. 1st Edition, Great Britain, Elsevier.

EET205/4
ANALOG ELECTRONICS

COURSE SYNOPSIS

This course exposes the student the basic knowledge in analog electronic. The exposure encompasses DC and AC analysis, frequency analysis and simple derivation of small-signal amplifiers model. This course offers the students an exposure to the theory and applications of op-amp and frequency response. Furthermore, the students will also learn about various type of active filters and voltage regulators.

COURSE OUTCOMES

1. Ability to design the basic amplifier circuits. (BJT, FET and operational amplifier).
2. Ability to analyze various types of filters.
3. Ability to design basic types of voltage regulators.

REFERENCES

1. Adel S. Sedra, Kenneth C. Smith. (2013). Microelectronic Circuits. 6th Ed. Oxford University Press.

2. Floyd, T. (2012). Electronic Devices. 9th Ed. Pearson Education, Inc.
3. Donald A. Neamen. (2010). Microelectronics Circuit Analysis and Design. 4th Ed. Mc Graw-Hill.
4. Boylestad, R.L., Nashelsky, L. (2009). 'Electronic Devices and Circuit Theory. 10th Ed. Prentice Hall.
5. Bogart, T.F. (2004). Electronic Devices and Circuits. 6th Ed. Prentice Hall.

EET207/3
SIGNALS AND SYSTEMS

COURSE SYNOPSIS

This course aims to introduce students the basic of signals and systems. To learn how certain input to a system will produce the required output. To understand signal spectrum concept and the method being utilized to analyze signal and its relations.

COURSE OUTCOMES

1. Ability to identify type and analyze waveform of the signals and its characteristics in engineering systems.
2. Ability to analyze signals and determine the process of the systems.
3. Ability to calculate and evaluate the system response using variable methods.

REFERENCES

1. Charles L. Philips, John M. Parr, Eve A. Riskin. (2014). 'Signals, Systems and Transforms', 5th Ed., Pearson Global Edition.
2. Luis Chaparro. (2014). Signals and Systems using MATLAB, 2 edition, Academic Press.
3. M.J. Roberts. (2011). Signals and Systems: Analysis Using Transform Methods and MATLAB, 2 edition, McGraw-Hill Education.
4. P Rao. (2008). 'Signals and Systems', Tata Mc Graw Hill.
5. Simon Haykin, Barry Van Veen. (2005). 'Signals and Systems', 2nd Ed, Wiley.

EET208/3
ELECTRICAL POWER TECHNOLOGY

COURSE SYNOPSIS

In Electrical Power Technology courses, student will be exposed to the concept of three-phase system and electromagnetism. The next part includes principles and operation of single-phase and three-phase transformer. At the end of these practical lab sessions they are asked to prepare lab report on the experiments they have carried out and submit for assessment.

COURSE OUTCOMES

1. Ability to evaluate parameters of three phase system.
2. Ability to solve electromagnetism problem.
3. Ability to analyze the principles and performance of single-phase and three-phase transformer.

REFERENCES

1 Boylestad, Robert L. (2014). 'Introductory Circuit Analysis', 12th Edition, Prentice Hall.
2. Stephen D.Umans. (2014).'Fitzgerald & Kingsley Electrical Machinery', 7th edition, McGraw-Hill.
3. Chapman, Stephen J. (2012). 'Electric Machinery Fundamentals', 7th Ed., New York: McGraw-Hill.
4. Theraja B.L. (2008). 'A Text Book of Electrical Technology', Volume II (AC & DC Machines), S.Chand& Company Ltd.
5. Edward Hughes, Ian McKenzie Smith, John Hiley, Keith Brown. (2008). 'Electrical and Electronic Technology', 10th Ed., Prentice Hall.

EET209/4
DIGITAL ELECTRONICS

COURSE SYNOPSIS

The aim of this course is to introduce students to the basic knowledge in the digital electronics. This course focuses the introduction and discussion of the fundamental of digital circuit design and analysis. The lectures cover the following topics: Numbering System, Algebraic Switching, Boolean Function, Combinational Logic Design and Sequential Logic Design.

COURSE OUTCOMES

1. Ability to apply the basic principles of numbering system and Algebraic Switching for complex digital electronics system.
2. Ability to design and innovate logic circuit using Boolean algebra and combinational logic design techniques.
3. Ability to design digital system project applications using sequential logic design techniques.

REFERENCES

1. Ronald J. Tocci. (2016). Digital Systems – Principles and Applications. 12th ed. Prentice Hall.
2. Floyd. Thomas L. (2014). Digital Fundamentals. 10th Ed. Pearson.
3. M. Morris Mano & Michael D. Ciletti. (2013). Digital Design. 5th Ed. Pearson
4. R. Tokheim. (2013). Digital Electronics: Principles and Applications. 12th ed. McGraw-Hill.

5. M. Morris Mano & Charles R.Kime. (2008). Logic and Computer Design Fundamentals. 4th Ed. Pearson.

EET240/3
ELECTRIC CIRCUIT III

COURSE SYNOPSIS

This course offers the students an exposure to the theories and concepts of First Order and Second Order Response of RL and RC Circuits, Laplace transform, Frequency response of AC circuits, Fourier series and Fourier transform. The students will also be tought on the skills to analyse linear electric circuit.

COURSE OUTCOMES

1. Ability to explain and analyze special types of circuit such as response of 1st and 2nd order on RL and RC circuit.
2. Ability to analyze the concepts of frequency response for AC circuits.
3. Ability to analyze electric circuits using Fourier Series and Fourier Transform for the circuit comprising passive elements.

REFERENCES

1. Charles K. Alexander & Matthew N.O.Sadiku. (2013). Fundamentals of Electric Circuits. International 5th Ed. McGraw-Hill.
2. Nilsson, J.W., Riedel, S.A. (2008). Electric Circuits. 8th Ed. Prentice Hall.
3. Irwin, J.D., Nelms, R.M. (2008). Basic Engineering Circuit Analysis. 9th Ed. John Wiley.
4. Hyat W.H., Durbin, S.M., Kimmerly, J.E. (2007). Engineering Circuit Analysis. 7th Ed. McGraw Hill.
5. Robbins, A.H, Miller, W.C. (2003). Circuit Analysis: Theory and Practice. 3rd Ed. Thomson/Delmar Learning.

EET301/4
POWER SYSTEM ENGINEERING

COURSE SYNOPSIS

This course intends to give students fair knowledge of power system engineering which covers the topics of generation, transmission and distribution systems. The sub-topics that will be emphasized are such as the per-unit system, transmission line parameters and models, load characteristics, fault and protection system.

COURSE OUTCOMES

1. Ability to differentiate types and operation of power system generations in groups.
2. Ability to explain and solve load characteristics, distribution system components and per-unit system.
3. Ability to calculate and analyze the transmission line parameters and models, symmetrical fault and protection system in power system.

REFERENCES

1. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye. (2010). Power System Analysis and Design, SI Version. 4th ed. CENGAGE Learning.
2. Hadi Saadat. (2010). Power System Analysis. 3rd ed. PSA Publishing.
3. Yoshihide Hase. (2007). Handbook of Power Systems Engineering, John Wiley & Sons, Inc.
4. Chapman, Stephen J. (2002). Electric Machinery and Power System Fundamentals. Boston: McGraw Hill.
5. El-Hawary, M. E. (2000). Electrical Energy Systems. Boca Raton: CRC Press.

EET302/3
CONTROL SYSTEMS ENGINEERING

COURSE SYNOPSIS

This is an introduction course to control systems engineering. Students will be exposed to the mathematical modeling for electrical, electro-mechanical as well as mechanical systems using block diagram, transfer functions, and signal-flow graphs. They will conduct system performance analysis in time and frequency domain. The course also covers system compensation design using PID and lead-lag controllers. This also includes a mini project/assignment for the system analysis and controller design.

COURSE OUTCOMES

1. Ability to produce mathematical model from physical systems (electrical/mechanical/block diagram) by employing suitable techniques such as Mason's law, Laplace transform and etc.
2. Ability to analyze system's response in time or frequency domain and analyze control system problems by utilizing control system graphical tools such as root locus or bode plot.
3. Ability to design and evaluate appropriate controller/s through system compensation in performing control system analysis.

REFERENCES

1. Norman S. Nise. (2011). Control System Engineering. 6th ed. John Wiley & Sons.
2. Richard C. Dorf & Robert H. Bishop. (2011). Modern Control Systems. 12th Edition. Prentice Hall.
3. Kuo B. C. Automatic Control System. 9th Edition. John Wiley & Sons.
4. Ogata K. (2009). Modern Control Engineering. 5th Ed. Prentice Hall.

5. Franklin G. F., Powell J. D. and Emani-Naeni A. (2009). Feedback Control of Dynamic Systems System. 9th Edition. Prentice Hall.

EET303/3
ELECTROMAGNETIC THEORY

COURSE SYNOPSIS

The purpose of this course is to learn the basic theory and analysis of electromagnetic. Student should be able to understand the basic concept of electrostatics, magnetostatics and dynamics. Student should also understand the theory and application of transmission line.

COURSE OUTCOMES

1. Ability to analyze the concept of vector analysis in electromagnetic theory.
2. Ability to investigate and analyze the concept of electrostatic and magnetic field.
3. Ability to relate and evaluate the concept of electromagnetic in transmission line analysis.

REFERENCES

1. Matthew N.O. Sadiku. (2010). Element of Electromagnetics. 5th Ed., Amazon.
2. U.A. Bakshi and A.V.Bakshi. (2010). Electromagnetic Fields. 1st Ed. Technical Publications Pune.
3. Fawwaz T. Ulaby. (2010). Fundamentals of Applied Electromagnetics. 6th Ed., Pearson (Prentice Hall).
4. William H. Hayt, John A. Buck. (2006). Engineering Electromagnetics. 6th Ed. McGraw Hill, International ed.
5. Stuart M. Wentworth. (2006). Fundamentals of Electromagnetics with Engineering Applications, 1st Ed., Wiley. John Wiley & Sons.

EET304/3
COMMUNICATION SYSTEM ENGINEERING

COURSE SYNOPSIS

This subject will cover all the basic principles and concepts of communication system including the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and medium. In addition, introductions to signal propagations and calculations of signal to noise ratio are also introduced to relate the student with real application.

COURSE OUTCOMES

1. Ability to illustrate basic principles of communication systems and the essential of communication system in real world.
2. Ability to differentiate the different types of modulation.
3. Ability to evaluate noise in communication system.

REFERENCES

1. Wayne Tomasi. (2009). Eletronic Communications System: Fundamentals through Advanced, 5th Edition, Pearson Education.
2. Rodger E. Ziemer, Wlliam H. Tranter. (2009). Principles of Communications, International Student Version, 6th Edition, Wiley.
3. Ian Glover and Peter M. Grant. (2009). Digital Comminication. Prentice Hall.
4. Louis E. Frenzel. (2007). Principles of Electronic Communication System. McGraw-Hill.
5. Jeffrey S. Beasley and Gary M. Miller. (2007). Modern Electronic Communication, 9th Edition. Pearson/ Prentice Hall.

EET306/4
ELECTRICAL MACHINES

COURSE SYNOPSIS

Primarily this Electrical Machines course can be divided into three parts. Part 1, begins by reviewing the basic concept of electromechanical conversion and transformers. Part 2, consisting of theoretical and performance analysis of DC machines, i.e. DC motors and DC Generators. Part 3 will cover the theoretical and performance analysis of single/three-phase AC machines which consist of Induction motor and Synchronous generators and also special motors.

COURSE OUTCOMES

1. Ability to analyze a standard equivalent circuit model and evaluate the characteristic of DC Machines.
2. Ability to analyze a standard equivalent circuit model and evaluate the characteristic of Induction Machines.
3. Ability to analyze a standard equivalent circuit model and evaluate the characteristic of Synchronous Machines.

REFERENCES

1. Stephen J. Chapman. (2010). Electric Machinery Fundamentals. 5th ed., McGraw-Hill.
2. Bhattacharya S.K. (2008). Electrical Machines. 3rd ed. Tata McGraw-Hill.
3. Theraja B.L. (2007). A Text Book of Electrical Technology. Volume II (AC & DC Machines), S. Chand& Company Ltd.
4. Charles A. Gross. (2007). Electric Machines. CRS Press.
5. Wildi, T. (2005). Electrical Machine, Drives and Power System. 6th ed., Prentice-Hall.



EET307/4
POWER ELECTRONICS I

COURSE SYNOPSIS

EET307 introduces Power Electronics as a multidisciplinary and interdisciplinary Applications Orientated Technology emphasizing on the main criterion of energy efficiency. Power electronic concept and devices, including circuit topologies and usages of diodes, transistors and MOSFET are introduced to grasp the basic understanding of the core of this course. Following, AC-DC, AC-AC, DC-DC and DC-AC converters performances, including operational features and waveform analysis, are developed from theory followed by laboratory simulations.

COURSE OUTCOMES

1. Ability to analyse operation, applications area and the need for design efficiency of power electronic systems.
2. Ability to calculate and analyse parameters for power rectifier, SCR, Triac and power transistors.
3. Ability to analyse and evaluate AC-DC converter, AC-AC converter and DC-DC converter.

REFERENCES

1. Daniel W.Hart. (2011). Power Electronics. Mcgraw-Hill International Edition.
2. Pressman, Billings & Morey. (2009). Switching Power Supply Design. 3rd Ed., McGraw Hill.
3. S Maniktala. (2006). Switching Power Supplies A to Z. Elsevier Newnes.
4. Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices & Applications. 3rd Ed., Pearson: Prentice-Hall.
5. Mohan, Undeland, Robbins. (2003). Power Electronics: Converters, Applications & Design. 3rd Ed., John Wiley.

EET308/3
POWER SYSTEM ANALYSIS

COURSE SYNOPSIS

This course can be divided into five parts. Part I, consisting of topic Introduction to power system, the main problem in power system, single-line diagram, representation of power system, calculation of per-unit system on power system's component, consisting of topic bus admittance and impedance matrix. Part II consisting of topic: power flow solution by means of Gauss-Seidel, Newton-Raphson, Decoupled and Fast-Decoupled method. Part III, consisting of topic symmetrical fault, symmetrical component and unsymmetrical fault. Part VI, consisting of topic Analyze Transient Stability with Equal Area and Step by Step Method.

COURSE OUTCOMES

1. Ability to analyse relevant information for power system load flow analysis.
2. Ability to analyze a symmetrical and unsymmetrical fault in power system network.
3. Ability to propose a solution in solving a stability problem in power system.

REFERENCES

1. Hadi Saadat. (2010). Power System Analysis. 3rd edition. PSA Publishing.
2. Professor Tom Overbye. (2004). Power System Analysis. Department of Electrical and Computer Engineering University of Wisconsin.
3 D.P. Nagrath, I.J. Kothari. (2003). Modern Power System Analysis. 3rd Ed. Tata McGraw-Hill.
4. Bergen, A. R., Vittal, V. (2000). Power System Analysis. Prentice Hall.
5. John. J. Grainger, William D. Stevenson, Jr. (1994). Power System Analysis. McGraw-Hill.

EET330/3
ENERGY GENERATION AND CONVERSION

COURSE SYNOPSIS

In part 1, the course introduces students to the conventional energy sources and develops understanding for electrical power generation. In part 2, it then discusses on the power quality problems that caused by the use of power electronics devices. Then it focuses on power electronics inverter and waveform shaping techniques used in a typical energy system, together with the introduction to uninterruptible power supply (UPS). In part 3, it analyzes the energy storage mediums such as batteries, fuel cells, inertia and pump storage concepts.

COURSE OUTCOMES

1. Ability to analyze the global energy system and conventional energy sources.
2. Ability to explain power quality problems and differentiate their mitigation devices and evaluate various inverter topologies through theoretical and simulation approaches.
3. Ability to synthesize and construct energy storage mediums such as battery and fuel cell in system applications.

REFERENCES

1. Ewald F. Fuchs, Mohammad A. S. Masoum. (2008). 'Power quality in power systems and electrical machines', Academic Press/Elsevier.
2. M. H. Rashid. (2007). 'Power Electronics Handbook: Devices, Circuits, and Applications - Engineering Series Academic Press Series in Engineering', Academic Press.
3. G N Tiwari and M K Ghosal. (2005). " Renewable Energy Resources", Alpha Science.
4. M. H. Rashid. (2004). "Power electronics: circuit, devices and applications", Prentice Hall.
5. Barry W. Kennedy. (2000). "Power Quality Primer", McGraw-Hill.

EET334/1
ENGINEERING TEAM PROJECT I

COURSE SYNOPSIS

This course introduces the small-scaled research project that inclined towards engineering designing is necessary for each third-year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of report and seminar. In the first semester, students will be given the lectures on project management, market analysis and commercialization strategy and also labs on 2D & 3D drawing. The proposal must be prepared, submitted and presented in the first semester. The second semester is allocated for the students to complete their project, write the final report, present and demonstrate their finished project.

COURSE OUTCOMES

1. Ability to evaluate project management, project life cycle, project planning with Work Breakdown Structure (WBS), Gantt chart, project costing etc.
2. Ability to evaluate the concept, perform feasibility study, perform market research – macro and micro environments, competitive analysis, commercialization process etc.
3. Ability to apply 2D & 3D drawing in project design concept and layout.
4. Ability to combine engineering knowledge and solve engineering design problem in team work
5. Ability to design a proper process to produce creative and innovative solution
6. Ability to demonstrate effective communication, report writing, presentation and entrepreneur skills.

REFERENCES

1. Related journals, proceedings and papers in electrical and electronic engineering 2013 onward

EET340/4
POWER ELECTRONICS AND DRIVES

COURSE SYNOPSIS

EET340 introduces Power Electronics as a Multidisciplinary & Interdisciplinary Applications Orientated Technology emphasising the main criterion of energy efficiency. AC-DC, AC-AC, DC-AC and DC-DC converter performance including waveforms analyses, as well as on how to design the converters. The converters are then extended to their application in the electrical drives where it will be used to control various parameters of AC and DC motors.

COURSE OUTCOMES

1. Ability to calculate the parameters and design basic AC-AC, AC-DC converters.
2. Ability to calculate the parameters and design basic DC-DC and DC-AC converters
3. Ability to calculate, analyse and justify power electronic drives parameters based on load characteristics.

REFERENCES

1. Pressman, Billings & Morey. (2009). Switching Power Supply Design. 3rd Ed., McGraw Hill.
2. S. Maniktala. (2006). Switching Power Supplies A to Z. Elsevier Newnes.
3. Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices & Applications. 3rd Ed., Pearson: Prentice-Hall.
4. Mohan, Undeland, Robbins. (2003). Power Electronics: Converters, Applications & Design. 3rd Ed., John Wiley.
5. Erickson R.W., Maksimovic D. (2001). Fundamentals of Power Electronics. 2nd Ed. Springer.

EET341/3
POWER SYSTEM ANALYSIS AND HIGH VOLTAGE ENGINEERING

COURSE SYNOPSIS

This course can be divided into two parts. Part I, consisting of topic Introduction to power system, the main problem in power system, single-line diagram, representation of power system, calculation of per-unit system on power system's component, consisting of topic bus admittance and impedance matrix, power flow solution by means of Gauss-Seidel, Newton-Raphson, symmetrical fault, Analyze Transient Stability with Equal Area and Step by Step Method.



Part II will introduce the students about insulating materials and their applications, breakdown phenomena in insulating material such as solids, liquids, and gases. The course wills also generation and measurement of high DC, AC and impulse voltages and currents, overvoltage phenomena, insulation coordination.

COURSE OUTCOMES

1. Ability to evaluate power flow with Gauss-Seidel, Newton-Raphson, Decoupled and Fast-Decoupled methods.
2. Ability to analyze fault current in Symmetrical Fault and unsymmetrical.
3. Ability to analyze the various breakdown mechanism and applications of vacuum, liquid, solid and composite dielectrics.
4. Ability to analyze the over-voltage phenomena, insulation coordination in power system.

REFERENCES

1. M. S. Naidu, V Kamaraju. (2013). High Voltage Engineering. McGraw-Hill.
2. J. Duncan Glover, Mulukutla S. Sarma. (2008). Power System Analysis and Design. 4th Edition. Thomson.
3. C.L. Wadhwa. (2007). 'High Voltage Engineering'. New Age International.
4. Hadi Saadat. (2004). Power System Analysis. 2nd Edition. McGraw-Hill.
5. Subir Ray. (2004). 'An Introduction to High Voltage Engineering', Prentice-Hall of India.

EET342/3
SUSTAINABLE ENERGY

COURSE SYNOPSIS

This course exposes the students mainly to sustainable energy sources for electrical power generation and energy management. In the first part, the students will be introduced to Solar Photovoltaic technology, characteristics, energy storage mediums and photovoltaic system design. The second part will be the introduction to wind energy and its related components. The third part will involve the students to energy management, energy efficient equipment and energy audit.

COURSE OUTCOMES

1. Ability to analyze and differentiate sustainable energy sources, related tariff and act.
2. Ability to analyze and design the conversion of Solar Photovoltaic system, wind energy and energy storage capacity.
3. Ability to synthesize solutions to problems related to energy management, energy efficiency and energy audit.

REFERENCES

1. Gilbert M. Masters. (2013). "Renewable and Efficient Electric Power Systems", Wiley-Interscience, Second Edition.
2. Sulaiman Shaari, Ahmad Maliki Omar, Shahril Irwan Sulaiman and Ahmad Hadri Haris. (2013). "Photovoltaic Energy System: Design Principles", Malaysian Green Technology Corporation.
3. Sulaiman Shaari, Ahmad Maliki Omar, and Shahril Irwan Sulaiman. (2012). "Fundamental of Solar Photovoltaic Technology", Sustainable Energy Development Authority Malaysia.
4. The Energy Efficiency and Conservation Guidelines Part 1: Electrical Energy - use Equipment, Kementerian Tenaga, Teknologi Hijau dan Air. (2011).
5. Frank Kreith & D. Yogi Goswami. (2007). "Handbook of Energy Efficiency and Renewable Energy", CRC Press.

EET411/3
POWER SYSTEM OPERATION & CONTROL

COURSE SYNOPSIS

This course aims to provide further understanding on the power system operation and control. Mainly it focuses on various aspects in power system operations such power generation, energy sources and transfers, operation and economics of power plants, optimal dispatch of power generation, unit commitment, power system controls, interconnections in power system, generator operations and synchronization with power system, and communications in power system such as SCADA.

COURSE OUTCOMES

1. Ability to analyze energy generation, power system behavior, economics of generating costs and optimal dispatch of power generation with and without transmission losses.
2. Ability to analyze unit commitment in thermal power plant and design power system control, interconnection system, operation of generators in parallel with large power system and Tie-line interchange between interconnected utilities.
3. Ability to analyze communication and SCADA system in power system.

REFERENCES

1. Saadat, H. (2010). 'Power System Analysis'. 3rd ed., PSA Publishing.
2. Wildi, T. (2005). `Electrical Machines, Drives, and Power System (6th Edition)`. Prentice Hall.
3. P.S.R. Murthy. (2011). 'Operation and Control in Power Systems'. CRC Press, 2nd edition.

4. Sivaganaraju, (2010). 'Power System Operation and Control'. Pearson Education India.
5. Glover, J.G., Sarma,M.S., and Overbye,T (2011). `Power System Analysis and Design, Fifth Edition`. Cengage Learning.

EET412/3
ELECTRICAL MACHINE DESIGN

COURSE SYNOPSIS

This course covers basic design principles of rotating and linear electrical machines. The course topic aims to provide students with an understanding of magnetic and electric loading, thermal and structural design, development of device characteristics (power conversion density & efficiency) and development of system interaction characteristics (regulation, stability, controllability & response).

COURSE OUTCOMES

1. Ability to analyse magnetic materials and magnetic circuits for electrical machine.
2. Ability to develop and manipulate equivalent circuits for electrical machine.
3. Ability to differentiate the performances of electrical machine.

REFERENCES

1. Juha Pyrhonen, Tapani Jokinen, Valeria Hrabovcova , "Design of Rotating Electrical Machines", John Wiley & Sons , 2008
2. Philip Beckley, "Electrical Steels for Rotating Machines", The institution of Electrical Engineers, ISBN 0 85296 980 5, 2002
3. Indrajit Dasgupta," Design of Transformer", Tata McGraw-Hill Publishing Com. Lmt, 2002.
4. S.V.Kulkarni, S.A. Khaparde," Transformer Engineering Design and Practical", Marcel Dekker Inc., 2004.
5. Jimmie J. Cathey," Electric Machines, Analysis and Design applying Matlab", McGraw-Hill Publishing Com. Lmt, 2001.

EET414/3
SUBSTATION DESIGN

COURSE SYNOPSIS

This course, to introduce aspects of the fundamentals and considerations of substation design, configuration and design of busbar and safety requirement. This course describe the functions of various substation main equipments, substation auxliary included protection design against internal and external fault. The students also learn how to measure soil resistivity and resistance grounding, substation grounding design, furthermore calculation of the ground grid substation. Latter in this course, students will learn and practice how to test and to do maintenance of the substation equipment parts.

COURSE OUTCOMES

1. Ability to explain and apply fundamentals of substation design.
2. Ability to select and design the components of substation and the substation protection system.
3. Ability to analyse the testing and commissioning method.

REFERENCES

1. J.D. McDonald. (2012) 'Electric Power Substations Engineering', 3rd ed. CRC Press.
2. Colin Bayliss. (2012). 'Transmission and Distribution Electrical Engineering', 4th ed.
3. Newness, Great Britain.
4. Garzon Ruben D. (2002). 'High Voltage Circuit Breaker', 2nd ed. Marcel Decker Inc, USA.
5. Rao, S. (2003). Electrical Substation Engineering & Practice. Khana Publishers, New Delhi.
6. H. Lee Willis. (2000). Power Distribution Planing. Dekker/CRC Press

EET416/3
ELECTRICAL DRIVES

COURSE SYNOPSIS

This course aims to equip students with the knowledge of DC and AC electrical drive systems which are commonly used in industries. The course covers the basic components of electrical drive systems and the speed control of the drive systems. The dynamics and braking of the drive systems will also be introduced.

COURSE OUTCOMES

1. Ability to explain, calculate and evaluate the converter parameters for controlling AC motor drives.
2. Ability to explain, calculate and evaluate the converter parameters for controlling DC motor drives.
3. Ability to explain, calculate and evaluate the dynamics and braking of DC and AC electrical drive systems.

REFERENCES

1. Bogdan Wilamowski and David Irwin (2011). Power Electronics and Motor Drives, 2nd Ed. CRC Press.
2. GopalDubey (2012). Fundamentals of Electrical Drives, 7th Reprint Ed. Alpha Science.
3. Muhammad Rashid (2013). Power Electronics, Circuits, Devices & Applications, 4th Ed. Prentice Hall.

4. Stephen Chapman (2012). Electric Machinery Fundamentals, 5th Ed. McGraw Hill.
5. VedamSubrahmanyam (2011). Electric Drives Concepts and Applications, 2nd Ed. Tata McGraw Hill.

EET417/3
HIGH VOLTAGE ENGINEERING

COURSE SYNOPSIS

This course will introduce the students about insulating materials and their applications, breakdown phenomena in insulating material such as solids, liquids, and gases, generation and measurement of high DC, AC and impulse voltages and currents, overvoltage phenomena, insulation coordination, high voltage testing techniques and testing of apparatus and equipment.

COURSE OUTCOMES

1. Ability to analyze the various breakdown mechanism and applications of vacuum, liquid, solid and composite dielectrics.
2. Ability to evaluate generations and measurements of high voltage AC, DC and impulse generator.
3. Ability to analyze the over-voltage phenomena, insulation coordination in power system, types of high voltage testing for electrical apparatus and non-destructive testing of materials.

REFERENCES

1. High-Voltage Engineering (Fifth Edition) (2013), M.S. Naidu,V. Kamaraju, McGraw Hill Education Private Limited
2. C.L. Wadhwa. (2007). 'High Voltage Engineering'. New Age International.
3. Subir Ray. (2004). 'An Introduction to High Voltage Engineering', Prentice-Hall of India.
4. E. Kuffel, W.S. Zaengl, J. Kuffel. (2000). 'High Voltage Engineering: Fundamentals', 2nd ed., Newness.
5. M.E. Khalifa. (2000). 'High Voltage Enfineering: Theory and Practice'. 2nd ed. Marcel Dekker Inc.

EET418/3
POWER QUALITY

COURSE SYNOPSIS

This course will introduce students to power quality issues, regulations and mitigation techniques to comply with it in industries. In the first part, students will be exposed to power quality standards and regulation used in electrical power system. Then, for the second part, the course will cover various power quality issues together with their source of problems Finally, the course will cover various mitigation techniques to be implemented according to their respective power quality problem to comply with the standard and regulation.

COURSE OUTCOMES

1. Ability to compare standards and regulations related to power quality in power system industries.
2. Ability to analyze power quality issues in a power system and identify source of their problem.
3. Ability to propose mitigation techniques according to power quality problem to comply with standard and regulation.

REFERENCES

1. Barry W. Kennedy ,"Power Quality Primer", McGraw-Hill, 2000.
2. Turan Gonen, "Electrical Power Distribution System Engineering", 2nd Edition, CRC Press, 2008..

EET427/3
INDUSTRIAL ELECTRONICS CONTROL

COURSE SYNOPSIS

This course will have a wide exposure on the industrial electronics control to the students. The course will cover the components, circuits, instruments, equipments and control techniques used in industrial automatic systems. In the beginning of this course, the topics covered are; basic principle of industrial electronics control and interfacing devices including the operational amplifiers, signal processors, opto-electronic interface devices, transducers, detection sensors, actuator, digital to analog converter and analog to digital converter. Next, this course will cover the design of the controller, proportional control, proportional integral control, proportional integral derivative control, pressure control and temperature control. In addition, servo and stepper motor control design and their typical applications of rotary table control, pen positioning and precise position control that are used in a variety of industrial automation application are also covered in this course. The student will also be exposed to programmable logic controller (PLC), its components, programming and operational procedure. Through this exposure, the students are expected to be able to perform more complex motion and process control applications.

COURSE OUTCOMES

1. Ability to explain and calculate Operational amplifiers, opto-electronic, signal processor, interfacing devices, transducers, detection sensors and actuator, digital

and analog controller, temperature control, and flow control related to industrial electronic control applications.
2. Ability to explain, analyse and design motor controller for industrial electronic control applications.
3. Ability to explain and design ladder diagram to perform a specified operation using PLC programming in applications of industrial electronic control.

REFERENCES

1. Bogdan Wilamowski and David Irwin (2011). The Industrial Electronics Handbook, 2nd Ed. CRC Press.
2. Frank Petruzella (2011). Programmable Logic Controllers, 4th Ed. McGraw Hill.
3. KhaledKamel and EmanKamel (2013). Programmable Logic Controllers: Industrial Control. McGraw Hill.
4. Terry Bartelt (2011). Industrial Automated Systems Instrumentation and Motion Control. Delmar Cengage Learning.
5. William Bolton (2009). Programmable Logic Controllers, 5th Ed. Newnes.

EET429/3
POWER ELECTRONICS II

COURSE SYNOPSIS

Power Electronics II provides more advanced topics on power electronics converters and their applications. Topic covered include: design of power circuits including DC-DC and DC-AC converters; modeling, analysis and control strategies of DC-DC and DC-AC converters; gate driver circuits and protection circuits for power semiconductor devices and their thermal management. Several application examples such as power supplies, grid-connected PV inverter and their applications in high voltage power system are also discussed.

COURSE OUTCOMES

1. Ability to analyze, design and evaluate power electronics converters, its control strategies and application.
2. Ability to evaluate the design requirements of drive circuits, protection circuits, and thermal management of power electronic converters.
3. Ability to demonstrate teamwork attribute and effective communication skills throughout the course.

REFERENCES

1. Daniel W. Hart. (2011) Power Electronics. 1st Ed., McGraw-Hill
2. Robert W. Erickson and Dragan Maksimovic. (2001) Fundamental of Power Electronics. 2nd Ed.,Springer International Edition
3. Muhammad H. Rashid. (2013), Power Electronics: Circuit, Devices & Applications. 4th Ed., Pearson: Prentice-Hall
4. Andrzej M. Trzynadlowski. (2010), Introduction to Modern Power Electronics. 2nd Ed., Wiley
5. Mohan. Undeland. Robbins (2009), Power Electronics: Converters, Applications, and Design. 3rd Ed. (2009),John Wiley and Sons.

EET432/3
ELECTRICAL ENERGY UTILIZATION

COURSE SYNOPSIS

To introduce students to the energy efficiency and conservation in order to reduce energy costs and promote economic and environmental sustainability.

COURSE OUTCOMES

1. Ability to analyse energy management, standards and safety aspect of efficient electrical energy utilization
2. Ability to synthesize solution to problems related to demand side management and economic aspect of efficient energy equipments.
3. Ability to design and evaluate energy saving solution based on electrical energy audits.

REFERENCES

1. Joel N. Swisher, Gilberto de Martino Jannuzi, and Robert Y. Redlinger. Tools and methods for Integrated Resource Planning: Improving Energy efficiency and protecting the Environment. UNEP Collaborating Centre on Energy and Environment
2. Wayne C. Turner and Steve Doty. (2009). Energy Management Handbook. 7th Ed. Fairmont Press Inc
3. Frank Kreith and D. Yogi Goswami. (2008). Energy Management and Conservation Handbook. CRC Press
4. Gilbert M. Masters. (2004). Renewable and Efficient Electric Power Systems. John Wiley and Sons
5. Bary W. Kennedy. (2000). Power Quality Primer. McGraw Hill

EET433/3
RENEWABLE ENERGY SYSTEM

COURSE SYNOPSIS

This course consists of design basic system for integration of renewable generation into electricity and calculates the potential energy for different renewable technologies. This course also introduces students with the relevant conversion, storage, network interfacing and economic assessment techniques for renewable energy systems.



COURSE OUTCOMES

1. Ability to analyze and design the conversion of Solar Photovoltaic, energy from wind, hydro, biomass, biogas and fuel cell to electrical power.
2. Ability to evaluate the conversion of Solar Photovoltaic, energy from wind, hydro, biomass, biogas and fuel cell for economic analysis.
3. Ability to analyze the conversion of Solar Photovoltaic, energy from wind, hydro, biomass, biogas and fuel cell for system performance.

REFERENCES

1. B. K. Hodge. (2009). Alternative Energy Systems. John Wiley & Sons
2. John Twidell and Anthony D. Weir. (2006). Renewable Energy Resources. Taylor & Francis
3. G. N. Tiwari and M. K Ghosal. (2005). Renewable energy resources: basic principles and applications. Alpha Science International
4. Godfrey Boyle. (2004). Renewable Energy: Power for a Sustainable Future. Oxford University Press. Oxford
5. Gilbert M. Masters. (2004). Renewable and Efficient Electric Power Systems. John Wiley & Sons

EET434/3
ELECTRICAL POWER DISTRIBUTION SYSTEM

COURSE SYNOPSIS

This course will expose the students to the key components of electrical power distribution system. This includes substation operation, maintenance, equipment of substation and simple design of substation busbar. Furthermore, the student will be introduced with distribution system design, protection system and grounding which are also related to renewable energy resources.

COURSE OUTCOMES

1. Ability to evaluate electrical performance of underground distribution system including cable sizing, various types of distribution systems, advantages and disadvantages as well as operational details.
2. Ability to describe operation, maintenance, selection and functions of substation equipment part and ability to design simple busbar.
3. Ability to identify and calculate parameters in protection system of substation equipment caused by internal and external faults

REFERENCES

1. Turan Gonen, "Electric Power Distribution Engineering", CRC Press, Third Edition, 2014.
2. T. A. Short, "Electric Power Distribution Handbook", CRC Press, Second Edition, 2014.
3. John D. McDonald, "Electric Power Substations Engineering", CRC Press, Third Edition, 2012.
4. Colin R. Bayliss, Brian J. Hardy, "Transmission and Distribution Electrical Engineering", Newnes, Fourth Edition, 2012.
5. M.S. Naidu & V. Kamaraju, "High Voltage Engineering", Fourth Edition, Tata McGrawHill, 2009.

EET435/3
POWER PLANT ENGINEERING

COURSE SYNOPSIS

This course introduces few power generation methods available nowadays with deeply focused on the steam, gas and combined cycles power plant. The students need to understand and utilize the basic thermodynamics theories and apply to the power plant concept intelligently. The course begins by focusing on thermodynamics' steam cycles of steam power plant. Then, students have to know the concept of gas and combined cycle power plants besides other types such as hydroelectric, nuclear and non-conventional power generations. Electrical system related to power plant such as transformer, generator and motor also need to be understood by students. Finally, student must be able to evaluate economic analysis and environmental effect by power plant.

COURSE OUTCOMES

1. Ability to explain the basic thermodynamics application in fundamental steam and gas power plant engineering.
2. Ability to describe operation, maintenance, selection and function of power plants.
3. Ability to evaluate economic analysis and analyze environmental impact related to power plant.

REFERENCES

1. Nag P. K., Power Plant Engineering, 3rd Edition, TATA Mc Graw Hill, 2007
2. K. Raja, Amit P.S., Power Plant Engineering, 1st Edition, New Age International (P) Limited, 2006
3. Arora S.C. and Domkundwar S, A Course in Power Plant Engineering, Dhanpat Rai, 2001
4. K. K. Ramalingam, Power Plant Engineering, 3rd Edition, Scitech Publications, 2002

EET436/3
DESIGN AND INTEGRATION OF RENEWABLE ENERGY SYSTEM

COURSE SYNOPSIS

This course consists of basic system design for integration of renewable resources into electricity generation for both on-grid and off-grid application, prediction of renewable energy system performance for specific period of time and economic aspect of the implementation. In addition, it will cover operation, control and network interfacing of renewable energy system for both grid-connected and isolated mode.

COURSE OUTCOMES

1. Ability to design and analyze the conversion of energy from Solar Photovoltaic, wind, small hydro, biomass, biogas and hybrid system to electrical power.
2. Ability to evaluate the economic aspect of renewable energy project such as Solar Photovoltaic, energy from wind, small hydro, biomass, biogas and hybrid system.
3. Ability to predict and estimate the system performance of Solar Photovoltaic, wind, small hydro, biomass, biogas and hybrid system.

REFERENCES

1. Gilbert M. Masters, "Renewable and Efficient Electric Power Systems", 2nd Edition, John Wiley & Sons, 2013.
2. G.N. Tiwari, M.K. Ghosal, "Fundamentals of Renewable Energy Source", Alpha Science, 2007.
3. G.N. Tiwari, R.K. Mishra, "Advanced Renewable Energy Sources", Royal Society of Chemistry, 2011.
4. S. Chowdhury, S.P. Chowdhury and P. Crossley, "Microgrids and Active Distribution Networks", The Institution of Engineering and Technology, 2009.
5. Frank Kreith & D. Yogi Goswami, "Handbook of Energy Efficiency and Renewable Energy", CRC Press, 2007.

EET437/3
PHOTOVOLTAIC SCIENCE AND ENGINEERING

COURSE SYNOPSIS

This course is designed to introduce and educate students in the fundamental of solar cell science and technology. This course also covers the fabrication/ manufacturing technologies of solar cells or modules. Since a solar cell itself is made from semiconducting materials, students is introduced to the concept of band diagram. In the later stages, students will learn about the concept of electron-hole pairs and carriers in equilibrium condition. The next chapters will cover the knowledge of solar cell interfaces such as p-n and metal-semiconductor junctions. In the last three chapters, student will be introduced to the fundamental knowledge of solar cells, the efficiency measurement and also devices fabrication.

COURSE OUTCOMES

1. Ability to select proper semiconducting materials for solar cell fabrication.
2. Ability to apply the knowledge of semiconductor physics in solar cell application and technologies.
3. Ability to evaluate the solar cell efficiency and performances.

REFERENCES

1. D. Neamen, An Introduction to Semiconductor Devices, McGraw-Hill, New York (2012).
2. S.M. Sze and K.K. Ng, Physics of Semiconductor Devices, Wiley, New York (2006)
3. I.M. Dharmadasa, Advances in Thin-Film Solar Cells, Pan Stanford Publishing, Singapore (2012).

EET447/2
ENGINEERING TEAM PROJECT II

COURSE SYNOPSIS

This course introduces the small-scaled research project that inclined towards engineering designing is necessary for each third year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of report and seminar. In the first semester, students will be given the lectures on project management, market analysis and commercialization strategy and also labs on 2D & 3D drawing. The proposal must be prepared, submitted and presented in the first semester. The second semester is allocated for the students to complete their project, write the final report, present and demonstrate their finished project.

COURSE OUTCOMES

1. Ability to evaluate project management, project life cycle, project planning with Work Breakdown Structure (WBS), Gantt chart, project costing etc.



2. Ability to evaluate the concept, perform feasibility study, perform market research – macro and micro environments, competitive analysis, commercialization process etc.
4. Ability to apply 2D & 3D drawing in project design concept and layout.
5. Ability to combine engineering knowledge and solve engineering design problem in team work.
7. Ability to design a proper process to produce creative and innovative solution.
8. Ability to demonstrate effective communication, report writing, presentation and entrepreneur skills.

REFERENCE

1. Related journals, proceedings and papers in electrical and electronic engineering 2013 onward.

EET460/2
FINAL YEAR PROJECT I (RK23)

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing which is necessary for each final-year student. The students will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The area of research mainly on High Voltage, Electrical Power System and Machine Design.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve engineering problems.
2. Ability to develop appropriate research methodology for the project.
3. Ability to develop project proposal and progress report.
4. Ability to present and defend effectively project progress to selected audience.

REFERENCE

1. Referred Journal and Conference Papers, text book and Reliable Internet Resources.

EET461/4
FINAL YEAR PROJECT II (RK23)

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing which is necessary for each final-year student. The students will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The area of research mainly on High Voltage, Electrical Power System & Machine Design.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to conclude a complete project in a technical report (dissertation).
4. Ability to present and defend effectively project findings to selected audience.

REFERENCE

1. Referred Journals, Conference Papers, Text Books & Reliable Internet Resources.

EET462/3
ELECTRICAL INSTALLATION DESIGN

COURSE SYNOPSIS

This course is designed and structured to provide electrical engineers with the application skills needed in modern electrical engineering practice. This course uses a combination of theory and practical case studies to demonstrate and reinforce the principles. Students in this course are expected to work through the case studies. The case studies are based on actual installations and projects. The course topics includes Introduction to Electrical Installation Design, Final Circuit and Load Estimation, Lighting System, Switchgear, Protection Devices and Power Factor Corrections, Cable Selection and Wiring System, Earthing System.

COURSE OUTCOMES

1. Ability to describe, explain and apply the IEE Regulations and MS IEC Standards.
2. Ability to design and propose of low voltage electrical installation in indoor and outdoor of the building.
3. Ability to prepare, analyse and evaluate low voltage electrical system.

REFERENCES

1. W.E. Steward & T.A. Stubbs. (2002). Modern Wiring Practice – Design & Installation. 12th ed. Great Britain: Newnes.
2. N.Hasnizam & M.Rafi, (2009). Monograph: Electrical Installation Design. PPKSE.
3. BSI & IEE, (2008), "BS 7671 (2008) Requirements For Electrical Installations – IEE Wiring Regulations",17th Edition. Polestar Wheatones.

4. Department of Standards Malaysia, (2007), "MS 136: 2007, Electrical Installations of Building - Guide to MS IEC 60364".
5. Jabatan Kerja Raya Malaysia, Cawangan Kejuruteraan Elektrik,(2008), "Panduan Teknik. Edisi 4.

EET470/2
FINAL YEAR PROJECT I (RK45)

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing which is necessary for each final-year student. The students will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The area of research mainly on power electronic converters and motor drives.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve engineering problems.
2. Ability to develop appropriate research methodology for the project.
3. Ability to develop project proposal and progress report.
4. Ability to present and defend effectively project progress to selected audience.

REFERENCE

1. Referred Journal and Conference Papers, text book and Reliable Internet Resources.

EET471/4
FINAL YEAR PROJECT II (RK45)

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing which is necessary for each final-year student. The students will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The area of research mainly on power electronic converters and motor drives.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3 .Ability to conclude a complete project in a technical report (dissertation).
4. Ability to present and defend effectively project findings to selected audience.

REFERENCE

1. Referred Journals, Conference Papers, Text Books & Reliable Internet Resources.

EET480/2
FINAL YEAR PROJECT I (RK96)

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing which is necessary for each final-year student. The students will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The area of research mainly on renewable energy, energy utilization and management and distributed generation.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve engineering problems.
2. Ability to develop appropriate research methodology for the project.
3. Ability to develop project proposal and progress report.
4. Ability to present and defend effectively project progress to selected audience.

REFERENCE

1. Referred Journal and Conference Papers, text book and Reliable Internet Resources.



EET481/4
FINAL YEAR PROJECT II (RK96)

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing which is necessary for each final-year student. The students will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The area of research mainly on renewable energy, energy utilization and management and distributed generation.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to conclude a complete project in a technical report (dissertation).
4. Ability to present and defend effectively project findings to selected audience.

REFERENCE

1. Preferred Journals, Conference Papers, Text Books & Reliable Internet Resources.

CAREER OPPORTUNITIES

Electrical System Engineering, Industrial Electronics and Electrical Energy Systems graduates will have wide range of career prospects. Electrical engineers are always at demand to the industrial/private sectors, government sectors or entities and agencies that are related to the electrical system design.

Areas that need of electrical engineers are:

- Electrical/Electronics product manufacturers
- Tenaga Nasional Berhad (TNB)
- Independent Power Plant (IPP)
- Telekom Malaysia Berhad
- Angkatan Tentera Malaysia
- Jabatan Kerja Raya
- Consultants or contractors
- Education and training (universities, polytechnics and colleges)


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SCHOOL OF MANUFACTURING ENGINEERING

PROGRAMMES OFFERED

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- Bachelor of Engineering (Hons.) (Product Design Engineering)
- Master of Science (Manufacturing Engineering)
- Master of Science (Product Design Engineering)
- Master of Science (Manufacturing System Engineering) Mixed Mode
- Doctor of Philosophy (Manufacturing Engineering)
- Doctor of Philosophy (Product Design Engineering)

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INTRODUCTION

Initially, the School of Manufacturing Engineering, also known as PPKP was established with the name of the School of Manufacturing System Engineering or in short form of PPKSP on March 1, 2003. The school's new name was then proposed to School of Manufacturing Engineering and it has been approved officially by the Ministry of Higher Education dated October 30, 2004. Among the major justification for the changing the name of the school was due to the manufacturing engineering field is larger than the manufacturing systems engineering, or in other words, engineering manufacturing system is one aspect in the field of manufacturing engineering itself.

At its inception, the School of Manufacturing Engineering commenced its operation in the location of the School Complex, located at Kubang Gajah, Arau. Starting in 2004, School of Manufacturing Engineering was moved to a new location located at the Jejawi Engineering Complex along with six other schools. Then, once again this school was moved to a new location in Seberang Ramai, Kuala Perlis on 1 November 2007. Among the main factors for the second move was to accommodate the needs of the rooms for the increasing number of the academic staff, and also to facilitate communication between the non-academic staff, academic staff and students as the majority of students are placed in the residential colleges around Kuala Perlis.

In line with the development of a more rapidly growing industry and a key contributor to economic growth in Malaysia, the School of Manufacturing Engineering so far has offered two programs of study at Bachelor level, namely Bachelor of Engineering (Manufacturing Engineering) and Bachelor of Engineering (Product Design Engineering).

In general, the structure of the manufacturing engineering curriculum is designed to create a balance between technical specialization and industrial management. The entire core courses are offered in order to expose students to the important aspects of the manufacturing industry particularly to the methods for the production and an exposure to manufacturing technology. Manufacturing technologies focus on the selection of appropriate technology in the manufacturing process, taking into account several important factors such as the use of appropriate machines and the optimum process in accordance with the set standard.

Apart from that, the structure of product design engineering curriculum has been designed to create a balance between functionality and aesthetic aspects of design. The entire core courses are offered to expose students to the industry, especially the production of the design product is coordinated with the leading branded products in the world as well as an exposure the students to the manufacturing technology. Designs require the skills to create and produce consumer products by using the technology available in industrial design. An application of aesthetic values is also important to allow the product to be marketed globally.

For the Bachelor program, the number of credits needed to be completed prior the graduation requirement is 137 units of credit, where 120 unit credits include core courses, while the remaining 17 credit units of courses include the University requirements. In addition, final year students also need to carry out projects which are related to education programs, and in line with current industry requirements.

No less important, students are also required to carry out industrial training during the semester break before entering the fourth year of study. Students will be issued to undergo industrial training in the industries associated with the program of study offered. The main objective of these industrial training courses is required to complete the prospective graduates with the necessary technical knowledge in the real world of work in selected industries, when students were eligible for graduation.

In addition, the School of Manufacturing also offers Master of Science (Manufacturing), Master of Science (Product Design Engineering), Doctor of Philosophy (Manufacturing Engineering) & Doctor of Philosophy (Product Design Engineering). In principle, the school was founded with the goal of producing engineers who are not only skilled in specialized areas such as technical design and manufacturing, but also equipped with soft skills, entrepreneurship, languages, technology and information technology.

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BACHELOR OF ENGINEERING (HONOURS) (MANUFACTURING ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of Manufacturing Engineering or chosen field as demonstrated via career advancement.

PEO2:
Graduates who are members of and contribute to professional society.

PEO3:
Graduates who engage in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in Manufacturing Engineering discipline to solve the complex engineering problems.

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environment and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (MANUFACTURING ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (91)	EPT103/3 Materials	EPT161/3 Electrical Technology	EPT241/3 Solid Mechanics I	EPT228/3 Fluid Mechanics I	EPT335/3 Applied Thermodynamics	EPT312/3 Vibration and Mechanics of Machines	EIT302/4 Industrial Training	EPT445/2 Final Year Project I	EPT446/4 Final Year Project II
	EPT152/2 Engineering Drawing	EPT114/3 Statics	EPT212/3 Dynamics	EPT235/3 Thermodynamics	EPT341/3 Solid Mechanics II	EPT315/3 Machine Components Design		EPT412/3 Mechanical System Design	EPT481/3 Tools and Die Design
		EPT182/3 Manufacturing Process I	EPT261/3 Electronics	EPT281/3 Industrial Engineering	EPT383/3 Automation & Robotics	EPT386/3 Design for Manufacture		EPT447/3 Manufacturing Integrated Project	EPT495/2 Operational Research
		EPT183/2 Engineering Workshop	EPT282/3 Manufacturing Process II		EPT385/3 Metrology & Quality Control	EPT361/4 Instrumentation and Control		EPT484/2 Lean Manufacturing	EPT4XX/3 Elective**
					EPT384/3 Advanced Manufacturing Technology	EPT324/2 Heat Transfer		EPT485/2 Production Planning and Control	
Non Engineering (25)	EPT162/2 Computer Programming	EPT181/2 CAD/CAM			EPT371/2 Finite Element Analysis				
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics				EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
		UUT122/2 Skills and Technology in Communication							
University Required (19)	UUW233/2 Islamic & Asian Civilisations or UUW 237/2 Malaysian Cultures	UVA111/0 Foundation English*	UVW211/2 English for General Purposes*	UUW224/2 Engineering Entrepreneurship	UVW312/2 English for Technical Communication*	UUW322/2 Thinking Skills			
	UVW410/2 University Malay Language	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum	UVWXXX/2 Option*					
	UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies								
	UZWXXX/1 Co-Curriculum								
139	17	19	18	16	19	17	4	15	14
Total Units for Graduation 137									

*Compulsory and optional course according to MUET results.

	UVA111/0 Foundation English	UVW211/2 English for General Purposes	UVW312/2 English for Technical Communication	UVWXXX/2 Option
Band 1 & 2	compulsory	compulsory	compulsory	optional
Band 3		compulsory	compulsory	optional
Band 4, 5 & 6			compulsory	compulsory

** Elective Courses (Subject to changes): EPT491/3 Micromachining or EPT492/3 Industrial Ergonomics.

BACHELOR OF ENGINEERING (HONOURS) (PRODUCT DESIGN ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of Product Design Engineering or chosen field as demonstrated via career advancement.

PEO2:
Graduates who are members of and contribute to professional society.

PEO3:
Graduates who engage in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in Product Design Engineering discipline to solve the complex engineering problems.

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environment and sustainable development.

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (PRODUCT DESIGN ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (91)	EPT103/3 Materials	EPT161/3 Electrical Technology	EPT241/3 Solid Mechanics I	EPT228/3 Fluid Mechanics I	EPT335/3 Applied Thermodynamics	EPT315/3 Machine Components Design	EIT302/4 Industrial Training	EPT445/2 Final Year Project I	EPT446/4 Final Year Project II
	EPT152/2 Engineering Drawing	EPT114/3 Statics	EPT212/3 Dynamics	EPT235/3 Thermodynamics	EPT341/3 Solid Mechanics II	EPT324/2 Heat Transfer		EPT463/3 Automatic Control	EPT415/3 Vibration
	EPT191/2 Workshop & Studio Practice	EPT184/3 Manufacturing Technology	EPT261/3 Electronics	EPT262/2 Measurement & Instrumentation System	EPT314/3 Machine Mechanism	EPT364/3 Mechatronics		EPT427/3 Pneumatics & Hydraulics System Design	EPT495/2 Operational Research
		EPT192/3 Product Innovation		EPT293/3 Engineering Product Design I	EPT393/3 Engineering Product Design II	EPT329/3 Fluids Mechanics II		EPT448/3 Product Design Integrated Project	EPT4XX/3 Elective**
					EPT394/3 Product Ergonomic & Safety	EPT395/3 Engineering Product Design III			
Non Engineering (25)	EPT162/2 Computer Programming	UUT122/2 Skills and Technology in Communication	EPT283/2 Computer Aided Design		EPT371/2 Finite Element Analysis				
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics				EUT444/3 Management for Engineers	EUT442/2 Professional Engineers
University Required (19)	UUW233/2 Islamic & Asian Civilisations or UUW 237/2 Malaysian Cultures	UVA111/0 Foundation English*	UVW211/2 English for General Purposes*	UUW224/2 Engineering Entrepreneurship	UVW312/2 English for Technical Communication*	UUW322/2 Thinking Skills			
	UVW410/2 University Malay Language	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum	UVWXXX/2 Option*					
	UUW235/2 Ethnic Relations or UUW239/2 Malaysian Studies								
	UZWXXX/1 Co-Curriculum								
139	19	18	17	18	19	16	4	14	14
Total Units for Graduation 137									

*Compulsory and optional course according to MUET results.

	UVA111/0 Foundation English	UVW211/2 English for General Purposes	UVW312/2 English for Technical Communication	UVWXXX/2 Option
Band 1 & 2	compulsory	compulsory	compulsory	optional
Band 3		compulsory	compulsory	optional
Band 4, 5 & 6			compulsory	compulsory

** Elective Courses (Subject to changes): EPT481/3 Tools and Die Design or EPT491/3 Micromachining.

LIST OF COURSES:

BACHELOR OF ENGINEERING (HONOURS) MANUFACTURING ENGINEERING (RK 13)

- EPT 103/3 MATERIALS
- EPT114/3 STATICS
- EPT 152/2 ENGINEERING DRAWING
- EPT 161/3 ELECTRICAL TECHNOLOGY
- EPT 162/2 COMPUTER PROGRAMMING
- EPT 181/2 CAD/CAM
- EPT 182/3 MANUFACTURING PROCESS I
- EPT 183/2 ENGINEERING WORKSHOP
- EPT 212/3 DYNAMICS
- EPT 241/3 SOLID MECHANICS I
- EPT 261/3 ELECTRONICS
- EPT 228/3 FLUIDS MECHANICS I
- EPT 235/3 THERMODYNAMICS
- EPT 281/3 INDUSTRIAL ENGINEERING
- EPT 282/3 MANUFACTURING PROCESS II
- EPT 312/3 VIBRATION AND MECHANICS OF MACHINES
- EPT 315/3 MACHINE COMPONENTS DESIGN
- EPT 324/2 HEAT TRANSFER
- EPT 335 APPLIED THERMODYNAMICS
- EPT 341/3 SOLID MECHANICS II
- EPT 361/4 INSTRUMENTATION AND CONTROL
- EPT 371/2 FINITE ELEMENT ANALYSIS
- EPT 383/3 AUTOMATION AND ROBOTICS
- EPT 384/3 ADVANCED MANUFACTURING TECHNOLOGY
- EPT 385/3 METROLOGY AND QUALITY CONTROL
- EPT386/3DESIGN FOR MANUFACTURE
- EPT 412/3 MECHANICAL SYSTEM DESIGN
- EPT 481/3 TOOLS AND DIE DESIGN
- EPT 484/2 LEAN MANUFACTURING
- EPT 485/2 PRODUCTION PLANNING AND CONTROL
- EPT 495/2 OPERATIONAL RESEARCH

BACHELOR OF ENGINEERING (HONOURS) PRODUCT DESIGN ENGINEERING (RK84)

- EPT 103/3 MATERIALS
- EPT 114/3 STATICS
- EPT 152/2 ENGINEERING DRAWING
- EPT 161/3 ELECTRICAL TECHNOLOGY
- EPT 162/2 COMPUTER PROGRAMMING
- EPT 184/3 MANUFACTURING TECHNOLOGY
- EPT 191/2 WORKSHOP & STUDIO PRACTICE
- EPT 192/3 PRODUCT INNOVATION
- EPT 212/3 DYNAMICS
- EPT 228/3 FLUID MECHANICS I
- EPT 235/3 THERMODYNAMICS
- EPT 241/3 SOLID MECHANICS I
- EPT 261/3 ELECTRONICS
- EPT 262/2 MEASUREMENT & INSTRUMENTATION SYSTEM
- EPT 283/2 COMPUTER AIDED DESIGN
- EPT 293/3 ENGINEERING PRODUCT DESIGN I
- EPT 314/3 MACHINE MECHANISM
- EPT 315/3 MACHINE COMPONENTS DESIGN
- EPT 324/2 HEAT TRANSFER
- EPT 329/3 FLUIDS MECHANICS II
- EPT 335/3 APPLIED THERMODYNAMICS
- EPT 341/3 SOLID MECHANICS II
- EPT 364/3 MECHATRONICS
- EPT 371/2 FINATE ELEMENT ANALYSIS
- EPT 393/3 ENGINEERING PRODUCT DESIGN II
- EPT 394/3 PRODUCT ERGONOMIC & SAFETY
- EPT 395/3 ENGINEERING PRODUCT DESIGN III
- EPT 415/3 VIBRATION
- EPT 427/3 PNEUMATICS & HYDRAULICS SYSTEM DESIGN
- EPT 448/3 PRODUCT DESIGN INTEGRATED PROJECT
- EPT 463/3 AUTOMATIC CONTROL
- EPT 495/2 OPERATIONAL RESEARCH



COURSE SYLLABUS

EPT 103/3
MATERIALS

COURSE SYNOPSIS

This course introduces students to the engineering materials fundamentals including the engineering materials application, atomic bonding, crystal structure, mechanical and physical properties, corrosion mechanism, microstructural analysis, phase diagram, ferrous and non-ferrous alloys, polymer and advance materials.

REFERENCES

1 William F. Smith, Javad Hashemi, 2006, Foundation of Materials Science and Engineering, Fourth edition, McGraw Hill.
2. William D. Callister, Introduction to Materials, John-Wiley & Sons.
3. Budinski, K.G, 2006, Engineering Materials Properties and Selection, 8th edition, Prentice Hall.
4. Shackeford, J.F, 2005, Introduction to Materials Science for Engineers,6th edition, Prentice Hall.
5. Mars G. Fontana, 1986, Corrosion Engineering, Third edition, McGraw Hill.

EPT114/3
STATICS

COURSE SYNOPSIS

This course deals with the rigid-body mechanics in the area of statics. Statics deals with the equilibrium of bodies that are at rest. Each principle is applied first to a particle, then to a rigid body subjected to a coplanar system of forces, and finally to a general case of three-dimensional force systems acting on a rigid body. The topics involved in this course is force vector, equilibrium of a particle, force system resultants, equilibrium of a rigid body, structural analysis, mechanical friction and moment of inertia.

REFERENCES

1. Hibeler, R.C.. *Engineering Mechanics Statics SI,* Pearson Prentice-Hall, Inc.
2. Bedford, A.M. & Fowler, W. (2007). *Engineering Mechanics: Statics & Dynamics, 5th Edition*. Prentice Hall.
3. Ferdinand P. B, Johnson Jr., E. R. & William E. C. (2004). *Vector Mechanics for Engineers Statics Seventh Edition*. Mc-Graw Hill.
4. Hibeler, R.C. & Peter Schiavone (2004). *Engineering Mechanics Statics – Statics Study Pack SI Third Edition.* Pearson Prentice-Hall, Inc.
5. Meriam, J. L. & Kraige, L. G. (2003). *Engineering Mechanics, Statics Fifth Edition*. John Wiley & Sons, Inc.
6. Riley, W, Sturges, L. & Morris, D. (2007). *Mechanics of Materials*. John Wiley & Sons, Inc.

EPT 152/2
ENGINEERING DRAWING

COURSE SYNOPSIS

This course introduces fundamental of engineering drawing, engineering graphic as language, basic drafting skill, applied geometry, shape description, basic dimensioning, tolerance, detail and assembly drawing based on BS308 part 1 and part 2.

REFERENCES

1. Jensen C., Helsel J D., Short D R., 2007, Engineering Drawing & Design. 7th ed. Mc-Graw Hill.
2. Jensen C., Helsel J D., 1996. Fundamentals of Engineering Drawing. 4th ed. Mc-Graw Hill.
3. Kirkpatrick J M., 2003. Basic Drafting Using Pencil Sketches and AutoCAD. Prentice Hall.
4. Luzzader W. J., Duff J. M., 1993. Fundamentals of Engineering Drawing With an Introduction to Interactive Computer Graphics for Design and Production. 11th ed. Prentice Hall International.
5. Goetsch D L., Chalk W.S., Nelson J.A. Rickman R.L., 2005. Technical Drawing. 5th ed. Thomson Delmar Learning.

EPT 161/3
ELECTRICAL TECHNOLOGY

COURSE SYNOPSIS

This course is intended to provide students with clear understanding the concepts and principles of the DC and AC circuits, basic principles of three phase ac circuits, and electromagnetism. The students will also gain an understanding of the basic operating principles of a transformer; calculate induced e.m.f, equivalent resistance, reactance and impedance, losses and transformer efficiency. At the end of the subject, the students will understand the principles of DC and AC Electrical Machines.

REFERENCES

1. Charles K. Alexander & Matthew Sadiku, "*Fundamentals of Electric Circuits*", 5th Edition, McGraw Hill, 2012.
2. John Bird, Electrical Circuit Theory and Technology.4th Edition, Newnes, 2010
3. Edward Hughes, Electrical and Electronic Technology. 11th Edition, Prentice Hall, 2012.
4. S.A. Reza Zekavat, Electrical Engineering: Concepts and Applications, Prentice Hall, 2013

EPT 162/2
COMPUTER PROGRAMMING

COURSE SYNOPSIS

This course introduces to Computers and Computing Fundamentals, Program Structure, Printing, Comments, Variables, Arithmetic Operations, Math Functions, Input/ Output, Control Structure, Looping, Functions, Numeric Arrays, User Friendly Interface and their application on solving engineering problems. C programming language is utilized in this course.

REFERENCES

1. H. H. Tan and T. B. D'Orazio, 1999. C Programming for Engineering & Computer Science, McGraw-Hill.
2. Behrouz A. Forouzan and Richard F, Gilberg, 2001. Computer Science A Structured Programming Approach Using C, Second Edition, Brooks/ Cole.
3. Jeri R. Hanly and Elliot B. Koffman, 2002. Problem Solving & Program Design in C, 3rd Edition, Addison Wesley.
4. Elice E. Fischer, David W. Eggert and Stephen M. Ross, 2001. Applied C: An Introduction and More, McGraw-Hill.
5. Harry H. Cheng, 2010. C for Engineers and Scientists: An Interpretive Approach, McGraw Hill.

EPT 181/2
CAD/CAM

COURSE SYNOPSIS

This course introduces the principles and application of CAD/CAM systems. It enables students to understand the theory, concept, and application of CAD/ CAM as used in the industry. Students will use CAD software to illustrate parts, and CAM software to convert CAD files into numerical control (NC) codes.

REFERENCES

1. P.N. Rao. CAD/CAM Principles and Applications. 2nd Edition. McGraw Hill. (2004)
2. Ibrahim Zeid. Mastering CAD/CAM.1st Edition. McGraw Hill International Edition. (2004)
3. Farid M. Amirouche. Principles of Computer Aided Design and Manufacturing. 2nd Edition. Prentice Hall. (2003)
4. Chris McMahon, Jimmie Browne. CADCAM : From Principles to Practice. Addison Wesley Publication. (1993)
5. Chris McMahon, Jimmie Browne. CADCAM : Principles, Practice and Manufacturing Management. 2nd Edition. Prentice Hall. (1999)

EPT 182/3
MANUFACTURING PROCESS I

COURSE SYNOPSIS

This course explores the manufacturing process which used in industry to convert raw material into finished product. This course will devided into five groups; first introduction to manufacturing technology, followed by fundamentals of materials in manufacturing. Secondly solidification process will be introduced including metal casting, casting processes, glass product, shaping plastics, producing rubber goods and polymer matrix composite. Thirtly this course focus on metal forming and sheet metal working. Fourthly students will be expose to powder processing. Lastly, this course will be introduce various joining and assembly process such as welding, brazing, soldering, adhesive bonding, and mechanical fastening processes.

REFERENCES

1. Groover, M.P. Fundamentals of Modern Manufacturing, 2nd Ed., John Wiley & Sons, Inc., 2002.
2. Kalpakjian S, Schmid S.R. Manufacturing Engineering and Technology, 4th ed., Prentice Hall Inc. 2001
3. Schey, J.A. Introduction to Manufacturing Processes, 3rd Ed., Mc Graw Hill, 2000.
4. Philip F. Ostwald, Jairo Munoz (1997). *Manufacturing Processes and Systems.* 9th ed., John Wiley & Sons.
5. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). *Materials and Processes in Manufacturing*. 8th ed., John Wiley & Sons, Inc.
6. Steve F. Krar, Arthur R.Gill, Peter Smid. *Technology of Machine Tools*. 6th ed. Mc Graw Hill

EPT 183/2
ENGINEERING WORKSHOP

COURSE SYNOPSIS

This course explores the manufacturing processes with practical methods that used in industry to convert raw material into finished product. This course will devided into five workshops; first workshop: solidification process will be introduced including sand casting and plastic injection molding process. Second workshop: particulate processing of metal, forming and sheet metalworking. Thirt workshop: various joining and assembly process such as welding and mechanical fastening processes. Fourth workshop: students will be expose to rapid prototyping process and last workshop: students need do the presentation of mini project that given by lecturer or vocasional trainning officer (PLV).

REFERENCES

1. Groover, M.P. (2002). *Fundamentals of Modern Manufacturing, 2nd Edition.* John Wiley & Sons, Inc.
2. DeGarmo, E. P., Black, J.T. & Kohser, R.A. (1997). *Manufacturing Processes and Systems, 9th Edition.* John Wiley & Sons.
3. Kalpakjian, S. & Schmid, S.R. (2001). *Manufacturing Engineering and Technology, 4th Edition.* Prentice Hall.
4. Krar, S., Gill, A. & Smid, P. (2010). *Technology of Machine Tools, 7th Edition*. Mc Graw Hill.
5. Schey, J.A. (2000). *Introduction to Manufacturing Processes, 3rd Edition.* Mc Graw Hill.

EPT 184/3
MANUFACTURING TECHNOLOGY

COURSE SYNOPSIS

This course introduces students to industrial manufacturing technology used for converting raw materials into finished products. Various processes, machinery, and operations will be examined with emphasis placed on understanding engineering materials and processing parameters that influence design considerations, product quality and production costs.

REFERENCES

1. Kalpakjian, S. & Steven, R. S. (2006). Manufacturing Engineering and Technology, 5th Edition in SI Units. Prentice-Hall, Inc.
2. Bruce R.G., Dalton, W. K., Neely, J.E. & Kibbe, R. R. (2003). Modern Materials & Manufacturing Process, 3rd Edition. Prentice Hall.
3. DeGarmo, E. P., Black, J.T. & Kohser, R.A. (2006). Materials and Processes in Manufacturing. 9th Edition. Wiley.
4. Grover, M.P. (2010). Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 4th Edition. Wiley.
5. Schey, J.A. (2000). Introduction to Manufacturing Processes, 3rd Edition. McGraw-Hill, Inc.
6. Schmid, S. (2007). Manufacturing Processes for Engineering Materials, 5th. Edition. Prentice Hall.

EPT 191/2
WORKSHOP AND STUDIO PRACTICE

COURSE SYNOPSIS

This course will expose the student in practicality and developing skills regarding design processes and model/ prototype fabrication. Hence, topics will be focusing to product sketching techniques and model/prototype fabrication. Through the assignment given, the knowledge and skills that need by a product designer will be developing. Furthermore, this course will expose the student by studio/workshop sessions through product design assignments which emphasis on creative thinking and the production of visual in the context of design. The student will be expose trough design assignment about the concepts and methods in designing; elements of good quality product; included concepts sketching and presentation drawing; model making; understanding of engineering drawing and design documentation.

REFERENCES

1. Serope Kalpakjian, Steven R. Schmid 2006. Manufacturing Engineering and Technology - 5th Edition in SI Units, Prentice-Hall, Inc.
2. John A. Schey, 2000. Introduction to Manufacturing Processes, 3rd Edition, McGraw-Hill, Inc.

EPT 192/3
PRODUCT INNOVATION

COURSE SYNOPSIS

This course initially discusses about the basic ideas of inventing which covers the principles of invention and innovation. This topic also will cover the discussion on psychology of invention in order to give the basic understanding of various psychological factors that greatly influence the way of innovative process. In conjunction with technology, the next topic will focus on fundamental principles of technology such as the energies and their forms, the storage of energy and some general concepts that have been used over and over again in originating, developing and applying many devices and systems. As the topic goes on, the role of inventor in product cycle and its principles, analysis elements and related issues in innovation activities will be discussed continuously. Next, the inventive process will be proposed to produce the novel design concepts and the reverse engineering process will be discussed as to improve the current design concepts. In order to support the inventive process, some creative techniques will be introduced to enhance the ideas in the following topic. As the course goes on, the aesthetics intentions in product invention will not excluded as an additional value in generating the innovative ideas. The intellectual properties such as patents, trade mark, trade secret and copyright will be put in for the next topic as important legislative documents to protect the ideas. To strengthen the innovation works, the presentation techniques and ethics will also be studied using graphic software and aided materials such as panels and mock-up.

REFERENCES

1. William F. Smith, Javad Hashemi, 2006, Foundation of Materials Science and Engineering, Fourth edition, McGraw Hill.
2. G. Kivenson, 1982, The Art and Science of Inventing, 2nd edition, Van Nostrand Reinhold.
3. M. Baxter,1995, Product Design: Practical Methods for The Systematic Development of New Products, CRC Press.
4. P.Trott, 2002, Innovation Management and New Product Development, 2nd edition, Prentice Hall.
5. Wego Wang, 2010, Reverse Engineering: Technology of Reinvention, CRC Press.
6. M.Crawford , 2003,New Products Management, McGraw-Hill.
7. G.E. Dieter, 2000, Engineering Design, 3rd edition, McGraw Hill.
8. R.J. Eggert, 2005, Engineering Design, Prentice Hall.

EPT 212/3
DYNAMICS

COURSE SYNOPSIS

In this course, students use the concepts of mechanics in dynamic conditions. The course will be presented in two parts: kinematics, which treats only the geometric aspects of motion, and kinetics, which is the analysis of the forces causing the motion. To develop these principles, student learns the dynamics of a particle first, followed by topics in rigid-body dynamics in two and then three dimensions. Emphasis will be given on the kinematics and kinetics of a particle, planar kinematics and kinetics of a rigid body, three dimension kinematics and kinetics of a rigid body.

REFERENCES

1. Beer, F. B., Johnston, E. R. Jr. and Clausen, W. E., Vector Mechanics for Engineers: Dynamics. 8th ed. in SI Units, Canada, McGraw-Hill, 2007.
2. Hibbler R. C., 2010. *Engineering Mechanics- Dynamics*, 12th ed. Prentice Hall.
3. Meriam J. L. & Kraige L.G., 2007. *Engineering Mechanics, Dynamics*, John Wiley & Sons, Inc.
4. Beer, F. P. & Johnston E. R., 1998. *Engineering Mechanics-Dynamics*, 4th ed. John Wiley & Sons, Inc.
5. Bedford, A. & Fowler, W., 1996. *Engineering Mechanics-Dynamics,* Addison Wesley Longman.
6. Ginsberg. J., 2007. *Engineering Dynamics.* 3rd ed. New York: Cambridge University Press.

EPT 228/3
FLUIDS MECHANICS I

COURSE SYNOPSIS

In Fluid Mechanics I, students will be exposed to the knowledge of basic properties of fluid, static fluid problems, integral relation of control volume problems, and principle of fluid friction in pipe. This course will enable the students to integrate the theory in fluid mechanics to the real world problems. Besides, there are also several expected experiments in this course which should be conducted by the students during the course period.

REFERENCES

1. Frank M. White (1999) 4th edn. Fluid Mechanics. Rhode Island: McGraw-Hill
2. J.F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack, Fluid Mechanics, Fifth Edition, Prentice-Hall, 2005.
3. B. R. Munson, D. F. Young and T. H. Okiishi. Fundamentals of Fluid Mechanics. John Wiley & Sons.
4. B.S. Massey, Mechanics of fluids, Chapman & Hall, London.
5. C.T., Crowe, D. F. Elger and J. A. Roberson, Engineering Fluid Mechanics, Eight Edition, John Wiley & , 2005.
6. R.L. Mott, Applied Fluid Mechanics, Sixth Edition, Prentice Hall, 2006.

EPT 235/3
THERMODYNAMICS

COURSE SYNOPSIS

This course covers the basic concepts in thermodynamic laws such as the properties of substances, energy principles, first and second law of thermodynamics which applicable in engineering applications. The course emphasizes the study of energy sources and conservation through its concept and principles.

REFERENCES

1. Cengal Y.A. and Boles M.A., *Thermodynamics: An Engineering Approach*, 7th Edition, McGraw-Hill Inc., New York, 2006.
2. Eastop T.D. & Mac Conkey A., *Applied Thermodynamics for Engineering Technologists*, 5th Ed., Prentice Hall, 1993.
3. Stephen R. Turns, *Thermodynamics: Concepts and Applications* , Cambridge University Press, 2006.
4. Michael J. Moran & Howard N. Shapiro , *Fundamentals of Engineering Thermodynamics*, 6 th Edition, Wiley, 2007.
5. Mohd Kamal Ariffin, " Termodinamik Asas", UTM Press, 2005.
6. W.Z. Black and J.G.Hartley.(1996). *Thermodynamics,* English/SI Version.3rd Edition Prentice-Hall.



EPT 241/3
SOLID MECHANICS I

Course Synopsis:

This course covers deformation and internal forces that exist in a solid body when subjected to external loads. The concepts of stress, strain, and constitutive behaviors are discussed. Students are taught to solve problems of loading on solid bodies under axial, torsion and bending loading conditions. The concepts of principal stresses and strains are used to solve problems involving multi-directional loadings. Students use Mohr's Circle to solve the problems.

REFERENCES

1. Hibbeler, R.C.,"Mechanics of Materials."7th ed Prentice Hall, 2008.
2. Raymond Parnes.,"Solid Mechanics in Engineering"John Willey & Sons, 2001.
3. Ferdinand P. Beer.,"Mechanics of Materials."4rd ed. McGraw-Hill, 2006.
4. Barber,J.R .,"Intermediate Mechanics of Materials." McGraw-Hill, 2001.
5. Madhuhar Vable.,"Mechanics of Materials." Oxford, 2002.

EPT 261/3
ELECTRONICS

COURSE SYNOPSIS

The purpose of this course is to give introduction and exposure to student about the electronic devices which includes analog and digital devices. The analog devices topic includes the introduction to semiconductor, PN junction, diodes, zener diodes, bipolar junction transistor (BJT) and operational amplifier. The digital device topic includes the introduction to binary number system, Boolean Algebra, logic gates and logic circuits, Boolean function, combinational logic circuits, sequential logic circuit and counters. Students will be exposed to the electronic basic, operation concept, analysis method including the usage of electronic device used in industry and introduction to microprocessor. Lab test will also be done to clarify the topics learned in the class.

REFERENCES

1. Tocci, R.J. and, Widmer, N.S.,*Digital Systems: Principles and Applications* 8th ed. Prentice Hall, 2001.
2. Knight, S.A.(1996). *Electronics for Engineers*. BH Newness.
3. Floyd, T.L. (1995). *Electronics Fundamentals, Circuits, Devices & Applications.* Prentice Hall.
4. Gates, E.D, *Introduction to Electronics, 5th Ed. Thomson Delmar Learning,* 2007.
5. Mukhopadhyay, A.K., *Microprocessor,Microcomputer and Their Applications. 3rd Ed.* Alpha Science Int. Ltd (2007).

EPT 262/2
MEASUREMENT AND INSTRUMENTATION SYSTEM

COURSE SYNOPSIS

This course introduces students to the basic principles in measurement system including various sensing methods, instrument types and their characteristics, display and recording elements, and their applications in the measurement of temperature, force, pressure, level and displacement, among many others.

REFERENCES

1. Figliola, R.S., 2006, Theory and Design for Mechanical Measurements, 4th Edition, John Wiley & Sons, Inc.
2. Morris, A.S., 2001, Measurement and Instrumentation Principles, Butterworth-Heinemann.
3. Beckwith, T.G., Maragoni, R.D. & Lienhard, J.H., 2006, Mechanical Measurement, 6th Edition, Prentice Hall.
4. Bentley, J.P., 2005, Principles of Measurement Systems, 4th Edition, Pearson.
5. Nakra, B.C. & Chaudhry, K.K. 2006, Instrumentation, Measurement and Analysis, 2nd Edition, Tata McGraw Hill.

EPT 281/3
INDUSTRIAL ENGINEERING

COURSE SYNOPSIS

This course introduces the fundamentals of Industrial Engineering. It covers elements of industrial engineering, improvement and the installation of people, materials, equipment, information, energy and economics. The main objectives of this course is to develop students into competent analysts who are capable of designing facilities and layouts that optimize material flow and minimize waste, understanding ergonomics and Occupational Safety and Health (OSH) requirements in working condition, performing neccessary evaluation in motion study for manufacturing operations, and understanding Six Sigma concept and methodology in industrial operation.

REFERENCES

1. Tompkins, J.A., Facilities Planning, 4th ed., John Wiley & Sons, Inc. 2010.
2. Fitting The Human: Intoduction to Ergonomics, 6th Edition, Karl H. E. Kroemer, CRC Press, 2008.
3. Occupational Safety and Health Act and Regulation, MDC Publishers Sdn Bhd, 2008.

4. Guidelines for Hazard Identification, Risk Assessment and Risk Control, Department of Occupational Safety and Health, 2008.
5. Groover, Mikell P., Work Systems: The Methods, Measurement & Management of Work, Prentice Hall 2007.
6. Barnes, Ralph M., Motion and Time Study: Design and Measurement of Work, John Wiley & Sons Inc., 1990.
7. Ronald D. Snee and Roger W. Horel., Leading Six Sigma A step-by-step Guide Based on Experience with GE and other Six Sigma Companies, Prentice Hall, 2003.
8. Gary Cornner.,Six Sigma and other Continuous Improvement Tools for the Small Shop, Society of Manufacturing Engineers(SME), 2002.

EPT 282/3
MANUFACTURING PROCESS II

COURSE SYNOPSIS

This course enables students to understand the use of conventional and modern machining processes. The course begins with an introduction to machining processes, followed by analyses of machine tools. Then, students are taught about CNC programming, CNC processes, tools and control systems. Students will perform machining processes and learn how to develop programming and solve problems related with it.

REFERENCES

1. Serope Kalpakjian and Steven R. Schmid, *Manufacturing Engineering and Technology,* Fifth Edition, Prentice Hall, 2006
2. Jon Stenerson, Kelly Curran, *Computer Numerical Control Operation and Programming*. 3rd ed., Prentice Hall, 2007.
3. Steve Krar, Arthur Gill, Peter Smid, *Computer Numerical Control Simplified,* 1st ed., Industrial Press Inc. New York, 2001.
4. Stephen F. Krar, Arthur Gill, *Exploring Advanced Manufacturing Technologies,* Industrial Press Inc. New York, 2003.
5. *Manufacturing Processes And Materials*, George F. Schrader, Ahmad K. Elshennawy, Lawrence E. Doyle, Society Of Manufacturing Engineers, 2000.

EPT 283/2
Computer Aided Design

COURSE SYNOPSIS

This course focuses on developing students' skills on the basis of 3D modeling and its application in engineering by using 3D Modeling software. It includes details on 3D modeling followed by producing 2D drawing, assembly drawing, exploded drawing, surface modeling, rendering and animation. All this skills will help student to apply its in engineering field to fulfill industry demand.

REFERENCES

1. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak, "Engineering Graphics", 8th edition, P, 2004.
2. James H. Earle, "Engineering Design Graphics", 11th ed.,Pearson Prentice-Hall, 2004.
3. R.K Dhawan, "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.
4. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan

EPT 293/3
ENGINEERING PRODUCT DESIGN I

COURSE SYNOPSIS

This course aims to develop an understanding of customer's needs and techniques to interpret the data into product conceptual solution that have market values. Students will learn the appropriate engineering approaches and methods to analyze user needs in conjunction with engineering science principles such as materials, static, dynamics, solid, fluid and thermodynamics in producing the conceptual solutions to fulfill the customers' needs. This course also focuses on manipulation of 3D CAD based software to construct the product conceptual solutions. Finally, students are hoped to be able to understanding various engineering design environments and produce the technical report to support the product conceptual.

REFERENCES

1. M. Baxter,1995, Product Design: Practical Methods for The Systematic Development of New Products, CRC Press.
2. M.Crawford ,2003,New Products Management, McGraw-Hill.
3. G.E. Dieter, 2000, Engineering Design, 3rd edition, McGraw Hill.
4. R.J. Eggert, 2005, Engineering Design, Prentice Hall.
5. Wego Wang, 2010, Reverse Engineering: Technology of Reinvention, CRC Press.
6. Ainon, Abdullah, 1994, Pemikiran Reka Cipta, 1st edition, Utusan Publication.



EPT 312/3
VIBRATION AND MECHANICS OF MACHINES

COURSE SYNOPSIS

This course is designed so that students learn the application of concepts in mechanics (statics and dynamics) to solve real world mechanical engineering problems pertaining to various machines that include belt and pulley systems, gears, flywheels and gyroscopes. Student will also learn the methods of balancing rotating masses and parts of a combustion engine. The concepts of vibration with respect to one-degree-of-freedom are also studied. At the end of this course, students should be able to solve problems related to various mechanical systems. In addition, they should be able to evaluate analytically the parameters of components of various machines under study.

REFERENCES

1. Pennock Gordon R., Shigley Joseph E., Uicker John J., Theory of Machines and Mechanisms, OXFORD University Press, 2003.
2. D. J. Inman, Engineering Vibration. Pearson Prentice Hall, 2001.
3. S. S. Rao, Mechanical Vibrations. Pearson Prentice Hall, 2004.
4. Che Abas Che Ismail, Mohd. Pauzi Abd. Ghani, Mohd. Yunus Abdullah,Teori Getaran dengan Penggunaan. Universiti Teknologi Malaysia, 1997.
5. W. J. Palm, Mechanical Vibration. John Wiley, 2006.

EPT 314/3
MACHINE MECHANISM

COURSE SYNOPSIS

This course prepares the students with the knowledge and analysing skills related to basic 3D rigid body kinematics, balancing on rotation mass, gear systems and follower, mechanism-kinematics diagram, movement ability, position analysis, velocity and acceleration analysis. At the end of this course, students should be able to solve problems related to various mechanical systems. In addition, they should be able to use and evaluate analytically the parameters of components of various machines under study.

REFERENCES

1. Rattan, S.S., Theory of Machines. 2nd ed. Tata McGrawHill, 2005.
2. Khurmi, R. S. and Gupta, J.K., Theory of Machines. New Delhi: Eurasia Publishing House , 1996.
3. Myszka, D.H., Machines and Mechanism: Applied Kinematic Analysis, 3rd eds., Prentice Hall (2005)
4. Hannah, J. and Stephens, R.C. Mechanics of Machines. Elementary Theory and Examples, 4th eds., Edward Arnold, 1991
5. Che Abas Che Ismail,Mohd. Yunus Abdullah,Roslan Abd Rahman, Mekanik Mesin Universiti Teknologi Malaysia, 2003
6. P.L. Ballaney, Theory of Machines and Mechanisms, Khanna Publisher 1995

EPT 315/3
MACHINE COMPONENTS DESIGN

COURSE SYNOPSIS

This course prepares students to determine structural integrity of common machine components such as Fasteners, Shafts, Gears, Springs and Riveted Joints. It introduces the methodology in engineering design and its relationship to top-level mechanical systems. It illustrates the isolation of the critical factors from a practical engineering problem, the application of known knowledge to quantitatively formulate the critical process, the assembly of the information needed for a solution, and the proper application of the solution in practical designs. This course will show how to identify the critical design parameters for any engineering component design and to manipulate them as part of the design process.

REFERENCES

1. Robert L. Mortt., (2004). Machine Elements in Mechanical Design. 4th Edition in SI Units, Pearson Prantice Hall.
2. Robert C. Juvinall and Kurt M. Marshek. (2005). Fundamental of Machine Components Design. 4th Edition. John Wiley & Sons
3. Norton, Robert L. (2004). Design of Machinery. 3rd Edition. McGraw-Hill
4. Richard Budynass, Joseph E. Shigley and Charles R. Mischke. (2004). Mechanical Engineering Design. 7th Edition. McGraw-Hill

EPT 324/2
HEAT TRANSFER

COURSE SYNOPSIS

The main objective of this course is to enable student to understand the concepts of conduction, convection and radiation which form the basics of heat transfer. Student will also perform theoretical calculations such as thermal conductivity, heat loss, and other important theories.

REFERENCES

1. Yunus A. Cengel., 1998, Heat transfer: A practical approach. Mc-Graw Hill
2. Tariq Muneer., Jorge Kubie., Thomal Grassie., 2003, Heat transfer: A problem solving approach, volume 1.
3. Jack Philip Holman., 2009, Heat transfer. Mc-Graw Hill Higher Education.
4. Adrian Bejan., 1993, Heat transfer. John Wiley & Sons, Inc.
   Anthony F. Mills., 1999, Heat Transfer. Prentice Hall.

EPT 329/3
FLUID MECHANICS II

COURSE SYNOPSIS

Fluid Mechanics II will enable students to analyse hydrodynamical flow fields. To enhance understanding of fluid behavior through application of dimensional reasoning, drag and lift considerations, boundary layer theory, compressible flow theory, measurement techniques and pump and turbine theory, computational fluid dynamics and computer applications and simulations. At the end of the course, students are able to develop an appreciation of the design principles in thermo-fluid system and the ability to analyze existing thermo-fluid systems and contribute to new designs

REFERENCES

1. J.F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack, Fluid Mechanics, Fifth Edition, Prentice-Hall, 2005.
2. C.T., Crowe, D. F. Elger and J. A. Roberson, Engineering Fluid Mechanics, Eight Edition, John Wiley & Sons, 2005.
3. B. R. Munson, D. F. Young and T. H. Okiishi. Fundamentals of Fluid Mechanics. John Wiley & Sons.
4. R.L. Mott, Applied Fluid Mechanics, Sixth Edition, Prentice Hall, 2006.
5. B.S. Massey, Mechanics of fluids, Chapman & Hall, London.

EPT 335
APPLIED THERMODYNAMICS

COURSE SYNOPSIS

Applied Thermodynamics is designed to enhance and extend students' ability to apply thermodynamic principles, especially the first and second laws of thermodynamics, and the laws of conservation of mass, momentum and energy, to industrial systems. It covers the broad application of the theory to many engineering applications, and emphasizes the analysis of energy transfers during power generation, heating, air-conditioning and refrigeration processes. At the end of the course, students should be able to apply relevant thermodynamic and conservation principles and perform calculations to evaluate the performance of gas and vapor power cycles, various compressors, and the performance of air-conditioning, refrigeration and heat pump cycles. Students should also be able to perform thermodynamic analyses of gas mixtures and gas-vapor mixtures.

REFERENCES

1. Eastop T.D. & Mac Conkey A., Applied Thermodynamics for Engineering Technologists, 5th Ed., Prentice Hall, 1993.
2. Cengal Y.A. and Boles M.A., Thermodynamics: An Engineering Approach, 7th Edition, McGraw-Hill Inc., New York, 2006.
3. Stephen R. Turns, Thermodynamics: Concepts and Applications, Cambridge University Press, 2006.
4. Michael J. Moran & Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, 6th Edition, Wiley, 2007.
5. Mohd Kamal Ariffin, " Termodinamik Asas", UTM Press, 2005.
6. W.Z. Black and J.G.Hartley.(1996). Thermodynamics, English/SI Version. 3rd Edition Prentice-Hall.

EPT 341/3
SOLID MECHANICS II

COURSE SYNOPSIS

The objective of the course is to enhance the understanding of the Solid Mechanics I course. The course is extended to deformation under static loading, beam deflection, column buckling, bending deformation of a thin plate and fracture mechanics. The deflection of beam problems is taught using various methods including application of energy methods. This energy method covers the principle of conservation of energy, virtual work and Castigliano's theorem.

REFERENCES

1. Hibbeler, R.C.,"Mechanics of Materials."7th ed. Prentice Hall, 2008.
2. PP Benham, RJ Crawford & CG Armstrong.,"Mechanics of Engineering Materials."2nd ed. Prentice Hall, 1996.
3. Ferdinand P. Beer.,"Mechanics of Materials."4rd ed. McGraw-Hill, 2006.
4. Barber,J.R .,"Intermediate Mechanics of Materials." McGraw-Hill, 2001.
5. Madhuhar Vable.,"Mechanics of Materials." Oxford, 2002.

EPT 361/4
INSTRUMENTATION AND CONTROL

COURSE SYNOPSIS

This course prepares students with the basic knowledge of and skill in instrumentation and control for instrumentation systems and control



engineering. Students are exposed to the basic concepts of instrumentation systems, elements, transducers, instrumentation system analysis, design criteria for measuring instrument and the suitable materials. This course will enhance the students' knowledge toward the principles and usage of instrumentation in manufacturing industries. The students will also learn control systems concepts and methods commonly used in industries. They will have the opportunity to strengthen their knowledge and understanding of instrumentation and control in manufacturing engineering. As such, students will be able to apply instrumentation and control techniques in manufacturing environment. In addition, they will also learn how to analyze and design simple controllers.

REFERENCES

1. C. S. Rangan, G. R. Sarma, V. S. V. Mani, 'Instrumentation Devices and Systems', Tata McGraw Hill, 1994.
2. Ogata, Katsuhiko,Modern Control Engineering . 5th ed., New Jersey, Prentice Hall, 2010.
3. Nise, Norman S., Control Systems Engineering . 6th ed., USA, John Wiley & Sons, 2011.
4. Bolton, W., Instrumentation and Control Systems. Norfolk, Newnes, 2004.
5. Doebelin E. O., Measurement System Application and Design, McGraw-Hill, 1990.

EPT 364/3
MECHATRONICS

COURSE SYNOPSIS

The aim of this course is to deliver the basic knowledge of the mechatronics. In this course, student will be exposed to several topics including input devices (sensors and transducers), output devices (electrical, mechanical, pneumatic and hydraulic actuation systems), signal conditioning, and digital signal. The students also will learn how to develop basic Programmable Logic Controller (PLC)ladder diagram. AT the end of the semester the students will acquire basic skills to comprehend and design simple mechatronic systems in product design.

REFERENCES

1. W. Bolton, "Mechatronics : Electronic control systems in mechanical and electrical engineering". 4th ed. Pearson-Prentice Hall. 2008
2. David G. Alciatore, "Introduction to Mechatronics and Measurement Systems". 4th ed. Mc. GrawHill. 2011
3. M. Jouaneh, " Fundamentals of Mechatronics" Cengage Learning. 2013
4. V.S. Bagad, "Mechatronics" 3rd ed. Technical Publications Pune. 2007
5. R. Iserman, "Mechatronic Systems: Fundamental", Springer,2003.
6. Standon, N. (2005) Handbook of Human Factors and Ergonomics Methods. London: CRC Press.
7. Jordan, Patrick W. (2002) An Introduction to Usability. Taylor & Francis Ltd.
8. Vink, P. (2005) Comfort and Design: Principles and Good Practice. CRC Press, Florida.

EPT 383/3
AUTOMATION AND ROBOTICS

COURSE SYNOPSIS

The objective of this course is to enhance the knowledge and the understanding of industrial automation and robotic which have been used in the industries today. Its covers topics regarding automation systems such as Flexible Manufacturing System (FMS), material handling, Automated Storage/ Retrieval System (ASRS), Automated Guided Vehicles (AGV). Students will be learning programmable logic control (PLC)and how to design pneumatic and hydraulic circuits manually and translate to simulation using related software. The course covers an explanation of the classification of robots, robot systems, end-of-arm tooling, sensors, robot safety and robot utilisation in the industries. In addition, Combination of Modular Production System (MPS) with Automation and Robotic Systems are also discussed.

REFERENCES

1. Mikell P. Groover, Automation, Production Systems, and Computer Intergrated Manufacturing, 3rd ed., Pearson Prentice Hall, 2008.
2. James A. Rehg, Introduction to Robotics in CIM Systems, 4th ed., Prentice Hall, 2000.
3. James A. Rehg, Glenn J. Sartori, *Programmable Logic Controllers*, Prentice Hall. NewJersey2007S.R.Deb, Robotics Technology and Flexible Automation, 2nd ed., Tata McGraw Hill,2010.
4. Frank D. Petruzella, Programmable Logic Controllers, 4th ed.,McGraw-Hill 2011.

EPT 384/3
ADVANCED MANUFACTURING TECHNOLOGY

COURSE SYNOPSIS

This course is an introduction to Advanced Manufacturing Technology (AMT). In general, AMT uses innovative technologies to improve products and/ or processes, and also the use of new business/management methodologies. In this course, four main elements in manufacturing including product design,

manufacturing technologies, handling system and manufacturing support group will be discussed with respect to the advanced technologies. Following are some of the technologies involved in the realization of AMT:

- Computer technologies (e.g., CAD, CAE, CAM, CIM)
- High Performance Computing for modeling, simulation and analysis
- High Performance Cutting
- High Precision Technologies
- Information Technologies
- Advanced robotics and other intelligent production systems
- Control systems to monitor processes
- Sustainable and green technologies
- New industrial platform technologies (e.g., composite materials)

REFERENCES

1. S.Kalpakjian, S.R.Schmid, Manufacturing Engineering and Technology. 7th ed., PEARSON, 2014.
2. Mikell P. Groover, Automation, Production Systems and Computer-Integrated Manufacturing, 3rd Edition, Prentice Hall, 2008.

EPT 385/3
METROLOGY AND QUALITY CONTROL

COURSE SYNOPSIS

This course gives an understanding about the concepts and techniques in dimensional metrology and quality control and the relationship between these fields of knowledge. Students will be exposed to dimensional metrology equipment such as the equipment used in linear measurement, angular measurement, surface measurement and coordinate measuring machine. In addition, students learn about quality control tools (7 old and new tools), sampling and reliability of engineering systems. Practical work will help students gain effective understanding.

REFERENCES

1. Dotson, C.L. Fundamentals of Dimensional Metrology. 5th Edition, Unites States, Thomson Delmar Learning, 2006.
2. Sower, V.E., Savoie, M.J., Renick, S., *An Introduction to Quality Management and Engineering*, Prentice Hall, 1999.
3. *Metrology & Measurement*, Bewoor, Tata Mcgraw-Hill, 2009
4. *Quality Control*, 8th Edition, Dale H. Besterfield, Pearson/Prentice Hall, 2008
5. *Process Quality Control: Troubleshooting And Interpretation Of Data*, 4th Edition, By Ellis Raymond Ott, Edward G. Schilling, Dean V. Neubauer, American Society For Qualit, 2005
6. Douglas C. Montgomery, *Introduction to Statistical Quality Control,* 5th ed., John Wiley & Sons, 2005.

EPT 371/2
FINITE ELEMENT ANALYSIS

COURSE SYNOPSIS

The finite element analysis (FEA) or finite element method (FEM) is a computational technique used to obtain approximate solutions of boundary value problems in engineering. A boundary value problem is a mathematical problem in which one or more dependent variables must satisfy a differential equation everywhere within a known domain of independent variables and satisfy specific conditions on the boundary of the domain. By taking this course, the students will learn the theoretical basis of the finite element analysis, its implementation principles, and the commercial software for solving finite element problems.

REFERENCES

1. David V. Hutton, 2004. Fundamentals of Finite Element Analysis. 1st Ed., McGraw-Hill, New York.
2. Chandrupatla, T.R. and Belegundu, A.D., 2003. Introduction to Finite Elements in Engineering. 3rd Ed., Prentice Hall International.
3. Zienkiewicz, O.C. and Taylor, R.L., 2005. The Finite Element Methods, 6th Ed., McGraw-Hill, New York.
4. Cook, R.D., Malkus D.S., Plesha, M.E., 2001. Concepts and Applications of Finite Element Analysis. 4th Ed., John Wiley & Sons, New York.
5. Buchanan, G.R., 1995. Theory and Problems of Finite Element Analysis. Schaum's Outline Series, McGraw-Hill, New York.
6. Huebner, K.H., Thornton, E.A., Byrom, T.G., 1995. The Finite Element Method for Engineers. 3rd Ed., John Wiley & Sons, New York.

EPT386/3
DESIGN FOR MANUFACTURE

COURSE SYNOPSIS

This course introduces a method that is used to determine the suitable manufacturing processes and raw materials for a product. It also introduces the DFA methodology that helps to produce products which are correct and cost-effective for a production process and assembly requirement, for both manual assembly and also for automatic assembly processes. There are a number of design guidelines and rules in this course that can be used to develop a suitable component design according to the manufacturing process required. Students will have a group project to analyze an existing product design and then will propose a better design so that the assembly efficiency can be improved and the manufacturing cost can be reduced.



REFERENCES

1. G. Boothroyd, P. Dewhurst, W. Knight, 'Product Design for Manufacture and Assembly', 2nd Edition, Marcel Dekker Inc., 2002.
2. G. Boothroyd, P. Dewhurst, W. Knight, 'Product Design for Manufacture and Assembly, (Manufacturing Engineering and Materials Processing)', Third Edition, CRC Press, 2010
3. James Bralla, 'Design for Manufacturability Handbook', Mc-Graw Hill, 1998
4. David M. Anderson, 'Design for Manufacturability & Concurrent Engineering; How to Design for Low Cost, Design in High Quality, Design for Lean Manufacture, and Design Quickly for Fast Production',CIM Press, 2004
5. R. Dixon, 'Engineering Design and Design for Manufacturing', Fieldstone Publishers, 1995.

EPT 393/3
ENGINEERING PRODUCT DESIGN II

COURSE SYNOPSIS

This course introduces a method that is used to determine the suitable manufacturing processes and raw materials for a product. It also introduces the DFA methodology that helps to produce products which are correct and cost-effective for a production process and assembly requirement, for both manual assembly and also for automatic assembly processes. There are a number of design guidelines and rules in this course that can be used to develop a suitable component design according to the manufacturing process required. Students will have a group project to analyze an existing product design and then will propose a better design so that the assembly efficiency can be improved and the manufacturing cost can be reduced.

REFERENCES

1. G.E. Dieter, 2000, Engineering Design, 3rd edition, McGraw Hill.
2. G. Boothroyd, P. Dewhurst, W. Knight, 'Product Design for Manufacture and Assembly', 2nd Edition, Marcel Dekker Inc., 2002.
3. J. R. Dixon, 'Engineering Design and Design for Manufacturing', Fieldstone Publishers, 1995.
4. R.J. Eggert, 2005, Engineering Design, Prentice Hall.
5. Karl T. Ulrich and Steven D. Eppinger, "Product Design and Development" McGraw-Hill, 2008.
6. Clive L. Dym and Patrick Little, "Engineering Design: A Project Based Introduction", John Wiley & Sons, 2008

EPT 394/3
PRODUCT ERGONOMICS AND SAFETY

COURSE SYNOPSIS

In this course, students learn about the fundamental and principles of ergonomics in designing a product. It includes the understanding of human capabilities, the application of anthropometric data in product design and basic assessment tools to analyze design problems. The course also exposes students to specific considerations, needs or requirements in the product design for special populations such as the elderly and the disabled. In addition, students learn about safety issues in product design and evaluate products' safety using hazard analysis and risk assessment methods. At the end of this course, students should be able to design a product using ergonomics principles and methods.

REFERENCES

1. Haslegrave, M. (2006) Bodyspace: Anthropometry, Ergonomics and the Design of Work. 3rd ed. London: Taylor and Francis.
2. The Eastman Kodak Company (2004) Kodak's ergonomic design for people at work. 2nd ed. Hoboken, NJ: John Wiley & Sons.
3. Kroemer, K. H. E, Kroemer, H. B., and Kroemer-Elbert, K. E. (2001) How to Design for Ease and Efficiency. 2nd ed. Prentice Hall, New Jersey.
4. Standon, N. (2005) Handbook of Human Factors and Ergonomics Methods. London: CRC Press.
5. Jordan, Patrick W. (2002) An Introduction to Usability. Taylor & Francis Ltd.
6. Vink, P. (2005) Comfort and Design: Principles and Good Practice. CRC Press, Florida.

EPT 395/3
Engineering Product Design III

COURSE SYNOPSIS

In this course, students will increase their skills and knowledge in designing new products. They will produce drawings using Geometric Dimensioning and Tolerance (GD&T) symbols which used in a real industrial environment. Through this course, students will perform analysis on the tolerance of 3D models before they produce a prototype for a new product. The course also focuses on the methods in designing quality products and analyses of processes through Design of Experiments (DoE). Students also learn to apply and integrate knowledge and understanding of engineering science disciplines to support engineering design activities. In designing activities, students will apply Failure Mode and Effect Analysis (FMEA) for systematically identifying potential failures in a system

or a process. Lastly, students will perform economic analysis in the new product development process.

REFERENCES

1. Reliability and Warranties, Marlin U. Thomas 2006
2. Engineering Design: A systematic Approach 1996
3. Product Design and Development. Ulrich &Eppinger, McGraw Hill, 4th Edition,2008.
4. Mechanical Tolerance Stackup and Analysis, Bryan R. Fischer, 2006.
5. Geometric Tolerancing Workbook.
6. Product Design: Techniques in Reverse Engineering and New Product Development, Kevin Otto & Kristin Wood,Prentice Hall, 2001.
7. Dimensioning and Tolerancing ASME Y14.5M-1994.
8. Product Design for Manufacture and Assembly, G. Boothroyd, P. Dewhurst, W. Knight,2nd Edition, Marcel Dekker Inc., 2002.

EPT 412/3
MECHANICAL SYSTEM DESIGN

COURSE SYNOPSIS

The aim of this course is to develop students' ability to design and build complex engineering systems with understanding and consideration of the systemic implication of design decisions and design challenges faced. By the end of this course, the student will be able to apply design theory and design methodology to design and build an engineering system comprises of a number of mechanical sub-systems. Mechanical systems covered during lectures are pressure vessel systems, vehicle design basics and motive power systems, complemented with theories on risk and reliability, and sustainable design. Thermal systems, pneumatic and hydraulic systems and power transmission systems are not covered in the syllabus as they are already included in EPT 315 (Power transmission systems), EPT383 (Automation and Robotics), and EPT335 (Thermal systems). These courses are required to be attended prior to this course or may be attended concurrently. The theory of the three systems may be needed to complete a design project, which involves designing any machines commonly used in manufacturing industry. Basic Vehicle Design is included as an added value for students, for vehicle design is an example of integration of several mechanical sub-systems to form a complex engineering system apart from machines used at production plant.

REFERENCES

1. Dym, Clive L. and Patrick Little, Engineering Design: A Project-Based Introduction. 2nd ed. Wiley, New York, 2004.
2. Somnath Chattopadhyay, Pressure vessels: Design and practice. 3rd ed. CRC, Boca raton, 2005.
3. Rao V. Dukkipati, Vehicle Dynamics. Narosa Publishing House, New Delhi, 2000.
4. David Crolla and Behrooz Mashadi, Vehicle Powertrain Systems: Integration and optimization. Iley, UK, 2012.

EPT 415/3
PRODUCT DESIGN INTEGRATED PROJECT

COURSE SYNOPSIS

The objective of the course is to introduce the student with the skills and knowledge in vibrations disciplines. The syllabus covers the fundamental of vibration and oscillation motion, free vibration, force vibration, transient vibration, two degree of freedom systems and multiple degree of freedom systems. The student will be well prepared towards industrial application elements such as vibration control, vibration measurement and signal analysis methods.

REFERENCES

1. Sinegiresu S. Rao (2000). Mechanical Vibration. Fourth Edition, Prentice Hall.
2. W. Thompson (2004). Theory of Vibration With Application. Prentice Hall.
3. W.J. Palm III (2005). Mechanical Vibration, John Wiley & Sons.
4. J.H.Ginsberg (2001) Mechanical and Structural Vibration: Theory and Application, John Wiley.
5. D.J.Inman (2001) Engineering Vibration, Prentice-Hall.

EPT 427/3
PNEUMATIC AND HYDRAULIC SYSTEMS DESIGN

COURSE SYNOPSIS

This course exposes students about the fundamental of theory and concept to pneumatic & hydraulic systems that are being practiced in modern industry. This course focuses on introduction of symbols, components, and circuits used in pneumatic & hydraulic systems as well as its application in industry. To increase knowledge of students in this course, a practical approach using pneumatic and hydraulic equipment is aided by computer software to construct the related circuits. At the end of this course, the pneumatic system application is combined with electro-pneumatic system which uses electric power, relay, sensor and limit switch to control the pneumatic components.



REFERENCES

1. Anthony Esposito, Fluid Power with Application, Seventh Edition, Pearson International Edition, 2009.
2. Igor L. Krivts, German V. Krejnin, Pneumatics Actuating Systems for Automatic Equipment, Structure and Design, Taylor & Francis, 2006.
3. Khairur Rijal Jamaludin, Reka Bentuk Sistem Kuasa Bendalir, Universiti Teknologi Malaysia., 2004
4. John S. Cundiff, Fluid Power Circuits and Controls, Fundamentals and Applications., CRC Press. 2002.
5. James L. Johnson, Introduction to Fluid Power, Delmar, 2002.

EPT 448/3
PRODUCT DESIGN INTEGRATED PROJECT

COURSE SYNOPSIS

Product Design Integrated Project is a culminating course in measuring several Program Outcomes that every student should obtain. This project emphasizes all the knowledge ranging from concept till application in producing a product prototype. Strong fundamentals in Product Development, Concept & Mechanisms, Control & Systems as well as the Project Management understanding are among the essentials need in making this project successful. Students will be group into 3-5 and they will be working together in satisfying several elements outlined to them every week. At the beginning of every week, there will be an hour summarized lecture on what they have gone through in Product Design related courses in previous semesters. Following to that session, students are required to evaluate and create their products to suit the required criteria. They will have 6 hours per week for the project. At the end of the semester, all groups are expected to be ready with a product prototype.

REFERENCES

1. Product Design and Development. Ulrich & Eppinger, McGraw Hill, 4th Edition,2008.
2. G. Boothroyd, P. Dewhurst, W. Knight, 'Product Design for Manufacture and Assembly', 2nd Edition, Marcel Dekker Inc., 2002.
3. J. R. Dixon, 'Engineering Design and Design for Manufacturing', Fieldstone Publishers, 1995.
4. Kroemer, K. H. E, Kroemer, H. B., and Kroemer-Elbert, K. E. (2001) How to Design for Ease and Efficiency. 2nd ed. Prentice Hall, New Jersey.
5. P.Trott, 2002, Innovation Management and New Product Development, 2nd edition, Prentice Hall.

EPT 463/3
AUTOMATIC CONTROL

COURSE SYNOPSIS

In this course, student will be exposed to the mathematical modeling for electrical and mechanical system using block diagram and transfer functions. In addition, they will be able to determine and analyze the characteristic, stability and performance of feedback control system in time and frequency domain. The students will also learn how to design a feedback control system.

REFERENCES

1. Ogata K. (2010). Modern Control Engineering. 5th ed. Prentice Hall.
2. Norman S. Nise. (2011). Control System Engineering. 6th ed. John Wiley & Sons
3. Kuo B. C. (2010). Automatic Control System. 9th ed. John Wiley & Sons.
4. Richard C. Dorf, Robert H. Bishop (2011), Modern Control Systems, 12th ed. Prentice Hall.
5. Franklin G. F., Powell J. D. and Emani-Naeni A. (2009). Feedback Control of Dynamic Systems System. 9th ed. Prentice Hall.
6. U. A. Bakshi, S.C. Goyal, Feedback Control System, 2nd Revised ed. Technical Publication Pune.
7. Charles L. Phillips, Royce D. Harbor, Feedback Control System, 4th ed. Prentice Hall

EPT 481/3
TOOLS AND DIE DESIGN

COURSE SYNOPSIS

Tool and die are used by machines to produce products. The objective of this course is to enhance the knowledge of Engineering students on design requirements and principles for the development of tools and dies. Important analyses which are required to produce tools and dies that can function effectively are explained. Students will also learn the components of the tools and dies and the critical parameters which are required based on the parts or products drawing.

REFERENCES

1. Herman W. Pollack, Tool Design, 2nd Ed. Prentice Hall, 1998.
2. Edward G. Hoffman, Jig and Fixture Design, 5th Ed., Delmar Publishers, 2004.
3. David S. (Chief Technical Reviewer), Fundamentals of Tools and Design, 5th Ed. SME, 2003..
4. Die Design Fundamentals, SME, 1995.
5. Ivana Suchy, Handbook of Die Design. 2nd Edition, McGraw-Hill.

EPT 484/2
LEAN MANUFACTURING

COURSE SYNOPSIS

This course provides the student with lean production describing the background behind its development and how evaluations and assessments of production systems are performed. The course will focuses on gaining an understanding of Lean practices from both a technical standpoint and the people perspective needed to effect the change and sustain the improvement. Examples of applications in manufacturing processes will be presented. At the end of the semester, the students should have a basic understanding of the design, operation, and control of lean manufacturing systems and be able to use quantitative methods to model, analyze, and optimize such systems.

REFERENCES

1. Andy, B., FT Guide to Lean: How to Streamline Your Organization, Engage Employees and Great A Competitive Edge, Pearson Education, 2013.
2. Nicholas,J., Lean Production for Competitive Advantage, CRS Press, 2011.
3. Bohdan W. Oppenheim, Lean For Systems Engineering, John Wiley & Sons, 2011.
4. Ennis, P., Lean Production Simplified, Productivity Press, 2002.
5. William M. Feld, Lean Manufacturing: Tools, Techniques and How To Use Them, The St. Luice Press, 2000.

EPT 485/2
PRODUCTION PLANNING AND CONTROL

COURSE SYNOPSIS

This course provides the students with knowledge of production and operations management. It is designed to highlight the practical and applied techniques, which can improve the organization's quality and productivity. The designing, planning, organizing, operating, and controlling of operating systems is the focus of this course including analytical techniques, tools and concepts applicable to managing operations. Such concepts include Introduction to Production Management, Aggregate Planning and Forecasting, Capacity Planning, Push and Pull Control System, Inventory management, Operations Scheduling and Supply Chain Management. On completion of the course, students will be able to understand the strategic role of operations management and apply analytical skills and problem-solving tools to the analysis of the operations problems.

REFERENCES

1. Heizer J. & Render, B., Operations Management, 11th Ed., Pearson Education, 2013.
2. William J. Stevenson, Operations Management, 11th Ed., McGraw-Hill, 2012.
3. Krajewski,L.J. , Ritzman, L.P., & Malhotra M. K., Operation Management: Process and Supply Chain, 10th Ed., Pearson Education, 2013.
4. Greasley A., Operation Management, 3rd Ed., John Wiley & Son, 2013.
5. Nahmias, S., Production and Operation Analysis, 6th Ed., McGraw-Hill, 2009.

EPT 495/2
OPERATIONAL RESEARCH

COURSE SYNOPSIS

Operations research (OR) has many applications in science, engineering, economics and industry. OR helps in solving problems in different environments that needs decisions. This course will focus on mathematical modeling, where the students will be teach to formulate, analyze and solve mathematical models that represent real-world problems. In particular, this course will cover mathematical programming techniques such as linear programming (graphical solution, simplex method, duality theory and sensitivity analysis), network optimization (transportation and assignment problems, shortest path, minimum spanning tree problem), and integer programming. At the end of this course, students will have the skills to expand existing or build their own formulations to critically evaluate the impact of model assumptions and choose an appropriate solution technique for a given formulation.

REFERENCES

1. F.S. Hillier and Lieberman, G.J, Introduction To Operation Research, 9th Ed. Mc Graw Hill, 2010.
2. H.A. Taha, Operations Research: An Introduction, 9th Ed., Pearson Education, 2013.
3. H. A. Eiselt and Carl-Louis Sandblom. Operation Research:A Model Based Approach,1st Edition. Springer, 2010.
4. David J. Rader, Deterministic Operations Research: Models and Methods in Linear Optimization, Wiley 2010.
5. Wayne L. Winston., Operations Research: Applications and Algorithms, 4th Edition. Duxbury Press 2003.



CAREER OPPORTUNITIES

- Process Engineer
- Quality Engineer
- Industry Safety Engineer
- Maintenance Engineer
- Production Design Engineer
- Process Design Engineer
- Research & Development Engineer (R&D)
- Academician
- Consultancy

SCHOOL OF MATERIALS ENGINEERING

PROGRAMMES OFFERED

- Bachelor of Engineering (Honours) (Materials Engineering)
- Bachelor of Engineering (Honours) (Metallurgical Engineering)
- Bachelor of Engineering (Honours) (Polymer Engineering)
- Master of Science (Materials Engineering)
- Master of Science (Polymer Engineering)
- Master of Science Mixed Mode (Polymer Engineering)
- Doctor of Philosophy

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INTRODUCTION

Materials Engineering, Metallurgical Engineering and Polymer Engineering are related to the structure and properties of materials that have engineering applications. Materials Engineer, Metallurgical Engineer and Polymer Engineer are responsible for designing, producing, inspecting and testing of engineering materials such as metal and its alloys, semiconductors, superconductors, ceramics, polymers, plastics and composites. All three programmes emphasize learning and practical courses in all courses offered.

In accordance with the global demands of developing technologies and emerging inventions and innovations, a high need for professionals in Materials Engineering, Metallurgical Engineering and Polymer Engineering is required in various industries that operating on the advancement of research and development, manufacturing technology and production. Thus, these programs aim to produce human resources professional that are proficient and have strong knowledge in the field of Materials Engineering, Metallurgical Engineering and Polymer Engineering.

SCHOOL OF MATERIALS ENGINEERING VISION & MISSION

VISION

A world-class academic and research centre in the field of materials science and engineering

MISSION

To realise the country's aspirations and contribute towards global civilization in the field of materials science and engineering

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BACHELOR OF ENGINEERING (HONOURS) (MATERIALS ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of materials engineering or chosen field as demonstrated through career advancement.

PEO2:
Graduates who are members and contribute to professional society.

PEO3:
Graduates who engage in lifelong learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in materials engineering discipline to the solution of complex engineering problem

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (MATERIALS ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (101)	EBT151/3 Engineering Drawing	EBT109/3 Quality Control Engineering	EBT207/4 Materials Structure & Properties	EBT254/3 Transportation Phenomenon in Materials Processing	EBT317/3 Fluid Mechanics	EBT303/3 Process Control	EIT302/4 Industrial Training & Engineering Innovation	EBT405/3 Non Destructive Testing	#EBT421/3 Advanced Material Engineering OR #EBT439/3 Advanced Electronic Packaging
	EBT114/3 Electrical Technology	EBT112/3 Statics	EBT251/3 Engineering Materials Chemistry	EBT211/4 Physical Metallurgy	EBT323/4 Materials Characterization	EBT318/3 Surface Engineering		EBT402/3 Corrosion Engineering	
	EKT150/3 Computer Programming	ECT112/3 Engineering Skills	EBT252/4 Strength of Materials	EBT225/4 Fundamentals of Ceramics	EBT326/4 Polymer Properties	EBT329/3 Polymer Processing		#EBT429/3 Composite Materials OR #EBT424/3 Construction Materials	
			EBT212/3 Dynamics	EBT253/3 Analytical Chemistry	EBT351/3 Electronic Materials Engineering	EBT324/3 Materials Thermodynamics		EBT427/3 Technical Ceramic	
								EBT445/2 Final Year Project 1	EBT446/4 Final Year Project 2
								^ EBT447/4 Materials Selection & Design	^ EBT447/4 Materials Selection & Design
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Statistic For Engineer		EUT444/3 Management for Engineer		EUT442/2 Professional Engineer	
	UUT122/2 Skills & Technology in Communication								
120	14	12	17	17	14	15		16	11
University Required (17)		* UVA111/2 Foundation English II	** UVW211/2 English for General Purposes		UVW312/2 English for Technical Communication				
		UUW235/2 Ethnic Relations or ***UUW239/2 Malaysian Studies			UUW224/2 Engineering Entrepreneurship	UUW233/2 TITAS or *** UUW237/2 Malaysian Cultures			
	UUWXXX/2 or UVWXXX/2 Option Subject	UVW410/2 University Malay Language or *** UVW110/2 Basic Malay Language				UUW322/2 Thinking Skill			
	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum		UZWXXX/1 Co-Curriculum					
17	3	5	2	1	4	4	-	-	-
137	17	17	19	18	18	19	4	16	11
Total Units for Graduation 137									

^ Course begins in the first semester but total credits are given upon completion of the second semester. # Elective Subject. * Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW211 English for General Purposes. ** Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW312 English for Technical Communication. *** For international students only.

BACHELOR OF ENGINEERING (HONOURS) (METALLURGICAL ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of metallurgical engineering or chosen field as demonstrated through career advancement.

PEO2:
Graduates who are members and contribute to professional society.

PEO3:
Graduates who engage in life-long learning or continuous education opportunities.

PEO4:
Graduates who contribute towards research and development.

PEO5:
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in metallurgical engineering discipline to the solution of complex engineering problem

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6:
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7:
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development

PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (METALLURGICAL ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (101)	EBT151/3 Engineering Drawing	EBT109/3 Quality Control	EBT207/4 Materials Structure & Properties	EBT211/4 Physical Metallurgy	EBT311/4 Mechanical Metallurgy	EBT303/3 Process Control	EIT302/4 Industrial Training & Engineering Innovation	#*EBT405/3 Non Destructive Testing* OR #*EBT418/3 Welding Metallurgy*	EBT419/3 Applied Metallurgy
	EBT114/3 Electrical Technology	ECT112/3 Engineering Skills	EBT251/3 Engineering Materials Chemistry	EBT213/4 Extractive Metallurgy I	EBT317/3 Fluid Mechanics	EBT314/3 Metallurgical Thermodynamics		EBT402/3 Corrosion Engineering	EBT420/3 Metallurgical Forensic Analysis
	EKT150/3 Computer Programming	EBT112/3 Statics	EBT252/4 Strength of Materials	EBT253/3 Analytical Chemistry	EBT313/4 Metallurgical Characterization	EBT318/3 Surface Engineering		#*EBT411/3 Engineering Alloys* OR #*EBT414/3 Electronic Metallurgy*	
			EBT212/3 Dynamics	EBT254/3 Transportation Phenomenon in Materials Processing	EBT351/3 Electronic Materials Engineering	EBT319/3 Extractive Metallurgy II		EBT443/4 Metallurgical Design	
								EBT445/2 Final Year Project 1	EBT446/4 Final Year Project 2
Non Engineering Core (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Statistic For Engineer		EUT444/3 Management for Engineer		EUT 442/2 Professional Engineer	
	UUT122/2 Skills & Technology in Communication								
120	14	12	17	17	14	15		17	10
University Required (17)		UVA111/2 * Foundation English	UVW211/2 ** English for General Purpose		UVW312/2 English for Technical Communication				
		UVW410/2 University Malay Language or ***UVW110/2 Basic Malay Language			UUW224/2 Engineering Entrepreneurship	UUW322/2 Thinking Skill			
	UUWXXX/2 or UVWXXX/2 Option Subject	UUW235/2 Ethnic Relations or ***UUW239/2 Malaysian Studies				UUW233/2 TITAS or ***UUW237/2 Malaysian Cultures			
	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum		UZWXXX/1 Co-Curriculum					
17	3	5	2	1	4	4	4	-	-
137	17	17	19	18	18	19		17	10
Total Units for Graduation 137									

Elective Subject. *Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW312 English for Technical Communication.
***For international students only.

BACHELOR OF ENGINEERING (HONOURS) (POLYMER ENGINEERING)

PROGRAMME OBJECTIVES (PEO)

PEO1:
Graduates who are leaders in the field of polymer engineering or chosen field as demonstrated through career advancement

PEO2:
Graduates who are members and contribute to professional society

PEO3:
Graduates who engage in lifelong learning or continuous education opportunities

PEO4:
Graduates who contribute towards research and development

PEO5:
Graduates who are entrepreneurial engineers

PROGRAMME OUTCOMES (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in Materials Engineering and Polymer discipline to the solution of complex engineering problem

PO2:
Ability to identify, formulate and solve complex engineering problems.

PO3:
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs

PO4:
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5:
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PO6:
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PO7:
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PO8:
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11:
A recognition of the need for, and an ability to engage in life-long learning.

PO12:
Demonstrate understanding of project management and finance principles.



CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (POLYMER ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (101)	EBT105/4 Organic Chemistry	ECT112/3 Engineering Skills	EBT 238/3 Physical Chemistry	EBT109/3 Engineering Quality Control	EBT317/3 Fluid Mechanics	EBT303/3 Process Control	EIT302/4 Industrial Training & Engineering Innovation	EBT435/3 Polymer in Electronic Application	#EBT448/3 Polymer Adhesive & Coating or #EBT449/3 Environmental Friendly Polymer
	EBT114/3 Electrical Technology	EBT 131/3 Engineering Mechanics	EBT 240/3 Plastic Materials	EBT232/4 Polymer Synthesis	EBT334/3 Polymer Testing & Characterization	EBT 335/4 Polymer Blends		EBT437/3 Polymer Composites	
	EKT150/3 Computer Programming	EBT 110/3 Introduction to Polymer	EBT231/4 Elastomeric Materials	EBT 235/4 Structure & Polymer Properties	EBT 333/4 Rubber Processing	EBT337/4 Mass & Heat Transfer in Polymer		EBT441/3 Polymer Engineering Design	EBT 442/3 Polymer Engineering Integrated Design Project
		EBT151/3 Engineering Drawing		EBT239/4 Thermodynamic in Polymer	EBT336/4 Plastic Processing	EBT338/4 Latex Processing		EBT445/2 Final Year Project 1	EBT446/4 Final Year Project 2
Non Engineering Core (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics		EUT444/3 Engineering for Management			EUT442/2 Professional Engineer
	UUT122/2 Skills & Technology in Communication								
120	15	15	13	18	14	18		11	12
University Required (17)		*UVA111/2 Foundation English	**UVW112/2 English for General Purposes		UVW312/2 English for Technical Communication			UUW233/2 TITAS or ***UUW237/2 Malaysian Cultures	
	UUWXXX/2 or UVWXXX/2 Option Subject	UVW410/2 University Malay Language or ***UVW110/2 Basic Malay Language	UUW235/2 Ethnic Relations or ***UUW239/2 Malaysian Studies		UUW322/2 Thinking Skill			UUW224/2 Engineering Entrepreneurship	
	UZWXXX/1 Co-Curriculum	UZWXXX/1 Co-Curriculum			UZWXXX/1 Co-Curriculum				
17	3	3	4	-	5	-	-	4	
137	18	18	17	18	19	18	4	15	12
Total Units for Graduation 137									

Elective Subject. *Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW312 English for Technical Communication.
***For international students only.

LIST OF COURSES

- EBT 105/4 ORGANIC CHEMISTRY
- EBT 109/3 ENGINEERING QUALITY CONTROL
- EBT 110/3 INTRODUCTION TO POLYMER
- EBT 112/3 STATICS
- EBT 114/3 ELECTRICAL TECHNOLOGY
- EBT 131/3 ENGINEERING MECHANICS
- EBT 151/3 ENGINEERING DRAWING
- EBT 207/4 MATERIALS STRUCTURE & PROPERTIES
- EBT 211/4 PHYSICAL METALLURGY
- EBT 212/3 DYNAMICS
- EBT 213/4 EXTRACTIVE METALLURGY I
- EBT 225/4 FUNDAMENTALS OF CERAMICS
- EBT 231/4 ELASTOMERIC MATERIALS
- EBT 232/4 POLYMER SYNTHESIS
- EBT 235/4 STRUCTURE AND POLYMER PROPERTIES
- EBT 238/3 PHYSICAL CHEMISTRY
- EBT 239/4 THERMODYNAMICS IN POLYMER
- EBT 240/3 PLASTIC MATERIALS
- EBT 251/3 ENGINEERING MATERIALS CHEMISTRY
- EBT 252/4 STRENGTH OF MATERIALS
- EBT 253/3 ANALYTICAL CHEMISTRY
- EBT 254/3 TRANSPORTATION PHENOMENON IN MATERIALS PROCESSING
- EBT 303/3 PROCESS CONTROL
- EBT 311/4 MECHANICAL METALLURGY
- EBT 313/4 METALLURGICAL CHARACTERIZATION
- EBT 314/3 METALLURGICAL THERMODYNAMICS
- EBT 317/3 FLUID MECHANICS
- EBT 318/3 SURFACE ENGINEERING
- EBT 319/3 EXTRACTIVE METALLURGY II
- EBT 323/4 MATERIALS CHARACTERIZATION
- EBT 324/3 MATERIALS THERMODYNAMICS
- EBT 326/4 POLYMER PROPERTIES
- EBT 329/3 POLYMER PROCESSING
- EBT 333/4 RUBBER PROCESSING
- EBT 334/3 POLYMER TESTING AND CHARACTERIZATION
- EBT 335/4 POLYMER BLENDS
- EBT 336/4 PLASTIC PROCESSING
- EBT 337/4 MASS AND HEAT TRANSFER IN POLYMER
- EBT 338/4 LATEX PROCESSING
- EBT 351/3 ELECTRONIC MATERIALS ENGINEERING
- EBT 402/3 CORROSION ENGINEERING
- EBT 405/3 NON DESTRUCTIVE TESTING
- EBT 411/3 ENGINEERING ALLOYS
- EBT 414/3 ELECTRONIC METALLURGY
- EBT 418/3 WELDING METALLURGY
- EBT 419/3 APPLIED METALLURGY
- EBT 420/3 METALLURGICAL FORENSIC ANALYSIS
- EBT 421/3 ADVANCED MATERIALS ENGINEERING
- EBT 424/3 CONSTRUCTION MATERIALS
- EBT 427/3 TECHNICAL CERAMIC
- EBT 429/3 COMPOSITE MATERIALS
- EBT 435/3 POLYMER IN ELECTRONIC APPLICATION
- EBT 437/3 POLYMER COMPOSITES
- EBT 439/3 ADVANCED ELECTRONIC PACKAGING
- EBT 441/3 POLYMER ENGINEERING DESIGN
- EBT 442/3 POLYMER ENGINEERING INTEGRATED DESIGN PROJECT
- EBT 443/4 METALLURGICAL DESIGN
- EBT 445/2 & EBT 446/4 FINAL YEAR PROJECT I
- EBT 447/4 MATERIALS SELECTION AND DESIGN
- EBT 448/3 POLYMER ADHESIVE AND COATING
- EBT 449/3 ENVIRONMENTAL FRIENDLY POLYMER



COURSE SYLLABUS

EBT 105/4
ORGANIC CHEMISTRY

COURSE SYNOPSIS

This course is developed to introduce the basic concepts of organic chemistry, chemical structures and reactions, to familiar with mechanism concepts of reactions and to understand the theoretical and conceptual background of organic chemistry.

COURSE OUTCOMES

1. Ability to identify chemistry fundamentals.
2. Ability to explain and distinguish selected organic compounds both: aliphatic and aromatic organic compounds.
3. Ability to discuss and analyze concepts and principles on mechanism of major organic reactions.
4. Ability to analyze important organic phenomena related to polymer structure and properties.

REFERENCE BOOKS

1. Solomons, T.W.G, Craig B.F. (2011). Organic Chemistry, International Student Version, Tenth Edition, John Wiley & Sons, Inc.
2. Paula, Y. B., (2004). Organic Chemistry. 4th ed., Person Education International
3. John Mc Murry., (2004). 'Organic Chemistry', 6th ed., Thomson Learning, Inc., 2004.
4. Janice Gorzynski Smith,(2006). Organic Chemistry, Second Edition, McGraw. Hill International Edition
5. Harol Hart (1991). Organic Chemistry: A short Course Eight Edition, Houghton Mifflin Company, Boston

EBT 109/3
ENGINEERING QUALITY CONTROL

COURSE SYNOPSIS

Introduction to quality: Definitions of quality, History of quality, Overview of quality concepts. Total Quality Management – Principles and Practices, Quality management systems - ISO 9000, GMP, Basic Quality tools, Cost of Quality, Fundamental of statistics, Fundamentals of Probability, Reliability, Control chart for variables, Control charts for attributed, Capability analysis, Lot by lot acceptance sampling by attributes, Acceptance sampling system.

COURSE OUTCOMES

1. Ability to differentiate the essentials of the quality management philosophy and theories of experts including Deming and Juran. Ability to develop and implement TQM in work place as well as can contribute in developing ISO 9000 Systems.
2. Ability to apply statistical process control techniques to monitor industrial process variation as well as interpret the chart to identify potential corrective plan.
3. Ability to apply acceptance sampling plan curves, calculate component failure rate and reliability of the system.
4. Design appropriate quality control system, such as TQM, management and planning tools, control chart, acceptance sampling system.

REFERENCE BOOKS

1. Douglas C. Montgomery. (2008). Introduction to Statistical Quality Control. 6th Edition Wiley.
2. Dale H. Besterfield. (2004). Quality Control, 7th edition, Prentice Hall.
3. Juran J.M. and Gryna F.M. (1988). Juran's Quality Control Handbook. 4th Ed. Singapore: McGraw-Hill.
4. Ishikawa K. (1986). Guide to Quality Control. 2nd Ed. Tokyo: Asian Productivity Organization.
5. Shewhart W.A. (2011). Statistical Method from the Viewpoint of Quality Control. New York: Dover Publications.

EBT 110/3
INTRODUCTION TO POLYMER

COURSE SYNOPSIS

The aim of this course is to introduce the basic knowledge of polymer classification, identification, properties and applications in polymer engineering.

COURSE OUTCOMES

1. Ability to describe and differentiate the importance of polymers and classification.
2. Ability to describe and compare the basic principles of polymerization reaction and polymer identification.
3. Ability to analyze the basic concept of properties polymers (stress strain) related to engineering materials.
4. Ability to categorize a wide range of polymer applications and understand polymer in its environmental impact.

REFERENCE BOOKS

1. Sperling, Leslie H., (2006). Introduction to Physical Polymer Science. 4th Edition. New Jersey: Wiley-Interscience
2. Fried, Joel R., (2014). Polymer Science and Technology. 3rd Edition. Upper saddle River: Prentice Hall
3. Stuart, Barbara H., (2002). Polymer Analysis. England: John Wiley & Sons, Ltd

4. Coleman, Michael M. & Painter, Paul C., (1998). Fundamental of Polymer Science: An Introductory Text. 2nd Edition. Lancaster: CRC Press

EBT 112/3
STATICS

COURSE SYNOPSIS

This course involves the introduction to mechanics, force vector, equilibrium of particle, force system resultants, equilibrium of rigid body, structural analysis, friction, centroids and center of gravity.

COURSE OUTCOMES

1. Ability to analyze and apply the basic concept of forces and moments
2. Abality to analyze and apply principles of equilibrium in particles and rigid bodies
3. Ability to analyze and solve the structures and framework problems
4. Ability to determine the properties of areas
5. Ability to determine and analyses of the mechanical friction

REFERENCE BOOKS

1. Meriam, J. L. & Kraige, L. G. (2013). Engineering Mechanics, Statics seventh Edition. John Wiley & Sons, Inc.
2. Bedford, A.M. & Fowler, W. (2007). Engineering Mechanics: Statics & Dynamics, 5th Edition. Prentice Hall.
3. Riley, W, Sturges, L. & Morris, D. (2007). Mechanics of Materials. John Wiley & Sons, Inc.
4. Ferdinand P. B, Johnson Jr., E. R. & William E. C. (2004). Vector Mechanics for Engineers Statics Seventh Edition. Mc-Graw Hill.

EBT 114/3
ELECTRICAL TECHNOLOGY

COURSE SYNOPSIS

This course is intended to provide students with knowledge and ability to apply, analyze as well as to evaluate basic electrical technology for materials such as basic DC and AC circuits, i.e. Ohm's law, Kirchhoff's current and voltage law and basic principles of 3-phase AC circuits, basic electromagnetism and magnetic circuits i.e. Faraday's law, Lenz's law, LC circuits and transformer, and basic electric machines i.e. dc machines and induction motors.

COURSE OUTCOMES

1. Ability to analyze the DC and AC circuits by using Ohm's law, Kirchhoff's current law, Kirchhoff's voltage law and Thevenin's theorem.
2. Ability to calculate and evaluate properties of magnetic materials such as magnetic field, magnetic induction, eddy current etc. Using basic electromagnetic principles.
3. Ability to evaluate and design dc and ac machines such as transformer, induction motors etc using properties of suitable magnetic materials.

REFERENCE BOOKS

1. Boylestad, Robert L. (2007). Introductory Circuit Analysis. 11th Edition. Prentice Hall.
2. Hughes. (2005). Electrical and Electronic Technology. 9th Edition. Prentice Hall.
3. Richard J. Fowler. (2008). Electricity Principles and Applications. 7th Edition. Mc Graw Hill.
4. Charles K. Alexander & Matthew N.O.Sadiku. Fundamentals of Electric Circuits. International Third Editions, McGraw-Hill.
5. Nilsson, J.W. & Riedel. (2005). S.A., Electric Circuits. 7th Edition. Pearson Prentice Hall.

EBT 131/3
ENGINEERING MECHANICS

COURSE SYNOPSIS

The main objective of this course is to expose students about basic concepts of force and resultant force. They will also learn about friction and distributed forces. Students will apply this basic knowledge to analyze the stability and equilibrium of structures such as truss and machines. In terms of dynamics, the students will learn how to solve kinematics problems for particles and rigid bodies. They will also learn solutions for kinetics problems, which can be considered by using forces acceleration and principle of work and energy.

COURSE OUTCOMES

1. Ability to describe and calculate basic concepts and principles of physics related to engineering mechanics in terms of statics, such as force, First Law of Motion, Third Law of Motion, truss, frame, machine and friction.
2. Ability to evaluate and solving static problems through further analysis by applying concepts and principles in describing, sketching and/or drawing free body diagram.
3. Ability to describe and calculate basic concepts and principles of physics related to engineering mechanics in terms of dynamics, such as kinematic, kinetic, Second Law of Motion, position, velocity, acceleration, work, energy and impulse.
4. Ability to evaluate and solving dynamic problems through further analysis by applying concepts and principles in describing, sketching and/or drawing free body diagram.



REFERENCE BOOKS

1. Hibbeler, R.C.,(2010). Engineering Mechanics: Statics. 12th ed., Singapore, Prentice Hall.
2. Hibbeler, R.C., (2010). Engineering Mechanics: Dynamics. 12th ed., Singapore, Prentice Hall.
3. Meriam, J.L. & Kragie, L.G., (2008). Engineering Mechanics: Statics. 6th ed. USA, SI ver. Wiley.
4. Meriam, J.L. & Kragie, L.G., (2008). Engineering Mechanics: Dynamics. 5th ed. USA, SI ver. Wiley.
5. Riley, W.F. and Sturges, L.D. (1996). Engineering Mechanics: Dynamic. 2nd ed, USA, Wiley.

EBT 151/3
ENGINEERING DRAWING

COURSE SYNOPSIS

This course will introduce student to Engineering Drawing including; Basic Drafting Skills - Lines and Lettering, Circles and Arcs, Basic Dimensioning, Dimensioning Circular and Common Features, Dimensioning Methods, Limits and Tolerances. Geometry - Beginning Geometry: Straight Lines, Polygons, Ellipse, Helix and Parabola, Geometric Symbols. Orthographic - Orthographic Representation, Methods of Representation, Orthographic Projection – First angle projection, Orthographic Projection – Third angle projection, Reference Arrows Layout, Identifying Symbols, Hidden Surface and Edges, Inclined Surface, Circular Features, Oblique Surface. Pictorial Drawing - Isometric Drawing, Nonisometric Drawing, Dimensioning isometric Drawing. Auxiliary - Primary Auxiliary View, Secondary Auxiliary View. Sections - Sectional Views, Cutting-Plane Lines, Full Sections, Section Lining, Half Sectioning. Computer-Aided Drawing (CAD) - AutoCAD, IronCAD, CAD Mould, Plotting/Printing

COURSE OUTCOMES

1. Able to examine and explain the basic of engineering drawings and CAD software
2. Able to distinguish common terms used in drawing and design
3. Able to interpret the elements of engineering drawings
4. Able to design the required engineering drawing based on industrial needs

REFERENCE BOOKS

1. Cecil Jensen, Jay D. Helsesl and Dennis R. Short, (2008). *Engineering Drawing & Design*. 7th Edition. New York: McGraw-Hill.
2. Shah, M. B., (2005). *Engineering drawing*. New Delhi: Pearson Education.
3. Boundy, A. W., Albert William, (2002). *Engineering drawing*. Boston: McGraw-Hill.
4. Madsen D.A. (2006). Engineering Drawing and Design. 4th Ed. Stamford: Cengage Learning
5. Marelli R. and McCuistion P. (2001). Geometric Tolerancing: A Text-Workbook. 6th Ed. Singapore: McGraw Hill.

EBT 207/4
MATERIALS STRUCTURE & PROPERTIES

COURSE SYNOPSIS

This course will introduce student to historical perspective, materials science and engineering, materials classification. The contents include fundamental concept of **atomic structure** and their bonding; the classification of **crystalline and non crystalline** materials and their applications; comprehensive guide for identification of **imperfection** in solids such as point defects in metals, ceramic, impurities in solids, defects in polymer, dislocations (linear defects), interfacial defects, bulk or volume defect, atomic vibrations; introduction to diffusion. Mechanical properties of materials involves **stress-strain behavior**, non elastic and elastic properties of materials, compression property, shear, fatigue, creep, and flexural strength, hardness of materials, **electrical** properties - Ohm's law, electrical conductivity, electronic and ionic conduction, electrical properties using Ohm's Law, energy band structure, conduction in terms of band and atomic bonding models, electron motion, semiconductivity, electrical conduction in materials, **thermal** properties - heat capacity, thermal expansion, thermal conductivity, thermal stresses, **magnetic** properties - diamagnetism, paramagnetisme, ferromagnetisme, antiferromagnetisme, temperature effect on the magnetic behaviour, domain and hysteresis, hard and soft magnets, superconductor and **optical** properties - electromagnetic ray, solid and light interaction, atomic and electronic interaction, optical properties of metals and non metals, refraction, reflection, absorption, transmission, applications of optical phenomena - laser, fibre optic in communication.

COURSE OUTCOMES

1. Able to identify and differentiate the type of atomic bonding and materials structure
2. Able identify various type of defect and compare basic concepts of diffusion in materials
3. Able to assess and evaluate the physical and mechanical properties of various type of materials

4. Able to correlate physical and mechanical properties and predict the factor that affecting these two properties of materials

REFERENCE BOOKS

1. William D. Callister and David G. Rethwisch (2013). Materials Science and Engineering: An Introduction. 9th Ed. New York: John Wiley.
2. Smith, W.F., (1995). Principles of Materials Science and Engineerings. (Mcgraw Hill Series in Materials Science and Engineering)
3. 2nd Ed. Singapore: McGraw Hill.
4. Donald R. Askeland & Pradeep P. Phule, (2003). The Science and ngineering of Materials. 4th Ed. Thomson Brooks/Cole.
5. Brick R.M. et al. (1977). Structure and Properties of Engineering Materials. Singapore: McGraw-Hill.
6. Hayden H.W. et al. (1965). The Structure and Properties of Materials, Volume 3: Mechanical Behavior. New York: John Wiley & Sons.

EBT 211/4
PHYSICAL METALLURGY

COURSE SYNOPSIS

This course will introduce student to differentiate between process or extractive metallurgy and physical metallurgy. General characteristic of metals, physical and mechanical properties of metals, atomic structure and bonding of metals. Phase transformation concepts in metals. Phase stability, categories of phase transformation, and kinetics of phase transformation. **Solidification Process** - Process of solidification and two energy involved in solidification process, distinguish between equiaxed and columnar grains. **Imperfections in Solid** - Imperfection in solid metals and deformation mechanism for metals (edge and screw dislocation, plastic and elastic deformation). Slip: concept of slip, dislocations, twins, and their role in plastic deformation of single crystal. Critical slip system in FCC, BCC and HCP single crystal. Resolved shear stress by using Schmid Law.

Brief Introduction to Phase Diagram - Binary isomorphous system and binary eutectic system, phase diagram with intermediate phase or compound. Iron- iron carbide phase diagram, microstructure development in Fe-C alloy. Basic concept, solid state reaction kinetics, multiphase transformation, microstructure changes, and Fe-C properties. **Introduction to IT Diagram** - Isothermal transformation diagram (IT) and continuous cooling transformation (CCT) diagram.

Strengthening Mechanism - Grain size reduction, Solid solution strengthening, Strain hardening, Dispersion strengthening by phase transformation, interfacial energy, age/precipitation hardening, and microstructural development in age hardening. **Hardenability** - Mechanical behaviour of Fe-C alloy, tempered martensite, hardenability, jominy test, effect of alloying to hardenability, cold work. Recovery, recrystallization and grain growth. Procedure of steel heat treatment: austenitizing, annealing, full annealing, normalizing, quenching, tempering. **Surface Heat Treatment** - Introduction, types of treatment (carburizing, nitriding, carbonitriding and cyaniding). Diffusion- steady and non steady state diffusion. **Non Ferous Alloys** - Classification, heat treatability, microstructure and general properties of aluminum alloys, copper alloys, magnesium alloys, titanium alloys, nickel alloys. **Metallography Quantitative** - Grain size by metallography quantitative, ASTM grain size number and average grain size diameter. Important of grain size on the behaviour of crystalline metals.

COURSE OUTCOMES

1. Ability to define and describe the important basics of physical metallurgy and phase transformation
2. Ability to understand the phase diagrams and their relation with microstructures
3. Ability to design heat treatment process to achieve the required properties for required application

REFERENCE BOOKS

1. John E. Neely, Thomas J. Bertone, (2000). *Practical Metallurgy and Materials for Industry*.
2. L. Carl Love. (1985). *Principles of Metallurgy*. Reston.
3. Verhoeven J.D. (1975). Fundamentals of Physical Metallurgy. New York: Wiley
4. Smallman R.E. and Ngan A.H.W. (2007). Physical Metallurgy and Advanced Materials. 7th Ed. Oxford: Butterworth-Heinemann.
5. Abbaschian R. and Reed-Hill R.E. (2008). Physical Metallurgy Principles. Stamford: CL-Engineering.

EBT 212/3
DYNAMICS

COURSE SYNOPSIS

Students will be introduced to the concepts of mechanics in dynamic conditions. The course is presented in two parts: kinematics, which treats only the geometric aspects of motion, and kinetics, which is the analysis of the forces causing the motion. To develop these principles, student learns the dynamics of a particle, followed by topics in rigid-body dynamics in two and then three



dimensions. Emphasis will be given on the kinematics and kinetics of a particle, planar kinematics and kinetics of a rigid body, three dimension kinematics and kinetics of a rigid body.

COURSE OUTCOMES

1. Ability to evaluate the kinematics and kinetics of particle problems
2. Ability to analyze and solve the planar kinematics and kinetics of a rigid body
3. Ability to analyze the three dimensional kinematics and kinetics of a rigid body

REFERENCE BOOKS

1. Hibbler R. C., 2010. Engineering Mechanics- Dynamics, 12th ed. Prentice Hall.
2. Meriam J. L. & Kraige L.G., 2008. *Engineering Mechanics, Dynamics*, 6th ed. in SI Version, John Wiley & Sons, Inc.
3. Beer, F. B., Johnston, E. R. Jr. and Clausen, W. E., Vector Mechanics for Engineers: Dynamics. 8th ed. in SI Units, Canada, McGraw-Hill, 2007.

EBT 213/4
EXTRACTIVE METALLURGY I

COURSE SYNOPSIS

This course will introduce student to **Mineral Processing** - Advantages of mineral processing. Crushing: definition, type of crusher and its characteristics, selection of crusher. Grinding: grinding mills, mill liners, grinding action, critical speed. Laboratory Sizing Control: Sizing methods (screening, sedimentation), sizing scales. Industrial sizing: type of industrial screening, screening efficiency. Gravity concentration: gravity concentration methods (heavy medium separation, jigging, sluicing). Magnetic and Electrostatic Separation: Principles, type of separators. Flotation: process, flotation reagents, conditioning and flotation circuits. **Hydrometallurgy** - Ore processing using hydrometallurgy method. Kinetic of heterogeneous reaction. Leaching process. Mode and leaching techniques. Solution Purification: Solvent extraction, solvent components (extraction mechanism), counter-current extraction, and application of solvent extraction in industrial worldwide. Purification of pregnant solution: ion exchange and activated carbon. **Electrometallurgy** - Galvanics: Redox reactions, Electrochemical cells, reactions, and EmF, Cell EmF, Standard EmFs and electrode potentials. Cell types. Electrolytic cells Electrowinning, Electrorefining, Electroextraction, Electroleaching, Electrosynthesis. Metal and metal compound recovery: crystallization, cementation, hydrogen gas reduction. Thermodynamic and hydrogen reduction kinetics.

COURSE OUTCOMES

1. Able to discuss and practice the principle and process involved in mineral processing
2. Able to discuss and differentiate the theory in hydrometallurgy
3. Able to discuss and demonstrate the concept in electrometallurgy
4. Able to explain extraction process of some metals that have been established worldwide

REFERENCE BOOKS

1. A.R. Burkin, (2001). *Chemical Hydrometallurgy :Theory and principle.* London Imperial College Press.
2. Samsul Bahar Sadli, (1998). *Asas Proses Metalurgi.* Dewan Bahasa dan Pustaka, Kuala Lumpur.
3. Fathi Habashi, (1997). *Handbook of Extractive Metallurgy, Volume II.* Wiley-VCH.
4. Chiranjib Kumar Gupta, (2003). *Chemical Metallurgy.* Wiley-VCH.
5. Rosenqvist T. (2004). Principles of Extractive Metallurgy. 2nd Ed. Trondheim: Tapir Academic Press.

EBT 225/4
FUNDAMENTALS OF CERAMICS

COURSE SYNOPSIS

This course covers various types of ceramics materials such as structural ceramic, glasses, glass-ceramic and whitewares. Student will be exposed to various types of ceramic raw materials, Formulation and recipes of the ceramic body including the use of binder and additives, function of ceramic component in ceramic body, production of ceramic product from mixture of raw materials. Where steps of powder preparation from raw materials which include crushing, milling, mixing, filter pressing and spray drying will also be included. The course also covers fabrication and forming concept using various shaping methods. Heat treatment process will be discussed for glasses and glass-ceramics. While drying and firing stage will be explained in detail including type of sintering process and its mechanism. Product and glaze defect will be determined and caused of defect and solving methods will be identified. The properties of the ceramics will be correlated with the selection of raw materials as well as processing steps. Student will also be exposed on mould designing and fabrication using POP, Glaze formulation and production of various glaze appearance for aesthetic value and application will be the most interesting part.

COURSE OUTCOMES

1. Able to determine the principles and engineering knowledge for structural ceramic, white wares, glasses and glass-ceramic.
2. Able to identify suitable raw materials and its function and formulate its compositions for specific application including calculating the compositions of the ceramics body and glaze using various types of raw materials or minerals.
3. Able to describe fabrication process of different types of structural ceramic, whiteware glasses and glass-ceramic. Students should also able to determine the process control parameter.
4. Able to analyzed sintering mechanism in ceramic processing, product defect as well as phase transition which including nucleation and the growth of the crystals.
5. Able to design and fabricate ceramic mould using POP and produced ceramic product via slip casting process

REFERENCE BOOKS

1. Michel Barsoum, (2002). Fundamentals of Ceramics (Series in Material Science and Engineering). Taylor & Francis.
2. James S. Reed, (1995). Principles of Ceramics Processing, 2nd ed. John Wiley and Son Inc New York.
3. Allen Dinsdale diterjemah oleh Prof. Dr. Radzali Othman dan Prof. Madya Dr. Ahmad Fauzi Mohd Noor, (1993). Sains Tembikar:Bahan, Proses dan Hasilan. Penerbit USM P.Pinang.
4. Lawrence H. Van Vlack diterjemahkan oleh Zainal Arifin Ahmad (1991). Seramik Fizik Untuk Jurutera. Kuala Lumpur : Dewan Bahasa dan Pustaka.
5. Bengisu, M (2001). Engineering Materials: Engineering Ceramics. Springer, New York.

EBT 231/4
ELASTOMERIC MATERIALS

COURSE SYNOPSIS

To introduce the basic knowledge of elastomeric materials on structure and properties, characterization, concept of rubber elasticity and principles of rubbers in engineering application.

COURSE OUTCOMES

1. Able to explain and discuss of the classification, structure/properties relationship, rubber elasticity concept of elastomeric materials.
2. Able to identify and distinguish different type of rubbers and illustrate structure of natural rubber and synthetic rubbers.
3. Able to explain and apply principles of rubbers in engineering application.
4. Able to assess on how selected rubber are commercially prepared.

REFERENCE BOOKS

1. Wood, P.R., (2004). Mixing of Vulcanisable Rubbers and and Thermoplastic Elastomers, Rapra Technology.
2. Ciesielski, A., (2001). An Introduction To Rubber Technology, Rapra Technology Ltd.
3. Crompton, Roy, (2007). Determination of Additives in Polymers and Rubbers, Rapra Technology.
4. McKeen, Laurence W. (2012). Permeability Properties of Plastics and Elastomers (3rd Edition), Elsevier
5. Bukhina, M.F.; Kurlyand, S.K. (2007). Low-Temperature Behaviour of Elastomers. VSP - An imprint of BRILL.

EBT 232/4
POLYMER SYNTHESIS

COURSE SYNOPSIS

This course is developed to introduce the basic concepts of synthesis polymer about chemical structures, reaction schemes and mechanistics aspects of polymerization. Understanding the theoretical, conceptional background and practical of synthesis polymer.

COURSE OUTCOMES

1. Ability to discuss and identify the basic concepts of materials and polymer synthesis.
2. Able to apply the concept of polymerization and relationship to structure and properties.
3. Able to distinguish different polymerization and kinetic of polymerization.
4. Able to synthesize polymeric material and how to analyze the polymeric material.

REFERENCE BOOKS

1. Braun, D., Cherdron, H., Ritter, H., (2005). Polymer Synthesis: Theory and Practice: Fundamentals. Methods, Experiments', 4th ed., Springer.
2. Malcom P.S., (1997). Polymer Chemistry, University of Harlford, Oxford University Press, Inc. New York.
3. Odian G. (2004). Principle of Polymerization, 4th ed. City University of New York. Wiley-Inter Science



EBT 235/4
STRUCTURE AND POLYMER PROPERTIES

COURSE SYNOPSIS

This course is offered to provide knowledge on principles and concept of structure/property relationship of polymeric materials. This includes the understanding on concepts of viscoelasticity, transition phenomena, mechanical and thermal properties of polymers.

COURSE OUTCOMES

1. Ability to explain and apply the principles and concept of structure/ properties of polymers.
2. Ability to explain and analyze transition phenomena in polymers.
3. Able to apply and propose knowledge on concepts of viscoelasticity.
4. Able to interpret and compare the mechanical and thermal properties in polymeric materials.

REFERENCE BOOKS

1. Gottfried, W. E., (2001). Polymeric Material: Structure-Properties-Applications, Carl Hanser Verlag.
2. Sperling, L.H., (2001). Introduction to Physical Polymer Science, John Wiley and Sons, Inc.
3. Allcock, H.R., Lampe, F.W.and Mark, J.E., (2003). Contemporary Polymer Chemistry, 3rd ed., Pearson Education, Inc.: Prentice Hall.
4. Gnanou, Yves, (2008). Organic and Physical Chemistry of Polymers, Wiley Interscience.

EBT 238/3
PHYSICAL CHEMISTRY

COURSE SYNOPSIS

The aim of this course is to introduce the knowledge of physical chemistry, calculate and solve problem of physical chemistry in polymeric materials.

COURSE OUTCOMES

1. Ability to describe and calculate the fundamentals basic of physical chemistry.
2. Ability to identify and calculate the polymer viscosity and justify the distribution law and phase rule in polymeric materials.
3. Ability to solve problem and calculate chemical properties and kinetic in polymeric materials.
4. Ability to plan and evaluate or correlation of physical and chemical properties in polymer processing.

REFERENCE BOOKS

1. Sperling, L. H., (2006). Introduction to Physical Polymer Science, 4th ed., Wiley-Interscience.
2. Gnanou, Yves, (2008). Organic and Physical Chemistry of Polymers, Wiley Interscience.
3. Teraoka, I. (2002). Polymer Solutions An Introduction to Physical Properties, Wiley & Sonn Inc., Publication.
4. Silbey, R.J., Alberty, R.A. & Bawendi, M.G. (2005). Physical Chemistry, Wiley & Son, Inc., Publication.

EBT 239/4
THERMODYNAMICS IN POLYMER

COURSE SYNOPSIS

The aim of this course is to introduce the knowledge of thermodynamic in polymer, calculate and solve problem of thermodynamic in polymer engineering process.

COURSE OUTCOMES

1. Able to describe and calculate the fundamentals basic thermodynamics law.
2. Able to calculate heat, work and other thermodynamic properties in polymer processes.
3. Able to solve problem and calculate using thermodynamic in polymer engineering processes.
4. Able to plan and evaluate specific equation of or correlation of chemical reaction in thermodynamics law.

REFERENCE BOOKS

1. Irving M. K and Robert M, R (2005). Chemical Thermodynamics, Wiley & Sons, Inc., Publication, United State (USA).
2. Myron Kaufman (2002). Principles of Thermodynamic, Marcel Dekker, Inc, New York.
3. Utracki, L.A., (2002). Polymer Blends', Rapra Technology.
4. Rao, Natti S.; Schumacher, Gunter (2004). Design Formulas for Plastics Engineers (2nd Edition), Hanser Publishers.

EBT 240/3
PLASTIC MATERIALS

COURSE SYNOPSIS

The aim of this course is to introduce students with the concepts and types of plastic materials. Student will be able to distinguish the structure and property relationship of plastic materials and able to provide some ideas on the concept selection principles, additives and sustainability of the plastic materials.

COURSE OUTCOMES

1. Ability to discuss the concept of plastic materials and distinguish the type of plastic materials.
2. Ability to distinguish the relationship between structure and property of plastic materials.
3. Ability to evaluate the concept of plastic additives and compare the principle of plastics recycling and sustainability.

REFERENCE BOOKS

1. Brydson, J.A., (1999). Plastic Materials. 7th Edition. Oxford: Butterworth-Heinemann.
2. Jean, P.P. and Henry, S., (2003). Thermosetting Polymers. New York: Marcel Dekker, Inc.
3. Charles, A. H.,(2000). Modern Plastic Handbook, Mc Graw Hill, Inc.
4. Sidney H.G., (2003). Handbook of Thermoset Plastics. 2nd Edition. London: RAPRA Tech.
5. Domininghaus, H. (1993). Platic for Engineers: Materials, Properties, Applications,. Munich: Hanser Pub.

EBT 251/3
ENGINEERING MATERIALS CHEMISTRY

COURSE SYNOPSIS

Introduction to Thermodynamics - First law of thermodynamics, expansion and contraction of work, enthalpy, heat capacity, thermochemistry and it application in metallurgy. **Second Law of Thermodynamics** - Differentiate entropy function, cyclic process, several relations of thermodynamics which involving Gibbs Free Energy, relationship between equilibrium constant and temperature in reaction. **Reaction Kinetics** - Effect of reactants and products concentration, determination of order and velocity constant of reaction, effect of temperature for reaction, theory of absolute reaction rates for catalyst, diffusion in solid state. **Electrochemistry** - Electrolytes, electrolytic conduction, electrode potentials, galvanic cell, calculation of e.m.f. and cell potential, reduction and oxidation potential, standard electrode potential series. **Interface Phenomenon** - Surface energy and surface tensions, interfacial energy except gas/liquid interface, interfacial of three phases, absorption and colloid.

COURSE OUTCOMES

1. Ability to describe first law of thermodynamics and it application in materials
2. Ability to describe the importance of differentiate entropy function, several of thermodynamics and relationship between equilibrium constant at temperature in reaction
3. Ability to describe the effect reactant and products concentration, effect of temperature, and diffusion in solid state
4. Ability to describe electrochemistry, surface energy, interfacial energy expect gas /liquid interfacial, absorption and colloid

REFERENCE BOOKS

1. Azizan Aziz dan Kamarudin Hussin. (2000). *Pengenalan Kimia Metalurgi*. Pulau Pinang: Penerbit USM.
2. Moore, J.J. (1998). Chemical Metallurgy. 2nd Edition. London: Butterworths.
3. Fahlman B.D. (2011). Materials Chemistry. 2nd Ed. New York: Springer.
4. Allcock H.R. (2008).Introduction to Materials Chemistry. New York: Wiley.
5. West A.R. (1999). Basic Solid State Chemistry. 2nd Ed. New York: Wiley.

EBT 252/4
STRENGTH OF MATERIALS

COURSE SYNOPSIS

Stress analysis, stress theory, strain analysis, strain theory, relationship of stress- strain and stress- strain temperature. Axial load, torsional loading, bend loading, bending stress, strain deflection. **Failure Criterion** - Elastic deflection failure, excessive yielding failure, fracture failure, excessive deflection failure, and progressive failure. **Statically Indeterminate Beam Analysis** - Method of integration, moment- area method, method of superposition, energy method, and plastic analysis. **Combined Loading** - Combined axial and bending load, combined axial, bending and torsion load. **Column** - Buckling of column, end- support conditions, empirical formula. **Joint** - Rivet and bolt analysis (average shear strength and tensile strength), welding, and connection analysis.



COURSE OUTCOMES:

1. Ability to analyze general concept strength of materials and its mechanical properties
2. Ability to analyze the materials behaviors when different mode of load applied e.g. torsion of circular shafts, bending and deflection of beams
3. Ability to analyze the effect of combined stresses and the ability to analyze the behavior of different structure of materials, e.g. columns and connections under several types of loadings

REFERENCE BOOKS

1. Ferdinand Beer, Jr., E. Russell Johnston, John DeWolf and David Mazurek (2014). Mechanics of Materials. 7th, McGraw Hill.
2. Hibbeler, R. C. (2013). Mechanics of Materials. 9th Edition, Prentice Hall.
3. Megson, T. H. G. (2014). Structural and Stress Analysis. 3rd Edition. Butterworth: Heinemann.
4. Shackelford, J.F. (2008). Introduction to Materials Science for Engineers. 7th Ed. New York: Prentice Hall.
5. Askeland, D.R. et al. (2010). The Science and Engineering of Materials. 6th Ed. Stamford: Cengage Learning.

EBT 253/3
ANALYTICAL CHEMISTRY

COURSE SYNOPSIS

The main purpose of the Course is to provide students with a strong theoretical and practical grounding in the principles and practices of Analytical Chemistry. Basically student will learn Analytical objective, Stoichiometric Calculations, General Concept of Equilibrium, Gravimetric Analysis, Complexometric Titrations, Precipitation Reactions and Titrations, Redox and Potentiometric Titrations, Chromatographic methods and Environmental Analysis. Student will undertake Analytical Chemistry Laboratory for helping student to further develop hands-on skills.

COURSE OUTCOME

1. Ability to identify and correlate the nature and scope of analytical chemistry with the analytical reaction in the solution.
2. Ability to prepare and analyze material by solvent extraction, precipitation, complexometric method and ion exchange technique.
3. Ability to integrate the principles and methodology of instrumental analysis like thermal, spectrochemical, atomic spectrometric analysis, chromatographic technique and sensor for automation.

REFERENCE BOOKS

1. Christian, Gary. D., (2013). Analytical Chemistry, 7th Edition. John Wiley & Sons.
2. Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch (2013). Fundamentals of Analytical Chemistry, 9th Edition. Cengage Learning.
3. Higson, Seamus. P. J., (2004). Analytical Chemistry. Oxford University: Oxford University Press.
4. David S. Hage and James R. Carr (2010). Analytical Chemistry and Quantitative Analysis 1st Edition. Prentice Hall.

EBT 254/3
TRANSPORTATION PHENOMENON IN MATERIALS PROCESSING

COURSE SYNOPSIS

Heat Transfer - Fourier's law and thermal conductivity, thermal conductivity of gases, thermal conductivity of solids, thermal conductivity of liquids, thermal conductivity of bulk materials, heat transfer and the energy equation, quenching heat transfer coefficient, heat transfer coefficient in forging. **Solidification of Metals** - Solidification in sand moulds, solidification in metal moulds, continuous casting, crystal growth. **Radiation Heat Transfer** - Basic characteristic, the black radiator and emissivity, the energy distribution and the emissive power, gray bodies and adsorptivity, radiation combine with convection, radiation from gases. **Fick's Law and Diffusion in Materials** - Definition of fluxes, Fick's first law, diffusion in solids, diffusion under composition gradient effect, Darken's equation, diffusion based on temperature in solids, diffusion in ceramic materials, diffusion in semiconductor materials, diffusion in liquids, diffusion in gases. **Diffusion in Solids** - Steady state diffusion experiments, microelectronic diffusion processing, homogenization of alloys, formation of surface layers. **Mass Transfer in Fluid Systems** - Diffusion through a stagnant gas film, diffusion in moving gas stream, the mass transfer coefficient, mass transfer in chemical vapor deposition. **Interphase Mass Transfer** - Two-resistance mass transfer theory, mixed control in gas-solid reactions, iron carbonization with surface reaction and diffusion as control factor, transportation in gas phase and diffusion as control factor, silicon oxidation, alloys vaporizing during melting.

COURSE OUTCOMES

1. Understand and analyze the problem on basic behavior of fluid (static motion, also in pipe) and momentum transfer.
2. Understand and analyze the problem on heat transfer by conduction, radiation and convection.
3. Understand and analyze the problem on mass transfer in gases, liquid and solid.

REFERENCE BOOKS

1. James R. Welty, Charles E. Wick, Robert E. Wilson, Gregory Rorrer. (2014). Fundamentals of Momentum, Heat Transfer and Mass Transfer. 6th Edition, John Wiley.
2. Poirier, D.R., Geiger, G.H. (1998). Transport Phenomena in Material Processing. Wiley
3. Thomson W.J. (2000). Introduction to Transport Phenomena. New York: Prentice Hall.
4. Deen W.M. (2011). Analysis of Transport Phenomena (Topics in Chemical Engineering) 2nd Edition. USA: Oxford University Press.
5. Bird R.B. (2006). Transport Phenomena. 2nd Ed. New York: John Wiley & Sons.

EBT 303/3
PROCESS CONTROL

COURSE SYNOPSIS

The aim of this course is to introduce the principle of process control system, including continuous and batch control approaches; knowledge of control algorithm implementation for selected process; capability of selecting instrumentation for process control; proficiency of managing and handling project from designing to applying the process control approach into the system.

COURSE OUTCOMES

1. Able to discuss the objective for process control and able to distinguish the essential feature of process control.
2. Able to interpret dynamic process by constructing balance equation; solve differentiation equation, and design the transfer function for open and closed-loop.
3. Able to analyze the stability of the system, apply and validate the control system in physical equipment.

REFERENCE BOOKS

1. D. R. Coughanowr, S.E. LeBlanc (2009) Process System Analysis and Control, 3rd Edition, McGraw Hill International Edition.
2. D.E. Seborg, T.F. Edgar, D.A. Mellichamp (2011), Process Dynamic and Control, Wiley and Sons.
3. T. E. Martin (2000) Process Control: Designing Processes and Control System for Dynamic Performance, McGraw Hill International Edition.
4. Dorf, R.C., Bishop, R.H. (2010). Modern control system 12th Edition. Prentice Hall.
5. Johnson C.D. (2007). Process Control Instrumentation Technology 8th Edition. New York: Prentice Hall.

EBT 311/4
MECHANICAL METALLURGY

COURSE SYNOPSIS

This course is designed to introduce the students various aspects of Mechanical Metallurgy such as elastic plastic behaviour, stress concept, tensile deformation of ductile metal, ductile and brittle behaviour, elastic stress-strain relations, Mohr'circle of stress, stress tensor, calculation of stresses from elastic strain, strain energy, stress concentration, finite element method. Elements of the theory of plasticity such as flow curve, true stress-strain, Von Mises yielding criterion, maximum shear stress or Tresca criterion. Plastic Deformation of Single Crystals such as concept of crystal geometry, lattice defects, deformation by slip, slip in a perfect lattice, slip by dislocation movement, critical resolved shear stress for slip, deformation by twinning, stacking faults. Dislocation theory; Burgers vector, dislocation loop, dislocation in face-centered cubic lattice, intersection of dislocation, dislocation sources, multiplications of dislocations, dislocation pile-ups. Fracture mechanics theory such as fracture toughness test, design aspects for fracture mechanics. Fatigue of metals such as effect of mean stress on fatigue, cycle stress-strain curve, low-cycle fatigue, crack propogation. Design aspects for low-cycle fatigue. Creep such as creep mechanism, design aspects for creep behaviour. Failure analysis such as techniques for failure analysis, equipments for failure analysis, metallographic sample preparation for failure analysis, excessive load, wear, wear protection, corrosion, brittle fracture at low temperature, shear fracture, failure of heat treatment, fatigue, fracture mode identification, design consideration, type of fatigue fracture.

COURSE OUTCOMES

1. Ability in analyzing the behavior and response of metal to applied load.
2. Ability to analyze the concept of single crystal deformation in metallurgy.
3. Ability to appraise the concept of strengthening mechanism and failure of metals.



REFERENCE BOOKS

1. John E. Neely, Thomas J. Bertone, (2003). *Practical Metallurgy and Materials for Industry.* 6th Edition. Prentice Hall.
2. Schaffer, Saxena, Antolovich, Sanders & Warner, (1999). *The Science and Design of Engineering Materials.* 2nd Edition. Mc Graw Hill.
3. George E. Dieter. (1988). *Mechanical Metallurgy.* SI Metric Edition.Mc-Graw Hill.
4. Meyers M.A. (1983). Mechanical Metallurgy: Principles and Applications. New York: Prentice Hall.
5. May I.L. (1981). Principles of Mechanical Metallurgy. Amsterdam: Elsevier

EBT 313/4
METALLURGICAL CHARACTERIZATION

COURSE SYNOPSIS

This course is designed to expose students the basic principles of metal characterization using LM, SEM, TEM as well as the principles of crystallography, metal texture, x- ray diffraction method and follow by spectroscopic technique and analytical.

COURSE OUTCOMES

1. Ability to identify suitable characterization technique such as XRD, XRF, SEM, DTA and TGA and others to characterize metal and composite materials.
2. Ability to analyze and identify an unknown metals via various characterization techniques such as XRD, SEM, DTA, TGA and others.
3. Ability to analyze physical and chemical properties of metals through various characterization techniques for selection materials purpose.
4. Ability to apply and decide metal characterization concept and method

REFERENCE BOOKS

1. Baldev Raj, G. Amarendra, M.H. Manghnani (2007). *Advanced in Materials Characterization.* CRC Press.
2. Hammond, C (2001). *The Basic of Crystallography and Diffraction*. Oxford University Press,.
3. Elton N. Kaufmann (2003). *Characterization of Material.* John Wiley.
4. Marc De Graef (2003). *Introduction to conventional transmission electron microscopy.* Cambridge University Press.
5. Paolo Samori (2006). *Scanning Probe Microscope Betond Imaging, Manipulation of Molecules and Nanostructures.*

EBT 314/3
METALLURGICAL THERMODYNAMICS

COURSE SYNOPSIS

This course is design to review of First and Second laws of thermodynamics. **Chemical Equilibrium** - Activity, equilibrium constant, Le-Chatelier's principle, chemical potential, law of mass action. Effect of temperature and pressure on equilibrium constant, Vant Hoff's isotherm. Free energy-temperature diagrams, oxygen potential and oxygen dissociation pressure. Measurement of activity, Gibb's phase rule and its applications, Free energy composition diagram. **Solution Chemistry** - Partial molar quantities, Ideal solutions, Rault's law, non ideal solutions, Gibbs-Duhem equation. Free energy of formation of solution, regular solutions. Excess thermodynamic quantities. **Electrochemistry** - Electrochemical cell, determination of thermodynamic quantities using reversible electrochemical cell, EMF cell, electrode potential, electrode potential-pH diagrams and their applications. Thermodynamics laws to metallurgical systems with special emphasis on roasting, sintering, smelting and refining processes. Introductory theoretical treatment of alloying and alloy systems. Application of thermodynamic data to phase diagram.

COURSE OUTCOMES

1. Ability to apply basic concept of thermodynamic for further understanding in metallurgical thermodynamic
2. Ability formulate thermodynamic equilibrium, solution chemistry and electrochemistry in metallurgical process
3. Ability to justify the thermodynamics laws to specially emphasis metallurgical system, treatment of alloying and alloy systems

REFERENCE BOOKS

1. Ahindra Ghosh, (2004). *Textbook of Materials & Metallurgical Thermodynamics*. Prentice Hall of India.
2. R.H. Tupkary, (1995). *Metallurgical Thermodynamics.* TU Publishers, Nagpur.
3. D.R. Gaskell, (1981). *Introduction to Metallurgical Thermodynamics.* McGraw-Hill Book Co. Inc., New York.
4. Yunus A. Cengel & Michael A. Boles, (2005). *Thermodynamics: An Engineering Approach*. McGraw-Hill.
5. Eric Brian Smith, (2004). *Basic Chemical Thermodynamics.* Imperial College Press.

EBT 317/3
FLUID MECHANICS

COURSE SYNOPSIS

Course will be concentrate with fluid properties, fluid classification and force types in fluids. Thus, students will be learning about fluid properties in two different conditions, static and dynamic condition. Student also will learn momentum principles including basic equations for controlled system and volume, and then basic equations in differential form. The students will see in fluid application in flow topic in pipes and turbo-machine. The course also concentrates flow measurement aspect, like as tools and procedures which used in flow measurement.

COURSE OUTCOMES

1. Ability to describe concept and solve problems of static and dynamic of liquid state
2. Ability to comprehend and analyze the concepts of fluid kinematics and momentum equation to solve engineering problem
3. Ability to apply and analyze Bernoulli equation to solve piping flow problem
4. Ability to analyze the design a turbo machine using energy equation for piping system

REFERENCE BOOKS

1. Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John A. Roberson (2012). Engineering fluid Mechanics. 10th Edition. Wiley.
2. James R. Welty, Charles E. Wick, Robert E. Wilson, Gregory Rorrer. (2001). Fundamental of momentum, heat transfer, and mass transfer. 4th edition. John Wiley.
3. Munson B.R. et al. (2009). Fundamentals of Fluid Mechanics. New York: Wiley.
4. Fox R.W. et al. (2008). Introduction to Fluid Mechanics. New York: Wiley.
5. Mott R.L. (2005). Applied Fluid Mechanics. 6th Edition. New York: Prentice Hall.

EBT 318/3
SURFACE ENGINEERING

COURSE SYNOPSIS

Surface Engineering is multidisciplinary activity intended to tailor properties of the surfaces of the engineering component. The desired properties or characteristic of surface-engineered components include to improve corrosion and wear resistance, improved mechanical properties and functional materials such as electronic device, sensors, solar and optical devices. This course provides the fundamentals of surface engineering, coatings, thin film and substrate. This course will be covered surface engineering types and processing, its mechanism, advantages and disadvantages and its applications. This course also discuss the technical approach and engineering design of surface engineering based on its technology especially in nanotechnology, solar, microelectronic, wear and corrosion resistance. The objectives of this course to make comprehensive understanding of surface engineering knowledge and its application especially in materials and metallurgical engineering field.

COURSE OUTCOMES

1. Ability to describe and compare the concepts, fundamental and mechanism for surface engineering, coating and thin films.
2. Ability to analyze and characterize thin film, coating and surface engineering in terms of its optical, electrical, magnetic and mechanical properties.
3. Ability to design, evaluate and apply the growth of thin film and surface engineering.

REFERENCE BOOKS

1. Davis, J.R. (2001), Surface Engineering for Corrosion and wear resistance. ASM International
2. ASM Handbook Volume 5, Surface Engineering, (1994) ASM International
3. Freund, L.B. and Suresh, S. (2003) Thin Film Materials. Cambridge.
4. Rastogi, M. C. (2003) Surface and interfacial Science: Applications to engineering and technology. Narosa Publishing House.
5. Waseda, Y and Muramatsu, A. (2004) Morphology Control of Materials and Nanoparticles. Springer.

EBT 319/3
EXTRACTIVE METALLURGY II

COURSE SYNOPSIS

This course is designed to introduce general principle in extracting metal ore using pyrometallurgy route starting from ore treatment, drying, calcination, roasting and sintering. Type of furnace for smelting, including the detail process in smelting and refining will be explained. This course will provide student with the knowledge on the extraction of ferrous and non-ferrous metals and the impact of the pyrometallurgy on the environmental aspects.

COURSE OUTCOMES

1. Ability to discuss the principle involved in pyrometallurgy
2. Ability to explain the process involved in pyrometallurgy
3. Ability to calculate and determine the charge/feed needed in pyrometallurgy



4. Ability to understand and take awareness the consequences occurred from pyrometallurgy technology

REFERENCE BOOKS

1. Chiranjib Kumar Gupta, "Chemical Metallurgy", Wiley-VCH, ISBN 3527303766 (2003).
2. Fathi Habashi, "Textbook of Pyrometallurgy" Métallurgie Extractive Québec, ISBN 2922686051 (2002)
3. Samsul Bahar Sadli, "Asas Proses Metalurgi", Dewan Bahasa dan Pustaka, ISBN 9836256350 (1998).
4. Fathi Habashi, "Handbook of Extractive Metallurgy, Volume II", Wiley-VCH, (1997).
5. Colin Bodsworth, "The Extraction and Refining of Metals" CRC Press ISBN 0849344336 (1994)

EBT 323/4
MATERIALS CHARACTERIZATION

COURSE SYNOPSIS

This course is designed to expose students the basic principles of materials characterization using LM, SEM, TEM as well as the principles of crystallography , metal texture, x- ray diffraction method and follow by spectroscopic technique and analytical.

COURSE OUTCOMES

1. Ability to identify and analyze microstructure of the materials.
2. Ability to interpret and analyze thermal behavior of the materials
3. Ability to comprehend and analyze structure of the materials.
4. Ability to apply and characterize elemental analysis of the materials.
5. Ability to characterize and evaluate optical property of the materials.
6. Ability to identify, analyze and compare surface characterization of the materials.

REFERENCE BOOKS

1. Hammond, C (1998).The Basic of Crystallography and Diffraction, Oxford University Press,.
2. Douglas A. Skoog & James J. Leary. (1992). Principles of Instrumental Analysis, 4th Ed. Sounders College Publishing.
3. Larry, G., Harges (1988). Analytical Chemistry: Principles and Techniques, Prentice Hall.
4. Gary, D., Cristian (1986). Analytical Chemistry, 4th Edition, John Wiley & sons.
5. John Edward Gentle (1982).Atomic Absorption Spectrometry, Elsevier.

EBT 324/3
MATERIALS THERMODYNAMICS

COURSE SYNOPSIS

Summarised revision on thermodynamic; Phase transformation; Solid state-Reaction. Thermodynamic of the phase diagram; Consideration of the free energy, transformation kinetics - Thermodynamic and kinetics in the glass formation system, precipitation of the different phases at different composition from matrix.

COURSE OUTCOMES

1. Ability to understand the fundamental concepts of thermodynamics.
2. Ability to understand the statistical themodynamics, Unary heterogeneous systems, multicomponent, homogeneous non reacting systems –solutions, multicomponent heterogeneous systems, Multicomponent heterogeneous systems and Thermodynamics of phase diagrams, and relate to the materials.
3. Ability to understand thermodynamics of interfaces, the thermodynamics of electrolysis and defect in crystals, and apply to the materials process.

REFERENCE BOOKS

1. Boris S. Bokstein, Mikhail I. Mendelev, (2005). *Thermodynamics and Kinetics in Materials Science.* Oxford University Press.
2. Svein Stolen & Tor Grande, (2004). *Chemical Thermodynamics of Materials.* John Wiley & Sons.
3. H.G. Lee, (1999). *Chemical Thermodynamics for Metals and Materials.* Imperial College Press.
4. Yunus A. Cengel & Michael A. Boles, (2005). *Thermodynamics: An Engineering Approach*. McGraw-Hill.
5. J. Susanto, (1988). *Termodinamik Gunaan: Masalah dan Contoh Penyelesaian*. Dewan Bahasa dan Pustaka.

EBT 326/4
POLYMER PROPERTIES

COURSE SYNOPSIS

The course is designed to introduce to the students various properties of polymer such as thermoplastic, elastomer, thermoset, aspects of polymer physic including amorfous, semi-crystalline and crosslink of polymer, reinforcement of polymer products, mechanical properties, physical properties, characterization and analysis of polymer by using equipments.

COURSE OUTCOMES

1. Ability to analyze the aspects of polymer physic and chemical such as elastomer, thermoplastic and thermoset.
2. Ability to examine the importance of various types of the plastics, polymer compounds and the component of the rubber.
3. Ability to evaluate and justify the various aspects of physical and mechanical properties of polymeric materials.
4. Ability to assess and interpret the properties of polymeric materials by using various equipments.

REFERENCE BOOKS

1. Gottfried W.E. (2001). Polymeric Materials – Structure-Properties-Application. Hanser Gardner.
2. William D. Callister, David G. Rethwisch (2013). Materials Science and Engineering: An Introduction. 9th Edition. Wiley.
3. Vishu Shah. (2007). Handbook of Plastics Testing and Failure Analysis 3rd Edition. Wiley-Interscience.
4. Richard, C.P, (1993). Polymer Engineering Principles, Properties, Processes, Test for Design. Hanser Publication.
5. F.W. Billmeyer.(1984). Textbook of Polymer Science. John Wiley & Sons, Inc.

EBT 329/3
POLYMER PROCESSING

COURSE SYNOPSIS

This course provides detail introduction to the variety of polymer materials processing, including the rheology and melt flow, equipments and important methods of polymer processing, the influence of related factors in polymer processing, the occurrence of defects due to processing and how to solve the problems.

COURSE OUTCOMES

1. Ability to measure, examine and analyse the suitable methods of polymer processing for product manufacturing.
2. Ability to understand, relate and apply the basic concepts of sustainability in polymer processing and applications for environmental importance.
3. Ability to discuss concepts and principles of the various processing equipment for polymer materials.
4. Ability to compare and analyse various rheological and processing parameters in the actual processing equipment.

REFERENCE BOOKS

1. A. Brent Strong (2006). Plastics Materials and Processing. 3rd Edition. Pearson Prentice Hall, New Jersey.
2. Sperling L. H (2005). Introduction to physical Science Polymer Science 3rd Edition. Wiley-Interscience, New York.
3. James C. Gerdeen, Harold W. Lord and Ronald A. L. Rorrer (2006). Engineering Design with Polymers and Composites, CRC Press Taylor & Francis Group, Boca Raton, London New York.
4. Samjay k. Mazumdar (2002). Composites Manufacturing: Materials, Product, and Process Engineering. CRC Press, Boca Raton, Florida.
5. Donald G. Baird and Dimitris I. Collias (1998). Polymer Processing: Principal and Design. John Willey & Son, Inc, New York

EBT 333/4
RUBBER PROCESSING

COURSE SYNOPSIS

This course to enhance knowledge, fundamental and significant concepts of rubber processing and formulation, different processing techniques, and testing of raw materials and finished products which are important in handling and controlling rubber processing machines.

COURSE OUTCOMES

1. Able to explain and differentiate on different rubber processing techniques.
2. Able to apply and propose knowledge in rubber formulation and mixing.
3. Able to assess testing on rubbers: raw material and finished products.
4. Able to assess handling and controlling rubber processing machines.

REFERENCE BOOKS

1. Gent, A. N., (2001). Engineering with Rubber: How to Design Rubber Components, 2nd ed. Hanser Publishers.
2. Mark, J. E., (2005). The Science and Technology of Rubber, 3rd ed.,Elsevier Inc.
3. Brown, R.,(2006). Physical Testing of Rubber, 4th ed., Springer.
4. Harry, L. (1985). Basic Compounding and Processing of Rubber. Rubber Division, American Chemical Society Inc., Ohio, USA.
5. Rodgers, B., (2004). Rubber Compounding: Chemistry and Applications', Marcel Dekker.



EBT 334/3
POLYMER TESTING AND CHARACTERIZATION

COURSE SYNOPSIS

This course introduce the basic concepts of testing and characterization, the usage of various polymer characterization equipments, understanding the analysis concept to identify and characterize the polymeric materials.

COURSE OUTCOMES

1. Able to explain and apply the basic concepts of polymer characterization.
2. Able to apply and analyze the characterization and interpretation of the analysis results.
3. Able to apply and propose various analysis apparatus to measure the properties of polymeric materials.
4. Able to solve and select problems or defects related to polymeric materials.

REFERENCE BOOKS

1. Ghottfried W. Ehrenstein, Gabriela Riedel, Pia Trawiel, (2004). Thermal Analysis of Plastic, Hanser.
2. Hatakayama, T and Zhenlai, L. (1998). Handbook of Thermal Analysis, John Wiley and Sons, Inc. Canada.
3. Vishnu Shah (1998). Handbook of Plastics Testing Technology, John Wiley and Sons, Inc. New York.
4. Naranjo, A. Noriega MP, Osswald T, Roland-Alteza, Sierra, (2008). Plastic Testing and Characterization, Hanser, Germany.

EBT 335/4
POLYMER BLENDS

COURSE SYNOPSIS

The aim of this course to provide the knowledge of polymer blends. Promote an understanding on their properties relationship and provide knowledge on testing and characterization of polymer blends. The concept of reactive blending and engineering applications of polymer blends.

COURSE OUTCOMES

1. Able to apply and analyze concept of polymer blends.
2. Able to compare and evaluate blending conditions to structure, properties, testing and characterization of polymer blends.
3. Able to apply and analyse the principles of reactive and non-reactive compatibilizer in polymer blends.
4. Able to design and assess polymer blends according to engineering applications.

REFERENCE BOOKS

1. Paul, D. R & Bucknall, C. B., (2000). Polymers Blends , John Wiley and Sons, Inc.
2. Gabriel, O. Shoinake, George, P.S. (1999). Polymer Blends and Alloys, Marcel Dekker, New York.
3. Vasile, C.,Kulshrestha, A. K., (2003). Blends and Composites, Rapra Publisher.
4. Utracki, L.A., (2002). Polymer Blends, Rapra Technology.

EBT 336/4
PLASTIC PROCESSING

COURSE SYNOPSIS

The aim of this course is to introduce the processing methods for thermoset and thermoplastic polymer; measure the rheology flow, employ testing, processing parameter, processing methods, troubleshooting, characterization of the products and also knowledge on compounding and additives.

COURSE OUTCOMES

1. Able to discuss and distinguish thermoset and thermoplastic processing methods.
2. Able to select, apply and calculate typical rheology behavior of thermoset and thermoplastic.
3. Able to operate and evaluate the operation and troubleshoot various thermoset and thermoplastic processing techniques.
4. Able to identify and assess problem troubleshooting on various thermoset and thermoplastic processing technique.

REFERENCE BOOKS

1. Pascault, J.P., Sautereau, H., Verdu, J. and William, R.J.J. (2002). Thermosetting Polymers. New York: Marcel Dekker, Inc.
2. Sidney, H. Goodman. (2005). Handbook of Theroset Plastics, Jaico Publishing Housendbook.
3. Charles A. Harper. (1999). Modern Plastics Handbook. Mc Graw Hill.
4. Baird, D.G., Colkas, D.I. (1998). Polymer Processing, Principles and Design. New York: John Wiley and Sons. Inc
5. Mallick, P.K., Newman, S. (1998). Composites Materials Technology Process and Properties. Munich: Hanser Publisher.

6. Tim, A. O. (1998). Polymer Processing Fundamental. Munich; Hanser

EBT 337/4
MASS AND HEAT TRANSFER IN POLYMER

COURSE SYNOPSIS

The aim of this course is to introduce the knowledge of mass and heat transfer in polymer processing. Student will be able to describe the principles of convective mass transfer at boundry layer, mass transfer between phases, to calculate and solve the mass and heat transfer problem in polymer processing equipments such as injection molding and screw extruder and also capable to plan and evaluate the heat and mass transfer in conduction, convection and radiation involves during polymer processing.

COURSE OUTCOMES

1. Able to describe and differentiate fundamental mass and heat transfer.
2. Able to calculate and analyze the mass transfer problem in polymer processing equipment such as injection molding and screw extruder.
3. Able to calculate and apply heat transfer in conduction, convection and radiation.
4. Able to plan and evaluate of heat transfer and mass transfer in conduction, convection and radiation and in polymer processing equipment such as injection molding.

REFERENCE BOOKS

1. James R. Welty *et all* (2007) Fundamental of momentum, Heat, and Mass Transfer, 5th Edition, Jhon Wiley & Son, Inc. USA.
2. Hans Dieter Baehr – Karl Stephan (2006) Heat and Mass Transfer 2nd Edition (revision, Springer, Germany.
3. Coulson & Richardson's (1999) Chemical Engineering, Sixth Edition (Reprint 2009) " Fluid Flow, Heat and Mass Transfer", Elsevier, Great Britain (UK).
4. Henning Bockhorn, Dieter Mewes, Wolfgang Peukert and Hans-Joachim Warnecke (2010) Heat and Mass Transfer – Micro and Macro Mixing: Analysis, Simulation and Numerical Calculation, Springer-Verlag Berlin Heidelberg
5. Rong Zheng, Roger I. Tanner, Xi-Jun Fan (2011) Injection Molding: Integration of Theory and Modeling Methods, Springer Heidelberg Dordrecht London New York
6. Rachid Bennacer (2007) Numerical Methods for Heat & Fluid Flow, International Conference on Computational Heat and Mass Transfer, Emerald Group Publishing Limited 0961-5539

EBT 338/4
LATEX PROCESSING

COURSE SYNOPSIS

This course emphasizes on the fundamental characteristic of natural and synthetic lattices, latex compounding and processing as well as their applications in latex industries and others.

COURSE OUTCOMES

1. Able to analyze various natural rubber latex properties including fundamental characteristic, colloidal properties behavior and handling.
2. Able to prepare natural rubber latex product from different formulations and techniques.
3. Able to assess various applications and related matters and issues in natural and synthetic rubber latex by consideration of health and safety aspects.

REFERENCE BOOKS

1. Blackley, D. C. (1997). Polymer Latices: Science and Technology, 2nd Edition, Vol. 1 - 3 : Chapman & Hall, London.
2. Warson, H. and Finch, C. A. (2001). Application of Synthetic Resin Latices: Fundamental Chemistry of Latices and Applications in Adhesives, John Wiley & Sons, Ltd, New York.
3. Dunn, David J. (2002). Natural and Synthetic Latex Polymers: Market report, Rapra Technology.
4. Vikas Mittal, (2009). Advances in Polymer Latex Technology, Nova Science Publishers,
5. Gad, Shayne C., (2002). Safety Evaluation of Medical Devices (Electronic Resources), 2nd ed., Marcel Dekker.

EBT 351/3
ELECTRONIC MATERIALS ENGINEERING

COURSE SYNOPSIS

Elementary materials science concept, electrical and thermal conduction in solid, elementary quantum physics, modern theory of solids, semiconductor, dielectric materials and insulator, magnetic properties and superconductivity, optical properties of materials.
Electronic packaging: Fundamental of electronics packaging design, reliability, thermal management, single chip packaging and multichip packaging.

COURSE OUTCOME

1. Ability to relate the electronic structure components with the materials structure.
2. Ability to solve materials related problems in semiconductor and other electronic devices.



3. Ability to appraise the properties of electronic materials e.g. Dielectric, Magnetic and Optical properties.

REFERENCE BOOKS

1. Safa Kasap (2005), Principles of Electronic Materials and Devices, 3rd Edition, McGraw-Hill Science/ Engineering/Math.
2. Rao R. Tummale (2001). Fundamentals of Microsystems Packaging. McGrawhill,.
3. Gardner, Julian W. (2001). Microsensors MEMS and Smart Devices, Wiley.
4. Harper C. (2009). Electronic Materials and Processes Handbook. Singapore: McGraw-Hill.
5. Kasap S. (2005). Principles of Electronic Materials and Devices. 3rd Ed. Singapore: McGraw-Hill.

EBT 402/3
CORROSION ENGINEERING

COURSE SYNOPSIS

Student will learn corrosion and surface engineering principles. Therefore, in this subject, the student will learn electrochemistry, corrosion type, and corrosion problems in industries. Electrochemistry principles, corrosion types, Pourbaix Diagram, Corrosion mechanism, kinetic and corrosion rate. Corrosion prevention methods, inhibitors, anodic and cathodic prevention, coating, stress corrosion cracking, selection and design, corrosion problems in industry and its solution.

COURSE OUTCOMES

1. Able to evaluate the concepts of corrosion engineering.
2. Able to correlate the mechanism, thermodynamic and kinetic of corrosion.
3. Able to evaluate the basic of corrosion testing and analysis.
4. Able to design corrosion protection and prevention for sustainable development.

REFERENCE BOOKS

1. Roberge P. (2008). Corrosion Engineering: Principles and Practice. Singapore: McGraw-Hill.
2. Jones D.A. (1995). Principles and Prevention of Corrosion. 2nd Ed. New York: Prentice Hall.
3. A.W. Batchelor, Loh Nee Lam, Andrew William Batchelor & Margam Chandrasekaran, (2000).*Materials Degradation and Its Control by Surface Engineering*. Publisher: Imperial College Press.
4. Fontana, M.G. & Greene, N.D. (1986). *Corrosion Engineering.* 3rd Ed. New York: McGraw-Hill.
5. Wranglen, Gosta. (1985). *Introduction to Corrosion and Protection of Metals*. London: Chapman & Hall.

EBT 405/3
NON DESTRUCTIVE TESTING

COURSE SYNOPSIS

Non-destructive testing (NDT) is a method used for inspection of an internal part of materials. Identifying defects and flaws in material which could not be seen using our naked eyes is absolutely important in determining the material lasting age and the material performance. It is formerly known that the effective method of NDT is almost depending on the knowledge and skill of the person incharge. Because of that reason, this course offers several topics which covers the general NDT methods that are normally used in engineering field such as liquid penetrant, magnetic particle, eddy current, ultrasonic, and radiography technique.

COURSE OUTCOMES

1. Ability to distinguish principle of non-destructive testing method
2. Ability to describe the procedures for each NDT methods
3. Ability to assess defects and select NDT tools for inspection

REFERENCE BOOKS

1. B. Raj, T. Jay Kumar & M. Thavasimuthu. (2007). Practical Non-Destructive Testing 3rd Edition. Alpha Science Int'l Ltd.
2. J. S. Peter. (2002). Non-destructive Evaluation: Theory, Techniques and Applications. Marcel Dekker Incorporation, New York: USA.
3. F. Kojima, T. Takagi, S.S. Udpa and J. Pavo. (2002). Electromagnetic Non-destructive Evaluation, IOS Press. Amsterdam: Netherland.
4. Chuck Hellier. (2012). Handbook of Non-destructive Evaluation. McGraw-Hill, New York: USA.
5. E. B. Don and K. S. Roderic. (1997). Non-destructive Evaluation, A Tool in design, manufacturing, and service, CRC Press Incorporation, Boca Raton: Florida.

EBT 411/3
ENGINEERING ALLOYS

COURSE SYNOPSIS

This course is designed for students to study various types of engineering alloys including apparent microstructure, microstructural changes after heat treatment, heat-treatment design and applications of engineering alloys. To study metal matrix composites and biomaterials.

COURSE OUTCOMES

1. Enable students to describe the original microstructure and compare with the microstructure after heat treatment for various engineering alloys. To define the MMC materials types and applications. Mechanisms of detection failure analysis
2. Enable students to evaluate different types of engineering alloys, testing and evaluation of the effect alloying element additions.
3. Ability to correlate the properties of engineering alloys to their applications, analyze and solve some problems and to consider the governing factors in designing alloys for certain applications.
4. Enable to describe processes that involve in manufacturing engineering alloys and their impact on environment and the required measures to save energy and reduce pollution.

REFERENCE BOOKS

1. William Smith.(1993). *Structure and properties of engineering alloys*. 2th Edition, McGraw Hill.
2. J. R Davis. (2001). *Alloying: Understanding the Basics.* ASM International.
3. Mathew, F.L, Rawlings, R.D. (1998). *Composite Materials: Engineering and Science.* Chapman & Hall,
4. Ronal F.G. (1994). *Principle of Composite Materials Mechanics.* McGraw-Hill.
5. Suresh, S., Mortensen, A., Needleman, A., (1993). *Fundamentals of Metal-Matrix Composite.* Elsevier.

EBT 414/3
ELECTRONIC METALLURGY

COURSE SYNOPSIS

This course is designed for student to review the microelectronic packaging hierarchy, 6 levels of packaging. First and level interconnection techniques in electronic packaging hierarchy. **Die Bonding** - Die bonding material and types of metals used. Properties of each metals involved. Function of metals in die bonding. **Wire Bonding** - Wire bonding technology and bonding techniques. Metallurgy of wire bonding and its characteristic. Intermetallic compound and metallic interface. Wire bond testing concepts. Bonding issues and reliability failures. **Soldering Technology** - Solder materials and microstructures. Flux and solderability. Solder joint and intermetallic formation. Reliability and failure mechanisms. Applications and metallization in flip chip technology and tape-automated bonding. **Processing Technologies** - Metal deposition techniques commonly used in microelectronic packaging processes including evaporation, sputtering and elctro- and electroless plating which are used in the fabrication of corrosion-resistant metal pads on IC packages. Advantages and disadvantages of the technique used. Patterning process. Metal-to-metal joining process. **Package Construction** - Application of metals in base, lead frames and lids construction.

COURSE OUTCOMES

1. Ability to justify and compare the applications of metals in electronic packaging technology
2. Ability to justify the metallization processes and its effects to the interconnect reliability
3. Ability to evaluate and predict intermetallic formations and its effect to the reliability of electronic interconnects
4. Ability to analyze and compare metal deposition techniques commonly used in microelectronic packaging processes

REFERENCE BOOKS

1. Harper C. (2009). Electronic Materials and Processes Handbook. Singapore: McGraw-Hill.
2. Kasap S. (2005). Principles of Electronic Materials and Devices. 3rd Ed. Singapore: McGraw-Hill.
3. J.H. Westbrook, R.L. Fleischer. (2000). *Magnetic, Electrical, and Optical Properties and Applications of Intermetallic Compounds*. Volume 4. Publisher: Wiley.
4. George G. Harman. (1997). *Wire Bonding in Microelectronics: Materials, Processes and Equipment*. Publisher: McGraw-Hill Professional.
5. Mayer J.W. and Lau S.S. (1989). Electronic Materials Science: For Integrated Circuits in SI and GaAs. New York: Prentice Hall.

EBT 418/3
WELDING METALLURGY

COURSE SYNOPSIS

This course is designed to introduce the students to welding metallurgy principles and influencing factor in welding metallurgy selected. Therefore, students will be exposed to welding principle, metallurgical welding, welding types and welding mechanism, welding problems in varies industries and welding solutions.



COURSE OUTCOMES

1. Ability to identify fundamental, principles and engineering of welding metallurgy
2. Ability to apply welding metallurgy practice for ferrous and non-ferrous alloys
3. Ability in solving problems, analyzing and testing of welding metallurgy

REFERENCE BOOKS

1. Lancaster J.F. (1999). Metallurgy of Welding. 6th Ed. UK: Abington Publishing.
2. Easterling. K, (1993). *Introduction to Physical Metallurgy of Welding.* Butterworth: Heinemann.
3. Granjon H. (1991). Fundamentals of Welding Metallurgy. UK: Abington Publishing.
4. Kou. S.(1987). *Welding Metallurgy.* John Wiley & Sons.
5. Linnert G.E. (1965) Welding metallurgy;: Carbon and alloy steels. Volume 1: fundamentals. 3rd Ed. USA: American Welding Society.

EBT 419/3
APPLIED METALLURGY

COURSE SYNOPSIS

This course is to introduce the students to fundamental of metal casting. Casting technology, heating and pouring. Solidification and cooling. Fluidity and fluid flow phenomena in casting processes. Casting quality and casting defects. Characterization of engineering powders. Production of metallic powders . Conventional pressing and sintering. Alternative pressing and sintering techniques. Matereials and products for Powder Metallurgy. Overview of metal forming. Material behaviour. Bulk deformation process in metal working, rolling, forging, extrution bar and wire drawing. Cutting and bending operation, drawing, shear metal forming operation. Mechanics of metal cutting and chip formation. Power and energy relationship in machining.

COURSE OUTCOMES

1. Ability to describe fundamental applied metallurgy and its application in materials (ferrous and non-ferrous)
2. Ability to describe types of patterns, molds, furnaces and the different types of gating systems
3. Ability to describe and analyze the products from powder metallurgy, conventional pressing and sintering
4. Ability to describe and analyze the process of cutting and bending, chip formation and cutting fluid

REFERENCE BOOKS

1. Peter Beeley. (2001). *Foundry Technology.* 2nd Ed. Oxford:Butterworth/Heinemann.
2. John E. Neely, Thomas J. Bertone. (2000). *Practical Metallurgy and materials for Industry.*
3. J. Beddoes, M. Bibby. (1999). *Principle of Metal Manufacturing Process.* Butterworth- Heinemann.
4. Serope Kalpakjian. (1991). *Manufacturing processes for Engineering Materials.* Addison Wesley.
5. Degarmo, Black and Koser. (1988). *Material and Processes in Manufacturing.*

EBT 420/3
METALLURGICAL FORENSIC ANALYSIS

COURSE SYNOPSIS

This course is designed to bridge the gap between theory and practice of forensic analysis in term of metallurgical aspect. It presents a very practical approach to forensic analysis for metallurgical engineering students who interested in understanding how knowledge of forensic analysis can lead to better productivity. The forensic analysis of product/component failures is also studied from beginning to end for certain case studies that normally happen in industries. The module also provides hands-on experience on alloy forensic analysis both at during laboratory work and on site visit. Student also exposed with technical report writing technique through mini project.

COURSE OUTCOMES

1. Ability to evaluate what metallurgical forensic analysis can mean in terms of profitability and liability
2. Be able to implement general procedures, techniques and precautions in failure analysis
3. Be able to analyze the exposed and extract the hidden information presented by failed product/ component that may resulted from wide variation of failure factors
4. Be able to develop corrective and preventive actions based on forensic analysis finding

REFERENCE BOOKS

1. Das, A. K. (1997). *Metallurgy of Failure Analysis*. McGraw-Hill. New York
2. Brooks, C.R., Choudhury, A., Brooks, C.R., (2001). *Failure Analysis of Engineering Materials*. McGraw-Hill. . New York
3. McEvily, A.J., (2002). *Metal Failures: Mechanisms, Analysis, Prevention.* John Wiley & Sons. New York
4. Mobley, R. K., (1999). *Root Cause Failure Analysis.* Butterworth-Heinemann. Woburn
5. Tawancy, H.M., Nureddin., A. U. Abbas. M., (2004). *Practical Engineering Failure Analysis.* Taylor & Francis. New York

EBT 421/3
ADVANCED MATERIALS ENGINEERING

COURSE SYNOPSIS

Introduction to advanced material (nanostructured, synthethic alloy, ODS alloy), the fabrication process of those materials and its applications also characterization techniques by using TEM, SEM, XRD and BET methods.

COURSE OUTCOMES

1. Ability to comprehend an advanced material concept and the characterization method.
2. Ability to 'know how' the processing techniques of advanced materials.
3. Ability to justify the application of advanced materials.

REFERENCE BOOKS

1. Smallman R.E. and Ngan A.H.W. (2007). Physical Metallurgy and Advanced Materials. 7th Ed. Oxford: Butterworth-Heinemann.
2. Hari Singh Nalwa. (2002). *Nanostructred Materials and Nanotechnology.* Academic Press,
3. El-Eskandarany. S.M. (2001). *Mechanical Alloying For Fabrication Of Advanced Engineering Materials.* Noyes Publication,
4. Bernier P, S lefrant, G Bidan. (1999). *Advance In Synthetics Metals.*Elsevier.
5. Edelstein. A, Cammarata R. S. (1996). *Nanomaterial: Synthesis, Properties And Application.*

EBT 424/3
CONSTRUCTION MATERIALS

COURSE SYNOPSIS

Introduction to the basic construction materials including raw material, physical and mechanical properties, processing and construction material designs. Also introduction to construction industries in Malaysia and involvement of others organization in supervising construction industry such as JKR, CIDB, IEM, PAM, Sirim, Kementerian Perumahan dan Kerajaan Tempatan dan Pusat Khidmat Kontraktor.

COURSE OUTCOMES

1. Ability to determine and discuss the processing, properties and testing of various construction materials
2. Ability to differentiate construction materials and its applications in construction (concrete/ masonry/ plastic/ glass/ timber/ bitumen)
3. Ability to identify, formulate, and solve engineering experimental design problems

REFERENCE BOOKS

1. Mahyudin Ramli, Teknologi Konkrit dan Pembinaan, Dewan Bahasa & Pustaka, 1991
2. R.K. Rajput (2000). Engineering Material, S. Chand & Company Ltd.
3. J. Newman, Advanced Concrete Technology: Constituent Materials, Butterworth, Heinemann, 2004.
4. Theodore Marotta, John C. Coffey, Cynthia LaFleur-Brown. Christine LaPlante (2010). Basic Construction Materials, Prentice Hall, 8th Editions.
5. Sidney Mindess, J. Francis Young, David Darwin (2002). Concrete, Prentice Hall, 2nd Edition.

EBT 427/3
TECHNICAL CERAMIC

COURSE SYNOPSIS

This course is designed to exposed the students to the technical ceramic and important aspect in advance ceramic. **Electro Ceramic** - Materials and properties. Basic concept of ceramic to electro ceramic application including insulator, ceramic high frequency, piezoelectric transistor and superconductor. **Refractory** - Properties and application of different types of refractory such as silica, alumina silica, magnesit dan crome magnesit. **Ceramic Structure** - Materials and properties. Basic principles of ceramic to the aerospace, cutting tools, automobile and biomaterials applications. **Ceramic Matrix Composites** - Properties and several toughening technique. Carbon-carbon composites and hybrid composite. Processing of fiber reinforced composites including pultrusion, prepreg production process and filament winding. **Bio Ceramic** - Selection, properties and application. Basic concept of toughening and produce ceramic composite for biomaterials application. **Non Structure Ceramic** - Materials and properties. Nonstructural application including packaging, sensor, filtering and electrical optic. **Glass** - Mechanical, optic, electric and chemical resistance properties of glass. Glass transition temperature and structure of glass including glass forming oxides, glass modifying oxides and intermidiate oxides in glasses. Properties and application of different composition of glasses such as soda lime glass, borosilicate glass and lead glasses. Production and forming methods of glasses including heating, molding, drawing or rolling and annealing.

COURSE OUTCOMES

1. Able to distinguish and/or illustrates the concept, principles and basic properties of electro-ceramic, refractory, structural and bio-ceramic materials.
2. Able to construct and/or correlates between materials used-crystal structure-processing and properties of different advanced ceramics materials.



3. Able to propose and/or design mechanism, function and approach in different areas of advanced ceramic materials.
4. Able to justify and/or solve problems arises in different areas of advanced ceramic materials.

REFERENCE BOOKS

1. Richard K. Ulrich, William D.Brown. (2006). Advanced Electronic Packaging. 2nd Edition. Publisher: John Wiley & Sons, Inc.
2. Rao R. Tummala. (2001). Fundamentals of Microsystems Packaging. Publisher: McGraw-Hill.
3. Charles A. Harper. (2005). Electronic Packaging and Interconnection Handbook. 3rd Edition. McGraw Hill Professional, 2005
4. Xingcun Colin Tong. (2011), Advanced Materials for Thermal Management of Electronic Packaging. Springer Series in Advanced Microelectronics.
5. Vasudeva P. Atluri, Sujit Sharan, Ching Pong Wong, Darrel Frear. (2007). Advanced Electronic Packaging, Part of MRS Proceedings, Vol 968

EBT 429/3
COMPOSITE MATERIALS

COURSE SYNOPSIS

This course is focusing on the three major types of composite materials which are Ceramic Matrix Composite (CMC), Metal Matrix Composite (MMC) and Polymer Matrix Composite (PMC). Lectures cover on several important aspects of composite materials. This includes the introductions, classifications, properties, applications and characterizations of composite materials, matrix and reinforcement phase, manufacturing and processing methods, types and influence of different reinforcement, inter-phase properties, mechanical and failure behavior, current and future potential applications of composite products. At the end of this course, students will have a comprehensive knowledge and well understanding regarding composite materials.

COURSE OUTCOMES

1. Able to classify different types of composite materials.
2. Able to explain the properties and characteristics of each composite materials.
3. Able propose a suitable fabrication technique of composite materials for specific application.
4. Able to analyze problems, select and fabricate better composite system/ process for greener environment applications.

REFERENCE BOOKS

1. John Wanberg (2012). Composite Materials: Fabrication Handbook #3. Wolfgang Productions.
2. Khairel Rafezi Ahmad, Mohd Mustafa Abdullah, Che Mohd Ruzaidi Ghazali, Shamsul Baharin Jamaludin, Mohamed Faisol Mohamed Noor, Alida Abdullah (2011) Pengenalan Bahan Komposit. Penerbitan UniMAP, 2011.
3. Krishan K. Chawla (2012). Composite Materials: Science and Engineering", Springer.
4. William F. Smith, Javad Hashemi (2010). Foundations of Materials Science and Engineering 5th Edition. McGraw-Hill Education.
5. Mathew, F.L., Rawlings, R.D. (1998). Composite Materials: Engineering and Science, Chapman & Hall.

EBT 435/3
POLYMER IN ELECTRONIC APPLICATION

COURSE SYNOPSIS

To provide knowledge of polymer application in electronic industries. This includes an understanding on the concepts of fabrication processes of various polymers in this application. Provide knowledge on characterization and selection principles of polymer in electronic application.

COURSE OUTCOMES

1. Able to apply the basic knowledge on the concepts of polymer in electronic application requirements.
2. Able to categorize the materials involved and the production processes.
3. Able to identify the importance of polymers and manage the problems in electronic application.
4. Able to select testing and characterization of some polymers for electronic application.

REFERENCE BOOKS

1. Kasap. S. O. (2002) "Principles of Electronic Materials and Devices", 2nd Edition, Mc Graw Hill, New York.
2. Charles A. Harper. (2005) "Electronic Packaging and Interconnection Handbook", 4th Edition, Mc Graw Hill, New York.
3. Manas Chanda, Salil K. Roy. (2009) "Industrial Polymers. Specialty Polymers, and Their Application", CRC Press, Taylor & Francis Group.

EBT 437/3
POLYMER COMPOSITES

COURSE SYNOPSIS

This course will provide the concepts of polymer composites with several of fabrication techniques. This course also provides knowledge on fiber reinforcement of polymer matrices and their corresponding properties. The course includes the mechanics of composites and some composite testing methods.

COURSE OUTCOMES

1. Able to categorize, differentiate and relate the concepts of polymer composites.
2. Able to explain and compare the fabrication techniques of composites.
3. Able to calculate, analyze and prepare composite testing methods.
4. Able to evaluate and measure the mechanical properties of composites.

REFERENCE BOOKS

1. Deborah, D. L. Chung, (2003). Composites Materials: Science and Application, Springer-Verlag, Ltd, London.
2. Avokali, G. (2001). Handbook of Composite Fabrication. Rapra Technology Limited, UK
3. Barbara H. Stuart (2002). Polymer Analysis. John Wiley & Sons, Ltd., England

EBT 439/3
ADVANCED ELECTRONIC PACKAGING

COURSE SYNOPSIS

In this course, students will be exposed to the following components**: Introduction on the overview of microelectronic packaging** such as function of an electronic package, packaging hierarchy, and brief history of microelectronic packaging technology. The advantages, disadvantages and challenges of each of the above packages towards meeting the needs of the nanometer range, needs of new devices and market will be shared. **Thermal management**: heat transfer theory, thermal & cooling design and thermal measurement methodology that involved the software and hardware. **Package assembly and its design characteristic:** Fundamentals and process of integrated circuit (IC) assembly will be shared. This includes the three primari IC assembly technology: wirebonding, tape automated bonding (TAB) and flip chip. **The fundamentals and process of board assembly** which typically involves mounting components on wiring board and soldering thier leads to the board. Main technologies of board assembly will be shared which includes surface mount technology (SMT) and through hole assembly technology. The generic board assembly issues which relates to material will also be shared. Soldering **technology**: alloy, soldering tecnique, microstructure, interconnection, no-clean solder, lead-free solder and lead-free plating.

COURSE OUTCOMES

1. Able to examine the packaging hierarchy and construct the latest types of electronic packaging used in various semiconductor industries.
2. Able to examine the materials involved and the production processes. This include ability to analyse the design, thermal problems and creating methods to overcome these problems in gaining the optimum performance while considering the environment friendliness of the materials and their processing.
3. Able to analyse the conventional and advance electronic assembly automation and tolerate the challenges, facilities involved to its applications in wireless industry-based products.

REFERENCE BOOKS

1. S.O Kasap. (2002). *Principles of Electronic Materials and Devices*. 2nd Edition. Publisher: McGraw-Hill.
2. Ken Gilleo. (2001). *Area Array Packaging Handbook*. 1st Edition. Publisher: McGraw-Hill.
3. Charles A. Harper. (2000). *Electronic Packaging and Interconnection Handbook*. 3rd Edition.Publisher: McGraw-Hill.
4. John H. Lau. (2000). *Low Cost Flip Chip Technologies for DCA, WLCSP, and PBGA Assemblies*. Publisher: McGraw-Hill.
5. John Lau, S.W. Ricky Lee. (1999). *Chip Scale Package – Design, Materials, Process, Reliability, and Applications.* Publisher: McGraw-Hill.

EBT 441/3
POLYMER ENGINEERING DESIGN

COURSE SYNOPSIS

The aim of this course is to develop knowledge on the polymer engineering design specifically for plastic injection moulding activities, dies for extrusion process and a design that involves a polymerization reactor. The generate knowledge will provide an effective skill to counter and solve the common problem approach on the fundamental basis of polymer engineering design.



COURSE OUTCOMES

1. Able to describe and discuss the concept of mould and die design and its purpose to get an optimum processing conditions during polymer processing.
2. Able to compose the optimize mould design and die design condition for different type of molding requirement.
3. Able to apply fundamentals in the design and operation of chemical plant.
4. Able to apply the concepts and methods of plant design and economic evaluation.

REFERENCE BOOKS

1. Peters M. S. and K. D. Timmerhaus, Plant Design and Economics for Chemical Engineers, 4th Edition, McGraw-Hill Book Company, New York (1991).
2. Perry's (1997). Chemical Engineer's Handbook, 7th Edition, McGraw-Hill Book Company, New York.
3. Rase, H. F. (1977). Chemical Reactor Design for Process Plants, Volumes I & II, J. Wiley & Sons, Inc., New York.
4. Micheali, W (1992). Extrusion Dies for plastics and rubber: Design and Engineering. Munich: Hanser Publishers.
5. Michaeli, W.; Greif, H.; Kretzschmar, G.; Ehrig, F. (2001). Training in Injection Molding. Munich: Hanser Publishers
6. Rosato, D.V, Rosato, D.V, Rosato, M.G (2000). Plastic design handbook. Massachusetts: Kluwer Academic Publishers.
7. Osswald, T.A, Hernandiz-Ortiz, J. P (2006). Polymer Processing: Model and simulation. Munich: Hanser Publishers.
8. Campo, E. A (2006). The complete part design handbook: For injection molding of thermoplastics. Munich: Hanser Publishers.

EBT 442/3
POLYMER ENGINEERING INTEGRATED DESIGN PROJECT

COURSE SYNOPSIS

This course contains foundation and knowledge on engineering design. Apply and practice knowledge on polymer engineering and properties, principle of polymer selection, process selection and sustainability of materials to reinforce the engineering knowledge through case study and designed capstone-project. This project is an open-ended and conceptual based (no end product).

COURSE OUTCOMES

1. Ability to develop design solutions based on appropriate knowledge in "polymer design" with realistic constraints.
2. Ability to use engineering tools for product/system design, simulation and analysis.
3. Ability to communicate effectively to share information and describe concepts and ideas with the engineering community.
4. Ability to demonstrate understanding on project management and finance principles.

REFERENCE BOOKS

1. Micheal, F. Ashby. (2010). Materials Selection in Mechanical Design. Butterworth Heneimann.
2. Pat. L. Mangonon. (1999). The Principles of Materials Selection for Engineering Design. Prentice Hall.
3. Michael F. Ashby (2009). Materials and Design: The Art and Science of Material Selection in Product Design. Butterworth-Heinemann
4. Michael F. Ashby and D. R. H. Jones. (2005). Engineering Materials 1: an Introduction to Properties, Applications and Design: v. 1. Butterworth-Heinemann Ltd
5. Michael F. Ashby, Hugh Shercliff, David Cebon. (2009). Materials: Engineering, Science, Processing and Design. A Butterworth-Heinemann

EBT 443/4
METALLURGICAL DESIGN

COURSE SYNOPSIS

Metallurgical design are create to incorporate engineering standards and realistic constrains, including most of the following considerations: economic, ethical, environmental and social. Focus on the design process, and the design method. The development of interdisciplinary teams is a high priority. The course integrates vertically and horizontally concepts from all areas of Metallurgical Engineering into a practical design project designed to train the students in the design practice. Fundamentals of the design process, specifications, decision-making, materials selection, materials process, experimental design, statistic process control and preliminary design are the focus. This course consists in the students playing the role of apprentices to design by teaming up with the interdisciplinary students in the s design projects.

COURSE OUTCOMES

1. Able to define and describe fundamental metallurgical design and selection
2. Able to relate metallurgical knowledge, processing, microstructure and performance and their implication with metallurgical design

3. Able to design any metallurgical activities and apply in engineering and industrial application

REFERENCE BOOKS

1. George E. Dieter, (2000). *Engineering Design, a Materials and Processing Approach, Third Edition.* McGraw-Hill Company.
2. Atila Ertas and Jesse C. Jones, (1993). *The Engineering Design Process*. John Wiley & Sons, Inc.
3. Ashby M.F. and Johnson K. (2009). Materials and Design, Second Edition: The Art and Science of Material Selection in Product Design. 2nd Ed. Oxford: Butterworth-Heinemann.
4. Schaffer J.P. (1998). The Science and Design of Engineering Materials. 2nd Ed. Singapore: McGraw-Hill.
5. Pickering F.B. (1978). Physical Metallurgy and the Design of Steels. London: Applied Science Publishers.

EBT 445/2 & EBT 446/4
FINAL YEAR PROJECT

COURSE SYNOPSIS

Research project will be conducted by the final year student. Objective of the project is to introduce the real problem in the field of engineering and familiarize the research method, problem solving, research publication and presentation of the effective results through thesis and seminar.

COURSE OUTCOMES

1. Able to plan and manage research project.
2. Ability to apply theory that had been studied in research project.
3. Able to write a technical report professionally.
4. Able to present a research project professionally.

EBT 447/4
MATERIALS SELECTION AND DESIGN

COURSE SYNOPSIS

This course contains foundation of knowledge on engineering design and the role of materials in it. Knowledge and understanding on Engineering Materials and their properties, Material property charts, Principles of materials selection, Process and process selection and Sustainability of Material are required to reinforce the foundation of knowledge. Practical knowledge in understanding of engineering design and selection of material will be assessed through case study and designed capstone-project. *∗This course begins in the first semester (Sem 7th) but total credits are given upon completion of the second semester (Sem 8th).*

COURSE OUTCOMES

1. Ability to recognize the design concept and requirement of complex engineering problem in Material Engineering field
2. Ability to apply and evaluate the design concept and requirement for the selected project in Material Engineering field
3. Ability to develop and integrate the specific unit process and unit operation in Material Engineering field
4. Ability to conduct economic evaluation of the selected project in Material Engineering field

REFERENCES

1. Micheal, F. Ashby. (2010). Materials Selection in Mechanical Design. Butterworth Heneimann.
2. Pat. L. Mangonon. (1999). The Principles of Materials Selection for Engineering Design. Prentice Hall.
3. Michael Ashby (2009). Materials and Design: The Art and Science of Material Selection in Product Design. Butterworth-Heinemann
4. Michael F. Ashby and D. R. H. Jones. (2005). Engineering Materials 1: An Introduction to Properties, Applications and Design: v. 1. Butterworth-Heinemann Ltd
5. Michael F. Ashby, Hugh Shercliff, David Cebon. (2009). Materials: Engineering, Science, Processing and Design. A Butterworth-Heinemann

EBT 448/3
POLYMER ADHESIVE AND COATING

COURSE SYNOPSIS

To introduce the basic knowledge on principles and properties of adhesion, adhesives polymer coatings. This course is focus on design formulation of adhesives and coating products, study working properties, testing and characterization and also application of them.

COURSE OUTCOMES

1. Able to explain basic concepts of adhesives and coatings for polymeric systems.
2. Able to differentiate selected adhesive and coating system for certain applications.
3. Able to create, formulate and characterize different polymer adhesives and coatings systems.
4. Able to select and adapt main testing methods for adhesives and coatings, preparation and performance.

REFERENCE BOOKS

1. Mittal, K. L., Pizzi, A. (2003). Handbook of Adhesive Technology, Marcel Dekker. Inc, New York.

2. Souheng, Wu. (1982). Polymer Interface Adhesion, Marcel Dekker. Inc, New York
3. Dillard, D. A., Pocius, A. V. (2002). Adhesion Science and Engineering, Vol. I and II, Elsevier.
4. Edward W. Orr. (1998). Performance Enhancement in Coatings. Hanser Publisher, Jerman

EBT 449/3
ENVIRONMENTAL FRIENDLY POLYMER

COURSE SYNOPSIS

The aim of this course is to provide the knowledge of environment friendly polymer. Solve on their issues and understand the future needs of environmental polymers and create alternative ways for handling polymer issue such as degradable polymer and polymers recycling.

COURSE OUTCOMES

1. Able to analyze and solve awareness on pertinent issue of polymer recycling and predict the future needs of environment polymers.
2. Able to select and evaluate with issues on polymers and additive, selection in accordance to environment requirement.
3. Able to apply and distinguish of biopolymer from viewpoint of molecular, structure and processing and develop biocompatibility aspect of biopolymer.
4. Able to prepare and select of on polymer wastes, biopolymer and biodegradable polymers in various engineering application.

REFERENCES

1. Francesco La Mantia, (2002). Handbook of Plastics Recycling, Rapra Technology Limited, Shawbury.
2. Catia Bastioli, (2005). Handbook of Biodegradable Polymers, Rapra Technology limited, Shawbury.
3. Jhonson R.M. (2003). Biopolymer. Sithers Rapra, Vol 14. U.K.

JOB OPPORTUNITIES

Graduates with a Bachelor of Engineering (Materials Engineering), (Metallurgical Engineering) and (Polymer Engineering) have broad employment prospects either in the private sector/industry, departments in government or statutory bodies. Sectors that offer employment opportunities are as followed;

- Metal Industry.
- Polymer Industry.
- Electronic Packaging Industry.
- Materials Processing Industry.
- Automotive Industry.
- Service and Maintenance Industry.
- Engineering Fabrication Industry.
- Quality Control Department.
- Department of Engineering and Product Design.
- Research and Development Institution or Department.
- Institutions of Higher Education.
- Polytechnic / Community College.

The main careers for graduates in these THREE programmes are as followed;

- Process Engineer.
- Production Engineer.
- Manufacturing Engineers.
- Quality Control Engineer (QC).
- Quality Assurance Engineer (QA).
- Failure Analysis Engineer.
- Product Development Engineer.
- Process Development Engineer.
- Materials Development Engineer.
- Metallurgical Engineers.
- Negotiation and Site Engineer.
- Research Officer.
- Lecturer for Polytechnic / College Community.
- Teaching Engineer



SCHOOL OF BIOPROCESS ENGINEERING

PROGRAMMES OFFERED

- Bachelor of Engineering (Honours)(Bioprocess Engineering)
- Bachelor of Engineering (Honours)(Biosystems Engineering)
- Master of Science (Bioprocess Engineering)
- Master of Science (Biosystems Engineering)
- Doctor of Philosophy

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INTRODUCTION

The School of Bioprocess Engineering (SBE) was first established in October 2005 after approval from the Ministry of Higher Education. SBE currently offers two (2) Bachelor's Degree programmes namely Bachelor of Engineering (Hons.) (Bioprocess Engineering) and Bachelor of Engineering (Hons.) (Biosystems Engineering). The fields of Bioprocess Engineering and Biosystems Engineering play a significant role in industrialized countries. Generally, the curricula are designed to enhance student's theoretical knowledge. The primary purpose is to produce holistic graduate engineers who posses not only the technical knowledge and critical skills but also equipped with skills in information technology, communication, entrepreneurship, and also ethics. Hence, the structures of the curricula are designed to deliver these important knowledge and skills.

BACHELOR OF ENGINEERING (HONOURS) (BIOPROCESS ENGINEERING)

Bioprocess Engineering is a specialization of biological processes and Biotechnology in Chemical Engineering field. It deals with the design and development of equipment and processes for the manufacturing of bio-based products such as food, feed, pharmaceuticals, nutraceuticals, chemicals, polymers, and etc, from biological materials. Bioprocess engineering is a conglomerate of mathematics, biology and chemical design,and consists of various spectrums like studying of fermentors (mode of operations etc.), large scale production of biological product, optimization of yield in the end-product and the quality of end-product and microorganism cellular-based productions.

BACHELOR OF ENGINEERING (HONOURS) (BIOSYSTEMS ENGINEERING)

UniMAP's Biosystems Engineering is considered as the biology-focused evolution of typical Agricultural Engineering programme and applies to all living organism systems with an exception of human. It is an engineering programme that *"integrates engineering science and design with applied biological, environmental and agricultural sciences towards sustainable development of agricultural related industries"*.The curriculum structure of Biosystems Engineering encompasses courses and exposures related to disciplines in automation and emerging technologies, information technology, power and machinery, postharvest technology, structures and environment, soil and water, and sustainable agriculture.

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BACHELOR OF ENGINEERING (HONOURS) (BIOPROCESS ENGINEERING)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Graduates who are leaders in the field of chemical engineering in bioprocess or chosen field as demonstrated via career advancement.

PEO2
Graduates who are members of and contribute to professional society.

PEO3
Graduates who engage in life-long learning or continuous education opportunities.

PEO4
Graduates who contribute towards research and development.

PEO5
Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in bioprocess/ chemical engineering discipline to the solution of complex engineering problem.

PO2
Ability to identify, formulate and solve complex engineering problems.

PO3
Ability to design solutions for complex engineering problems and systems, components or processes to meet desired needs.

PO4
Ability to conduct investigation into complex problems as well as to analyze and interpret data.

PO5
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7
Ability to understand entrepreneurship, the process of innovation and the need for environmental and sustainable development.

PO8
Ability to understand the professional and ethical responsibilities and commitment to the community.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11
Recognition of the need for, and an ability to engage in life-long learning.

PO12
Demonstrate understanding of project management and finance principles.

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (BIOPROCESS ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (87)	ERT 105/3 Electrical Technology	ECT 112/3 Engineering Skills	ERT 213/3 Process Instrumentations	ERT 206/4 Thermodynamics	ERT 316/3 Reaction Engineering	ERT 320/3 Bioseparation Engineering		ERT 445/2 Final Year Project 1	ERT 446/4 Final Year Project 2
		EKT 120/4 Computer Programming	ERT 214/4 Material and Energy Balance	ERT 215/3 Fluid Mechanics	ERT 317/4 Biochemical Engineering	ERT 321/4 Process Control & Dynamics		ERT 424/3 Bioprocess Plant Design I	ERT 428/4 Bioprocess Plant Design II
			EQT 203/3 Engineering Mathematics III	ERT 216/4 Heat & Mass Transfer	ERT 318/4 Unit operations	ERT 314/4 Bioreactor System		ERT 425/3 Good Manufacturing Practice For Bioprocess Industries	#ERT4XX/3 Elective II
					ERT 319/3 Industrial Waste Treatment	ERT 322/3 Safety & Loss Prevention		#ERT 4XX/3 Elective I	
						ERT 323/2 Simulation for Bioprocess Engineering			
Non Engineering (31)	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II	ERT 207/4 Analytical Chemistry	EQT 271/3 Engineering Statistics		EUT 122/2 Skills & Technology in Communication	EIT 302/4 Industrial Training	EUT 444/3 Management for Engineers	EUT 442/2 Profesional Engineers
	ERT 106/3 Biochemistry	ERT 107/3 Microbiology for Bioprocess Engineering							
	ERT 102/4 Organic Chemistry	ERT 108/3 Physical Chemistry							
University Required (19)	UVW 410/2 University Malay Language		UUW 224/2 Engineering Entrepreneurship	UVW 312/2 English For Technical Communication	UUW 322/2 Thinking Skills				
	UZW XXX/1 Co-Curricular Activity	UVW 211/2* English For General Purposes	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UUW XXX/2 Option Subjects	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies				
	UVA111/0 Foundation English	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity						
137	16	17 (+2*)	19	18	18	18	4	14	13
Total Units for Graduation 137									

Elective:
Elective I : ERT 426/3 Food Engineering , ERT427/3 Design of Experiments
Elective II : ERT 429/3 Energy from Bioresources, ERT 430/3 Pharmaceutical Process Engineering



BACHELOR OF ENGINEERING (HONOURS) (BIOSYSTEMS ENGINEERING)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Graduates who are leaders in the field of agricultural/biosystems engineering or chosen field as demonstrated via career advancement

PEO2
Graduates who are members of and contribute to professional society

PEO3
Graduates who engage in life-long learning or continuous education opportunities.

PEO4
Graduates who contribute towards research and development

PEO5
Graduates who are entrepreneurial engineers

PROGRAMME OUTCOMES (PO)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in agricultural/biosystems engineering discipline to the solution of complex engineering problem.

PO2
Ability to identify, formulate and solve complex agricultural/ biosystems engineering problems.

PO3
Ability to design solutions for complex engineering problems and systems, component or process to meet desired needs.

PO4
Ability to conduct investigation into complex problems, as well as to analyze and interpret data

PO5
Ability to use techniques, skills and modern engineering tools necessary for complex engineering practices so as to be easily adaptable to industrial needs.

PO6
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO8
Understanding of professional and ethical responsibilities and commitment to the community.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11
Recognition of the need for, and an ability to engage in life-long learning.

PO12
Demonstrate understanding of project management and finance principles.

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (BIOSYSTEMS ENGINEERING)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEM	I	II	I	II	I	II		I	II
Engineering Core (92)	ERT 147/3 Fundamental of Biosystems Engineering	ERT 150/2 Statics	ERT 205/4 Fluid Mechanics Engineering	ERT 246/4 Hydrology And Water Resources Engineering	ERT 354/3 Soil Engineering	ERT 351/3 Sustainable Agrosystems Engineering	EIT 302/4 Industrial Training	ERT 445/2 Final Year Project 1	ERT 446/4 Final Year Project 2
	ERT 148/2 Computer Aided Engineering Design		ERT 250/2 Dynamic	ERT 254/3 Thermodynamics for Biosystems Engineering	ERT 245/4 Heat And Mass Transfer in Biological Systems	ERT 457/3 Design of Automation Systems		ERT 461/3 Biosystems Engineering Design 1	ERT 462/3 Biosystems Engineering Design 2
			ERT 251/2 Strength of Materials	ERT 255/3 Engineering Properties of Biological Materials	ERT 350/3 Instrumentation, Measurement & Control in Biosystems	ERT 356/3 Unit Operations		ERT 4XX/3 Elective 1	ERT 4XX/3 Elective 2
			ERT 252/3 Geomatic Engineering	ERT 256/2 Theory of Structures	ERT 353/3 Energy & Power in Biosystems	ERT 355/2 Biosystems Modelling and Simulation		ERT 464/3 Design of Machine & System	EUT 442/3 Profesional Engineers
			ERT 253/3 Electrical & Electronics Technology	EQT 271/3 Engineering Statistics	ERT 352/3 Farm Structures			ERT 460/3 Controlled Environment Engineering	
								EUT 444/2 Management for Engineers	
Non-Engineering Core (22)	ERT 149/4 Applied Biology for Biosystems Engineering	ERT 151/3 Biochemistry							
	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II	EQT 203/3 Engineering Mathematics III						
		EKT 150/3 Introduction to Computer Programming							
		ECT 112/3 Engineering Skills							
		UUT 122/2 Skills & Technology in Communication							
University Required (19)	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UVW 312/2 English for Technical Communication	UUW 224/2 Engineering Entrepreneurship	UUW 322/2 Thinking Skills			UVW XXX/2 Option
	UVW 410/2 University Malay Language	UVW 211/2* English for General Purposes				UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies			
	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures								
	UVA 111/0 Foundation English								
137	17	17(+2*)	18	17	18	15	4	16	15

	Waste-to-Wealth Engineering	Soil & Water Resources Engineering	Agro Processing & Production
Elective 1 (Semester 1)	ERT 466/3 Waste Management	ERT 468/3 Surface Water Management	ERT 456/3 Post Harvest Engineering
Elective 2 (Semester 2)	ERT 467/3 Biomass Conversion Technology	ERT 469/3 Groundwater Engineering	ERT4 70/3 Bio-products Manufacturing



LIST OF COURSES

BACHELOR OF ENGINEERING (HONOURS) (BIOPROCESS ENGINEERING)

- ERT 102/4 ORGANIC CHEMISTRY
- ERT 105/3 ELECTRICAL TECHNOLOGY
- ERT 106/3 BIOCHEMISTRY
- ERT 107/3 MICROBIOLOGY FOR BIOPROCESS ENGINEERING
- ERT 108/3 PHYSICAL CHEMISTRY
- ERT 206/4 THERMODYNAMICS
- ERT 207/4 ANALYTICAL CHEMISTRY
- ERT 213/3 PROCESS INSTRUMENTATIONS
- ERT 214/4 MATERIAL AND ENERGY BALANCE
- ERT 215/3 FLUID MECHANICS
- ERT 216/4 HEAT & MASS TRANSFER
- ERT 314/4 BIOREACTOR SYSTEM
- ERT 316/3 REACTION ENGINEERING
- ERT 317/4 BIOCHEMICAL ENGINEERING
- ERT 318/4 UNIT OPERATIONS
- ERT 319/3 INDUSTRIAL WASTE TREATMENT
- ERT 320/3 BIOSEPARATION ENGINEERING
- ERT 321/4 PROCESS CONTROL & DYNAMICS
- ERT 322/3 SAFETY & LOSS PREVENTION
- ERT 323/2 SIMULATION FOR BIOPROCESS ENGINEERING
- ERT 424/3 BIOPROCESS PLANT DESIGN 1
- ERT 425/3 GOOD MANUFACTURING PRACTICE FOR BIOPROCESS INDUSTRIES
- ERT 426/3 FOOD ENGINEERING
- ERT 427/3 DESIGN OF EXPERIMENTS
- ERT 428/4 BIOPROCESS PLANT DESIGN 2
- ERT 429/3 ENERGY FROM BIORESOURCES
- ERT 430/3 PHARMACEUTICAL PROCESS ENGINEERING
- ERT 445/2 FINAL YEAR PROJECT 1
- ERT 446/4 FINAL YEAR PROJECT 2

BACHELOR OF ENGINEERING (HONOURS) (BIOSYSTEMS ENGINEERING)

- ERT 147/3 FUNDAMENTAL OF BIOSYSTEMS ENGINEERING
- ERT 148/2 COMPUTER AIDED ENGINEERING DESIGN
- ERT 149/4 APPLIED BIOLOGY FOR BIOSYSTEMS ENGINEERING
- ERT 150/2 STATICS
- ERT 151/3 BIOCHEMISTRY
- ERT 205/3 FLUID MECHANICS ENGINEERING
- ERT 250/2 DYNAMIC
  PREREQUISITE: STATICS
- ERT 251/3 STRENGTH OF MATERIALS
  PREREQUISITE: ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS
- ERT 252/3 GEOMATICS ENGINEERING
- ERT 253/3 ELECTRICAL AND ELECTRONICS TECHNOLOGY
- ERT 246/4 HYDROLOGY AND WATER RESOURCES ENGINEERING
- ERT 254/3 THERMODYNAMICS
- ERT 255/3 ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS
- ERT 256/2 THEORY OF STRUCTURES
- ERT 354/3 SOIL ENGINEERING
- ERT 245/4 HEAT AND MASS TRANSFER IN BIOLOGICAL SYSTEMS
- ERT 350/3 INSTRUMENTATION MEASUREMENT AND CONTROL IN BIOSYSTEMS ENGINEERING
- ERT 353/3 ENERGY AND POWER IN BIOSYSTEMS
- ERT 352/3 FARM STRUCTURES
  PREREQUISITE: THEORY OF STRUCTURES
- ERT 351/3 SUSTAINABLE AGROSYSTEMS ENGINEERING
- ERT 457/3 DESIGN OF AUTOMATION SYSTEMS
- ERT 356/3 UNIT OPERATIONS
  PREREQUISITE: HEAT AND MASS TRANSFER IN BIOLOGICAL SYSTEMS
- ERT 355/2 BIOSYSTEMS MODELLING AND SIMULATION
- ERT 445/2 FINAL YEAR PROJECT I
- ERT 461/3 BIOSYSTEMS ENGINEERING DESIGN I
- ERT 464/3 DESIGN OF MACHINE AND SYSTEM
- ERT 460/3 CONTROLLED ENVIRONMENT ENGINEERING
  PREREQUISITE: HEAT AND MASS TRANSFER IN BIOLOGICAL SYSTEMS
- ERT 446/4 FINAL YEAR PROJECT 2
- ERT 462/3 BIOSYSTEMS ENGINEERING DESIGN 2
- ERT 466/3 WASTE MANAGEMENT
- ERT 456/3 POST HARVEST ENGINEERING

COURSE SYLLABUS

BACHELOR OF ENGINEERING (HONOURS) (BIOPROCESS ENGINEERING)

ERT 102/4
ORGANIC CHEMISTRY

COURSE SYNOPSIS

This course introduces the fundamental theories (atomic orbital, molecular orbital and hybridization theories) and the application of hybridization theory in reactions involving alkynes and alkenes. Then, focusing on conformational analysis of alkanes and emphasizing on the nucleophilic substitution reactions of alkylhalides. The course also covers on physical and chemical properties, and chemical reactions involving alcohol and ester, aldehyde and ketone, carboxylic acid and aromatic compound. The application of organic chemical process is discussed in terms of biofuel and biopharmaceutical production.

COURSE OUTCOMES

1. Ability to explain the basic concepts theoretically and apply the knowledge of the physical and chemical properties of each functional group.
2. Ability to explain theoretical organic chemical reactions of alkenes, alkynes and alkyhalides at molecular level.
3. Ability to demonstrate the reactions involving alcohol, ether, aldehyde, ketone, carboxylic acid and aromatic compounds.
4. Ability to formulate the knowledge of organic chemical process in industry such as production of biopharmaceuticals.

REFERENCES

1. Bruice, P.Y. 2004. *Organic Chemistry.* 4th. Edition. Prentice Hall.
2. McMurry, J. 2000. Organic Chemistry 5th Edition, Brooks/Cole.
3. Solomons, T.W.G. and Fryhle, C.B. .2008. *Organic Chemistry.* 9th Ed. John Wiley.
4. Goerge, T. Austin. *Shreve's Chemical Process Industries.* 5th Edition. McGraw Hill International.
5. Bruice, P.Y. 2006. *Esential Organic Chemistry.* Pearson International Edition, Pearson Prentice Hall.
6. Groggins, P.H. 2001. *Unit Processes in Organic Chemistry Synthesis.* Tata McGraw Hill.

ERT 105/3
ELECTRICAL TECHNOLOGY

COURSE SYNOPSIS

This course is intended to provide students with clear understanding of the DC and AC circuits, basic principles of 3-phase AC circuits, electro-magnetism and magnetic circuits. They will also gain an understanding of the basic operating principles and performance analysis of three most commonly used electric machines, namely, transformers, dc machines, and induction motors.

COURSE OUTCOMES

1. Ability to explain the principle elements of DC and AC circuits such as current, voltage, power, energy, nodes, branches etc.
2. Ability to analyze the DC and AC circuits by using Ohm's Law, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Source Transformation and Thevenin's theorem.
3. Ability to calculate and analyze parameters of three phase AC system for Wye and Delta connection.
4. Ability to analyze the basic concept of magnetism and electromagnetism and its application in DC and AC machines.

REFERENCES

1. Boylestad, Robert L. 2007. Introductory Circuit Analysis, 11th Edition, Prentice Hall.
2. Hughes, 2005. Electrical and Electronic Technology, 9th Edition, Prentice Hall.
3. Richard J. F. 2008. Electricity Principles and Applications, 7th Edition, Mc Graw Hill.
4. Charles K. A. and Matthew N.O.Sadiku. International Third Editions. Fundamentals of Electric Circuits, McGraw-Hill.
5. Nilsson, J.W. and Riedel, S.A. 2005. Electric Circuits, 7th Edition, Pearson Prentice Hall.

ERT 106/3
BIOCHEMISTRY

COURSE SYNOPSIS

The topics covered in this course include the origin of life and structure of prokaryotes and eukaryotes cells, properties of water and structure, classification and function of biomolecules such as carbohydrates, lipids and amino acids. The role of proteins and enzymes in biochemistry, purification of protein, molecular biology and genetics will be featured in the course. Electron transportation, citric acid cycle and photosynthesis in biological processes will also be briefly highlighted in this course.

COURSE OUTCOMES

1. Ability to define and describe the biochemical concepts and terms associated with life.



2. Ability to differentiate the structure, classification and function of carbohydrates, lipids and nucleic acids.
3. Ability to evaluate the role of proteins in biochemistry and purification of proteins. To introduce enzymes.
4. Ability to illustrate electron transportation, citric acid cycle and photosynthesis in biological processes.

REFERENCES

1. McKee, T. & McKee, J. 2003. *Biochemistry, 3rd Edition*, McGraw Hill. New York.
2. Voet D. & Voet, J.G. 2004. *Biochemistry 3rd Edition*, Wiley International Edition, New York.
3. Elliott, W.H. & Elliott, D.C. 2005. *Biochemistry 3rd Edition*. Oxford University Press
4. Campbell, M.K. & Farrell, S.O. 2006. Biochemistry 5th Edition. Belmont, CA.
5. Mathews, C.K., van Holde, K.E. & Ahern, K.G. 2000. Biochemistry 3rd Edition. Benjamin Cumming, San Francisco.

ERT 107/3
MICROBIOLOGY FOR BIOPROCESS ENGINEERING

COURSE SYNOPSIS

This course covers the role of bacteria, fungi and virus in bioprocess industries. Comparison of prokaryotes and eukaryotes; microbial metabolism; microbial growth kinetics and fermentation process; and factors contributing to productivity, spoilage and preservation in food and industrial microbiology are also discussed.

COURSE OUTCOMES

1. Ability to define and describe important concepts and terminology in microbes and their metabolism.
2. Ability to demonstrate practices in microscopy, staining, sterilization, isolation and identification of bacteria and fungi.
3. Ability to define, describe and apply microbial growth in fermentation and biological process.

REFERENCES

1. Prescott, L. M., Harley, J. S & A. Klein, D. A. 2005. *Microbiology*. McGraw Hill.
2. Bauman, R. 2006. *Microbiology with diseases by taxonomy 2nd Edition.* Pearson Education, Prentice Hall.
3. Cowan, M.K. 2006. *Microbiology: a systems approach 1st edition.* McGraw-Hill Higher Education.
4. Black, J.G. 2005. *Microbiology: principles and explorations 5th edition.* John Wiley, New York.
5. Waites, M.J., Morgan, N.L., Rockey, J.S. & Higton, G.H. 2001. *Industrial Microbiology: An Introduction.* Blackwell Science, United Kingdom.

ERT 108/3
PHYSICAL CHEMISTRY

COURSE SYNOPSIS

This course is designed to prepare engineering students for advance knowledge in chemistry such as thermodynamics, chemical equilibria and chemical kinetics.

COURSE OUTCOMES

1. Ability to define and apply the phenomena, basic concepts, laws and principles in physical chemistry.
2. Ability to calculate and solve a problem concerning physical chemistry.
3. Ability to illustrate various fundamental laws in physical chemistry.

REFERENCES

1. Atkins, P and de Paula, Julia. 2006. *Physical Chemistry*. Oxford University Press, 8th Edition.
2. Bahl, B.S.; Bahl, Arun & Tuli, G.D. 2006. *Essentials of Physical Chemistry*. S. Chand, New Delhi.
3. Paul Monk, 2004. *Physical Chemistry*, John Wiley & Sons.
4. Levine I. N. , 2002. Physical Chemistry, McGraw Hill, 5th Edition.
5. Silbey R. J., Alberty R. A., Bawendi M. G. 2005. Physical Chemistry, John Wiley & Son, Inc., 4th Edition.

ERT 206/4
THERMODYNAMICS

COURSE SYNOPSIS

This course covers the concept of chemical and biochemical engineering thermodynamics. It provides the basic tools necessary for the students to be exposed to the fundamentals properties of thermodynamics and the law of thermodynamics in engineering systems. Also are provided with a comprehensive exposure to the theory as well as to the application of thermodynamics solution and the equation of state for pure and mixture fluids, the phase equilibrium and chemical reaction equilibrium calculations.

COURSE OUTCOMES

1. Ability to analyze and evaluate the fundamentals properties of thermodynamics and apply the law of thermodynamics in engineering systems.

2. Ability to calculate heat, work and other thermodynamics properties ideal fluid, solve problems for real fluids using volumetric equations of state and develop thermodynamic properties relations.
3. Ability to analyze the theory of the solution thermodynamics as well as the equation of state for pure and mixture fluids and to calculate phase equilibrium and chemical reaction equilibrium calculations.

REFERENCES

1. Smith, J.M., Van Ness, H.C. and Abbort, M.M. 2005. Introduction to Chemical Engineering Thermodynamics, Seventh Edition, McGraw-Hill..
2. Cengel, Y.A. and Boles, M.A. 2007. Thermodynamics-An engineering Approach, 6th edition, McGraw-Hill.
3. Iynkaran, K., David, J. and Tandy. 2004. Basic Thermodynamics – Applications and Pollution Control, 2nd edition, Pearson Prentice Hall.
4. Daubert, Thomas, E. 1985. Chemical engineering Thermodynamics, McGraw-Hill.
5. (The book is in bahasa version available at the library, translated by Prof. Mashitah Hassan, 1990)

ERT 207/4
ANALYTICAL CHEMISTRY

COURSE SYNOPSIS

This course introduces and discusses the basic principle of analytical chemistry that covers data analysis and interpretation. Basic statistics and the utilization of statistics are applied in most of the analytical methods. To introduce, discuss and apply classical analytical methods such as gravimetriy and titrimetry. This course also meant to introduce, discuss and apply modern methods in analytical chemistry such as chromatographic and spectroscopic technique.

COURSE OUTCOMES

1. Ability to analyze the correct statistical method for data analytical and to remember the steps in quantitative analysis
2. Ability to evaluate the concentration of analytes of various classical titrimetric (acid-base, complexation, redox and precipitation) and gravimetric methods for mass determination
3. Ability to evaluate modern chromatography and spectroscopic principles and to interpret and calculate the sample concentration.

REFERENCES

1. Christian, G. D. 2004. Analytical chemistry. 6th ed. John Wiley & Sons, Inc.
2. Harvey, D. 2000. Modern Analytical Chemistry. McGraw-Hill.
3. Keeley, D and Haines, P. J. 2002. Analytical Chemistry. Oxford: Bios Scientific
4. Skoog, D. A., West, D. M. and Holler, F. J. 1996. Fundamentals of Analytical Chemistry. Saunders College Publication
5. David S. Hage and James R. C. 2010. Analytical Chemistry and Quantitative Analysis. First edition. Prentice Hall.
6. James Miller and Jane C Miller. 2010. Statistics and Chemometrics for Analytical Chemistry (6th Edition), Pearson Education Canada

ERT 213/3
PROCESS INSTRUMENTATIONS

COURSE SYNOPSIS

The course objective is to prepare the students with the necessary skills in the process industry. The course begins with introduction to process measurements involved in the process industries, followed by introduction to fundamental of industrial valves. Students then will be taught about ISA symbology, where students will be taught with the universal symbols used in process industry. Students then will be taught how to write the identification letter as well as the tag numbers for unit operation and piping. To complete the course, students will learn how to read and develop process flow diagram (PFD) and also piping and instrumentation diagram (P & ID).

COURSE OUTCOMES

1. Ability to describe and discuss the function of different types of valves; describe and discuss the operational aspects of the valves.
2. Ability to discuss and compare the function and operational aspects of pumps, fans, blowers and compressors.
3. Ability to develop the process flow diagram by applying the ISA symbology.
4. Ability to develop the piping and instrumentation Diagram by applying the ISA symbology.

REFERENCES

1. Smith, C.A. and Corripio, A. 2006. *Principles and Practice of Automatic Process Control, Third Edition,* John Wiley.
2. McCabe, W.L., Smith, J.C. and Harriott, P. 2005. *Unit Operations of Chemical Engineering, Seventh Edition,* McGraw-Hill.



3. Skousen, P.L. 2004. *Valve Handbook, Second Edition,* McGraw-Hill.
4. Perry, R.H. and Green, D.W. 1997. *Perry's Chemical Engineers' Handbook, Seventh Edition,* McGraw-Hill.
5. Murrill, P.W. 2000. *Fundamentals of Process Control Theory, Third Edition,* ISA.
6. McAvinew, T. and Mulley, R. 2005. *Control System Documentation: Applying Symbols and Identification, Second Edition,* ISA.
7. Meier, F.A., and Meier, C.A. 2004. *Instrumentation and Control Systems Documentation,* ISA.

ERT 214/4
MATERIAL AND ENERGY BALANCE

COURSE SYNOPSIS

This course starts with engineering calculations. Students are taught to interpret series of data and to interpret graphs. Material balance as well as energy balance also will be covered in the course. The course will be completed with the introduction of several methods in calculating material balance and energy balance in a system.

COURSE OUTCOMES

1. Ability to solve basic engineering calculations, convert units in the same dimensions and scientifically interpret series of data.
2. Ability to identify single unit and multiple unit processes, distinguish parameters given in order to find a solution. Students are able to discuss mass balance concept and solv e material balance problems.
3. Ability to measure parameters, solve energy balance problems and discuss energy balance concepts.
4. Ability to evaluate steam tables to solve problems in a system and also analyze all possible information data given in a system to provide a solution combining of material and energy balance.

REFERENCES

1. Felder, R. 2005. Elementary Principles of Chemical Processes, John-Wiley, 3rd Update Edition.
2. Himmelblau, R. 7th Edition. Basic Principles and Calculations in Chemical Engineering, Prentice Hall.
3. Bailey and Ollis. 2005. Biochemical Engineering Fundamentals, McGraw Hill, 2nd Edition.
4. Doran, M.P. 1995. Bioprocess Engineering Principles, Elsevier Science.
5. Richardson, J.F. 1994. Chemical Engineering, Volume 3, Prentice Hall.
6. Reklaitis G.V. 1983. Introduction to Material and Energy Balance, John Wiley.

ERT 215/3
FLUID MECHANICS

COURSE SYNOPSIS

This course emphasizes fundamental concepts and problem-solving techniques. Topics to be covered include fluid properties, static and kinematics, control volume analysis, momentum analysis of flow system, dimensional analysis, internal flows (pipe flows), differential analysis, and external flows (lift and drag).

COURSE OUTCOMES

1. Ability to analyze the essential parameters describing a fluid system and demonstrate dimensional analysis and homogeneity.
2. Ability to calculate pressures, forces, and stability in static fluid systems and identify whether a flow is steady or unsteady, uniform or non-uniform, laminar of turbulent and flow rate in dynamic fluid system and distinguish the link between conserved quantities and the equations of fluid mechanics.
3. Ability to evaluate appropriate control volumes and surfaces for developing the equations of fluid mechanics and analyse phenomena associated with external flow.

REFERENCES

1. Cengel, Cimbala. 2006. Fluid Mechanics; Fundamentals and Applications. N.Y. Mc Graw Hill.
2. Mott, R.L. 2006. Applied Fluid Mechanics, 6th Edition, Prentice Hall.
3. Crowe, C.T., Elger, D.F., Robertson, J.A. 2005. Engineering Fluid Mechanics, John Wiley, 8th Edition.
4. Bruce, R.M., Donald , F.Y. and Okishi, T.H. 1990, Fundamentals of Fluid Mechanics, John Wiley and Sons.
5. Dauglas, J.R. 1991. Fluid Mechanics, 3rd Ed., Pitman.

ERT 216/4
HEAT & MASS TRANSFER

COURSE SYNOPSIS

This course covers the modes of heat transfer, which are conduction, convection and radiation, the application of the principle in various unit operations in plant. The principle of mass transfer will also be discussed. The application of mass transfer will be covered in the next course called bioseparation engineering and unit operation.

COURSE OUTCOMES

1. Ability to calculate mode of heat transferred.
2. Ability to calculate mode of mass transferred.
3. Ability to evaluate heat transfer knowledge as well as designing heat transfer equipment.

REFERENCES

1. Christie J. Geankoplis. 2003. Transport Processes and Separation Process Principles: Includes Unit Operations. McGraw-Hill, Fourth Edition.
2. Holman J.P. 2001. Heat Transfer, Eighth SI, McGraw-Hill.
3. McCabe *et. al*. 2005. Unit Operations of Chemical Engineering, McGraw Hill, New York.
4. Doran M. P. 2006. Bioprocess Engineering Principles, Academic Press, London.
5. Incropera, F. P. and De Witt, D. P. 2006. *Fundamentals of heat and mass transfer*, 6th Ed, Wiley, New York.

ERT 314/4
BIOREACTOR SYSTEM

COURSE SYNOPSIS

This course will provide an introduction to the fundamental ideas of the bioreactor design and operations. It will also develop students' knowledge and understanding the important principles and techniques that are used in the design and analysis of various types of bioreactor system for microbial, animal and plant cell cultures. It also covers relevant issues in bioreactor system such as scaling up/down, instrumentation and control of bioreactor as well as sterilization.

COURSE OUTCOMES

1. Ability to design and formulate fermentation media and decide on the types of carbon and nitrogen source.
2. Ability to recognize, compare and draw the schematic diagram for specific types of bioreactors.
3. Ability to design a stirred tank bioreactor according to the specific application.
4. Ability to develop scale up based on geometric similarities or constant power number.

REFERENCES

1. Doran, P. M. 2006. Bioprocess Engineering Principles. London: Academic Press.
2. Shuler, M. L. and Kargi, F. 2001. Bioprocess Engineering: Basic Concepts. 2nd Ed. Upper Saddle River, NJ: Prentice Hall PTR.
3. Asenjo, J. A. and Merchuk, J. A. 1995. Bioreactor System Design. New York: Marcel Dekker Inc.
4. Najafpour, G.A. 2007. Biochemical Engineering and Biotechnology. Amsterdam: Elsevier B.V.
5. Mitchell, D. A., Krieger, N. and Berovic, M. 2006. Solid-state fermentation bioreactors: Fundamentals of design and operation. Springer Berlin Heidelberg.
6. Scragg, A. H. 1992. Bioreactors in Biotechnology: A Practical Approach. Ellis Horwood.
7. Stanbury, S.F. and Whitaker, A. 1984. Principle of Fermentation Technology. New York: Pergamon Press.

ERT 316/3
REACTION ENGINEERING

COURSE SYNOPSIS

Reaction Engineering is concerned with the exploitation of reactions on a commercial scale. Its goal is to familiarize with different designs of reactors. It also emphasizes qualitative arguments, simple reactor sizing method, graphical procedures, and frequent comparison of capabilities of the major reactor types. Simple ideas are treated first, and then extended to more complex problems.

COURSE OUTCOMES

1. Ability to categorize design equation for most common industrial reactors and calculate the rate law and rate law parameters.
2. Ability to calculate Residence Time Distribution (RTD) functions in non-ideal reactors.
3. Ability to develop conversion and sizing for chemical reactors and to explain steady-state isothermal reactor.
4. Ability to evaluate the difference of catalysis and catalytic reactions.

REFERENCES

1. Fogler, H. S. 2006. Elements of Chemical Reaction Engineering. 4th ed. Prentice Hall Inc. U.S.
2. Levenspiel, O. 2001.Chemical Reaction Engineering. 3rd ed. John-Wiley. U.S.
3. Davis, M. E and Davis, R. J. 2002 Fundamentals of Chemical Reaction Engineering. 1st ed. Mc Graw Hilll, U.S.
4. Fogler, H. S. 2010. Essentials of Chemical Reaction Engineering. 1st ed. Prentice Hall. U.S.
5. Salmi, T. O., Mikkola, J. P. and Warna, J. P. 2010. Chemical Reaction Engineering and Reactor Technology (Chemical Industries). CRC Press.



ERT 317/4
BIOCHEMICAL ENGINEERING

COURSE SYNOPSIS

This course focuses on the interaction between chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems are featured among lecture topics. Kinetic of growth, death and metabolism are also covered. Batch and continuous fermentation and the effect of agitation, mass transfer and enzyme technology are included. The laboratory exercises introduce students to the fundamental practices in biochemical engineering.

COURSE OUTCOMES

1. Ability to develop anzyme reactions based on its kinetics study and applied catalysis.
2. Ability to evaluate microbial system based on its metabolic pathways and kinetics study in batch and continuous cultures.
3. Ability to propose bioconversion technologies of microbial, plant and animal cell culture for the production of value-added product.

REFERENCES

1. Shuler, M. L. and Kargi, F. Latest Edition. *Bioprocess Engineering: Basic Concept. 3rd Ed.* Upper Saddle River, NJ: Prentice Hall PTR.
2. Dutta, R. 2008. *Fundamentals of Biochemical Engineering.* New Delhi: Ane Books India.
3. Katoh, S. and Yoshida, F. 2009. *Biochemical Engineering: A Textbook for Engineers Chemists and Biologists*. Weinheim: Wiley-VCH Verlag GmbH & Co.
4. Nielsen, J., Villadsen, J. and Gunner L. 2011. *Bioreaction Engineering Principles. 3rd Ed*. New York: Springer Science+Bussiness Media.
5. Najafpour, G.A. 2007. *Biochemical Engineering and Biotechnology*. Amsterdam: Elsevier B.V.

ERT 318/4
UNIT OPERATIONS

COURSE SYNOPSIS

This course includes introduction to mass transfer theories and applications followed by specialized unit operations including gas absorption, distillation, adsorption, liquid-liquid extraction, solid-liquid extraction (leaching), membrane separation process, filtration and centrifugation. The theory is supported by performing laboratory experiments.

COURSE OUTCOMES

1. Ability to develop a basic design for single effect and multiple-effect evaporators, packed cooling towers.
2. Ability to develop and evaluate a basic design for gas-liquid separation and vapour-liquid separation equipment.
3. Ability to characterize solid particle, identify different types of size reduction equipment, and to apply equation for one-dimensional motion of particles through a fluid.

REFERENCES

1. McCabe, W. L., Smith, J. C. and Harriott, P. 2004. Unit Operations of Chemical Engineering, McGraw-Hill.
2. Geankoplis, C.J. 2003. Transport Processes and Separation Process Principles, Prentice Hall.
3. Seeder, J.D. and Henly, E. J. 2006. Separation Process Principles, John Wiley and Son.
4. Wankat, P. C. 2006. Separation Process Engineering, Pearson Education.
5. Benitez, J. 2009. Principles and Modern Applications of Mass Transfer Operations, John Wiley and Son.

ERT 319/3
INDUSTRIAL WASTE TREATMENT

COURSE SYNOPSIS

This course covers waste treatment methods that are commonly used in industries. It's introduced to the terms that are related to *waste* and how to calculate the properties such as *biological oxygen demand* (BOD), *chemical oxygen demand* (COD) and *total carbon* (TOC). From these calculations and other given information, basic unit operations involved in the treatment of waste can be design. This course also give an understanding on the processes involved in waste treatment for different industries keeping in view of the Environmental Impact Assessment (EIA), Life Cycle Assessment (LCA) and legal framework.

COURSE OUTCOMES

1. Ability to calculate the physical, chemical, and biological properties of waste material.
2. Ability to calculate and compare the treatment methods for particular waste.
3. Ability to design and evaluate various unit operations for waste treatments.
4. Ability to propose the landfill, incineration waste treatments and waste management systems.

REFERENCES

1. Metcalf and Eddy. 2003. Wastewater Engineering: Treatment and Reuse, Inc, 4th Ed. (or latest edition) Mc Graw-Hill.

2. Davis, M.L. and Cornwell, D.A. 1998. Introduction to Environmental Engineering, 3rd Ed., Mc Graw-Hill.
3. Paul T. W. 2005. Waste Treatment and Disposal, 2nd Ed., John Wiley.
4. Droste, R.L. 1997. Theory and Practice of water and wastewater treatment, John Wiley.
5. Nelson, L. N. 2006. Industrial Waste Treatment, Elsevier Science & Technology Books.
6. Wang, L. K., Hung, Y.T., Lo, H.H. and Yapijakis, C. 2006. Waste Treatment in The Process Industry, Taylor and Francis.

ERT 320/3
BIOSEPARATION ENGINEERING

COURSE SYNOPSIS

This course focuses on the the recovery, isolation, purification and polishing of products synthesized by biotechnological processes like r-DNA technology, conventional microbial fermentation and enzyme technology. The principles, advantages and limitations of certain purification units also discussed. At the end of this course, students are able to understand the process involved in bio separation and propose a suitable process for different types of product in integration of bio separation schemes.

COURSE OUTCOMES

1. Ability to analyze process and important parameters involved in recovery and isolation of bioproducts for selected bioseparation units.
2. Ability to evaluate process and important parameters involved in purification and polishing steps of bioproducts for selected bioseparation units.
3. Ability to propose bioseparation techniques/processes and RIPP (Recovery, Isolation, Purification and Polishing) scheme.

REFERENCES

1. Harrison, R.G. Todd, P., Rudge S.R. and Petrides D.P. 2003. Bioseparations Science and Engineering, Oxford University Press.
2. Rajni Hatti-Kaul et al. 2003. Isolation and Purification of proteins (Biotechnology and Bioprocessing), Marcel Dekker Ltd.
3. Sabramanian Ganapathy. 1998. Bioseparation and Bioprocessing. A handbook, 2nd Edition, Wiley.
4. Paul, A. Belter, Clussler, E.L. and Wei-Shou Hu. 1998. Bioseparations: Downstream Processing for Biotechnology, Wiley.
5. Michael S. Verral. 1996. Downstream Processing of Natural Products, A Practical Handbook, Wiley.
6. Sivasankar, B. 2006. Bioseparations: Principles and Technique, Prentice Hall.
7. Ladisch, M. R. 2001. Bioseparations Engineering: Principles, Practice and Economics, Wiley- Interscience.

ERT 321/4
PROCESS CONTROL & DYNAMICS

COURSE SYNOPSIS

This course includes an introduction to process control and dynamics, feedback controllers, control system instrumentation, overview of control system design, theoretical models, dynamic behavior of processes, PID controller design and troubleshooting. The theory is supported by performing laboratory experiments.

COURSE OUTCOMES

1. Ability to derive and develop theoretical model of chemical processes, analyze Laplace transform techniques to simplify first order and second order processes and creat transfer functions and state space models.
2. Ability to develop dynamic behavior of first and second order processes, analyze dynamic response characteristics of more complicated processes and development of empirical models from process data.
3. Ability to analyze control system instrumentation and propose feedback control system for bioprocess and chemical processes.
4. Ability to calculate and analyze dynamic behavior of closed-loop control system.

REFERENCES

1. Seborg, D.E., Edgar, T.F., Mellicamp D.A. 2011. Process Dynamic and Control. John-Wiley, 3rd Edition.
2. Riggs, J.B. 2006. Chemical and Bioprocess Control. Pearson.
3. Bequette, B.W. 2003. Process Control;Modelling, Design, and Simulation. Prentice Hall.
4. Marlin, T. 2002. Process Control: Designing Processes and Control System for Dynamic Performance. McGraw-Hill.
5. Coughonowr. 2001. Process system, Analysis and Control, 3rd edition, McGraw-Hill.

ERT 322/3
SAFETY & LOSS PREVENTION

COURSE SYNOPSIS

This course covers the fundamental of process safety specifically toxicology, industrial hygiene, sources model, fires



and explosions as wells as relief concept design. The students are also exposed to hazard identification, risk assessment and accident investigation. The course will be concluded with biohazard and biosafety in bioprocess.

COURSE OUTCOMES

1. Ability to analyze the source, toxic release and dispersion models and evaluate the significance of the events.
2. Ability to distinguish fires and explosion as well as examine ways to prevent it.
3. Ability to evaluate relief concepts as well as calculate or sizing the relief system.
4. Ability to propose and evaluate process safety to identify the hazard and risk in the industry.

REFERENCES

1. Mohanad El-Harbawi .2010. Process Safety and Loss Prevention, LAP Lambert Academic Publishing AG & Co KG.
2. Crowl, D. A., Louvar, J. F. 2002. Chemical Process Safety; Fundamentals with Applications. 2nd edition, Prentice Hall, New Jersey.
3. Mannan, S. 2005. Lee's Loss Prevention in the Process Industries: Hazard Identification, Assessment and Control, 3rd edition, Butterworth-Heinemann, Massachusetts.
4. Sanders, R. E. 2005. Chemical Process Safety; Learning From Case Histories. Elsevier Butterworth Heinemann, Third Edition. Amsterdam.
5. Dennis P. Nolan 2010. Loss Prevention and Safety Control: Terms and Definition, Saudi Aramco, Dhahran, Saudi Arabia , USA, CRC Press.

ERT 323/2
SIMULATION FOR BIOPROCESS ENGINEERING

COURSE SYNOPSIS

The course covers introduction of simulation of bioprocess, material and energy balances, equipment sizing and costing, and environmental impact assessment. Students are exposed to the usage of SuperPro design software for modeling and simulation purposes. Subsequently, sustainability assessment will be introduced, emphasizing on economic and profitability analysis.

COURSE OUTCOMES

1. Ability to apply and analyze engineering calculation like mass and energy balance, stoichiometry and kinetics of the bioprocess.
2. Ability to analyze process and organize unit operation in bioprocess using simulation software.
3. Ability to analyze, collect and organize economic process data and apply environmental impact and sustainability assessment.

REFERENCES

1. Heinzle, E. Biwer, A. P. and Cooney C. L. 2007. Development of Sustainable Bioprocesses: Modelling and Assessment. Wiley.
2. Dunn, Irving J., Heinzle, Elmar, Ingham, John, and Prenosil, Jiri E. 2003. Biological Reaction Engineering Dynamic Modelling Fundamentals with Simulation Examples 2nd Edition. John Wiley.
3. Shuler, M.L. 2001. Bioprocess Engineering: Basic Concepts. 2nd Edition. Prentice-Hall.

ERT 424/3
BIOPROCESS PLANT DESIGN 1

COURSE SYNOPSIS

Bioprocess Engineering Design is a 2 part course covering aspects of engineering design related to open-ended design projects at professional level engineering design task in bioprocess engineering field. The design project is a team-based approach to provide capstone design experience emphasizing on the application of sciences, mathematics and engineering science acquired in earlier course work in design of projects. The scope of the course covers the knowledge on the elements in project formulation, planning/scheduling, management and communication, engineering economics including cost-benefits analysis and budgeting, critical thinking, ethics and safety in engineering design, fundamental in engineering design methodology (the process and tools) and systems engineering. Analysis of case studies pertaining to engineering issues in design.

COURSE OUTCOMES

1. Ability to differentiate between ethical and legal issues and relate how these are related to design projects in bioprocess engineering field.
2. Ability to demonstrate team work through group weekly meetings, project planning and management, analysis of case studies and class presentation.
3. Ability to analyze and assess the impact of design and engineering solutions on society and environment.
4. Ability to evaluate economic and feasibility study of a design project in bioprocess engineering.

5. Ability to compose engineering problems and alternative solutions and formulate a sound proposal in bioprocess engineering project using systematic design process.

REFERENCES

1. Sinnott, R.K. 2012. Chemical Engineering Design. Vol.6, 3rd ed. Butterworth-Heinemann.
2. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S. 2010. Product and Process Design Principles: Synthesis, Analysis and Evaluation, 3rd Edition. John Wiley & Sons, New Jersey
3. Peters, M.S. and Timmerhaus, K.D. 2002. Plant Design and Economics for Chemical Engineers. 5th ed. McGraw-Hill, New York.
4. Douglas, J.M. The Conceptual Design of Chemical Processes. 1998. McGraw-Hill, New York.
5. Turton, Richard, Bailie, Richard C., Whiting Wallace B. and Shaeiwitz, Joseph A. 1997. Analysis, Synthesis and Design of Chemical Processes. Prentice Hall.

ERT 425/3
GOOD MANUFACTURING PRACTICE FOR BIOPROCESS INDUSTRIES

COURSE SYNOPSIS

This course gives complete overview about the production facility from start of the project up to the production process and how to carry out all project steps according to the guidelines of the GMP. Topics include the background to GMP and cGMP regulations and guidelines and their relevance in the laboratory, process development and pilot plant.

COURSE OUTCOMES

1. Ability to analyze the concepts and the requirements of GMP and Validation, the Standard Operation Procedure (SOP) and Safety and Health Environment (SHE) aspects.
2. Ability to develop the GMP requirement and primary and secondary bioprocess engineering products, together with the Hazard Analysis and Critical Control Point (HACCP).
3. Ability to evaluate the utilities and services, laboratory design, process development facilities and pilot manufacturing facilities.

REFERENCES

1. Nally, J.D. 2007. Good Manufacturing Practices for Pharmaceuticals, Sixth Edition, Informa Healthcare Inc, New York, USA.
2. Alli, I., Food, Quality Assurance, CRC PRESS, New York, 2004.
3. Bliesner, D.M. 2006. Establishing A Cgmp Laboratory Audit System: A Practical Guide, John Wiley & Sons, Inc., Hoboken, New Jersey.
4. Bennet, B. 2003. Pharmaceutical Production: an Engineering Guide, Institution of Chemical Engineers (IChemE), Warwickshire, UK.
5. WHO Guidelines, Quality assurance of pharmaceuticals, Good manufacturing practicesand inspection, WHO Press, World Health Organization, Geneva, Switzerland, 2007.

ERT 426/3
FOOD ENGINEERING

COURSE SYNOPSIS

This course covers multidisciplinary field of applied physical sciences which combines science, microbiology, and engineering education for food and related industries. Topics to be covered include introduction to food engineering, food ingredients, nutrition, nutritional information, spoilage, food production systems, preservation processes, freezing, drying, direct-heating, radiation, extrusion and packaging.

COURSE OUTCOMES

1. Ability to differenciate types of food processing ingredients and calculate the nutrition information in food.
2. Ability to differentiate the function of food processing operations and propose a suitable system for a certain application.
3. Ability to assess the problems that involved in food engineering operations.

REFERENCES

1. Singh, R. Paul and Dennis, R. H. 2009. Introduction to Food Engineering, Fourth Edition (Food Science and Technology). Academic Press. Elsevier.
2. Side, Catherine "Food Product Development : Based on Experience", Wiley-Blackwell, 2008.
3. Barbosa-Cánovas, Gustavo V. Schmidt, Shelly Fontana, Anthony. 2008. Water Activity in Foods: Fundamentals and Applications, Wiley-Blackwell.
4. Williams, C. 2006. Improving the Fat Content of Foods, Woodhead Publishing, Limited.

ERT 427/3
DESIGN OF EXPERIMENTS

COURSE SYNOPSIS

The course begins with the strategy of experimentation using appropriate statistical software. Calculation on



analysis of variance is also included as well as 2^k factorial design and 2^{k-p} fractional factorial design. Further study on Response Surface Methods (RSM) such as Central Composite Design (CCD) and Box-Behnken designs for fitting a second order model. The incorporation of Design of Expert software in analyzing the chemical or biochemical process will make the students learning more effective. Finally, introduction to Taguchi approach to process optimization is discussed.

COURSE OUTCOMES

1. Ability to apply and analyze principles for designing experiment and building empirical models.
2. Ability to calculate and evaluate the analysis of variance and principles of factorial design.
3. Ability to design for fitting first order and second order model using Response Surface Methodology.

REFERENCES

1. Douglas C.Montgomery. 2012. Design and analysis of experiments, 8th Edition", Wiley and Sons Inc.
2. Douglas C.Montgomery, George C.Runger. 2011. Applied Statistics and probability for engineers 5th edition", John Wiley and Sons Inc.
3. Douglas C.Montgomery. 2012. Design and analysis of experiments, International Student Version, 8th Edition", Wiley and Sons Inc.
4. Douglas C.Montgomery, George C.Runger, Norma F. Hubele. 2011. Engineering Statistics, SI Version, 5th Edition, John Wiley and Sons Inc.
5. Raymond H.Myers, Douglas C.Montgomery. 1995. Response Surface Methodology, Process and product optimization using designed experiments, John Wiley and Sons Inc.

ERT 428/4
BIOPROCESS PLANT DESIGN 2

COURSE SYNOPSIS

This course requires student to work in a pre-determined group to solve a practical and industrially relevant design problem in the same way as might be expected in an industrial situation. The scope of the class is to develop and evaluate process alternatives via rigorous simulation, perform equipment sizing, optimise various process units, analyse the safety and environmental impact of the process, estimate capital and operating costs, and assess plant profitability to meet desired project needs within realistic constraint. The use of modern engineering design practices, tools and product/solution development process, trouble-shooting methodology, learn and utilise a realistic simulation of the real-world design process, engineering analysis and synthesis through their projects Knowledge integration from other Bioprocess Engineering courses is required to identify, solve, and design solution for complex engineering problems.

COURSE OUTCOMES

1. Ability to conduct engineering analysis and adeptly apply principles and tools of mathematics and science to solve multi-facetted design project to produce credible conclusions.
2. Ability to formulate and produce solutions that properly address critical issues and assumptions that are conceptually and contextually valid and meet client expectation.
3. Ability to design component, equipment, process, plant and systems in bioprocess engineering using engineering tools and design softwares for optimum performance.
4. Ability to display understanding of bioprocess engineering project and integrate the design for manufacturability, utility and sustainability.
5. Ability to write project report that conforms to engineering professional standard and to perform verbal presentation on the project.

REFERENCES

1. Sinnott, R.K. 2012. Chemical Engineering Design. Vol.6, 3rd ed. Butterworth-Heinemann.
2. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S. 2010. Product and Process Design Principles: Synthesis, Analysis and Evaluation, 3rd Edition. John Wiley & Sons, New Jersey
3. Peters, M.S. and Timmerhaus, K.D. 2002. Plant Design and Economics for Chemical Engineers. 5th ed. McGraw-Hill, New York.
4. Douglas, J.M. The Conceptual Design of Chemical Processes. 1998. McGraw-Hill, New York.
5. Turton, Richard, Bailie, Richard C., Whiting Wallace B. and Shaeiwitz, Joseph A. 1997. Analysis, Synthesis and Design of Chemical Processes. Prentice Hall.

ERT 429/3
ENERGY FROM BIORESOURCES

COURSE SYNOPSIS

This course introduces energy production that can be generated from bioresources or biomass which is an alternative way of producing energy from fossil-based fuels. This course emphasizes the use of more environmental-friendly technologies which can lead to reduction of pollution, thus sustaining the ecology system. The contents cover the characteristics of biofuels, bioresources suitable for conversion technologies, biological

routes and chemical routes in producing fuels, and also the limitations of bioconversion processes.

COURSE OUTCOMES

1. Ability to differentiate the characteristics of biofuels and compare the process descriptions of various biofuel production.
2. Ability to evaluate the limitations of biofuel productions processes.
3. Ability to propose a biofuel production process from potential biological feedstocks.

REFERENCES

1. Cheng, J. 2010. Biomass to Renewable Energy Processes. CRC Press.
2. Vertes, A., Qureshi, N., Blaschek, H. P. and Yukawa, H. 2010. Biomass to Biofuels: Strategy for Global Industries, John Wiley & Sons, Ltd.
3. Pandey, A. 2009. Handbook of Plant-based Biofuels, CRC Press.
4. Brown, R. C. 2003. Biorenewable Resources: Engineering New Products From Agriculture, Iowa State Press.
5. Lee, S., Speight, J. G. and Loyalka, S. K. 2007. Handbook of Alternative Fuel Technologies, CRC Press.

ERT 430/3
PHARMACEUTICAL PROCESS ENGINEERING

COURSE SYNOPSIS

The course includes the principles of drug pharmacokinetics: absorption, distribution, metabolism and excretion of drugs. This course also covers the scientific and technological aspects of the designing and manufacturing of pharmaceutical products.

COURSE OUTCOMES

1. Ability to explain the basic concept of drug absorption and disposition and analyze the related pharmacokinetics.
2. Ability to evaluate the pharmaceutical engineering processes in pharmaceutical formulation and production.
3. Ability to design pharmaceutical facilities.

REFERENCES

1. Bennet, B. and Cole, G. Pharmaceutical Production: An Engineering Guide. Warwickshire: Institution of Chemical Engineers (IChemE)., 2003.
2. Aulton M. E., Pharmaceutics. The science of dosage form design. 2nd Edition. London: Churchill Livingstone., 2002.
3. David J. am Ende, Chemical Engineering in the Pharmaceutical Industry: R&D to Manufacturing, New Jersey, USA: John Wiley & Sons, Inc., 2011.
4. Blacker A. John, Williams Mike T., Pharmaceutical Process Development - Current Chemical and Engineering Challenges, Royal Society of Chemistry, UK: Cambridge., 2011.
5. Anthony J. Hickey, David Ganderton. Pharmaceutical Process Engineering: 2nd Edition. New York: Informa Healthcare., 2009
6. Sambamurthy K., Pharmaceutical Engineering. New Delhi: New Age International Publishers. 2012

ERT 445/2
FINAL YEAR PROJECT 1

COURSE SYNOPSIS

This course consists of lecture and independent study on the technique of conducting literature review, identification of problem statements, project objectives and research methodology. The students are guided on the proper techniques and format of thesis writing, submit the project proposal and present to the internal examiners.

COURSE OUTCOMES

1. Ability to synthesize information including standards, code of practice, journals, policies, field data, etc, relevant to the specific research to be undertaken and relate with societal and global issues.Ability to review information source then recognize, construct and justify the suitable research information.
2. Ability to analyze scenario and compose the problem statements and the research objectives of the project.
3. Ability to formulate research methodology incorporating clear fundamentals, theories and benchmarked against standard practices governing the research project.
4. Ability to prepare and defend research proposal with effective communication skills.

REFERENCES

1. Donald, H. McBurney and Theresa, L. White. 2007. Research Methods, 7th Edition, Thomson Wadsworth.
2. Leo Finkelstein, Jr. 2008. Pocket Book of Technical Writing for Engineers and Scientist. 3rd Edition, McGraw Hill.
3. Rowena, M. 2006. How to write a thesis. Open University Press. England.
4. Hoang, P. 2006. Springer Handbook of Engineering Statistic. Springer-Verlang, London.
5. Bailey, S. 2003. A practical guide for students. TJ International Ltd. USA.
6. A Guide To Student Final Year Project, 2003. UniMAP.



7. Daniel Holtom and Elizabeth Fisher. 1999. Enjoy Writing Your Science Thesis or Dissertation, Imperial College Press.
8. Academic journals.

ERT 446/4
FINAL YEAR PROJECT 2

COURSE SYNOPSIS

This course consists of lectures and independent study on the techniques of conducting laboratory and/or field experiments. The students are guided on the techniques and implementation of research and monitored based on the research plan, data analysis, interpretation and conclusion. The students are required to write, submit and defend their thesis to the internal examiner.

COURSE OUTCOMES

1. Ability to conduct research experiments, analyze and interpret data and deduce good conclusion.
2. Ability to use techniques and modern tools to solve research problems.
3. Ability to plan activities pertaining to research project and execute the plan to meet the required research objectives and datelines.
4. Ability to write research report that conforms to standard thesis format and performs verbal presentation.

REFERENCES

1. Donald, H. McBurney and Theresa, L. White. 2007. Research Methods, 7th Edition, Thomson Wadsworth.
2. Leo Finkelstein, Jr. 2008. Pocket Book of Technical Writing for Engineers and Scientist. 3rd Edition, McGraw Hill.
3. Rowena, M. 2006. How to write a thesis. Open University Press. England.
4. Hoang, P. 2006. Springer Handbook of Engineering Statistic. Springer-Verlang, London.
5. Bailey, S. 2003. A practical guide for students. TJ International Ltd. USA.
6. A Guide To Student Final Year Project, 2003. UniMAP.
7. Daniel Holtom and Elizabeth Fisher. 1999. Enjoy Writing Your Science Thesis or Dissertation, Imperial College Press.
8. Academic journals.

BACHELOR OF ENGINEERING (HONOURS) (BIOSYSTEMS ENGINEERING)

ERT 147/3
FUNDAMENTAL OF BIOSYSTEMS ENGINEERING

COURSE SYNOPSIS

This course will introduce students to the basic concept of biosystems engineering and its application in the biosphere, the ecosystem and the biological systems involving microbes, plants and animals. Students will learn the systems methodologies, life cycle assessment, growth and feedback, biological models and data measurement and analysis. The application of conservation of mass and energy in determining the input, process and output components in agrosystems are also covered.

COURSE OUTCOMES

1. Ability to define and explain the scope of Biosystems engineering, the responsibilities to the society, cultural, global and environment towards sustainable development.
2. Ability to identify and describe systemic properties of biological systems; apply the system methodologies and engineering principles and the productivity of the biosystems.
4. Ability to calculate the integration the physical and biological information for engineering analytical framework.
5. Ability to evaluate the interfacing effect of bio and physical systems in terms of production efficiency by considering the sustainability of the biosystems.

REFERENCES

1. Alocilja, E. C. Principle of Biosystems Engineering. Erudition Books. 2002.
2. Saterbak, K. Y. Sen; L. V. McIntire. Bioengineering Fundamentals. 2007.
3. Konopka, A.K. Systems Biology. Principles, Methods, and Concepts. CRC Press 2007.
4. AhindraNag .Biosystem Engineering: McGraw Hill. 2009.
5. Briassoulis, D. Panagakis, and P. Nikopoulos, E. Education and Research in Biosystems Engineering in Europe. Agricultural University of Athens, 2008.
6. Barbara S. Hutchinson, Antoinette Paris-Greider. Using the Agricultural, Environmental, and Food Literature. CRC Press. 2002.

ERT 148/2
COMPUTER AIDED ENGINEERING DESIGN

COURSE SYNOPSIS

This course introduces and elaborates designing and modeling techniques commonly used in mechanical and civil designs covering 2-D and 3-D geometry related to drafting and design of mechanical and structural components and/or systems in Biosystems

Engineering. The primary software used is AUTODESK's AutoCAD and Inventor Pro.

COURSE OUTCOMES

1. Ability to apply designing and modelling techniques to construct engineering drawing using CAD.
2. Ability to compose 2D and 3D model to produce solution related to the engineering drawing problem.
3. Ability to use Autodesk software to construct engineering model and evaluate behaviour of the constructed model.
4. Ability to propose and justify an engineering model by preparing written report.

REFERENCES

1. Ibrahim Zeid. CAD/CAM Theory and Practice, McGraw Hill International. New York. 2010.
2. David Madsen. Engineering Drawing and Design. Cengage Learning. 2011.
3. Ullman, D.G. The Mechanical Design Process. 3rd ed. McGraw-Hill. New York. 2003.
4. Dnaher, S. The Complete Guide to Digital 3D Design. ILEX. Cambridge. 2004.
5. Calmettes, J.M. Best of 3D Virtual Product Design. Page One Publishing Pte. Ltd. Singapore. 2005.
6. Hannah, B. Becoming a Product Designer. John Wiley and Sons. New York. 2004.

ERT 149/4
APPLIED BIOLOGY FOR BIOSYSTEMS ENGINEERING

COURSE SYNOPSIS

This course covers various aspects of biology which are necessary to comprehend several subjects in biosystems engineering such are agricultural structures, sustainable agrosystems engineering, biosystems engineering design, biomass conversion technology, postharvest engineering and bio-products manufacturing. The first aspect deals with basic biology which includes cell and biological diversity. The second aspect deals with plants and animals which includes their structure, growth,and development. The third aspect comprises applied microbiology which includes application of microbiology in food & agriculture products enhancement.

COURSE OUTCOMES

1. Ability to illustrate and explain the cell and biological diversity.
2. Ability to examine and analyze the application of bio-resources in agriculture.
3. Ability to value the use of bio-resources for industrial and environmental sustainability.

REFERENCES

1. Campbell, N.A., Reece,J.B. Campbell Biology, 9th Edition, Pearson Education, Inc., San Francisco, CA 94111., 2011.
2. Belk C and Maier V B , Biology, Science for life with Physiology, 4th Edition, Pearson Education, Inc., San Francisco, CA 94111., 2013.
3. Gunstream S E.Explorations in basic biology12th edition, Pearson Benjamin Cummings, , San Francisco, California 94111, 2012.
4. Kratz R F and Siegfried D R, Biology For Dummies ® 2nd Edition, Wiley Publishing, Inc. 2010.
5. Madigan M T et.al, Brock biology of microorganisms 13th edition, .Pearson Education, Inc., publishing as Benjamin Cummings, San Francisco, CA 94111. 2012.

ERT 150/2
STATICS

COURSE SYNOPSIS

The course will expose the students about basic concepts of forces and resultant force through the concepts of free body diagram in two and three dimensions and apply the knowledge to solve problems fall under the concepts of equilibrium of a particle and rigid body. Students also will be exposed on the concepts of the moment of a force in two and three dimensions. Friction, concepts of center of gravity and center of a mass and moment inertia will also be discussed to understand the overall basic statics.

COURSE OUTCOMES

1. Ability to apply knowledge of mathematics, sciences, and engineering to analyze the basic principles of statics on mechanism and bodies.
2. Ability to identify and formulate solutions to the problems related to different force systems of a particle and rigid body in two and three dimensions.
3. Ability to evaluate and provide solutions to the problems related to frictions, centre of gravity, centre of mass for a system and moment of inertia of an area.

REFERENCES

1. R.C. Hibbler, K. B. Yap, Mechanics for Engineers Statics SI, Editon 13e, Pearson Education, Limited, 2013.
2. A. Pytel, J. Kiusalaas, Engineering Mechanics: Statics - SI Version, 3rd Edition, Cengage Learning, Canada, 2010
3. Bedford and Fowler, Engineering Mechanics: Statics and Dynamics, 5th Edition, Pearson-Prentice Hall, 2007.



4. S.D. Sheppard and B.H. Tongue, Statics. Analysis and design of systems in equilibrium, Wiley, 2005.
5. B.H. Tongue and S.D. Sheppard, Dynamics. Analysis and design of systems in motion, Wiley, 2005.
6. F.P. Beer and E.R. Johnston, Vector mechanics for engineers: statics and dynamics, 8th edition, 2006.

ERT 151/3
BIOCHEMISTRY

COURSE SYNOPSIS

The topics covered in this course include the analytical chemistry such as stoichiometry, solutions, material balance, pH and buffer. It also covers the properties of water and structure, classification and function of biomolecules such as carbohydrates, lipids, protein, amino acids, enzymes and phytochemistry.

COURSE OUTCOMES

1. Ability to analyze the biochemical concepts and analytical chemistry terms associated with life based on basic knowledge of science.
2. Ablility to distinguish and identify the engineering problems relate to the structure, classification and function of biomolecules; carbohydrates, lipids and proteins.
3. Able to evaluate and formulate the solutions of engineering problem relate to the roles of enzymes and phytochemicals in biochemistry.

REFERENCES

1. Vaidyanath, K., Pratap, R.K and Satya, P.K. 2004. Introduction to Applied Biology and Biotechnology. BS Publication. Hyderabad.
2. Voet, D. &Voet, J.G. 2004. Biochemistry 3rd Edition, Wiley International Edition, New York.
3. Elliot, W.H. & Elliot, D.C. 2005. Biochemistry 3rd Edition. Oxford University Press.
4. Campbell, M.K. & Farrell, S.O. 2006. Biochemistry 5th Edition. Belmont, CA.
5. Bauman, R. 2007. Microbiology with diseases by taxonomy 2nd Edition. Pearson Education, Prentice Hall.
6. Cowan, M.K. 2006. Microbiology: a system approach 1st Edition. McGraw-Hill Higher Education.

ERT 205/3
FLUID MECHANICS ENGINEERING

COURSE SYNOPSIS

This course covers and emphasizes fundamental concepts, principles, theories and problem-solving techniques pertaining to fluid properties, static and kinematics, control volume analysis, momentum analysis of flow system, dimensional analysis, internal flows (pipe flows), differential analysis, and open channel design. Upon the completion of this course, student would be able to design the right sizing of pipes and open channels and to analysis their flow characteristic.

COURSE OUTCOMES

1. Ability to analyze and interpret the essential parameters describing a fluid system and recognize the common devices used in measuring pressure and flow rates.
2. Ability to analyze and solve problem related to pressures, forces, and stability in static fluid systems in steady or unsteady, uniform or non-uniform, laminar and turbulent fluid.
3. Ability to design the open channel and related hydraulic structures using fundamental approaches such as Froude number and specific energy.

REFERENCES

1. Cengel, Y. A. Cimbala, J. M. "Fluid Mechanics: Fundamental and Applications, First edition in SI units" McGraw-Hill. 2006.
2. Douglas, J. F. et al, Fluid mechanics, 6thedition,Harlow, England, New York: Prentice Hall, 2011.
3. Mott, R.L. "Applied Fluid Mechanics", 6th Edition, Prentice Hall, 2006.
4. Crowe, C.T., Elger, D.F., Robertson, J.A. "Engineering Fluid Mechanics", John Wiley, 8th Ed, 2005.
5. White, F. M. Fluid mechanics, 7th edition, New York, N.Y.: McGraw Hill, 2011.
6. Kundu, P. K. Fluid mechanics, 4th Ed. Amsterdam; Boston: Elsevier/ Academic Press, 2008.

ERT 250/2
DYNAMIC
PREREQUISITE: STATICS

COURSE SYNOPSIS

The course covers the engineering basic knowledge especially kinematics of particles which includes displacement, velocity and acceleration, kinetics of particles; Newton's law of motion, equation of motion, work, impulse, momentum, principle of work and energy, principle of impulse and momentum, planar kinetics and kinematics of rigid bodies, three dimensional kinematics of rigid bodies, three dimensional kinetics of rigid bodies and mechanical vibration.

COURSE OUTCOMES

1. Ability to analyze the problems in the kinematics of particle and rigid body.

2. Ability to analyze problems related to kinetics of particle involving force and acceleration, work, energy and momentum.
3. Ability to evaluate the problems in the kinematics of rigid bodies in 2D and 3D.
4. Ability to formulate the solutions of the problems for damped and undamped vibrations.

REFERENCES

1. Beer F.P, Johnston E.R. and Cornwell P., Vector mechanics for engineers: Dynamics, 10th edition, McGraw Hill, 2013
2. Hibbler R.C., Engineering Mechanics: Dynamics, Pearson Prentice-Hall, NJ, 12th edition in SI Units, 2010.
3. Bedford and Fowler, Engineering Mechanics: Dynamics, 5th Edition, Pearson-Prentice Hall, 2007.
4. Meriam J. L. and Kraige L. G., Engineering Mechanics: Dynamics, 7th Edition SI Version, Wiley, 2013
5. Tongue B.H., Dynamics: Analysis and design of systems in motion, Wiley, 2009.

ERT 251/3
STRENGTH OF MATERIALS
PREREQUISITE: ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS

COURSE SYNOPSIS

This course covers the fundamental and behaviour of solid objects subject to mechanical forces. The coursesdeals with the relations between the external forces applied to elasticbodies and the resulting deformations and stresses. The topics will cover stress-strain, strain energy, shear forces, bending stress, deflection, torsion and material testing.

COURSE OUTCOMES

1. Ability to evaluate the mechanical properties of materials, stress and strain, and failure analysis.
2. Ability to evaluate the shear force, stress, bending moment and deflection of beam.
3. Ability to assess fatigue, torsion of shaft, plastic bending and torsion of materials

REFERENCES

1. Rattan, S.S.Strength of Materials. 2nd Edition.New Delhi: McGraw Hill Education, 2011.
2. Hibbler, R.C. Mechanics of Materials,9th Edition, Pearson education, 2013
3. Beer, F.P.,Johnston,E.R., Dewolf J.T., Mazurek, D.F. Mechanics of Materials. 6th Edition. McGraw Hill Education, 2011
4. Roy Craig, R..Mechanics of Materials, 3rd edition. John Wiley & Son, 2011.
5. Vable, M. Mechanics of Materials. Oxford University Press, 2002.

ERT 252/3
GEOMATICS ENGINEERING

COURSE SYNOPSIS

This course covers surveying, remote sensing, and geographical information systems (GIS) with emphases on basic surveying, fundamentals of remote sensing and its applications, and principles and applications of GIS in agricultural field. The students are exposed to field works to develop skill in using surveying equipments. The main topics discussed are traversing, tachometry, mapping, calculation of areas and volumes, GIS, GPS, and remote sensing.

COURSE OUTCOMES

1. Ability to apply the knowledge of geomatics engineering principles based on various types of geomatics surveying.
2. Ability to conduct surveying task and analyze data from various types of geomatics surveying.
3. Ability to analyze the component of precision farming and interpretation of data.
4. Ability to plan and organize geomatics activities for geospatial data collection (GPS), mapping (GIS) and presentation of the outcome.

REFERENCES

1. Kavanagh, B.F., Surveying: Principles and applications, 9th Ed. Prentice Hall, New York, NY. 2013.
2. Ghilani, C.D, and Wolf, P. Elementary Surveying: An Introduction to Surveying, Pearson, Edinburgh Gate, 2011.
3. Uren, J. and Price, W.F., Surveying for Engineers, 5th Edition, Palgrave Macmillan, 2010.
4. Lillesand, T.M., Remote Sensing and Image Interpretations, John Wiley and Sons, New York. 2007.
5. Heege, H.J., Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and Results, Springer, 2013.

ERT 253/3
ELECTRICAL AND ELECTRONICS TECHNOLOGY

COURSE SYNOPSIS

This subject covers almost all the topics of the basic electrical engineering, ranging from circuits to machines to measurements to power systems. An introduction to basic electronics has also been provided so as to prepare students



for an in-depth study later. At the end of this subject, student is able to construct the electric and digital electronic circuit.

COURSE OUTCOMES

1. Ability to analyze the DC and AC circuits by using Ohm's Law, Kirchhoff's Current Law and Kirchhoff's Voltage Law.
2. Ability to apply the basic concept of magnetism, and electromagnetism in magnetic circuit and evaluate basic DC machine systems.
3. Ability to apply the basic concept of measurement and measuring systems and calculate distribution system components in power system.
4. Ability to design logic circuit by logic gate, and Boolean function and evaluate Integrated Circuits (IC's) in digital electronic applications.

REFERENCES

1. Bhattacharya S. K., Basic Electrical and Electronic Engineering. Pearson., 2012.
2. Richard J. Fowler., Electricity Principles and Applications. 7th Edition. McGraw Hill., 2008.
3. Rafikha Aliana, Norina Idris, Phak Len Eh Kan, Mohammad Nazri., Digital Electronic Design. 1st Edition. Prentice Hall., 2007.
4. Theodore Wildi. Electrical Machines, Drives, and Power Systems. Sixth Edition, 2006
5. Anthony J.W., Ahmad R.G., "Introduction to Engineering Experimentation", 3rd Ed., Prentice Hall, 2010

ERT 246/4
HYDROLOGY AND WATER RESOURCES ENGINEERING

COURSE SYNOPSIS

This course introduces principles of surface water hydrology and their applications in water resources engineering. These include descriptive and quantitative applications of the hydrologic cycle, weather system, precipitation, evaporation, transpiration, surface and subsurface waters, stream flow hydrographs and flood routing. The course also covers applications of hydrologic and frequency analysis with respect to basic water management design procedure with emphases on earth embankments, reservoir and flood design.

COURSE OUTCOMES

1. Ability to identify and solve components of hydrologic cycle and concept of watershed in the biosystems engineering.
2. Ability to examine and use hydrologic analyses techniques to solve problem in water budget and hydrological gain and loss.
3. Ability to conduct investigation and analyze and interpret hydrologic data for engineering design problem based on unit hydrograph, flood routing, frequency analysis, frequency analysis and reservoir and flood design.
4. Ability to evaluate and propose hydrologic simulation model for rainfall-runoff analysis and project design.

REFERENCES

1. Bedient B. P; Huber W.C and Vieux B.E,. (2008) Hydrology Floodplain Analysis, 4th Ed. Prentice-Hall, Inc, Upper Saddle River, NJ 07458.
2. SubramayaK.(2008), Engineering Hydrology, 3rd Ed. McGraw Hill,NewYork,N.Y.
3. DID. (2000), Urban Stormwater Management Manual for Malaysia, DID, Malaysia.
4. Mays, L.W (2001),Water Resources Engineering,John Wiley &Sons,NewYork,N.Y.
5. Ward A.D, Trimbel S.W (2003), Environmental Hydrology, 2nd Edition, Lewis Publisher, Boca Raton.

ERT 254/3
THERMODYNAMICS

COURSE SYNOPSIS

This course covers the study of heat related to matter in motion. The course elaborates on the First Law of Thermodynamics which involves the conversion of energy from one form to another and the Second Law of Thermodynamics which determines the direction of heat flow, and the availability of energy to do work. Topics on gas power and refrigeration cycles as well as phase equilibrium are also covered.

COURSE OUTCOMES

1. Ability to analyze the properties of pure substances and apply the fundamental knowledge of basic thermodynamic properties.
2. Ability to analyze the engineering problems relate to energy in closed system and apply second law of thermodynamics in refrigeration cycle.
3. Ability to predict the P-V-T behavior of gas mixture and analyze the gas vapor pressure and chemical reaction using knowledge of thermodynamics properties for process of innovation

REFERENCES

1. Cengel, Y.A. and Boles, M.A.2015. Thermodynamics-An Engineering Approach, 8th edition, McGraw-Hill,
2. Smith, J.M., Van Ness, H.C., Abbott, M. M. 2005. Introduction to Chemical Engineering Thermodynamics, 7th Edition, McGraw – Hill
3. Sandler, S. 2006. Chemical, Biochemical, and Engineering Thermodynamics, Wiley.
4. Van Vliet, T. 2009. Thermodynamics for the Practicing Engineers, Wiley.
5. Thomas, E., and Philip R. 2010. Thermodynamics, Statistical Thermodynamics, & Kinetics. 2nd Edition, Pearson.

ERT 255/3
ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS

COURSE SYNOPSIS

This course introduces principles and methods for determination and analysis of physical as well as thermal and electromagnetic properties of biological materials. The course also covers aspect of moisture determination and management of biological materials. These properties are essentials for engineers in designing process and equipment related to materials and food processing.

COURSE OUTCOMES

1. Ability to analyze the knowledge of sciences relate to the physical and rheological attributes and properties of biological materials.
2. Ability to analyze the engineering problems relate to thermal and electromagnetic properties of biological materials.
3. Ability to assess and formulate the solutions for engineering problems relate to water activity of biological materials for handling, storage and effective moisture management.
4. Ability to perform investigation as well as analyze and interpret data for engineering properties of biological materials using modern technology and equipment.

REFERENCES

1. Sahin,S and Sumnu,S.G., Physical Properties of Foods, Springer Science, 2007.
2. Da-Wen Sun, Emerging Technologies for Food Processing, 2nd Ed., Academic Press, Elsvier, London, 2014.
3. Rattan, S.S., Strength of Materials, 2nd Edition, New Delhi, McGraw Hill Education, 2011.
4. Jose M.Aguilera and Peter J. Lilliford, Food Materials Science, Springer Verlag Berlin Heidelberg, 2008.
5. Ludger O. Figura and Arthur A. Teixera, Food Physics: Physical Properties-Measurement and Applications, Springer –Verlag Berlin Heidelberg, 2007.

ERT 256/2
THEORY OF STRUCTURES

COURSE SYNOPSIS

This course covers functions of structures, design loads, reactions and forces systems, analysis of statically determinate structures including beams, trusses, frames and arches; energy methods of determining deflections of structures, influence lines and criteria for moving loads, analysis of statically indeterminate structures using stiffness method for beams, trusses and frames. Also introduces finite element analysis for analysis of structures.

COURSE OUTCOMES

1. Ability to analyze engineering problems relate to statically indeterminate elastic structural members and to determine external loads, deformation, and internal forces.
2. Ability to analyze structures with moving loads using basic knowledge of mathematics, sciences and engineering.
3. Ability to evaluate and solve the problems relate tostructural member deflections under given loading.
4. Ability to evaluate and formulate the solution for complex engineering problems relate tothe force and stiffness method for truss, beam, and frame analysis.

REFERENCES

1. Hibbeler, R.C. Structural Analysis. Eight Edition in SI Unit. Prentice Hall, Singapore. 2012.
2. Aslam Kassimali. Structural Analysis. 5th Edition. Cengage Learning. 2014.
3. Kenneth, M.L., Chia, M.U. and Gilbert, A. Fundamental of Structural Analysis. McGraw Hill, 2010.
4. Gianluca, R and Raymond, I.G. Structural Analysis: Principles, Methods and Modelling. CRC Press. 2014.
5. Kaveh, A. Computational Structural Analysis and Finite Element Methods. Springer. 2013.

ERT 354/3
SOIL ENGINEERING

COURSE SYNOPSIS

Soil engineering in the context of biosystems engineering would have three major components: (a)Soil Physics: to provide basic knowledge to the student on physical engineering properties of



soil in relation to irrigation and crop water requirement; (b)Soil mechanics : to provide basic knowledge to the student on soil mechanical properties in relation to soil foundation in relation to infrastructures and machineries; (c) Soil Dynamics (terramechanics): to provide basic knowledge to the student on soil-machine trafficabilty relationship. Upon the completion of this subject, students would be able to conduct a complete physical and mechanical investigation of soil that are required for irrigation and drainage, foundation and slope stability design and agricultural machine selection.

COURSE OUTCOMES

1. Ability to apply the basic concept of soil textural classification and physical characteristics in relation to irrigation/ drainage and foundation design.
2. Ability to evaluate mechanical properties of soil in relation to building foundation and slope stability under the static soil condition.
3. Ability to synthesize the soil dynamics behavior in relation to soil-machine-traction design for agricultural machineries.

REFERENCES

1. Soil Mechanics Laboratory Manual, 8thEd.(2012). BrajaM.Das. Oxford Univ. Press.
2. Soils and Foundations. Liu, C. and Evet, J.B. (2014).. 8th Ed. Pearson.
3. Soil Mechanics Fundamental (2015), Muni Budhu. Kindle Edition.
4. Soil Physics for agriculture and environment (2000). H. Don Scott. Wiley.
5. Soil Mechanics in Engineering Practices (2010). Karl Terzaghi. Wiley.

ERT 245/4
HEAT AND MASS TRANSFER IN BIOLOGICAL SYSTEMS

COURSE SYNOPSIS

This course introduces mechanisms by which heat is transferred from one body to another. The course covers steady state and transient heat conduction, convection and radiation, also mass transfer with special address on biological systems. Emphases are placed on formulation and application of respective mathematical models of heat and mass transfer across both physical and biological bodies, as well as design of heat exchangers for application to biological systems.

COURSE OUTCOMES

1. Ability to analyze through application of appropriate mathematical equations, problems related to various heat and mass transfer mechanisms.
2. Ability to design heat exchanger for application to biosystems related problems exhibiting competence in performing energy analysis on the heat exchanger.
3. Ability to formulate and performheat and/ormass transfer analysis of a given problema related to biológical systems.

REFERENCES

1. Yunus A. Cengel (2014). Heat and Mass Transfer: A Practical Approach, 5th Ed., McGraw Hill, New York.
2. Incropera, F.P. Bergmann, T.L., DeWitt, D.P. and Levin, A.S. (2013). Fundamentals of Heat and Mass Transfer, John Wiley and Sons, New York.
3. Holman, J.P. (2009). Heat Transfer, 10th Ed., McGraw Hill, New York.
4. Plawsky, J.L. (2014). Transport Phenomena Fundamentals, 3rd Ed., Taylor and Francis, New York.
5. Truskey, G.A., Yuan, F. and Katz, D.F. (2009). Transport Phenomena in Biological Systems, McGraw Hill, New York.

ERT 350/3
INSTRUMENTATION MEASUREMENT AND CONTROL IN BIOSYSTEMS ENGINEERING

COURSE SYNOPSIS

The course covers the general concept of instrumentation, various measuring devices, and the manipulation, transmission, and recording of data. Different methods in measuring and problem solving to various use in biosystems engineering will be addressed where applicable. Students will be able to comprehend control engineering application which are essential features of any measurement programme.

COURSE OUTCOMES

1. Ability to differentiate the main functional components in instrumentation and their working principle of various measurement devices.
2. Ability to differentiate roles and features of appropriate instruments for various measurements inbiosystems engineering applications.
3. Ability to evaluate control engineering application to solve problems in agricultural and biological system.

REFERENCES

1. Nakra, B.C. and Chaudhry, K.K. (2004) Instrumentation,Measurement and Analysis, Second Edition, Tata McGraw Hill. New York.

2. Singh, S.K. (2009). Industrial Instrumentation and Control, Third Edition, Tata McGraw Hill, New York.
3. Doebelin, E.O. (2004). Measurement Systems – Application and Design, McGraw Hill, New York.
4. Harsanyi, G. (2000). Sensors in Biomedical Applications, Technomic Publication, London.
5. Bell, D.A. (2000). Electronic Instrumentation and Measurement, Prentice Hall, New York.

ERT 353/3
ENERGY AND POWER IN BIOSYSTEMS

COURSE SYNOPSIS

The course encompasses on the concepts of energy and power generation from mechanical devices including engine, pumps, compressor, fan and blowers. The recent technology, production processes and engineering renewable energy development for sustainability from various sources such as wind, solar, hydro power, ocean and bioenergy are also discussed.

COURSE OUTCOMES

1. Ability to apply the knowledge of science and mathematics to analyze the principles of the internal combustion engines.
2. Ability to evaluate the performance and efficiency of power generator including engines, solid and liquid mover's devices to solve engineering problems.
3. Ability to evaluate the application of renewable energy for power generation to overcome the global environmental issues.

REFERENCES

1. Ayhan D. (2009) "Green Energy and Technology" Springer, Verlag London.
2. Aldo Viera R. (2009)"Fundamentals of Renewable Energy"Elsevier Inc. UK.
3. Grupta H.N. (2006) "Fundamentals of Internal Combustion Engines" Prentice Hall of India.
4. Forsthoffer'W.E. (2005) "Forsthoffer's Rotating Equipment Handbooks Pump" Elsevier USA.
5. Pulkrabek W. W.,(2004) "Engineering Fundamentals of the Internal Combustion Engine" Pearson Prentice Hall, UK.

ERT 352/3
FARM STRUCTURES
PREREQUISITE: THEORY OF STRUCTURES

COURSE SYNOPSIS

This course covers planning, engineering design and analysis together with materials cost estimation of farm structures which include greenhouses, structures for livestock husbandry, water and soils conservation related structures, off-highway roads, and other agricultural structures. In depth analysis of structural design using timber, reinforce concrete, and steel will be performed.

COURSE OUTCOMES

1. Ability to propose the farm structures and materials for layout planning and management.
2. Ability to design structural members using Eurocode 2 & Eurocode 3 by understanding the elements of professional and ethical responsibilities to community.
3. Ability to estimate cost of construction of biosystems structures by understanding the impact of environment and sustainability.
4. Ability to propose the structural elements analysis in design project related to biosystems activities/field.

REFERENCES

1. McKenzie, W.M.C (2013) Design of Structural Elements 2nd edition. Palgrave McMillan, UK.
2. Bhatt, P. MacGinley, T.J. Choo, B. S. (2013) Reinforced Concrete Design to Eurocodes: Design Theory and Examples, 4th Edition. CRC Press. UK.
3. Seward,D. (2009). Understanding Structures: Analysis, Materials, Design 4th Edition, Palgrave McMillan, UK.
4. Arya, C. (2009) Design of Structural Elements: Concrete Steelwork Masonry and Timber Designs to British Standards and Eurocodes 3rd Edition. Taylor & Francis.
5. Mosley, B. (2006) Reinforced Concrete Design to Eurocode 2. Palgrave McMillan, UK.
6. Lindley, J.A and Whitaker, J.H. (1995). Agricultural Buildings and Structures, ASAE.

ERT 351/3
SUSTAINABLE AGROSYSTEMS ENGINEERING

COURSE SYNOPSIS

This course discusses important components of sustainability for agrosystems which can be optimized through suitable application of engineering principles to reinforce the conventional wisdom of agrosystems production. Important engineering approaches invoking reviewing current practice and design will be covered. At the end of the course, student will



recognized the scope of engineering that can be a sustainable factor for the farming system.

COURSE OUTCOMES

1. Ability to distinguish agrosystems practices and sustainability indicators for environmental and sustainable development.
2. Ability to evaluate mathematical model for sustainable agrosystems in term of global and environmental issues.
3. Ability to design components and processes of sustainable agrosystems as well as proposing alternative practices and solutions to improve sustainability of agrosystems.

REFERENCES

1. Lynch, Daniel R. (2009).*Sustainable natural resource management for scientists and engineers,* Cambridge University Press, New York.
2. Michel De Lara and Luc Doyen (2008). *Sustainable management of natural resources: Mathematical models and method,* Springer-Verlag Berlin Heidelberg.
3. Mason.J. (2003)*Sustainable agriculture.2nd ed.,* Landlinks Press, Collingwood Vic. Australia.
4. Gliessman, Stephen R. (2001). *Agroecosystem sustainability: developing practical strategies,* CRC Press, Washington.

ERT 457/3
DESIGN OF AUTOMATION SYSTEMS

COURSE SYNOPSIS

This course covers automation and sensor technology applied in agricultural and biological systems. It also includes the components of automation system such as actuators and drivers, AC and DC motors. Topics such as control engineering application in agricultural and biological systems, and microcontroller are also discussed.

COURSE OUTCOMES

1. Ability to apply principle of automation and sensor technology for life-long learning in agricultural and biological systems.
2. Ability to analyze, identify, formulate and solve engineering problem of the actuator components and application of an automation system in Biosystems Engineering.
3. Ability to design automation system for agricultural and biological production systems using modern engineering tools in teams and ability to communicate effectively in writing and oral.

REFERENCES

1. Bolton, W. 2003. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering. 3rd edition. Prentice Hall.
2. Francis J. Pierce; Qin Zhang. 2012. Agricultural Automation: Fundamentals and Practices. CRC Press/Taylor & Francis Group.
3. Eggins, B.R. 2002. Chemical Sensors and Biosensors. John Wiley & Sons.
4. Rafael Comeaux and Pablo Novotny. 2009. Biosensors: Properties, Materials and Applications (Biotechnology in Agriculture, Industry and Medicine Series). 1st edition Nova Science Pub Inc.
5. George K. Knopf, Amarjeet S. Bassi. 2007. Smart Biosensor Technology. CRC Press/Taylor & Francis Group.

ERT 356/3
UNIT OPERATIONS
PREREQUISITE: HEAT AND MASS TRANSFER IN BIOLOGICAL SYSTEMS

COURSE SYNOPSIS

This subject introduces different types of unit operations in food and agro-based processing industries. The unit operations involved drying, evaporation, absorption, and distillation which are designed based on heat and mass transfer principles. Then, the student will also be taught on operation that involves size reduction such as milling, filtration and sieving. The course will end with the understanding of student in planning and designing mixing operations.

COURSE OUTCOMES

1. Ability to apply a basic principle of material and energy balances for selected unit operations in food and agro-based industries.
2. Ability to illustrate and evaluate a basic design for drying equipments and to distinguish the single and multiple effects of evaporators.
3. Ability to analyze and formulate gas absorption and distillation equipments and operations.
4. Ability to plan and design size reduction and mixing operation for food and agro-based industries.

REFERENCES

1. McCabe, W. L., Smith, J. C. and Harriott, P., Unit Operations of Chemical Engineering, McGraw-Hill, 2005.
2. Benitez, J., Principles andModern Applications of Mass Transfer Operations, John Wiley and Son, 2009.
3. Wancat, P.C., Separation Process Engineering, Pearson Education, 3rd Edition, 2012.

4. Rivas, O. R., Unit Operations of Particulate Solids: Theory and Practice. CRC Press, 2012.
5. Earle, R. L., and Earle, M.D., Unit Operations in Food Processing, 1966.

ERT 355/2
BIOSYSTEMS MODELLING AND SIMULATION

COURSE SYNOPSIS

The course advances students on concepts of systems analysis, modeling and computer simulation of agricultural and biological systems. Primary focus is on developing knowledge and skills to construct static as well as dynamic models, perform sensitivity analysis, parameter estimation and model evaluation. Review and analysis of models in agricultural and biological systems emphasizing crops, animals, and environment are also covered. Laboratory work using MATLAB and LabVIEW enhances student's ability in simulating biological systems. A group project culminates the course.

COURSE OUTCOMES

1. Ability to formulate mathematical models governing biological and physical behaviors of biosystems.
2. Ability to construct computer programming to simulate biosystems behaviors and responses.
3. Ability to analyze and formulate gas absorption and distillation equipments and operations.
4. Ability to prepare a simulation report working in a team.

REFERENCES

1. James W. Haefner (2012), Modelling Biological Systems: Principles and applications, UK: Springer.
2. Robert H Bishop (2014), Learning with LabVIEW, New York, Pearson.
3. William J. Palm III (2011), Introduction to MATLAB for Engineers (3rd Edition), University of Rhode Island, McGraw-Hill.
4. Mark M Meerschaert (2013). Mathematical Modelling, New York: Academic Press.
5. J.H.M. Thornley and J. France (2007), Mathematical Models in Agriculture: Quantitative methods for plants, animals and ecological science. 2nd Ed., Cambridge, CABI.

ERT 445/2
FINAL YEAR PROJECT I

COURSE SYNOPSIS

This course consists of lecture and independent study on the technique of conducting literature review, identification of problem statements, project objectives and research methodology. The students are guided on the proper techniques and format of thesis writing, submit the project proposal and present to the internal examiners.

COURSE OUTCOMES

1. Ability to synthesize information including standards, code of practice, journals, policies, field data, etc, relevant to the specific research to be undertaken and relate with societal and global issues.
2. Ability to analyze scenario and composethe problem statements and the research objectives of the project.
3. Ability to formulate research methodology incorporating clear fundamentals, theories and benchmarked against standard practices governing the research project.
4. Ability to prepare and defend research proposal with effective communication skills.

REFERENCES

1. Rowena, M.(2006). How to write a thesis. Open University Press. England.
2. Hoang, P.(2006). Springer Handbook of Engineering Statistic. Springer-Verlang, London.
3. Bailey, S.(2003). A practical guide for students. TJ International Ltd. USA.
4. A Guide To Student Final Year Project (2003). UniMAP.
5. Academic journals.

ERT 461/3
BIOSYSTEMS ENGINEERING DESIGN I

COURSE SYNOPSIS

Biosystems Engineering Design is a 2 part course covering aspects of engineering design related to open-ended design projects at professional level engineering design task in biosystems engineering field. The design project is a team-based approach to provide capstone design experience emphasizing on the application of sciences, mathematics and engineering science acquired in earlier course work in design of projects. The scope of the course covers the knowledge on the elements in project formulation, planning/scheduling, management and communication, engineering economics including cost-benefits analysis and budgeting, critical thinking, ethics and safety in engineering design, fundamental in engineering design methodology (the process and tools) and systems engineering. Analysis of case studies pertaining to engineering issues in design.



COURSE OUTCOMES

1. Ability to differentiate between ethical and legal issues and relate how these are related to design projects in biosystems engineering field.
2. Ability to demonstrate team work through group weekly meetings, project planning and management, analysis of case studies and class presentation.
3. Ability to analyze and assess the impact of design and engineering solutions on society and environment.
4. Ability to evaluate economic and feasibility study of a design project in biosystems engineering.
5. Ability to compose engineering problems and alternative solutions and formulate a sound proposal in biosystems engineering project using systematic design process.

REFERENCES

1. Chang N.B., (2011). Systems Analysis for Sustainable Engineering: Theory and Applications (Green Manufacturing & Systems Engineering).
2. Christianson L. L. and Rohrbach R. P. (1987). Design in Agricultural Engineering. ASAE Textbook.
3. Norton, R. L. (2006). Machine Design: An Integrated Approach, Pearson Education, 3rd Edition.
4. Sharma P. C. and Aggarwal D. K (2010). Machine Design, S.K Kataria& Sons.
5. Shigley J. E., Mischke, C. R., Brwon Jr. T. H. (2004). Standard Handbook of Machine Design, 3rd Edition, The McGraw-Hill Co. Inc.
6. Walsh R. A., (2007). Handbook of Environmental Engineering Calculations, 2nd Edition, The McGraw-Hill Co. Inc.

ERT 464/3
DESIGN OF MACHINE AND SYSTEM

COURSE SYNOPSIS

The course covers study of agricultural and other off-road vehicle with special attention to functional design requirements of various machine operations, cost analysis, machinery selection and testing. Topics also include tillage force analysis, tillage tools, mechanisms for metering and applying seed, fertilizer and pest control chemicals, harvesting methods and machinery, hydraulic and other methods of transmitting power and controlling machines, biomass cleaning, conveying of agricultural materials and crop drying. Interactions of machines with biological systems. Application of agricultural machinery for optimal selection, operation and performance, and management of farm machinery such as tractors, tillage, seeding, chemical application, biomass and grain/fruit harvesting and post-harvest handling in food (grain, vegetable) and industrial/ tree crops production (fruits, oil palm) systems.

COURSE OUTCOMES

1. Ability to analyze specialized components and evaluate mechanized systems for production, handling and processing of biological materials.
2. Ability to design machinery in biosystems engineering.
3. Ability to compare machine components in a variety of situations and select machines for specific operations in biosystems engineering.

REFERENCES

1. Claude Culpin. 2008. Farm Machinery Farm Machinery, 12th Edition, Wiley-Blackwell.
2. Kepner, R. A., Roy Bainer, and Berger, E. L. 2005. Principles of Farm Machinery, The AVI Publishing Inc.
3. Cleghorn, W. L. 2005. Mechanics of Machines.
4. Pennock, G. R. 2003. Theory of Machines and Mechanisms, Oxford University Press.
5. Low, K. H. 2003. Mechanics of Mechanisms, Prentice Hall.

ERT 460/3
CONTROLLED ENVIRONMENT ENGINEERING
PREREQUISITE: HEAT AND MASS TRANSFER IN BIOLOGICAL SYSTEMS

COURSE SYNOPSIS

The course covers thermal and environmental engineering design and analyses appropriate for controlled environment agricultural related production facilities for plants, animals, and aquaculture. Major topics include psychometrics, heat and mass transfer, ventilation, cooling and heating, air distribution within controlled environment buildings.

COURSE OUTCOMES

1. Ability to analyze heat and mass transfer of plants, animals and aquaculture structures.
2. Ability to design natural and forced cooling and/or heating for plants, animals, and aquaculture structures.
3. Ability to design natural and forced ventilation for plants, animals and aquaculture structures.
4. Ability to appraise and value the existing designs and safety aspect of plant, animals and aquaculture structures through groupwork project.

REFERENCES

1. Albright, L.D. (2005). Environmental Control for Plants and Animals. American Society of Agricultural and Biological Engineers, St. Joseph, MI.
2. Incropera, F.P. (2002). Introduction to Heat and Mass Transfer, 4th ed., John Wiley and Sons, New York.
3. Bartok, J. W. (2001). Energy Conservation for Commercial Greenhouses. NRAES. New York.
4. Ibrahim, D. (2003), Microcontroller Based Temperature Monitoring & Control. Newnes, Oxford.
5. Tiwari, G.N. (2003). Greenhouse Technology for Controlled Environment. Alpha Science, New York.

ERT 446/4
FINAL YEAR PROJECT 2

COURSE SYNOPSIS

This course consists of lectures and independent study on the techniques of conductinglaboratory and/or field experiments. The students are guided on the techniques and implementation of research and monitored based on the research plan, data analysis, interpretation and conclusion. The students are required to write, submit and defend their thesis to the internal examiner.

COURSE OUTCOMES

1. Ability to conduct research experiments, analyze and interpret data and deduce good conclusion.
2. Ability to use techniques and modern tools to solve research problems.
3. Ability to plan activities pertaining to research project and execute the plan to meet the required research objectives and datelines.
4. Ability to write research report that conforms to standard thesis format and performs verbal presentation.

REFERENCES

1. Rowena, M. (2006). How to write a thesis. Open University Press. England.
2. Hoang, P. (2006). Springer Handbook of Engineering Statistic. Springer-Verlang, London.
3. Bailey, S. (2003). A practical guide for students. TJ International Ltd. USA.
4. A Guide To Student Final Year Project (2003). UniMAP.
5. Academic journals.

ERT 462/3
BIOSYSTEMS ENGINEERING DESIGN 2

COURSE SYNOPSIS

This course covers topics on design aspects within related biosystems engineering thematic areas including (but not limited to) automation and emerging technologies, machine systems, postharvest technology, structures and environment, soil and water, information technology, and sustainable agriculture and cutting across several important food and industrial crops. The scope of the class is to design component, equipment, process, plant and systems to meet desired project needs within realistic constraint and to comprehend diverse and fast changing technology and open-end design problems in biosystems engineering and technology fields. The use of modern engineering design practices, tools and product/ solution development process, trouble-shooting methodology, learn and utilize a realistic simulation of the real-world design process, engineering analysis and synthesis through their projects. Knowledge integration from other Biosystems Engineering courses is required to identify, solve, and design solution for complex engineering problems.

COURSE OUTCOMES

1. Ability to conduct engineering analysis and adeptly apply principles and tools of mathematics and science to solve multi-facetted design project to produce credible conclusions.
2. Ability to formulate and produce solutions that properly address critical issues and assumptions that are conceptually and contextually valid and meet client expectation.
3. Ability to design component, equipment, process, plant and systems in biosystems engineering using engineering tools and design softwares for optimum performance.
4. Ability to display understanding of biosystems engineering project and integrate the design for manufacturability, utility and sustainability.
5. Ability to write project report that conforms to engineering professional standard and to perform verbal presentation on the project.

REFERENCES

1. Chang N.B., (2011). Systems Analysis for Sustainable Engineering: Theory and Applications (Green Manufacturing & Systems Engineering).
2. Christianson L. L. and Rohrbach R. P. (1987). Design in Agricultural Engineering. ASAE Textbook.
3. Norton, R. L. (2006). Machine Design: An Integrated Approach, Pearson Education, 3rd Edition.
4. Sharma P. C. and Aggarwal D. K (2010). Machine Design, S.K Kataria& Sons.
5. Shigley J. E., Mischke, C. R., Brwon Jr. T. H. (2004). Standard Handbook of Machine Design, 3rd Edition, The McGraw-Hill Co. Inc.

6. Walsh R. A., (2007). Handbook of Environmental Engineering Calculations, 2nd Edition, The McGraw-Hill Co. Inc.

ERT 466/3
WASTE MANAGEMENT

COURSE SYNOPSIS

This course covers the sources and properties of agricultural farm and agricultural related industries wasteand wastewater, and their effect on the environment. Also the physical, chemical and biological wasteand wastewater treatment and disposal. The waste characteristics and handling knowledge is included in the course. Last but not least, the organizational waste management design is also covered.

COURSE OUTCOMES

1. Ability to analyze the properties ofwastes and their impact on theenvironment for sustainable development.
2. Ability to design physical, chemicaland biological treatment systems ofagricultural related industrial wasteand wastewater for sustainable environment.
3. Ability to propose themanagement solution and responsibility for different characteristics of solid and agricultural waste.

REFERENCES

1. Metcalf and Eddy. Inc. Tchobanouglous, G., Stensel, H.D., Tsuchihashi, R. and Burton, F. 2014. Wastewater Engineering: Treatment and Resource Recovery. 5th Edition. McGraw Hill.
2. Nag., A. 2005. Environmental Education and Solid Waste Management. New Age International.
3. Bahadori, A. 2013. Waste Management in the Chemical and Petroleum Industries. Wiley.
4. Denison, R., Ruston, J. 2013. Recycling and Incineration: Evaluating The Choices. Island Press.
5. Christensen, T. 2010. Solid Waste Technology & Management. Wiley.

ERT 456/3
POST HARVEST ENGINEERING

COURSE SYNOPSIS

This course covers the importance of moisture content in agricultural products and its methods for determination, principle of drying, theory of diffusion, and mechanisms of drying including puff drying, foam mat drying, freeze drying, calculation of drying air temperature and air flow rate, air pressure within the grain bed. The course also elaborates on different types of dryers, their performances, energy utilization and efficiency in relation to drying and dehydration of agricultural products. The course discusses the types and causes of spoilage in storage, conditions for storage such as functional requirements of storage with emphasis on highly perishable AGRICULTURAL PRODUCE as well as cereal grains, control of temperature and relative humidity inside storage, and calculation of refrigeration load, designing conditioning of environment inside storage through natural, mechanical ventilation and cooling and transportation of refrigerated agricultural produce.

COURSE OUTCOMES

1. Ability to analyze drying/refrigeration process of biological materials and calculate the parameters influencing the process in solving complex engineering problems.
2. Ability to compare mechanisms of spoilage in highly perishable horticultural produce and cereal grain and design solutions based on appropriate postharvest handling technologies to control them.
3. Ability to select appropriate conditioning of environments and post harvest treatments for safe handlings of highly perishable horticultural and livestock produce.

REFERENCES

1. Mohammed Wasim Siddiqui. 2015. Postharvest Biology and Technology of Horticultural Crops: Principles and Practices for Quality Maintenance, Apple Academic Press, 572 pg, ISBN: 978.177.1880862.
2. AmalenduChakraverty, Paul Singh, R. 2014. Postharvest Technology and Food Process Engineering 1st Edition, CRC Prees, 581 pg, ISBN-101.466.553200.
3. Milind, S. Ladaniya. 2008. Citrus Fruits – Biology, Technology and Evaluation. Academic Press, ISBN: 978.012.3741301.
4. Phirke, P. S. 2007. Postharvest Engineering of Fruits and Vegetables. CBS, 215 pg, ISBN 978.812.3914282.
5. Sudheer K. P., and Indira, V. 2007. Post harvest Technology of Horticultural Crops. New India Publishing Agency.
6. Frank, P. Incropera, David, P. Dewitt, Theodore, L. Bergman and Adrienne, S. Lavine. 2007. Fundamentals of Heat and Mass Transfer, 6th ed., John Wiley & Sons, Inc., 1070 pg, ISBN-100.471.457280.

CAREER OPPORTUNITIES

Graduate from this school has a wide range of employment prospects either in private companies, industry, government departments and statutory bodies. Sectors that offer employment opportunities are as follows;

- Industrial Bioprocess
- Pharmaceutical Industry
- Food Industry
- Consultation and Research Institution such as MARDI, FRIM
- Chemical Industry
- Biotechnology Companies
- Environment Sector
- Public Sector Farming Body (FELDA, Felcra, MADA etc)
- Forestry Sector (Manufacturing & Management)
- Irrigation and Drainage
- Education Sector


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INTRODUCTION

The School of Environmental Engineering is the 8th engineering school in UniMAP and was established in January 2006 after approval from the Ministry of Higher Education in 2005. The school currently offers two undergraduate programs namely Bachelor of Engineering (Environmental Engineering) and Bachelor of Engineering (Civil Engineering). These programs are evaluated by the Engineering Accreditation Council (EAC) and the programs have been accredited by the Board of Engineers Malaysia (BEM) in respective fields.

The Vision and Mission of the School of Environmental Engineering are stated below:

Vision
An internationally recognized academic programme

Mission
To support the nation's aspirations in industrial agenda towards environmental sustainability

Bachelor of Engineering (Hons.) (Environmental Engineering) RK07
This program is accredited by the Board of Engineers Malaysia (BEM) (Ref. No: BEM/041/0111/M (002)) and recognized by The Institution of Engineers, Malaysia (IEM), Malaysia Qualification Agency (MQA) and the Malaysia Public Services Department (JPA). The programme covers the element of chemical and environmental engineering, environmental laws, safety and health, environmental and project management.

Bachelor of Engineering (Hons.) (Civil Engineering) RK01
This program is accredited by the Board of Engineers Malaysia (BEM) under Civil Engineering discipline (Ref. No: BEM/041/0100/M (001)). Students who follow this program will be exposed to various fields of civil engineering knowledge including geotechnical engineering, structural engineering, traffic & highway and water engineering.

Postgraduate Programmes
The School of Environmental Engineering also offers postgraduate programme to students who pursuing to continue their studies in higher levels. The school offers full or part-time study via research mode for the following programmes:

- M.Sc (Environmental Engineering)
- M.Sc (Civil Engineering)
- M.Sc (Building Engineering)
- PhD. (Environmental Engineering)
- PhD. (Civil Engineering)
- PhD. (Building Engineering)

FACILITIES

The School of Environmental Engineering is equipped with various research and teaching instruments which can be grouped into two major fields namely chemical / environmental and civil engineering. These instruments are placed in several laboratories including:

Civil Engineering Lab:
- Concrete Lab
- Structure Lab
- Heavy Structural Lab
- Geotechnical & Highway Lab
- Construction Material Testing Lab
- Computer Simulation Lab

Environmental Engineering Lab
- Water & Wastewater Lab
- Solid & Hazardous Waste Lab
- Hydraulic & Hydrology Lab
- Air, Noise & Vibration Lab
- Chemical Engineering Lab
- Consultation & Research Lab

The school is embarking into consultation and laboratory services to the industries. To fulfil the industrial requirements, several of our testing and analysis facilities are accredited with SAMM MS ISO/IEC 17025 which was granted by the Department of Standard Malaysia (DSM) (Skim Akreditasi Makmal Malaysia, SAMM 581). The scope of accreditation covering the area of:

- Mechanical (e.g. concrete and brick compression)
- Chemical (e.g. wastewater, surface water, drinking water, groundwater)

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BACHELOR OF ENGINEERING (HONOURS) (ENVIRONMENTAL ENGINEERING)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Graduates who are leaders in the field of environmental engineering or chosen field as demonstrated through career advancement.

PEO2
Graduates who are members and contribute to professional society.

PEO3
Graduates who pursue continuous education opportunities.

PEO4
Graduates who contribute through research and development.

PEO5
Graduates who are engineers and demonstrate entrepreneurial skills.

PROGRAMME OUTCOMES (PO)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence to the solution of complex engineering problems in an environmental/ civil engineering discipline.

PO2
Ability to identify, formulate and solve complex engineering problems.

PO3
Ability to design solutions for complex engineering problems and design systems, components or processes to meet desired needs.

PO4
Ability to conduct investigation into complex engineering problems as well as to analyze and interpret data.

PO5
Ability to use techniques, skills and modern engineering tools, necessary for complex engineering activities and practices so as to be easily adaptable to industrial needs.

PO6
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7
Ability to understanding entrepreneurship, the process of innovation and the need for sustainable development.

PO8
Understanding of professional and ethical responsibilities and commitment to the community.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11
Recognition of the need for, and an ability to engage in life-long learning.

PO12
Demonstrate understanding of project management and finance principles.

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (ENVIRONMENTAL ENGINEERING)

YEAR	FIRST			SECOND		THIRD			FOURTH	
	I	II		III	IV	V	VI		VII	VIII
Engineering Core (104)	EAT 105/4 Fundamental of Electrical Engineering	EKT 120/4 Computer Programming	ECOLOGICAL CAMP	EAT 213/4 Fluid Mechanics and Hydraulics	EAT 238/3 Hydrology	EAT 347/4 Mass Transfer **	EAT 342/3 Noise Pollution Engineering	EIT302/4 Industrial Training	EAT XXX/3 Elective I	EAT XXX/3 Elective II
	EAT 131/4 Environmental Chemistry	EAT 101/4 Basic Ecology		EAT 231/3 Thermodynamics *	EAT 208/3 Environmental Law, Health and Safety	EAT 348/3 Water Supply Engineering	EAT 343/3 Public Health and Occupational Hygiene		EAT465/3 Engineering Project Management	EAT 433/3 Environmental Engineering Design
	EAT 102/4 Mechanics and Material Engineering	EAT 104/4 Fundamental of Chemical Eng Processes		EAT 232/3 Fundamental of Environmental Engineering	EAT 235/3 Geo environmental Engineering	EAT 341/3 Solid and Hazardous Waste Engineering	EAT 344/3 Environmental Management System		EAT461/2 Final Year Project I	EAT 462/4 Final Year Project II
		ECT 112/3 Engineering Skills		EAT 233/3 Environmental Engineering Skills #		EAT 332/3 Environmental Impact Assessment	EAT 303/4 Wastewater Engineering		EAT 441/3 Environmental Remediation	
							EAT 301/4 Air Pollution Engineering			
Non Engineering (16)	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II		EQT 203/3 Engineering Mathematics III	EQT 271/3 Engineering Statistics					EUT442/2 Profesional Engineers
	UUT 122/2 Skills and Technology in Communication									
University Requirement (17)	UZW XXX/1 Co-curriculum	UZW XXX/1 Co-curriculum		UUW 224/2 Engineering Entrepreneurship	UVW 312/2 English for Technical Communication[c]	UUW 233/2 Islamic and Asian Civilizations or UUW 237/2 Malaysian Cultures[c]	UUW 322/2 Thinking Skills		UUW XXX/2 Option Subject	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies[c]
	UVA 111/2 Foundation English[a]	UVW211/2 English for General Purposes[b]			UVW 410/2 University Malay Language	UZW XXX/1 Co-curriculum				
133	18	19		18	16	16	19	4	13	14
TOTAL UNITS FOR GRADUATION IS 137										

ELECTIVES COURSES:

Elective I : EAT 445/3 Remote Sensing #, EAT 449/3 Environmental Process Control & Instrumentation, EAT 472/3 Advanced Water Treatment, EAT 476/3 Urban Stormwater Management

Elective II : EAT 447/3 Environmental Informatics, EAT 443/3 Built Environment, EAT470/3 Sustainable Energy, EAT 471/3 Environmental Risk Assessment

COURSE * IS A PRE-REQUISITE TO COURSE **
AND COURSE # IS PRE-REQUISITE TO COURSE ##

[a]Uncredited. Compulsory to students with MUET band 2 only. This course is prerequisite to UVW 211 Engllish for General Purposes.
[b]Compulsory to students with MUET Band 3 or less. This course is prerequisite to UVW 312 English for Technical Communication. UVW 211/2 is equivalent to UUW XXX/2 (Option Subject). 2 units will not be counted for those who took UVW 211/2.
[c] For international students only.



BACHELOR OF ENGINEERING (HONOURS) (CIVIL ENGINEERING)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Graduates are leaders in the field of civil engineering or chosen field as demonstrated through career advancement.

PEO2
Graduates who are members and contribute to professional society.

PEO3
Graduates pursue continuing education opportunities.

PEO4
Graduates who contribute through research and development.

PEO5
Graduates who are engineers and demonstrate entrepreneurial skills.

PROGRAMME OUTCOMES (PO)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence to the solution of complex engineering problems in an environmental/ civil engineering discipline.

PO2
Ability to identify, formulate and solve complex engineering problems.

PO3
Ability to design solutions for complex engineering problems and design systems, components or processes to meet desired needs.

PO4
Ability to conduct investigation into complex engineering problems as well as to analyze and interpret data.

PO5
Ability to use techniques, skills and modern engineering tools, necessary for complex engineering activities and practices so as to be easily adaptable to industrial needs.

PO6
Understanding of the social, cultural, global and environmental responsibilities of a professional engineer.

PO7
Ability to understanding entrepreneurship, the process of innovation and the need for sustainable development.

PO8
Understanding of professional and ethical responsibilities and commitment to the community.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

PO11
Recognition of the need for, and an ability to engage in life-long learning.

PO12
Demonstrate understanding of project management and finance principles.

CURRICULUM STRUCTURE FOR BACHELOR OF ENGINEERING (HONOURS) (CIVIL ENGINEERING)

YEAR	FIRST			SECOND		THIRD			FOURTH	
	I	II		III	IV	V	VI		VII	VIII
Engineering Core (104)	EAT 105/4 Fundamental of Electrical Engineering	EKT 120/4 Computer Programming	GEOMATIC CAMP	EAT 251/3 Structural Theory#	EAT 258/3 Building Material Engineering	EAT 314/4 Geotechnical Engineering∞∞	EAT 360/4 Highway & Transportation Engineering	EIT 302/4 Industrial Training	EAT 455/3 Industrialized Building System	EAT 451/4 Integrated Project Design
	EAT 102/4 Mechanics and Material Engineering *	EAT 115/4 Strength of Materials **		EAT 252/4 Fluid Mechanics Engineering	EAT 237/3 Water Supply Engineering	EAT 361/3 Reinforced Concrete Structures Design I	EAT 367/3 Steel Structure Design		EAT 461/2 Final Year Project I	EAT 462/4 Final Year Project II
	EAT 152/2 Engineering Geology	EAT 112/4 Geomatic Engineering		EAT 212/4 Soil Mechanics∞	EAT 253/3 Structural Analysis I ##	EAT 353/3 Structural Analysis II	EAT 363/3 Hydrology & Water Resources Engineering±		EAT XXX/3 Elective I	EAT XXX/3 Elective II
		ECT 112/3 Engineering Skills		EAT 249/3 Engineering Drawing	EAT 259/3 Hydraulics	EAT 356/4 Water & Wastewater Engineering	EAT 362/3 Reinforced Concrete Structures Design II			
						EAT 357/3 Construction Management				
Non Engineering (16)	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II		EQT 203/3 Engineering Mathematics III	EQT 271/3 Engineering Statistics					EUT 442/2 Professional Engineers
	UUT 122/2 Skills and Technology in Communication									
University Requirement (17)	UZW XXX/1 Co-curriculum	UZW XXX/1 Co-curriculum				UUW XXX/1 Co-curriculum	UUW 322/2 Thinking Skills		UUW 233/2 Islamic & Asian Civilizations or ***UUW 237/2 Malaysian Cultures	UUW 235/2 Ethnic Relations or ***UUW 239/2 Malaysian Studies
	*UVA 111/2 Foundation English	UUW XXX/2 Option or **UVW 211/2 English for General Purposes			UVW 312/2 English for Technical Communication		UVW 410/2 University Malay Language		UUW 224/2 Engineering Entrepreneurship	
137	16	19		17	17	18	17	4	14	15
TOTAL UNITS FOR GRADUATION IS 137										

ELECTIVES COURSES:

Elective I : EAT 412/3 Advanced Reinforced Concrete Structures Design, EAT 456/3 Foundation Engineering, EAT 476/3 Urban Stormwater Management±±, EAT 472/3 Advanced Water Treatment

Elective II : EAT 453/3 Advanced Structural Analysis, EAT 477/3 Advanced Steel Design, EAT 475/3 Construction Contract and Law, EAT 478/3 Building Information Modelling

*Uncredited. Compulsory to students with MUET Band 2 only. This course is prerequisite to UVW 211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW 213 English for Technical Communication.
***For international students only.

COURSE* IS A PRE-REQUISITE TO COURSE**
COURSE# IS A PRE-REQUISITE TO COURSE##
COURSE∞ IS A PRE-REQUISITE TO COURSE∞∞
COURSE± IS A PRE-REQUISITE TO COURSE±±



LIST OF COURSES

ENVIRONMENTAL ENGINEERING PROGRAMME (RK07)

- EAT 101/4 BASIC ECOLOGY
- EAT 102/4 MECHANICS AND MATERIAL ENGINEERING
- EAT 104/4 FUNDAMENTAL OF CHEMICAL ENGINEERING PROCESSES
- EAT 105/4 FUNDAMENTAL OF ELECTRICAL ENGINEERING
- EAT 131/4 ENVIRONMENTAL CHEMISTRY
- EAT 208/3 ENVIRONMENTAL LAW, HEALTH AND SAFETY
- EAT 213/3 FLUIDS MECHANICS AND HYDRAULICS
- EAT 231/3 THERMODYNAMICS
- EAT 232/3 FUNDAMENTAL OF ENVIRONMENTAL ENGINEERING
- EAT 233/3 ENVIRONMENTAL ENGINEERING SKILLS
- EAT 235/3 GEOENVIRONMENTAL ENGINEERING
- EAT 238/3 HYDROLOGY
- EAT 301/4 AIR POLLUTION ENGINEERING
- EAT 303/4 WASTEWATER ENGINEERING
- EAT 332/3 ENVIRONMENTAL IMPACT ASSESSMENT
- EAT 341/3 SOLID AND HAZARDOUS WASTE ENGINEERING
- EAT 342/3 NOISE POLLUTION ENGINEERING
- EAT 343/3 PUBLIC HEALTH AND OCCUPATIONAL HYGIENE
- EAT 344/3 ENVIRONMENTAL MANAGEMENT SYSTEM
- EAT 347/4 MASS TRANSFER
- EAT 348/3 WATER SUPPLY ENGINEERING
- EAT 433/3 ENVIRONMENTAL ENGINEERING DESIGN
- EAT 441/3 ENVIRONMENTAL REMEDIATION
- EAT 443/3 BUILT ENVIRONMENT
- EAT 445/3 REMOTE SENSING
- EAT 447/3 ENVIRONMENTAL INFORMATICS
- EAT 449/3 ENVIRONMENTAL PROCESS CONTROL & INSTRUMENTATION
- EAT 461/2 FINAL YEAR PROJECT I
- EAT 462/4 FINAL YEAR PROJECT II
- EAT 465/3 ENGINEERING PROJECT MANAGEMENT
- EAT 470/3 SUSTAINABLE ENERGY
- EAT 471/3 ENVIRONMENTAL RISK ASSESSMENT
- EAT 472/3 ADVANCED WASTEWATER TREATMENT
- EAT 476/3 URBAN STORMWATER MANAGEMENT

CIVIL ENGINEERING PROGRAMME (RK01)

- EAT 102/4 MECHANICS AND MATERIAL ENGINEERING
- EAT 105/4 FUNDAMENTAL OF ELECTRICAL ENGINEERING
- EAT 112/4 GEOMATIC ENGINEERING
- EAT 115/4 STRENGTH OF MATERIALS
- EAT 152/3 ENGINEERING GEOLOGY
- EAT 212/4 SOIL MECHANICS
- EAT 237/3 WATER SUPPLY ENGINEERING
- EAT 249/3 ENGINEERING DRAWING
- EAT 251/3 STRUCTURAL THEORY
- EAT 252/4 FLUID MECHANICS ENGINEERING
- EAT 253/3 STRUCTURAL ANALYSIS I
- EAT 258/3 BUILDING MATERIALS ENGINEERING
- EAT 259/3 HYDRAULICS
- EAT 314/4 GEOTECHNICAL ENGINEERING
- EAT 353/3 STRUCTURAL ANALYSIS II
- EAT 356/4 WATER & WASTEWATER ENGINEERING
- EAT 357/3 CONSTRUCTION MANAGEMENT
- EAT 360/4 HIGHWAY & TRANSPORTATION ENGINEERING
- EAT 361/3 REINFORCED CONCRETE STRUCTURES DESIGN I
- EAT 362/3 REINFORCED CONCRETE STRUCTURES DESIGN II
- EAT 363/3 HYDROLOGY AND WATER RESOURCES ENGINEERING
- EAT 367/3 STEEL STRCUTURE DESIGN
- EAT 412/3 ADVANCED REINFORCED CONCRETE STRUCTURES DESIGN
- EAT 413/3 CONSTRUCTION ENGINEERING
- EAT 451/3 INTEGRATED PROJECT DESIGN
- EAT 453/3 ADVANCED STRUCTURAL ANALYSIS
- EAT 454/3 TIMBER AND MASONRY DESIGN
- EAT 455/3 INDUSTRIALISED BUILDING SYSTEM
- EAT 456/3 FOUNDATION ENGINEERING
- EAT 459/3 BUILDING AUTOMATION SYSTEM
- EAT 461/2 FINAL YEAR PROJECT I
- EAT 462/4 FINAL YEAR PROJECT II
- EAT 463/3 ENVIRONMENTAL LAW, HEALTH AND SAFETY
- EAT 464/3 BUILDING SERVICES ENGINEERING
- EAT 475/3 CONSTRUCTION CONTRACTS AND LAW
- EAT 477/3 ADVANCED STEEL DESIGN
- EAT 476/3 URBAN STORMWATER MANAGEMENT
- EAT 478/3 BUILDING INFORMATION MODELLING

COURSE SYLLABUS

ENVIRONMENTAL ENGINEERING PROGRAMME (RK07)

EAT 101/4
BASIC ECOLOGY

COURSE SYNOPSIS

The study of basic ecology in understanding nature and environment, and the relationship between the organism and environment. Students will understand the effect of global environmental changes to the environment and how to preserve the environment. The syllabus covers on ecology, ecosystems, population, community, biogeochemical cycles, global environmental changes and microbiology.

COURSE OUTCOMES

1. Ability to define and describe basic concept of ecology and environment.
2. Ability to define and describe the energy flow in ecosystems.
3. Ability to define and describe the relationship among the organism in ecosystems.
4. Ability to describe the basic concepts of soil composition, biochemistry and metabolism pathways of microorganisms in soil, water and wastewater treatment.

REFERENCES

1. Smith T.M. and Smith R.L. (2006) Elements of Ecology, 6th Edition, Pearson.
2. Black, J.G. Microbiology, 7th Ed., John Wiley and Sons, Inc.
3. David, E.V. (2005) Environmental Biology for Engineer and Scientist, Wiley.

EAT 102/4
MECHANICS AND MATERIAL ENGINEERING

COURSE SYNOPSIS

The aim of this course is to enable the students to learn the basic of mechanics and material engineering. In engineering mechanics portion, students will be introduced to fundamentals and principles of static and dynamics mechanics. Resultant and equilibrium of coplanar force system as well as spatial force system will be covered in static portion while kinematics and kinetics of particle in dynamics potion. In material engineering portion, the student will be also taught on structure of crystalline solids, imperfection of solid as well as strength of material.

COURSE OUTCOMES

1. Able to apply the knowledge of mechanics and materials engineering.
2. Able to analyse engineering mechanic of statics and dynamics problems.
3. Able to analyse materials engineering problems based on its properties and structures
4. Able to demonstrate the principles of mechanics and material engineering through laboratory experiments.

REFERENCES

1. Hibbeler, R.C. (2010) Engineering Mechanics Statics. 12th Ed., Prentice Hall.
2. Hibbeler, R.C. (2010) Engineering Mechanics Dynamics. 12th Ed., Prentice Hall.
3. Peter Schiavone, Hibbeler, R.C. (2010) Engineering Mechanics Statics Study Pack. 12th Ed. Prentice Hall.

EAT 104/4
FUNDAMENTAL OF CHEMICAL ENGINEERING PROCESSES

COURSE SYNOPSIS

The aim of this course is to enable the students to understand the basic principles and calculation techniques that are fundamental to the field of chemical engineering processes. Then, the fundamental concepts of material balances and also energy balances on nonreactive and reactive processes will be covered. Finally, introduction to heat transfer theory, calculation and the mechanism will be taught at the end of this course.

COURSE OUTCOMES

1. Ability to understand and solve basic problems on material and energy balance.
2. Ability to understand and solve basic problems on heat transfer.
3. Ability to demonstrate the chemical engineering processes experiments.

REFERENCES

1. Felder, R.M. and Rousseau, R.W. (2000) Elementary Principles of Chemical Processes, 3rd Edition, Wiley.
2. Holman, J.P., Heat Transfer, 9th Ed. McGraw Hill.
3. Himmelblau, D.M., and Riggs, J.B., Basic Principles and Calculations in Chemical Engineering, 7th Ed., Prentice Hall.



EAT 105/4
FUNDAMENTAL OF ELECTRICAL ENGINEERING

COURSE SYNOPSIS

This course is intended to provide students with clear understanding of the DC and AC circuits, basic principles of 3-phase AC circuits, electro-magnetism and magnetic circuits. Students will also gain an understanding of the basic operating principles and performance analysis of three most commonly used electric machines, namely, transformers, dc machines and induction motors.

COURSE OUTCOMES

1. Able to synthesis the principles elements of DC and AC circuit as current, voltage, power, energy and power factor.
2. Able to calculate DC and AC circuit problems by using Ohm's Law, Kirchhoff's Law for current and voltage.
3. Ability to evaluate the principles of electrical generation, transmission and distribution in power industry in Malaysia.
4. Able to assess the law, rules and regulations adopted for electrical installation in Malaysia according to the Malaysian Acts, Standards, Safety Regulations and Code of Practice.

REFERENCES

1. Richard, J. Fowler. (2008) Electricity Principles and Applications, 7th Ed., McGraw Hill.
2. Boylestad, R.L. (2007) Introductory Circuit Analysis, 11th Ed., Prentice Hall.
3. Hughes (2005) Electronic Technology, 9th Ed., Prentice Hall.
4. Charles, K.A. and Matthew N.O.S. Fundamentals of Electric Circuits. International 3rd Ed., McGraw Hill.
5. Nilsson, J.W. and Riedel S.A. (2005) Electric Circuits, 7th Ed., Pearson Prentice Hall.

EAT 131/4
ENVIRONMENTAL CHEMISTRY

COURSE SYNOPSIS

The study of environmental chemistry is fundamental to an understanding of the natural and anthropogenic processes occurring on our planet. The course aimed to familiarize the students with qualitative and quantitative aspects of chemical and biological principles of environmental engineering and their application to pollution control. The syllabus focuses on the fundamentals of chemistry, water chemistry, atmospheric chemistry and soil chemistry.

COURSE OUTCOMES

1. Ability to explain basic concepts of fundamental chemistry.
2. Ability to define and discuss the chemical principles of water and wastewater pollution or treatment.
3. Ability to describe and calculate soil chemistry and chemical reactions involved.
4. Ability to discuss the chemistry, photochemistry and cyclic processes in atmospheres.

REFERENCES

1. Sawyer C.N., Mc Carty P.L. and Perkin G.F. (2003) *Chemistry for Environmental Engineering and Science*, 5th Ed., McGraw-Hill.
2. Manahan, Stanley E. (2005) *Environmental Chemistry*, 8th Ed., Boca Raton, Fla.; London: CRC Press.
3. Andrews, J. E. (2004) *An Introduction to Environmental Chemistry*, 2nd Ed., Malden, MA, Blackwell Science.

EAT 208/3
ENVIRONMENTAL LAW, HEALTH AND SAFETY

COURSE SYNOPSIS

Students will be exposed to Malaysian related laws and regulations on occupational safety and health (e.g. OSHA 1994) and environment (e.g. EQA 1974) and how to interpret the requirements stipulated under these documents. This course will also provide students the necessary information in identifying hazards, assessment and managing the risks that may be harmful to humans in the workplace.

COURSE OUTCOMES

1. Ability to comprehend and explain the legal requirement of environmental, safety and health laws and regulations.
2. Ability to describe and evaluate hazards in the workplace.
3. Ability to describe and evaluate the magnitude of risks on humans associated with the hazards in the workplace.
4. Ability to outline the management plan in managing the hazards and risks in the work place.

REFERENCES

1. Goetsch, D.L. (2010) Occupational Safety and Health for Technologist, Engineers and Managers, 7th Ed. Pearson Prentice Hall.
2. Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders, 2007 (amended at 5th April), International Law Book Services, Malaysia.
3. Environmental Quality Act & Regulations, 2006 (amended up to April), MDC Publishers Sdn. Bhd., Malaysia.

EAT 213/3
FLUIDS MECHANIC AND HYDRAULICS

COURSE SYNOPSIS

This course introduces the fundamental concept of fluid mechanics applied in Environmental Engineering. Topics to be covered include properties of fluids, fluid static and kinematics, Bernoulli's equation, energy equation, analysis of flow in open channel and pipeline system. The content of this course is considered as an essential element to be applied in the subsequent wastewater and water supply engineering. At the end of the course, students should be able to apply the theory to solve problems related to Environmental Engineering fluid mechanics.

COURSE OUTCOMES

1. Ability to define and describe the properties of fluids.
2. Ability to identify and analyse some fluid static and fluid dynamic theories and applications.
3. Ability to describe and solve problems related to fluid flow in pipeline system.
4. Ability to describe and solve problems related to fluid flow in open channel system

REFERENCES

1. Mott, R.L. (2006) Applied Fluid Mechanics. Prentice Hall.
2. Young, D.F., Munson, B.R., Okiishi, T.H. & Huebsch, W.W. (2007) A Brief Introduction to Fluid Mechanics. Wiley Interscience.
3. Landau L.D & Lifshitz, E.M. (2004) Fluid Mechanics. Elsevier.

EAT 231/3
THERMODYNAMICS

COURSE SYNOPSIS

Thermodynamics is a study related to the science of energy and their relation to heat and work. This course will discuss the basic concepts and properties of thermodynamics and the forms of energy and energy transfer. The first and second law of thermodynamics are useful in performing energy analysis and measuring thermal efficiency of a system. The second law leads to another property called entropy, which is a quantitative measure of microscopic disorder for a system.

COURSE OUTCOMES

1. Able to use thermodynamic tables, charts and equation of state to obtain appropriate property data in solving thermodynamics problems.
2. Able to evaluate fundamental engineering problems in thermodynamics involving closed systems, open systems under steady state and transient conditions by applying the first and second laws of thermodynamics.
3. Able to apply second law analysis methods for thermodynamic systems.

REFERENCES

1. Cengel, Y.A., Boles, M.A. (2006) Thermodynamics: An Engineering Approach, McGraw-Hill Higher Education.
2. Borgnakke, C., Sonntag, R. E. (2009) Fundamentals of Thermodynamics, 7th Edition John Wiley & Sons.
3. Rajput, R.K. (2010) Engineering Thermodynamics, 3rd Edition, Jones & Bartlett Learning.

EAT 232/3
FUNDAMENTAL OF ENVIRONMENTAL ENGINEERING

COURSE SYNOPSIS

This course focuses on fundamental concepts of environmental engineering. Students will be exposed briefly about the main component in environmental engineering that are water, air, solid waste and noise. The definition, causes, impacts and controls of every pollution (as above) will be described briefly. Furthermore, the Environmental Quality Act (EQA) 1974, limitation and guidelines that have been applied in Malaysia will also be described in this course.

COURSE OUTCOMES

1. Ability to describe or calculate the water quality parameters, legislation of water quality and pollution control and the principle of water and wastewater in industrial and domestic sewage.
2. Ability to describe or calculate classification of pollutant and particulate, the effect of pollutants and meteorology of air.
3. Ability to describe or calculate the physical properties of sound, noise measurement and control and related legislation.
4. Ability to describe or calculate solid and hazardous waste generations, characteristics, landfilling and related legislation.

REFERENCES

1. Mackenzie L.D. and David A.C., (2008) Introduction to Environmental Engineering 4th Edition, McGraw HillDavis M. L. and Masten S.J., Principles of Environmental Engineering. McGraw-Hill, 2004.



2. Peavy H. S., Rowe D.R. (1985) Tchobanoglous G., Environmental Engineering. McGraw-Hill.

EAT 233/3
ENVIRONMENTAL ENGINEERING SKILLS

COURSE SYNOPSIS

Environmental engineering skill plays an important role in environmental engineering for decision making and problem solving. The course explores the growth and the effectiveness of several sophisticated techniques in seeking reliable information and precision in many environmental engineering activities such as environmental monitoring and surveying, environmental database and information systems. Through this course the students are enabled to perform surveying tasks, utilize Geographical Information System (GIS), AutoCAD drawing and editing for aiding in decision making and problem solving in various environmental engineering disciplines as well as basic plotting using MATLAB. This course also aims to develop basic skills in using GIS, AutoCAD and MATLAB softwares.

COURSE OUTCOMES

1. Able to provide knowledge and perform surveying task and procedure.
2. Able to provide knowledge and practice the basic AutoCAD software package.
3. Able to produce map using Geographical Information System (GIS).

REFERENCES

1. Leach, James A, AutoCAD 2008 instructor: a student guide to complete coverage of AutoCAD's commands and features, McGraw-Hill Higher Education.
2. Yarwood, A, Introduction to AutoCAD 2008: 2D and 3D Design, Oxford: Elsevier/Newnes, 2007.
3. Kavanagh, B.F. (2009) Surveying Principle and Application, 8th edition, Prentice Hall.

EAT 235/3
GEOENVIRONMENTAL ENGINEERING

COURSE SYNOPSIS

This course presents the principles of geo-environmental engineering. It covers the chemical and geo-chemistry background of soil, rock classification, groundwater flow and contaminant fate and transport. This course also discusses the sources of contaminants and available remediation technologies which are widely used for groundwater treatment.

COURSE OUTCOMES

1. Ability to discuss and apply the component, concept and principle available in soil composition and properties.
2. Ability to utilizes and apply the knowledge of groundwater flow and transportation process in porous media.
3. Ability to discuss and apply the knowledge of the processes affecting the fate and transport of contaminants.
4. Ability to identify and utilizes the basic principles and remediation technologies available in subsurface contamination.
5. Ability to discuss and illustrate barriers and liner systems for contaminated land.

REFERENCES

1. Hari D. Sharma and Krishna R. Reddy (2004) Geoenvironmental Engineering, John Wiley & Sons.
2. Sarsby, R. (2000) Environmental Geotechnics, Balkema, Rotterdam.
3. Kavanagh, B. F. (1996) Surveying Principles and Application, 4th Edition, Prentice Hall.

EAT 238/3
HYDROLOGY

COURSE SYNOPSIS

Introduces the fundamental of hydrological process such as hydrologic cycle, atmospheric circulation, precipitation, evaporation, evapotranspiration and infiltration. Students will be introduced to equations to calculate, and equipment to measure many important hydrologic data including rainfall amount, evaporation rate and infiltration rate. Analysis will be done to look at the relationship between these values especially between rainfall, landuse, and streamflow values. Emphasis will be given for measurement technique of flowrate in river, and usage of Rating Curve to find the relationship between water level and streamflow values. Unit Hydrograph and it's usage and it's derivation will also be included.

COURSE OUTCOMES

1. Ability to discuss and perform the computation for hydrological process.
2. Ability to compute the flood hydrographs using various hydrograph methods.

3. Ability to analyze and apply the frequency analysis in hydrology.
4. Ability to compute the flood routing.

REFERENCES

1. Bedient, Huber (2012) "Hydrology & Floodplain Analysis 5th Edition". Pearson.
2. V.T. Chow, David R. Maidment, Larry W. Mays (1988) "Applied Hydrology". McGraw Hill, International Edition.
3. Viessman, Lewis (2003) "Introduction to Hydrology 5th Edition". Prentice Hall.
4. Raghunath (2007) "Hydrology: principles, analysis, design". New Age International.
5. Brutsaert.W (2005) "Hydrology: an introduction". Cambridge University Press.

EAT 301/4
AIR POLLUTION ENGINEERING

COURSE SYNOPSIS

This subject discuss in detail about air pollution control. As an introduction, students will be introduced to air pollution control philosophies and regulations which are relate to air pollution control in Malaysia. Meteorological aspects which control the transport of air pollutants are also discussed in this subject. Apart of that, this subject will explain and discuss the general idea on how to control air pollution, modelling the pollutant dispersion as well as designing air pollution control equipment.

COURSE OUTCOMES

1. Ability to identify and discuss the behaviour of meteorological condition and evaluate the air pollutant dispersion using the Gaussian Plume idea.
2. Ability to analyze and design the operation of air pollution control system for a specific problem.
3. Ability to demonstrate the air pollution control device experiments and measurements.

REFERENCES

1. Noel De Nevers (2000) Air Pollution Control Engineering, International Edition, McGrawHill.
2. Karl B. Schnelle, Jr., Charles A. Brown. (2002) Air pollution control technology handbook CRCnetBASE, CRC Press.
3. Wayne T. Davis (2000) Air pollution engineering manual / Air & Waste Management Association, Wiley.

EAT 303/4
WASTEWATER ENGINEERING

COURSE SYNOPSIS

The aim of this course is to enable the students to have the comprehensive understanding on Wastewater treatment processes, including preliminary, primary, secondary and tertiary treatments. In the first part of the course, student will be introduced to the wastewater sources, flow rate, treatment standard, location and plant hydraulics. The second part will be dealing with unit processes in primary treatment such as bar rack, screen, grit removal and sedimentation basin. The following part of the course containing the biological and chemical treatment processes of wastewater. By the end of the course, the student is expected to be familiarizing with the design principles of unit processes in wastewater treatment plant, applying all the basic knowledge in wastewater treatment theory.

COURSE OUTCOMES

1. Able to analyse the suitable unit process in wastewater engineering.
2. Able to solve calculation of the unit process applied in wastewater treatment.
3. Able to design basic structure of wastewater treatment plant.
4. Able to conduct experiment and adapt field trip observation associated with wastewater treatment process.

REFERENCES

1. Mackenzie L. Davis (2011) Water and Wastewater Engineering, Design Principles and Practice, International Ediition, McGraw Hill, Singapore.
2. Metcalf and Eddy, Inc, (2004) Wastewater Engineering, Treatment and Reuse, Fourth Edition, McGraw-Hill, New York Hammer.
3. M.J, Hammer M.J. Jr. (2012) Water and Wastewater Technology, International Edition, Prentice Hall-Pearson, Ohio.

EAT 332/3
ENVIRONMENTAL IMPACT ASSESSMENTS

COURSE SYNOPSIS

The aim of the course is to introduce the components and structure of an Environmental Impact Assessment (EIA) in line with Malaysian statutory requirement. This course will provide students with skills and knowledge in hazard and impact identification, prediction and evaluation of impacts and mitigation to reduce the magnitude of impacts. The scope will focuses on environmental and societies impacts on the proposed project. In achieving the objectives of this course, students will be engage in lecturers, small working groups in conducting



problem based learning and writing an environmental impact assessment statement.

COURSE OUTCOMES

1. Ability to explain and analyze the EIA process, and compare with legal requirements in Malaysia.
2. Ability to outline the terms of reference in conducting Environmental Impact Assessment (EIA) and evaluate the potential impacts to the environment and society.
3. Ability to assess the severity of adverse effects and suggest mitigation measures and monitoring plan.
4. Ability to comprehend the reporting mechanisms, public participation and auditing process.

REFERENCES

1. Nick Harvey and Beverley Clarke (2011) Environmental Impact Assessment: Procedures and Practices, Oxford University Press.
2. Charles H. Eccleston (2011) Environmental Impact Assessment: A Guide to Best Professional Practices, CRC Press.
3. Y. Anjaneyulu and Valli Manickam (2011) Environmental Impact Assessment Methodologies, CRC Press.

EAT 341/3
SOLID AND HAZARDOUS WASTE ENGINEERING

COURSE SYNOPSIS

Students will be introduced to elements of solid waste which is Municipal solid waste characterization, waste handling, generation rate, storage, collection and transport; waste treatment and disposal methods, including biological and chemical treatment, incineration, pyrolysis, landfill and site remediation, waste minimization. Student will also be enriched with characteristic of hazardous waste, handling, storage and collection, treatment and disposal methods, physicochemical and biological methods, stabilization & various ultimate disposal options such as solidification, incineration and secure landfilling. Finally, student will be able to design a landfill with complete understanding of the characteristic of a landfill.

COURSE OUTCOMES

1. Ability to define and differentiate sources, composition and properties of waste and hazardous waste.
2. Ability to design a complete flow of waste management system.
3. Ability to distinguish the hazard of hazardous waste and elaborate the concept of risk assessment for hazardous waste.
4. Ability to decide the final disposal of waste and hazardous waste and to design an engineered final disposal facility.

REFERENCES

1. Tchobanoglous, Theisen and Vigil (1993) Integrated Soild Waste Management: Principles & Management Issues, McGraw-Hill.
2. LaGrega, Buckingham & Evans (2001) Hazardous Waste Management, 2nd Edition, McGraw-Hill.
3. Cheremisinoff and Wu (1994) Hazardous Waste Management Handbook, Technology, Perception and Recycling. PTR Prentice Hall.
4. Pfeffer (1992) Solid Waste Management Engineering. Prentice Hall.
5. Vesilind P.A., Worrell W., Reinhart (2002) Solid waste engineering. Brooks/Cole.

EAT 342/3
NOISE POLLUTION ENGINEERING

COURSE SYNOPSIS

This course presents the basic principle and concepts of the noise pollution engineering. It covers how to tackle noise pollution problems, solutions available for noise control, how to determine noise, and how noise generated and radiated, and how it can be reduced. From the course, students will also be exposed to laws and codes governing noise and its control – Environmental Quality Act 1974, OSHA, Factories and Machinery Act 1967.

COURSE OUTCOMES

1. Ability to differentiate between noise and sound, able to explain and discuss the sources and effects of noise pollution.
2. Ability of defining the properties of sound, quantifying the noise levels and decibel as well as to characterize the noise.
3. Ability to develop methodologies to control noise pollution and get familiar with the statutory limits related to both ambient noise levels and noise levels at a workspace environment.

REFERENCES

1. Davis, M.L. and Cornwell, D. A. (1998) Introduction to Environmental Engineering, 3rd Editions, McGraw-Hill International Editions.
2. István L. Vér, Leo L. Beranek (2006) Noise and Vibration Control Engineering: Principles and Applications, Second Edition, John Wiley and Sons.

3. Wang, L.K., Pereira, N.C., Hung, Y. T. and Li, K. H. (2004) Advanced air and noise pollution control, Handbook of environmental engineering, Humana Press Inc.

EAT 343/3
PUBLIC HEALTH AND OCCUPATIONAL HYGIENE

COURSE SYNOPSIS

Public health and occupational hygiene are two interrelated studies. This course is divided into two sections that cover both public health and occupational hygiene. The first section is devoted to the fundamentals of health in the tropics, water supply and sanitation, diseases transmitted by microbes, vectors and other agents. This includes introduction to pollutants and other hazards in nature and indoors. The second section is on occupational hygiene and the topics covers in this section includes introduction to safety and health of workers and public, Malaysian occupational Safety and Health Act, Environmental, quality, health and safety management.

COURSE OUTCOMES

1. Ability to discuss, apply and analyse concepts in public health and epidemiology for health promotion and disease prevention.
2. Ability to discuss environmental health in the tropics and relate to water supply, sanitation and social practices.
3. Ability to discuss occupational hazards, evaluate risk and apply hierarchy of risk control in mitigating the potential of work related diseases with respect to relevant OSH legislation and standards.
4. Ability to appraise selected literature on public health in a group.

REFERENCES

1. Mary-Jane Schneider (2003) *"Introduction to Public Health"* 1st edition, Jones & Bartlett Publishers, 2003.
2. Bernard J. Turnock (2009) Public health: what it is and how it works, 4th Ed., Jones and Bartlett.
3. Bernard J. Turnock (2007) Essentials of public health, Jones and Bartlett.

EAT 344/3
ENVIRONMENTAL MANAGEMENT SYSTEM

COURSE SYNOPSIS

This course aims to develop an understanding of the role and implementation for ISO 14001 or Environmental Management System (EMS). The course focuses on the processes involved in ISO 14001/EMS, with a particular emphasis on technical requirements of the system, regulatory and community issues. Students will be able to interpret the requirements of ISO 14001/EMS and suggest the appropriate measures to reduce environmental degradation. Students will also be exposed to corporate environmental reporting which reflect the company commitment towards environmental conservation.

COURSE OUTCOMES

1. Ability to explain the environmental management and the requirements on ISO 14001 (environmental management system).
2. Ability to distinguish and articulate the aspect and impact of a human work processes that may resulted to adverse effect.
3. Ability to suggest mitigation measure and establish environmental policy in conserving the environment.
4. Ability to carry out environmental reporting.

REFERENCES

1. Blackburn W.R. (2007) The Sustainability Handbook: the complete management guide to achieving social, economic and environmental responsibility. Earthscan, Washington.
2. Darabaris J. (2007) Corporate Environmental Management, CRC Press.
3. Sheldon, C. and Yoxon, M. (2006) Environmental Management Systems: A Step-by-Step Guide to Implementation and Maintenance. 3rd Edition, Earthscan, Sterling, VA, Earthscan.
4. Barrow C.J. (2006) Environmental Management for Sustainable Development, 2nd Edition, Routledge, New York.
5. SIRIM (2005) Environmental management systems – Requirements with guidance for use (First revision) (ISO 14001:2004, IDT). SIRIM.
6. Whitelaw K. (2004) ISO 14001: environmental system handbook. 2nd Edition, Elsevier Butterworth-Heineman, Amsterdam.

EAT 347/4
MASS TRANSFER

COURSE SYNOPSIS

The study of mass transfer is of particular interest to environmental engineers which involves processes that move chemicals through the air, surface water, subsurface environment, or engineered systems. Transport processes move pollutants from the location at which they are generated, resulting in impacts that can



be distant from the pollution source. In addition, environmental engineers make use of the contents of this course in the design of emission-control systems. In this course the lectures discuss some of the processes that transport pollutants in the environment and in engineered systems. The goals of this discussion are twofold: to provide and understanding of the processes that cause pollutant transport, and to present and apply the mathematical formulas used to calculate the resulting pollutant fluxes.

COURSE OUTCOMES

1. Ability to utilize the understanding of the principle of mass transfer concepts.
2. Ability to utilize the understanding of mass transfer operation systems.
3. Ability to utilize transport processes in the design of emission-control systems.
4. Ability to utilize the understanding of the sources, fate and transport, and the impact of chemical substances.

REFERENCES

1. Warren Lee McCabe, Julian Cleveland Smith, Peter Harriott. (2005) Unit operations of chemical engineering, 7th Edition. McGraw Hill International Series.
2. Christie John Geankoplis (2014) Transport Processes & Saperation Process Principles (Includes Unit Operations, 4th Edition. Pearson.
3. Louis J. Thibodeaux (1996) Environmental chemodynamics: movement of chemicals in air, water, and soil. 2nd Edition. John Wiley & Sons.

EAT 348/3
WATER SUPPLY ENGINEERING

COURSE SYNOPSIS

This course introduces the student of Civil and Environmental Engineering on the application of basic science and engineering knowledge to solve water supply issues. The topics to be covered include water sources, quality and demand, water treatment plant design covering water intake, pre-treatment, primary treatment and advance water treatment processes, and water distribution system analysis.

COURSE OUTCOMES

1. Ability to identify water sources, water quality and consumption, and to forecast water demand.
2. Ability to identify the technology of water treatment processes.
3. Ability to design water treatment unit.
4. Ability to describe and analyze water distribution system.

REFERENCES

1. Qasim, S.R., Motley, E.M. and Zhu, G. (2000) Water Works Engineering: Planning, Design, and Operation. Prentice Hall PTR.
2. Mackenzie L. Davis (2011) Water and Wastewater Engineering, Design Principles and Practice, International Edition, McGraw Hill, Singapore.
3. The Malaysian Water Association (2000). MWA Design Guidelines for Water supply Systems, published by MWA.

EAT 433/3
ENVIRONMENTAL ENGINEERING DESIGN

COURSE SYNOPSIS

This course will focus on the design of an integrated Environmental Engineering Project. The course will start off with the introduction of basic principle of Engineering design and selection of the design project related to Environmental Engineering. The students are expected to work on selected project to design the unit process and unit operation as well as the economic analysis under the guidance of project supervisor.

COURSE OUTCOMES

1. Ability to acquire and apply complex knowledge of mathematics, science, engineering and an in-depth technical competence in an environmental engineering discipline.
2. Ability to identify, formulate and solve complex engineering problems.
3. Design and evaluate the specific complex unit process and unit operation in Environmental Engineering field
4. Ability to conduct investigation into complex problems as well as to analyze and interpret data.
5. Using Design Software to assist the complex design work e.g. WASDA and EPANET
6. Adopt awareness of the need for academic honesty and professional integrity and ethical responsibilities in the practice of engineering practices.
7. Understanding of professional and ethical responsibilities and commitment to the community.
8. Ability to function on multi-disciplinary teams.

9. Ability to communicate effectively on complex engineering activities with the engineering community and with society at large.
10. Recognition of the need for, and an ability to engage in life-long learning.
11. Execute economic evaluation of the selected project in Environmental Engineering field, which include cost estimations, capital investment, operating costs and rate of return on investment.

REFERENCES

1. Heinsohn, R.J. and Kabel, R.L (1999). *Sources, Control of Air Pollution*. New Jersey: Prentice Hall.
2. Metcalf & Eddy. (1991). *Wastewater Engineering, Treatment, Disposal and Reuse'*, 3rd edition. McGraw Hill.
3. The Malaysian Water Association (2000). MWA Design Guidelines for Water supply Systems, published by MWA.

EAT 441/3
ENVIRONMENTAL REMEDIATION

COURSE SYNOPSIS

This course provides a general overview of the environmental remediation with emphasis on soil, groundwater and aquifer contaminants. The student will be taught about the source and behaviour of subsurface contaminants, contaminants tracer study and remediation planning. Student will also be enriched with bioremediation technologies to recover the contaminants.

COURSE OUTCOMES

1. Ability to illustrate the concepts of bioremediation in soil, groundwater and contaminated site treatment.
2. Ability to describe and analyse the characteristics of contaminants.
3. Ability to identify and construct appropriate strategies to remediate contaminated soil.
4. Ability to identify and construct appropriate strategies to remediate contaminated water.

REFERENCES

1. Hari D. Sharma and Krishna R. Reddy (2004) Geoenvironmental Engineering. Wiley.
2. Pedro J.J. Alvarez and Walter A. Illman (2006) Bioremediation and natural attenuation. Wiley.
3. Mukesh Doble and Anil Kumar (2005) Bio-treatment of industrial effluents. Elsevier.

EAT 443/3
BUILT ENVIRONMENT

COURSE SYNOPSIS

The aim of this course is to enable the students developing an understanding, knowledge and skills in elements and principles of building design. At the beginning, students will be introduced to the environmental issues that pervade the built environment and therefore influence sustainable design. This then leads to the undertaking of a detailed and systematic exploration of the designs of energy efficient buildings, incorporating thermal control, thermal dynamics, green architecture, thermal insulation, ventilation, air-conditioning, lighting and acoustics. While mini projects are designed to help students develop a stronger emphasis in considering in more detail the holistic design of a building, its internal environment, and the system necessary to achieve a sustainable building.

COURSE OUTCOMES

1. Able to APPLY the elements and principles of building designs and planning.
2. Able to INTEGRATE tools and best practices within building planning that address the needs of energy efficiency.
3. Able to DEMONSTRATE the critical planning solutions to built environment that promote healthier communities.

REFERENCES

1. Mithraratne, N. (2007), Sustainable Living: The Role of Whole Life Costs and Values, 1st Ed, Butterworth-Heinemann (Elsevier Limited).
2. Khairuddin, A.R., and Abdul A.K.H. (2004), Sustainable Built Environment through Management and Technology, Kulliyah of Architecture & Environmental Design, UIA.
3. Kibert, C.J. (2005), Sustainable Construction: Green Building Design and Delivery, 1st Ed, John Wiley & Sons, Inc.

EAT 445/3
REMOTE SENSING

COURSE SYNOPSIS

Remote sensing is the acquisition of information about an object or phenomenon, without making physical contact with the object. This course emphasizes the understanding of the remote sensing foundation and principle as well as the use of remote sensor data, image interpretation and processing techniques. Specifically, this includes introduction to electromagnetic energy, satellite and sensor also its applications. The characteristic of various system embrace passive and active remote sensing also discussed.



COURSE OUTCOMES

1. Ability to understand basic concept of remote sensing.
2. Ability to convert and analyze environmental data by using digital image processing software.
3. Ability to characterized and utilizes the various system of remote sensing.

REFERENCES

1. Lilesand, T.M., Keifer, R.W. & Chipman, J.W (2007) Remote Sensing and Image Interpretation, 6th Edition, John Wiley & Sons.
2. John R. Jensen (1996) Introductory Digital Image Processing, 2rd edition, Prentice Hall.
3. Sabins, F. (1997) Remote Sensing – Principles and Interpretation, W.H. Freeman and Co., New York.
4. Mather, Paul M. (2004), Computer processing of Remotely-Sensed Images, Wiley.

EAT 447/3
ENVIRONMENTAL INFORMATICS

COURSE SYNOPSIS

Environmental informatics plays an important role in environmental decision making. Environmental informatics investigates the development of effective techniques to deliver comprehensive and reliable information for environmental research, management and public awareness. This assimilates expertise and technologies and promotes interaction between fields such as environmental monitoring, environmental databases and information systems, geographical information systems, numerical simulation modelling, knowledge-based systems, internet exploitation, data visualisation, human-computer interaction, information theory and public understanding of science. Great potential now exists to adopt the holistic perspective offered by Environmental Informatics to address the pressing problems surrounding environmental information in the world today. From this course, students will be at the forefront of these developments.

COURSE OUTCOMES

1. Able to ASESS the element and principles of sampling techniques.
2. Able to MANIPULATE environmental data into decision making information by using statistical analysis.
3. Able to ADAPTH the understanding on design experiments and able to manipulate experimental data using statistical model.

REFERENCES

1. Nicholas M.Avouris and Page (2008), Environmental Infromatics: Methodology and Applications of Environmental Infromatics Processing.
2. Lorenz M. Hilty (2006), Environmental informatics, Elsevier.
3. Jorge Marx Gómez, Michael Sonnenschein, Martin Müller (2007), Information Technologies in Environmental Engineering: ITEE 2007 - Third International ICSC Symposium.

EAT 449/3
ENVIRONMENTAL PROCESS CONTROL & INSTRUMENTATION

COURSE SYNOPSIS

The aim of this course is to enable the students to gain the conceptual understanding on Process Control and Instrumentation applied in Environmental Engineering. In the first part of the course, student will be introducing to common control system and instrumentation related to Environmental Processes. The second part will be consisting of process dynamics modeling, transformation of model into mathematical equation and solving the model by Laplace transform. The following part of the course containing the Characteristics, Forms, Modes, performances and tuning of Proportional-Integral-Derivative (PID) Control. By the end of the course, the student is expected to be familiarizing with control system in Environmental Engineering field. The application of the control system in Environmental Engineering will be introduce to the student at the last part of the course.

COURSE OUTCOMES

1. Ability to understand the concept of process control and instrumentation.
2. Ability to develop and solve dynamics model of chemical and biological processes related to environmental engineering.
3. Ability to analyze and design the control system for chemical and biological processes related to environmental engineering.
4. Ability to apply the process control strategies of typical chemical and biological process related to environmental engineering.

REFERENCES

1. J. B. Riggs and M. N. Karim (2007) "Chemical and Bio-Process Control", 3rd Ed, Pearson International Edition.
2. Coughanowr & Koppel (1991) "Process System Analysis and Control", McGraw Hill, 1991
3. Stephanopoulos, G. (1984) Chemical Process Control: An Introduction to Theory and Practice, Prentice Hall Inc., New York.

EAT 461/2
FINAL YEAR PROJECT I

COURSE SYNOPSIS

This an individual research project in connection with a special engineering problem and under the guidance of an academic staff. The project undertaken may fall under one of the following areas: Mathematical analysis, experimental tests, computer simulation, hardware and/ software development, to their field of interest. At the end of the project, each student prepares an engineering report, presents and demonstrates findings and results of the project work.

COURSE OUTCOMES

1. Able to APPLY the knowledge and provide assumptions to identify evidence for a conclusion.
2. Able to COLLECT relevant information in a literature review to provide background of the project.
3. Able to CONSTRUCT experimental design to solve the research problems.
4. Able to CONDUCT an investigation using various methods.
5. Able to PERFORM research activities with high ethic expressions.
6. Able to DEMONSTRATE engineering principles with a sense of responsibility.
7. Able to ADAPT and function on multi-disciplinary teams.
8. Able to DISPLAY effective communication skills on complex engineering activities with the engineering community and with society at large.
9. Able to RELATE research activities to relevant information from various sources for application on continuous learning.
10. Able to PRODUCE excellent project management.

REFERENCES

1. Donald H. McBurney and Teresa L. White, (2007). Research Methods, 7th Edition, Thompson Wadsworth.
2. Daniel Holtom & Elizaberth Fisher, (1999). Enjoy Writing Your Science Thesis or Dissertation, Imperial College Press.
3. Leo Finkelstein, Jr., (2008). Pocket book of Technical Writing for Engineers and Scientist. 3rd Edition, McGraw Hill.

EAT 462/4
FINAL YEAR PROJECT II

COURSE SYNOPSIS

This subject is the continuity of Final Year Project I. In this course students will conduct an experimental task which has been planned during the Final Year Project I. Students also will be completing their thesis report during this subject. In this course, students will be also exposed to journal writing.

COURSE OUTCOMES

1. Able to analyze the knowledge to identify evidence for a conclusion
2. Able to collect the relevant information in a literature review to provide background of the project
3. Able to construct the experimental design to solve the research problems.
4. Able to conduct the investigation using the various methods.
5. Able to manage the research activities with high ethic expressions
6. Able to develop engineering principles with a sense of responsibility
7. Able to adapt on the multi-displinary teams.
8. Able to display the effective communication skills on complex engineering activities with the engineering community.
9. Able to arrange research activities to the relevant information from the various source for the application on continuous learning
10. Able to develop excellent project management.

EAT 464/3
ENGINEERING MANAGEMENT

COURSE SYNOPSIS

This course aims to teach students on how to apply the project management skills and economic techniques in evaluating the design and engineering alternatives. The role of engineering economics is to assess the appropriateness of a given project, estimate its value, and justify it from an engineering standpoint. At the end of the course, students will be able to identify and discuss issues and challenges faced by engineers relating to project management in the current economic scenarios.

COURSE OUTCOMES

1. Able to apply decision making process to engineering project management.
2. Able to analyse economic scenarios.
3. Able to evaluate the process of project management and finance principles.

REFERENCES

1. O'Sullivan / Sheffin (2001), *Economics: Principles and Tools*, Prentice Hall.
2. R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, *Engineers in Society,* 2nd Ed., Mc Graw Hill.

3. S. Park Chan (2008), *Fundamentals Engineering Economics*, 2nd Ed., Prentice-Hall.
4. Stanley E. P., Samuel J. M., Jack R.M, Scot M.S, Margaret M. Sutton (2008), *Project Management: Planning, Scheduling, and Controlling Projects,* John Wiley & Sons Inc. USA.

EAT 470/3
SUSTAINABLE ENERGY

COURSE SYNOPSIS

This course assesses current and potential future energy systems, covering resources, extraction, conversion and end-use technologies, with emphasis on meeting regional and global energy needs in the 21st century in a sustainable manner. Various conventional and renewable energy production technologies, energy end-use practices and alternatives as well as consumption practices are also discussed. This includes the current usage of fossil fuels, solar and biomass energy. This course also assesses the current storage technology, which include fuel cells and batteries.

COURSE OUTCOMES

1. Ability to synthesize the function and conversion efficiency of a solar photovoltaic device and apply to a real-world project
2. Ability to describe the fundamental of biomass and assess the potential of biomass conversion as an alternative energy
3. Ability to define and assess the performance of the principal types of fuel cells and batteries.

REFERENCES

1. Dunlap, R., Sustainable Energy. 2014: Cengage Learning.
2. Kreith, F. and S. Krumdieck, Principles of Sustainable Energy Systems, Second Edition. Mechanical and Aerospace Engineering Series. 2013: CRC Press.
3. Tester, J.W., Sustainable Energy: Choosing Among Options. 2005: MIT Press.
4. Nelson, V.C., Introduction to Renewable Energy. 2011: Taylor & Francis.
5. Twidell, J. and T. Weir, Renewable Energy Resources. 2015: Taylor & Francis.

EAT 471/3
ENVIRONMENTAL RISK ASSESSMENT

COURSE SYNOPSIS

This course aims to assist students in the development of understanding and skills required for carrying out risk assessments and management. Students will learn on how to identify potential environmental/ workplace hazards and their potential adverse effect that may be harmful to humans and environment via qualitative and quantitative approach.

COURSE OUTCOMES

1. Understanding the principles and method of risk assessment.
2. Ability to investigate and assess human activity that influencing the distribution of chemicals in the environment.
3. Ability to assess and determine the magnitude of risk on humans associated with the exposure level.

REFERENCES

1. Ofungwu J. (2014) Statistical Applications for Environmental Analysis and Risk Assessment, John Wiley & Sons, New Jersey.
2. Reichl F-X. and Schwenk M. (2014) Regulatory Toxicology, Springer REFERENCES.
3. Ostrom S.T. and Wilhelmsen C.A. (2012) Risk Assessment: Tools, techniques and their applications, Wiley, New Jersey.
4. Simeonov L.I. and Hassanien M.A. (2009) Exposure and Risk Assessment of Chemical Pollution – Contemporary methodology, Springer.
5. Luttrell W.E.; Jederberg W.W. and Still K.R. (2008) Toxicology Principles for the Industrial Hygienist, American Industrial Hygiene Association (AIHA).
6. Ricci P.F. (2006) Environmental and Health Risk Assessment and Management: Principles and practice, Springer.
7. Hester R.E. and Harrison R.M. (1998) Risk Assessment and risk management, Cambridge, UK.

EAT 472/3
ADVANCED WASTEWATER TREATMENT

COURSE SYNOPSIS

This course focuses on the design aspect of secondary and tertiary treatment units in wastewater treatment plant. The student will be learned on the process analysis and reactor design for various suspended growth and attached growth biological treatment processes. In addition, the student will be exposed to the design of the advanced wastewater treatment unit such as membrane filter, adsorber, ion exchanger and advanced oxidation process unit. By the end of the course, the student is expected to be able to design in detail the specific unit processes of secondary and tertiary treatment units in wastewater treatment plant.

COURSE OUTCOMES

1. Ability to apply basic knowledge of process analysis and reactor design toward in-depth understanding in wastewater treatment plant design.
2. Ability to evaluate and propose a decision on the design of biological reactor for the secondary treatment unit in wastewater treatment plant.
3. Ability to evaluate and propose a decision on the design of tertiary treatment unit in wastewater treatment plant.

REFERENCES

1. Metcalf and Eddy, Inc, (2004) Wastewater Engineering, Treatment and Reuse, Fourth Edition, McGraw-Hill, New York
2. Mackenzie L. Davis (2011) Water and Wastewater Engineering, Design Principles and Practice, International Ediition, McGraw Hill, Singapore
3. Syed R. Qasim (1999) Wastewater Treatment Plants: Planning, Design, and Operation, Second Edition, CRC Press, Boca Raton, Florida
4. P. Aarne Vesilind (2003) Wastewater Treatment Plant Design, 1st edition, IWA-Water Environment Federation, London

EAT 476/3
URBAN STORMWATER MANAGEMENT

COURSE SYNOPSIS

The aim of this course to equip students with in-depth knowledge in urban stormwater design and management. This course highlights on the aspects of urban drainage management. The students are also exposed to environmental friendly drainage system, hydrological analysis, Best Management Practices (BMPs), and Quantity and Quality Controls. Upon completion of this course, the students should be able to analyse and determine viable project option, propose appropriate management strategies, and apply the appropriate techniques and strategies in urban stormwater planning and design.

COURSE OUTCOMES

1. Able to classify the aspects of urban drainage scheme which applies the concept of environmental friendly drainage in civil engineering.
2. Able to analyse urban drainage design alternative solutions based on the practices of the relevant authorities.
3. Able to design urban drainage systems with regard to sustainable development.
4. Able to explain urban drainage management in a group work.

REFERENCES

1. DID Malaysia. (2012). Urban Stormwater Management Manual for Malaysia, Second Edition, Kuala Lumpur.
2. Chin, D.A., (2013). Water Resources Engineering, 3rd Edition, Prentice Hall, New Jersey.
3. Mc Cuen, R.H. (2005). Hydrologic design and analysis, 3rd Edition, Prentice Hall, New

COURSE SYLLABUS FOR CIVIL ENGINEERING PROGRAMME (RK01)

EAT 102/4
MECHANICS AND MATERIAL ENGINEERING

COURSE SYNOPSIS

The aim of this course is to enable the students to learn the basic of mechanics and material engineering. In engineering mechanics portion, students will be introduced to fundamentals and principles of static and dynamics mechanics. Resultant and equilibrium of coplanar force system as well as spatial force system will be covered in static portion while kinematics and kinetics of particle in dynamics potion. In material engineering portion, the student will be also taught on structure of crystalline solids, imperfection of solid as well as strength of material.

COURSE OUTCOMES

1. Able to apply the knowledge of mechanics and materials engineering.
2. Able to analyse engineering mechanic of statics and dynamics problems.
3. Able to analyse materials engineering problems based on its properties and structures
4. Able to demonstrate the principles of mechanics and material engineering through laboratory experiments.

REFERENCES

1. Hibbeler, R.C. (2010) Engineering Mechanics Statics. 12th Ed. , Prentice Hall.
2. Hibbeler, R.C. (2010) Engineering Mechanics Dynamics. 12th Ed. , Prentice Hall.
3. Peter Schiavone, Hibbeler, R.C. (2010) Engineering Mechanics Statics Study Pack. 12th Ed. Prentice Hall.

EAT 105/4
FUNDAMENTAL OF ELECTRICAL ENGINEERING

COURSE SYNOPSIS

This course is intended to provide students with clear understanding of the DC and AC circuits, basic principles of 3-phase AC circuits, electro-magnetism and magnetic circuits. Students will also gain an understanding of the basic



operating principles and performance analysis of three most commonly used electric machines, namely, transformers, dc machines and induction motors.

COURSE OUTCOMES

1. Able to synthesis the principles elements of dc and ac circuit as current, voltage, power, energy and power factor.
2. Able to calculate dc and ac circuit problems by using ohm's law, Kirchhoff's law for current and voltage.
3. Able to evaluate the principles of electrical generation, transmission and distribution in power industry in Malaysia.
4. Able to assess the law, rules and regulations adopted for electrical installation in Malaysia according to the Malaysian acts, standards, safety regulations and code of practice.

REFERENCES

1. Richard, J. Fowler. (2008) Electricity Principles and Applications, 7th Ed., McGraw Hill.
2. Boylestad, R.L. (2007) Introductory Circuit Analysis, 11th Ed., Prentice Hall.
3. Hughes (2005) Electronic Technology, 9th Ed., Prentice Hall.
4. Charles, K.A. and Matthew N.O.S. Fundamentals of Electric Circuits. International 3rd Ed., McGraw Hill.
5. Nilsson, J.W. and Riedel S.A. (2005) Electric Circuits, 7th Ed., Pearson Prentice Hall.

EAT 112/4
GEOMATIC ENGINEERING

COURSE SYNOPSIS

In this course student will be introduce basic surveying involved in engineering, starting from linear measurement on plane. Students will do leveling after they learn 2 different data logging. With their knowledge in tapping and leveling, they have to do traversing and tachymetry. From all the data they have, student will ask to transform all the data to map using engineering drawing and AutoCAD. Lastly, students will be test in real work, in geomatic camp.

COURSE OUTCOMES

1. Ability to understand basic concept of geomatic.
2. Ability to analyze and interpret surveying data.
3. Ability to perform surveying techniques, skills and procedures.

REFERENCES

1. Barry Kavanagh (2009), Surveying Principles and Applications. Pearson.
2. Ghilani Wolf., Elementary Surveying, An Introduction to Geomatics, Twelfth Edition, Pearson International Edition.
3. N N Basak., Surveying and Levelling, McGraw Hill.
4. Ab. Hamid Mohamed, Asas Ukur Kejuruteraan, Penerbit Universiti Teknologi Malaysia.

EAT 115/4
STRENGTH OF MATERIALS

COURSE SYNOPSIS

The aim of this course is to enable students focused on strength of material which begins with the concept of stress and strain. The concept of axial load, torsion, and bending are also discussed. The stress results from combined loadings will be covered in this course, as well as the concepts for transforming multiaxial states of stress and in similar manner, the methods for strain transformation. Besides that the buckling of column also will be exposed to the student.

COURSE OUTCOMES

1. Ability to determine the stresses, strains and deformation of members in simple one-dimensional elastic system.
2. Ability to analyze torque-loaded member and evaluate the values and distribution of bending and shear stresses in beam section.
3. Ability to apply stress caused by combined loadings and buckling of column.
4. Ability to calculate stresses on inclined plane using Mohr's Circle.

REFERENCES

1. R.C Hibbeler' (2014) "Mechanics of Materials", 9th Ed, Prentice Hall.
2. Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf. (2004)"Mechanics of Materials". 3rd Edition. McGraw Hill.
3. Megson, T.H.G. (2002) "Structural and Stress Analysis", Butterworth: Heinemann.

EAT 152/3
ENGINEERING GEOLOGY

COURSE SYNOPSIS

This course provides the fundamental aspects of physical geology, structural geology and engineering geology for civil engineering works. Principles of engineering geology will be focus in areas of applied geology and rock mechanics. At the end of the course, students should be able to comprehend and apply the relevant principle of geology in civil engineering structures.

COURSE OUTCOMES

1. Ability to describe the knowledge of engineering geology.

2. Ability to discuss different types of rock , rock mass and geological structure.
3. Ability to solve calculation of rock and rock mass.

REFERENCES

1. C. W. W. Ng, N. Simons and B. Menzies (2008) 'A Short Course in Geology for Civil Engineers', Thomas Telford Publishing.
2. F.G.H. Blyth and M. H. de Freitas (2005) 'A Geology for Engineers', Elsevier Butterworth-Heinemann.
3. F. G. Bell (2007) 'Engineering Geology', Elsevier Ltd.

EAT 212/4
SOIL MECHANICS

COURSE SYNOPSIS

The course introduces the students with the basic and background of the properties and behaviour of soil deposits and the applications of soil mechanics theory. It includes brief introduction on geological and physical characteristics of soils. Also includes identification, classification and description of soil for engineering purposes. Application of mechanics on soil such as phase relationship, compaction, permeability and seepage, stresses and effective stresses, shear strength and consolidation are also covered.

COURSE OUTCOMES

1. Able to analyse the knowledge of soil mechanics.
2. Able to solve the calculation of soil mechanics problems.
3. Able to conduct the experiments associated with soil classification and parameters.

REFERENCES

1. R. F. Craig (1997) 'Soil Mechanics', E & FN Spon.
2. M. Budhu (1999) 'Soil Mechanics & Foundations', Wiley.
3. J.H Atkinson (1993) 'An introduction to the mechanics of soils and foundation, through critical state soil mechanics', McGraw Hill.

EAT 237/3
WATER SUPPLY ENGINEERING

COURSE SYNOPSIS

This course introduces the student of Civil and Environmental Engineering on the application of basic science and engineering knowledge to solve water supply issues. The topics to be covered include water sources, quality and demand, water treatment plant design covering water intake, pre-treatment, primary treatment and advance water treatment processes, and water distribution system analysis.

COURSE OUTCOMES

1. Ability to identify water sources, water quality and consumption, and to forecast water demand.
2. Ability to identify the technology of water treatment processes.
3. Ability to design water treatment unit.
4. Ability to describe and analyze water distribution system.

REFERENCES

1. Qasim, S.R., Motley, E.M. and Zhu, G. (2000) Water Works Engineering: Planning, Design, and Operation. Prentice Hall PTR.
2. Mackenzie L. Davis (2011) Water and Wastewater Engineering, Design Principles and Practice, International Edition, McGraw Hill, Singapore.
3. The Malaysian Water Association (2000). MWA Design Guidelines for Water supply Systems, published by MWA.

EAT 249/3
ENGINEERING DRAWING

COURSE SYNOPSIS

The course equips students with the manual and computer-aided drawing skill for general engineering drawing, especially the drawing for Civil Engineering profession. This includes the structural plan, cross section drawing and structural detailing. Through lectures, students will learn the basic characteristics of professional Civil engineering drawing and computer-aided drawing program. Through hands-on sessions using drawing software packages, this course enables the students to have first-hand practice on the drawing for some idealized and actual projects. Mini project cover several disciplines of Civil Engineering profession will be integrated through a series of these hand-on sessions. Moreover, students will learn about bill of quantity.

COURSE OUTCOMES

1. Able to describe the knowledge of engineering drawing and bill of quantity.
2. Able to solve engineering problems related to bill of quantity.
3. Able to use techniques, skills and modern engineering tools for engineering activities.
4. Able to presents effectively on engineering activities.

REFERENCES

1. Gary R Bertoline, Eric N Wiebe (2003) "Technical Graphics Communication", 3rd Ed., McGraw-Hill.



2. Zurflieh, Thomas P. (2005), AutoCAD 2004: 3D drawing and solid modeling, Prentice Hall.
3. Shawna Lockhart (2005) A tutorial Guide to AutoCAD 2005, Prentice Hall.

EAT 251/3
STRUCTURAL THEORY

COURSE SYNOPSIS

This course provides students with a clear and through presentation of the theory and application of structural analysis as it applies to beams, trusses and frames. It introduces analysis of statically determinate structures for beams, trusses and frames. Besides that, it also introduces deflections using geometrical method for the beams and also virtual work method for trusses, beams, and frames. Cables and arches also will be discussed at the end of this course.

COURSE OUTCOMES

1. Able to identify the statically determinate and indeterminate structures.
2. Able to analyze the support and internal loading developed in determinate structure.
3. Able to calculate the internal forces in cable and arch.
4. Able to determine the deformation of determinate structure.

REFERENCES

1. Hibbeler, R.C. (2009), "Structural Analysis", Seventh Edition, Prentice-Hall.
2. Kassimali, A. (1999) "Structural Analysis", Second Edition, PWS.
3. Hibbeler, R.C., Reddy C.S. (2005), "Mechanics of Material", Prentice-Hall.

EAT 252/4
FLUID MECHANICS ENGINEERING

COURSE SYNOPSIS

This course provides student knowledge in the patterns of movement of fluid particles. By the end of this subject student will be expected to understand the basic characteristics of fluid mechanics and fluid statics, be able to analyze the hydrostatics and basic hydrodynamics in fluid. Student also will be able to analyze and differentiate between the flow in pipe and flow in open channels. In this subject, student will be introduced to the Darcy-Weisbach equation, Moody diagram, Energy losses in pipelines, Minor losses, and multiple pipe systems.

COURSE OUTCOMES

1. Able to apply the knowledge of fluid static.
2. Able to analyse the flow in close channel.
3. Able to analyse the pipe flow system and open channel.
4. Able to conduct experiment associated to fluid mechanics and closed channel.

REFERENCES

1. Duncan, W.J., Thom, A.S. & A.D. Young. (1970) Mechanic of fluids, 2nd Edition. London.
2. Yunus A. Cengel & John M. Cimbala (2010) Fluid Mechanics: Fundamental and Applications. 2nd Edition. McGraw Hill.
3. Frank M. White (2003) Fluid Mechanics. 5th Edition. McGraw Hill.
4. Bruce R Munson, Donald F Young, Theodore H Okiishi (2002) Fundamentals of Fluid Mechanics. 4th Edition. John Wiley & Sons.
5. Robert, L.M. (2000) Applied Fluid Mechanics. 5th Edition. Prentice Hall.

EAT 253/3
STRUCTURAL ANALYSIS I

This course provides student with understanding of influence lines for statically determinate structures and approximate analysis of statically indeterminate structures. Student also will be introduce with beam, trusses and plane frame analysis using slope deflection and moment distribution methods. This course requires pre-requisites EAT 251/3 – Structural Theory.

COURSE OUTCOMES

1. Able to analyze the knowledge of stuctural analysis.
2. Able to solve the calculation of statically determinate and indeterminate structures.
3. Able to analyze structures using the displacement method of analysis.

REFERENCES

1. Hibbeler, R.C. (2009) "Structural Analysis", Seventh Edition, Prentice-Hall.
2. Kenneth, M. Leet. (2008) "Fundamentals of Structural Analysis". Third Edition. McGraw-Hill.
3. Reddy C.S. (1996), "Basic Structural Analysis", Tata McGraw Hill Publishing Co.

EAT 258/3
BUILDING MATERIALS ENGINEERING

COURSE SYNOPSIS

This course exposes students to different types of construction materials in building engineering. It covers type and function of cement, function of aggregates in concrete, water, admixtures, properties of fresh and hardened concrete, concrete mix design, manufacturing concrete on site. Properties and application of timbers, types and characteristics of bricks and blocks, ferrous and non-ferrous metals, and other current materials in the construction industry are also discussed.

COURSE OUTCOMES

1. Able to describe various building materials namely concrete, steel, timber, bricks and differentiate its influence to their properties.
2. Able to explain the materials used to make concrete; including their sources, production and properties.
3. Able to formulate the properties of timber and composite as a building materials
4. Able to apply the knowledge gain above for various application related to civil engineering work and discuss the innovations, new applications and new construction material for sustainable development.

REFERENCES

1. Edward Ellen and Joseph Iano (2008) "Fundamental of Building Construction: Materials and Methods", Fourth Edition. Wiley.
2. Bjorn Berge (2009) "Ecology of Building Materials". Second Edition. Architectural Press.
3. H. Zhang (2010) "Building Materials in Civil Engineering". Wood head Publishing Limited.

EAT 259/3
HYDRAULICS

COURSE SYNOPSIS

This course builds on the fundamentals given in Fluid Mechanics and reinforces students' understanding of the behaviour of fluids, through the study of the flow of water in typical civil engineering applications. The course covers the study of steady incompressible flow in pipelines and pipe networks, uniform and non-uniform flow in open channels, dimensional analysis and similitude and hydraulics machinery.

COURSE OUTCOMES

1. Able to analyse and design the fluid flowing in a closed channel.
2. Able to analyse and design the fluid flowing in an open channel.
3. Ability to conduct and demonstrate open channel experiments according to experimental procedure.

REFERENCES

1. Marriott, M. (2009) Civil Engineering Hydraulics, 5th Edition, Wiley Blackwell.
2. Chadwick, A., Morfett, J. and Borthwick, M. (2013) Hydraulics in Civil and Environmental Engineering, 5th Edition, CRC Press, New York
3. Kay, M. (2006) Practical Hydraulics. 2nd Edition. E & FN Spon, London.
4. Chow, V.T. (2009) Open-Channel Hydraulics, The Blackburn Press.
5. Houghtalen, R.J., Osman Akan, A., and Hwang, N.H.C. (2009) Fundamentals of Hydraulic Engineering Systems, 4th Edition, Prentice Hall.

EAT 314/4
GEOTECHNICAL ENGINEERING

COURSE SYNOPSIS

This course provides further discussion and explanation related to soil engineering. The topics cover in this course includes site investigation, bearing capacity and design of shallow foundation and pile foundation, lateral earth pressure, and slope stability. At the end of the course, students should be able to apply theory and practical to solve problem related to geotechnical engineering.

COURSE OUTCOMES

1. Able to apply the knowledge of geotechnical engineering.
2. Able to solve the calculation of geotechnical problems.
3. Able to design elements in geotechnical engineering.
4. Able to conduct the experiment associated with computer software.

REFERENCES

1. Das, B.M. (2010) 'Principles of Geotechnical Engineering', Cengage Learning.
2. Das, B.M. (2007) 'Principles of Geotechnical Engineering', Thomson.
3. Gofar, N. & Kassim, K.A. (2007) 'Introduction to Geotechnical Engineering', Prentice Hall.



EAT 353/3
STRUCTURAL ANALYSIS II

COURSE SYNOPSIS

This course provides student with understanding of matrix analysis for statically indeterminate structures using flexibility and stiffness methods. Non prismatic members are also included in the analysis. Student also will be introduced with the structural modeling using finite element method. Structural modeling and analysis using commercial structural analysis software are emphasized.

COURSE OUTCOMES

1. Ability to analyze the statically indeterminate beam, trusses and frame by applying the force or flexibility method.
2. Ability to analyze and solve indeterminate structural problems for prismatic and non- prismatic members.
3. Ability to analyze the statically indeterminate beam, trusses and frame by using the stiffness method.
4. Ability to derive the finite elements equation and apply in analysis of structures.

REFERENCES

1. Hibbeler, R.C. (2009) "Structural Analysis", Seventh Edition, Prentice-Hall.
2. Liu, G.R. and Quek S.S. (2003) The Finite Element Method: A Practical Course, Butterworth-Heinemann.
3. Kenneth, M. Leet. (2008) "Fundamentals of Structural Analysis". Third Edition. McGraw-Hill.

EAT 354/3
STEEL BUILDING DESIGN

COURSE SYNOPSIS

This course provides a basic understanding of behavior and design of steel members, connections and structures. At the end of this unit, students should be familiar with the behavior of steel structures; in particular the various forms of buckling and failure, particularly those associated with tension, bending, shear, compression, combined actions and connections; have a working knowledge of Eurocode, and be competent in designing a simple structure to Eurocode. The syllabus comprises the behavior of steel members and structures - properties of cross-sections, local buckling, elastic beams, plastic beams, tension members, compression members, effective lengths and elastic in-plane frame buckling, local lateral buckling of beams, in-plane bending of beam columns, lateral buckling of beam-columns, biaxial bending of beam-columns, bolted and welded connections.

COURSE OUTCOMES

1. Able to design axially loaded member without and/or with associate combination axial load and bending.
2. Able to design flexural members
3. Able to design steel structures joints.

REFERENCES

1. Trahair, N.S., Bradford, M.A., Nethercot, D.A., and Gardner, L. (2008) "The Behaviour and Design of Steel Structures to EC3", Taylor & Francis.
2. Martin, L.H., and Purkiss, J.A (2008) "Structural Design of Steelwork to EN 1993 and EN 1994" 3rd Edition, Butterworth-Heinemann.
3. Luis Simões da Silva, Rui Simões, Helena Gervásio (2010) "Design of Steel Structures: Eurocode 3: Design of Steel Structures. Part 1-1: General Rules and Rules for Buildings." The European Convention for Constructional Steelwork.
4. Wald, F., Tan, K.H., and Chiew, S.P. (2011) "Design of Steel Structures with Worked Examples" Research Publishing.

EAT 356/4
WATER & WASTEWATER ENGINEERING

COURSE SYNOPSIS

This course is an overview of engineering approaches to protecting water quality with an emphasis on fundamental principles. Theory and conceptual design of systems for treating municipal wastewater are discussed. Physical and biological processes are presented, including sedimentation, filtration, biological treatment and disinfection. Finally, there is discussion of engineered and natural processes for wastewater treatment.

COURSE OUTCOMES

1. Able to analyze the knowledge of wastewater engineering.
2. Able to solve calculation of wastewater problem.
3. Able to design sewage treatment plant using prescribed standard.
4. Able to conduct the experiment associated with wastewater for physical and biological parameter.

REFERENCES

1. Mark J. Hammer, Mark J. Hammer, Jr. (2005) Water and Wastewater Technology. Prentice Hall.

2. Mackenzie Davis (2011). Water and Wastewater Engineering: Design Principles and Practice. McGraw Hill.
3. Metcalf and Eddy (2005) Wastewater Engineering: Treatment and Reuse. McGraw Hill.

EAT 357/3
CONSTRUCTION MANAGEMENT

COURSE SYNOPSIS

This course is designed to provide students with the knowledge of subject area; ability to apply tools in a project environment; demonstrate competence in learning and evidence generating to sustain competency. The syllabus comprises scope management including project authorization, scope definition, control and finalization. Cost management including project costing, resource planning, budgeting and controlling financial completion are also emphasized. In addition, this course will also expose students to the time management including activity sequencing, duration estimating, scheduling, progress control, monitoring and forecasting.

COURSE OUTCOMES

1. Able to describe general project management principles.
2. Able to evaluate the project management planning.
3. Able to demonstrate project monitoring and handling over.
4. Able to communicate effectively in term of construction management process.

REFERENCES

1. Kraig K., Clifford J. S., Christine M. F., & Richard E. M. (2009) "Construction Management Fundamentals", Second Edition, McGraw Hill Construction.
2. Gido & Clements. (2003) "Successful Project Management", Second Edition. Thomson, South-Western.
3. Jack R. Meredith & Samuel J. Mantel, Jr. (2000), "Project Management: A Managerial Approach", Fourth Edition. John Wiley.

EAT 360/4
HIGHWAY & TRANSPORTATION ENGINEERING

COURSE SYNOPSIS

The goal of this course is to give knowledge, understanding and synthesis in highway engineering which covers topics on traffic, road and highway. The sub-topics discussed are characteristics of drivers, pedestrians, vehicles and road, fundamentals of traffic flow, including volume, speed and density, traffic engineering studies, geometric design of road, two and multi-lanes highway. Students will be taught briefly on materials related to asphalt, bitumen and concrete, flexible and rigid pavements.

COURSE OUTCOMES

1. Ability to understand traffic flow fundamentals and relationship between volume, speed and density.
2. Ability to understand the transportation planning process, forecast travel demand and design highway drainage structures.
3. Ability to understand soil bearing test, material used in pavement, and design flexible pavement.
4. Ability to design rigid pavement.

REFERENCES

1. Traffic and Highway Engineering, Fourth Edition, Nicholas J. Garber and Lester A. Hoel, (2009) Cengage Learning
2. Traffic Engineering Design, Principles and Practice, Second edition, 2005, Elsevier Butterworth-Heinemann
3. AASHTO Guide For Design Of Pavement Structures, 1993, American Association Of State Highway And Transportation Officials

EAT 361/3
REINFORCED CONCRETE STRUCTURE DESIGN I

COURSE SYNOPSIS

This course is designed to provide the student with a understanding of the limit state design concept and analysis of sections for bending; to provide a basic understanding of standard methods of analysis and design of reinforced concrete behaviour (including an understanding of capabilities and limitations); and to ability to analyze and design reinforces concrete structural elements. Among the topics discussed are objectives and methods of design, code of practice, analysis and design of sections for moment, design for shear, checking for deflection and cracking, durability and detailing requirements. Design of simply supported, continuous beams and cantilever beam, design of one way and two way restrained and simply supported slab and design a column. The syllabus is cover ultimate and serviceability limit state. Design resistance typical structural element and detailing.

COURSE OUTCOMES

1. Able to calculate moment and design the building structure.
2. Able to analyze shear, deflection and cracking.
3. Able to illustrate detailing of the structure using AutoCAD.



REFERENCES

1. Mohd Salleh Yassin, Ramli Abdullah, Reinforced Concrete Design to Eurocode 2, Universiti Teknologi Malaysia (UTM), 2014.
2. Mosley, W.H. Bungey, J.H. and Hulse, R. (2007) *Reinforced Concrete Design to Eurocode 2*. 6th Ed., Palgrave Macmillan.
3. W.M.C. McKenzie (2004) *Design of Structural Elements*. Palgrave Macmillan.

EAT 362/3
REINFORCED CONCRETE STRUCTURE DESIGN II

COURSE SYNOPSIS

This course is designed to provide the student with ability to analyze and design advanced reinforces concrete structural elements. Among the topics discussed are objectives and methods of design, code of practice, analysis and design of sections for moment, design for shear, checking for deflection and cracking, durability and detailing requirements. Calculation for design includes prestressed concrete, foundation, reinforced concrete frame and retaining wall.

COURSE OUTCOMES

1. Able to calculate moment and design the structure elements.
2. Able to analyze shear, deflection and cracking.
3. Able to illustrate detailing of the structure using AutoCAD.

REFERENCES

1. Mosley, W.H. Bungey, J.H. and Hulse, R. (2007) *Reinforced Concrete Design to Eurocode 2*. 6th Ed., Palgrave Macmillan.
2. W.M.C. McKenzie (2004) *Design of Structural Elements*. Palgrave Macmillan.
3. IStructE (19850 *Manual for the Design of Reinforced Concrete Building Structures*. The Institution of Structural Engineer.

EAT 363/3
HYDROLOGY AND WATER RESOURCES ENGINEERING

COURSE SYNOPSIS

This course is designed to expose students to the engineering principles involved in analysing and managing the quantity of water in natural and developed systems. This course consists of the hydrological cycle, water resources management and planning, precipitation, infiltration, flood routing, surface water, ground water and stormwater management. The students also will be exposed to the Urban Stormwater Management Manual for Malaysia (MSMA).

COURSE OUTCOMES

1. Able to demonstrate the scenario of hydrology and water resources engineering.
2. Able to solve the calculation of hydrology and water resources engineering problems.
3. Able to design basic stormwater management using prescribed manual.

REFERENCES

1. Subramanya K. "Engineering Hydrology". McGraw-Hill Inc. 2013.
2. Chow, V.T, David R. M., Larry W. M., "Applied Hydrology". McGraw Hill, International Edition 1988.
3. Drainage and Irrigation Department. "Urban Stormwater Management Manual for Malaysia 2nd Edition", Malaysia, 2012

EAT 412/3
ADVANCED REINFORCED CONCRETE STRCUTURES DESIGN

COURSE SYNOPSIS

This course provides additional knowledge on the aspect of reinforced concrete structural elements. As a continuation to the Concrete Building Design 1 and 2, the topics discussed include analysis and design of ribbed, waffle and flat slabs, water retaining structures, walls, corbel and Nibs. Methods of deflection calculation, design of elements for torsion and analysis and design of raft foundation are also covered.

COURSE OUTCOMES

1. Able to calculate moment and **design** the structure elements.
2. Able to **analyze** shear, deflection and cracking.
3. Able to **illustrate** detailing of the structure using AutoCAD.

REFERENCES

1. Mohd Salleh Yassin, Ramli Abdullah, Reinforced Concrete Design to Eurocode 2, Universiti Teknologi Malaysia (UTM), 2014.
2. Mosley, W.H. Bungey, J.H. and Hulse, R. *Reinforced Concrete Design to Eurocode 2*. 6th Ed., Palgrave Macmillan, 2007.
3. W.M.C. McKenzie, *Design of Structural Elements*. Palgrave Macmillan, 2004.

EAT 413/3
CONSTRUCTION ENGINEERING

COURSE SYNOPSIS

The construction sector is a major part of the total civil engineering and building industry. Construction projects range in size from the small to the very large (such as the construction of a hydroelectric power scheme or a freeway system). However, all projects share the common factors of utilizing workers, machines and materials, and of requiring organization and control. The graduate engineer must, therefore, be familiar with the range of construction equipment and techniques in common use, and must be able to plan and direct construction works. The course covers the areas of construction techniques, construction management and concrete technology.

COURSE OUTCOMES

1. Ability to discuss and describe the general project construction principles.
2. Ability to describe major components in project construction.
3. Ability to describe of the techniques of construction operations, planning and management.
4. Ability to understanding & describe of the design, construction and maintenance of buildings and built facilities and the management techniques used for these processes.

REFERENCES

1. Peurifoy, RL, Schexnayder, CJ & Shapira, A (2006), *Construction planning, equipment and methods*, 7th edition, McGraw Hill, Boston.
2. Gido & Clements. (2003) "Successful Project Management", Second Edition. Thomson, South-Western.
3. Brand, RE (1975), *Falsework and access scaffolds in tubular steel*, McGraw Hill, London.

EAT 451/3
INTEGRATED PROJECT DESIGN

COURSE SYNOPSIS

The civil engineering capstone senior design course involves all seniors in their last semester before graduation and is titled "Integrated Project Design." It is illustrate in the course as analysis, design and planning of a building engineering design project; an integrated and realistic group project involving as much as possible all major aspects of civil engineering profession. This course is the culminating activity in the civil engineering program.

COURSE OUTCOMES

1. Able to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in complex civil engineering discipline.
2. Able to identify, formulate and solve complex civil engineering problems.
3. Able to design complex sub-structure, structure and infra-structure to meet desired needs.
4. Able to investigate and interpret complex raw data; borelog, topographic map, architectural drawing, etc.
5. Able to use techniques, skills and modern engineering tools necessary for complex engineering practices.
6. Able to demonstrate/understand the social, cultural, global and civil responsibilities of a professional engineer.
7. Able to demonstrate/understand entrepreneurship, the process of innovation and the need for sustainable development of the environment.
8. Able to understand the professional and ethical responsibilities and commitment to the society.
9. Able to function on multi-disciplinary teams.
10. Able to communicate effectively in complex civil engineering activities.
11. Able to understand the need for, and engage in life-long learning.
12. Demonstrate understanding of project management and finance principles.

REFERENCES

1. Merritt, F. S., and Ricketts, J.T. (2001) "Building design and construction handbook", Sixth Edition, McGraw-Hill.
2. Chen, W.F., and Richard Liew, J.Y. (2003) "Civil Engineering Handbook", CRC Press.
3. Reynolds, C.E. and Steedman J.C., and Threlfall, A.J. (2008) "Reinforced Concrete Designer's Handbook". 11th Ed., E & FN Spoon.
4. Reynolds, C.E. and Steedman J.C. (1992) "Examples of the Design of Reinforced Concrete Buildings to BS8110", 4th Ed., E & FN Spoon.
5. Department of Irrigation and Drainage Malaysia (2000) "Urban Stromwater Management Manual for Malaysia" Department of Irrigation and Drainage Malaysia.
6. Bowles, J.E. (1996) "Foundation Analysis and Design", 5th Ed, McGraw-Hill.
7. Nunnally, S.W. (2007) "Construction method and management", Pearson Prentice Hall.
8. Riley, M and Cotgrave, A. (2004) "Construction Technology 2: Industrial and Commercial Building", Palgrave Macmillan



EAT 453/3
ADVANCED STRUCTURAL ANALYSIS

COURSE SYNOPSIS

This course provides students with basic knowledge of the finite element method (FEM) in structural analysis and response of the systems under dynamic excitation. For the finite element method this course explains the fundamental of the FEM and procedure to develop FEM equation. The fundamental of the FE will be utilized in the development of FEM equation for 2 dimensional solid models. The plasticity of the structural member also discussed and analyzed in this course. Moreover, the students will be introduced and exposed to the structural dynamic. For that purpose two basic topics in structural dynamic (i.e. equation of motion and response of single degree of freedom system under free vibration) will be covered in this course.

COURSE OUTCOMES

1. Ability to derive finite element equation.
2. Ability to analyze the 2 dimensional solid model using finite element method.
3. Ability to analyze moment capacity for the structural member.
4. Ability to derive the equation of motion for single degree of freedom system.

REFERENCES

1. G.R. Liu and S.S. Quek (2003) "The Finite Element Method: A practical course". 1st edition. Butterworth-Heinemann.
2. K. Chopra (2007) "Dynamics of Structures", Pearson Prentice Hall.
3. James G MacGregor and James K Wight (2005) "Reinforced Concrete Mechanics and Design" 4th Edition, Pearson Prentice Hall.

EAT 454/3
TIMBER AND MASONRY DESIGN

COURSE SYNOPSIS

This course provides student knowledge in engineering material (timber and masonry). Emphasis of this course is to introduce students to timber and masonry as structural member. Student will be able to design timber joint using nail and other mechanical fasteners, design unreinforced and reinforced masonry structural elements and structures and will be able to analyze serviceability and ultimate capacity design; seismic response; resistance and design.

COURSE OUTCOMES

1. Ability to design wood columns and bending members.
2. Ability to design timber joint using nail and other mechanical fasteners.
3. Ability to design unreinforced and reinforced masonry structural elements and structures.
4. Ability to analyze serviceability and ultimate capacity design; seismic response; resistance and design.

REFERENCES

1. Dayaratnam, P. (1997) "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House.
2. Abdy Kermani (1999), 'Structural Timber Design' Wiley-Blackwell, - Technology & Engineering
3. Jack Porteous, Abdy Kermani (2007) 'Structural Timber Design', John Wiley And Sons.

EAT 455/3
INDUSTRIALISED BUILDING SYSTEM

COURSE SYNOPSIS

This course is designed to expose students to the concepts of IBS which includes the advantages and disadvantages using IBS in Construction, Roadmap of IBS and the usage of IBS. It also highlighted the concept of Score Calculation and submission, Principal of Modular Coordination in IBS and concepts of buildibility. Joints and tolerances will also be discussed. Enhancement through mini project and hands-on will be done to further strengthen their knowledge on subject matter.

COURSE OUTCOMES

1. Able to classify the concept of IBS modern construction technology.
2. Able to calculate the Principle of Score calculation and its submissions.
3. Able to decide Concept of Modular Coordination in IBS.
4. Able to present the concept of IBS according to Malaysian Standard.

REFERENCES

1. Sarja (2010) "Open and Industrialized Building". Taylor & Francis.
2. Abraham Warzaski (2005) "Industralised and Automated Building Systems: A Managerial Approach". Second Edition. Tylor & Francis Group.
3. Albert G. H. Dietz (1971) "Industrialized Building Systems for Housing". The MIT Press.

EAT 456/3
FOUNDATION ENGINEERING

COURSE SYNOPSIS

This course provides further discussion and explanation related to foundation engineering. The topics cover in this course includes mat foundations, drilled-shaft foundations, retaining walls, foundations on difficult soils, and soil improvement. At the end of the course, students should be able to apply theory and practical to solve problem related to foundation engineering.

COURSE OUTCOMES

1. Able to **CALCULATE** soil bearing capacity for mat and drilled shaft foundations.
2. Able to **DESIGN** the stability of retaining walls.
3. Able to **FORMULATE** foundations on difficult soils for collapsible and expansive soils.
4. Able to **PRESENT** on soil improvement method and stability of retaining walls.

REFERENCES

1. Das, B.M. (2011) 'Principles of Foundation Engineering', Cengage Learning.
2. Das, B.M. (2007) 'Principles of Geotechnical Engineering', Thomson.
3. Das, B.M. (2004) 'Principles of Foundation Engineering', Thomson.

EAT 459/3
BUILDING AUTOMATION SYSTEM

COURSE SYNOPSIS

This course will introduce student to building management system which is used to refer to a wide range of computerized building control systems. Through this course, student will be able to learn about BAS communication standards, internet technologies and their applications in BASs, control and optimization of air- conditioning systems, control and optimization of central chilling systems and lighting-control systems security and safety control systems. At the end of the course, the students should be able to analyze and evaluate BASs systems.

COURSE OUTCOMES

1. Ability to analyze building automation system communication standards.
2. Ability to evaluate internet technologies and their applications in BAS.
3. Ability to evaluate control and optimization of air- conditioning systems control and optimization of central chilling systems.
4. Ability to design and evaluate lighting- control systems and security and safety control systems.

REFERENCES

1. Shengwei W. (2000) "Intelligent System And Building Automation", Spon Press.
2. Ogata, K. (2002) "Modern Control Engineering", 4th Ed. Prentice Hall.
3. Gopal, M. (2002) "Control Systems: Principles and Design", 2nd Ed. Tata McGraw-Hill.

EAT 461/2
FINAL YEAR PROJECT I

COURSE SYNOPSIS

This an individual research project in connection with a special engineering problem and under the guidance of an academic staff. The project undertaken may fall under one of the following areas: Mathematical analysis, experimental tests, computer simulation, hardware and/ software development, to their field of interest. At the end of the project, each student prepares an engineering report, presents and demonstrates findings and results of the project work.

COURSE OUTCOMES

1. Able to APPLY the knowledge and provide assumptions to identify evidence for a conclusion.
2. Able to COLLECT relevant information in a literature review to provide background of the project.
3. Able to CONSTRUCT experimental design to solve the research problems.
4. Able to CONDUCT an investigation using various methods.
5. Able to PERFORM research activities with high ethic expressions.
6. Able to DEMONSTRATE engineering principles with a sense of responsibility.
7. Able to ADAPT and function on multi-disciplinary teams.
8. Able to DISPLAY effective communication skills on complex engineering activities with the engineering community and with society at large.
9. Able to RELATE research activities to relevant information from various sources for application on continuous learning.
10. Able to PRODUCE excellent project management.

REFERENCES

1. Donald H. McBurney and Teresa L. White, (2007). Research Methods, 7th Edition, Thompson Wadsworth.
2. Daniel Holtom & Elizaberth Fisher, (1999). Enjoy Writing Your Science Thesis or Dissertation, Imperial College Press.

3. Leo Finkelstein, Jr., (2008). Pocket Book of Technical Writing for Engineers and Scientist. 3rd Edition, McGraw Hill.

EAT 462/4
FINAL YEAR PROJECT II

COURSE SYNOPSIS

This subject is the continuity of Final Year Project I. In this course students will conduct an experimental task which has been planned during the Final Year Project I. Students also will be completing their thesis report during this subject. In this course, students will be also exposed to journal writing.

COURSE OUTCOMES

1. Able to **analyze** the knowledge to identify evidence for a conclusion.
2. Able to **collect** the relevant information in a literature review to provide background of the project.
3. Able to **construct** the experimental design to solve the research problems.
4. Able to **conduct** the investigation using the various methods.
5. Able to **manage** the research activities with high ethic expressions.
6. Able to **develop** engineering principles with a sense of responsibility.
7. Able to **adapt** on the multi-displinary teams.
8. Able to **display** the effective communication skills on complex engineering activities with the engineering community.
9. Able to **arrange** research activities to the relevant information from the various source for the application on continuous learning
10. Able to **develop** excellent project management.

EAT 463/3
ENVIRONMENTAL LAW, HEALTH AND SAFETY

COURSE SYNOPSIS

Students will be exposed to Malaysian related laws and regulations on occupational safety and health (e.g. OSHA 1994) and environment (e.g. EQA 1974) and how to interpret the requirements stipulated under these documents. This course will also provide students the necessary information in identifying hazards, assessment and managing the risks that may be harmful to humans in the workplace.

COURSE OUTCOMES

1. Ability to comprehend and explain the legal requirement of environmental, safety and health laws and regulations.
2. Ability to describe and evaluate hazards in the workplace.
3. Ability to describe and evaluate the magnitude of risks on humans associated with the hazards in the workplace.
4. Ability to outline the management plan in managing the hazards and risks in the work place.

REFERENCES

1. Goetsch, D.L. (2010) Occupational Safety and Health for Technologist, Engineers and Managers, 7th Ed. Pearson Prentice Hall.
2. Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders, 2007 (amended at 5th April), International Law Book Services, Malaysia.
3. Environmental Quality Act & Regulations, 2006 (amended up to April), MDC Publishers Sdn. Bhd., Malaysia.

EAT 464/3
BUILDING SERVICES ENGINEERING

COURSE SYNOPSIS

This course is designed to provide students with an understanding of specification, design, installation and management of all building services equipment inside a buildings. Due to the complexity of modern engineering services in buildings, the role of Civil Engineers is become more important. In addition, the need to provide an internal environment that balances the comfort needs of the occupants with the functional requirements of the building calls for engineers with a wide range of knowledge and skills involving a multidisciplinary technical knowhow. Student will be able to assess the principles application and procedures related to building services (Mechanical & Electrical) system in modern buildings that is important for Civil Engineers.

COURSE OUTCOMES

1. Ability to describe and discuss the importance of building services in building design with respect to sustainability in modern buildings.
2. Ability to evaluate the choice of building services components and approach for better buildings design and operational during building life cycle.
3. Ability to evaluate the Mechanical & Electrical distribution systems in modern buildings and problems related to design, operation and maintenance.

REFERENCES

1. Chatterton, David V. (2007) Building Services Engineering, Hardback, Publisher Taylor & Francis Ltd.

2. David, V. Chatterton (2000) Building Services Engineering, Taylor & Francis.
3. MS1525:2007 Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings (First Revision).
4. MS IEC 60364-1:2007: Low Voltage Electrical Installation. LS-1 Electrical Installation Standard, Public Works Department, Malaysia.

EAT 472/3
ADVANCED WASTEWATER TREATMENT

COURSE SYNOPSIS

This course focuses on the design aspect of secondary and tertiary treatment units in wastewater treatment plant. The student will be learned on the process analysis and reactor design for various suspended growth and attached growth biological treatment processes. In addition, the student will be exposed to the design of the advanced wastewater treatment unit such as membrane filter, adsorber, ion exchanger and advanced oxidation process unit. By the end of the course, the student is expected to be able to design in detail the specific unit processes of secondary and tertiary treatment units in wastewater treatment plant.

COURSE OUTCOMES

1. Ability to apply basic knowledge of process analysis and reactor design toward in-depth understanding in wastewater treatment plant design.
2. Ability to evaluate and propose a decision on the design of biological reactor for the secondary treatment unit in wastewater treatment plant.
3. Ability to evaluate and propose a decision on the design of tertiary treatment unit in wastewater treatment plant.

REFERENCES

1. Metcalf and Eddy, Inc, (2004) Wastewater Engineering, Treatment and Reuse, Fourth Edition, McGraw-Hill, New York
2. Mackenzie L. Davis (2011) Water and Wastewater Engineering, Design Principles and Practice, International Edition, McGraw Hill, Singapore
3. Syed R. Qasim (1999) Wastewater Treatment Plants: Planning, Design, and Operation, Second Edition, CRC Press, Boca Raton, Florida
4. P. Aarne Vesilind (2003) Wastewater Treatment Plant Design, 1st edition, IWA-Water Environment Federation, London

EAT 475/3
CONSTRUCTION CONTRACTS AND LAW

COURSE SYNOPSIS

This course introduces students to Malaysian laws, which will focus on the sources, and branches of law in Malaysia. The course will emphasize on private laws related to construction practice, torts, law of contract and construction contract administration. Students will be exposed to construction contract administration which covers the Standard Forms of Contract, disputes in construction and dispute resolutions. At the end of the course, students should possess a sound knowledge of the Malaysian legal framework and familiar with legislative and legal constraints applicable to the practise of construction. More importantly, the students should be able to use their knowledge to promote ethical and better image of the construction industry.

COURSE OUTCOMES

1. Able to **APPLY** legal ethic and legal standards in construction practice.
2. Able to **DEMONSTRATE** problem-solving skill and **INTEGRATE** knowledge gained in other core subject to problem emerged.
3. Able to **DELIVER** critical reasoning and informed judgement in addressing legal issues in **CO4**.
4. Able to **SELECT** high ethical standards to adapt, live and respect to members of profession.

REFERENCES

1. Douglas Wood: Law and the Built Environment, Macmillan Press, 2010.
2. Construction Law, 5th edition, London: Sweet and Maxwell.
3. Crushman, R. F. and Meeker, C. A., (1989): Construction Defaults: Rights, Duties and Liabilities, New York: Wiley Law Publication, John Wiley and Son

EAT 476/3
URBAN STORMWATER MANAGEMENT

COURSE SYNOPSIS

The aim of this course to equip students with in-depth knowledge in urban stormwater design and management. This course highlights on the aspects of urban drainage management. The students are also exposed to environmental friendly drainage system, hydrological analysis, Best Management Practices (BMPs), and Quantity and Quality Controls. Upon completion of this course, the students should be able to analyse and determine viable project option, propose appropriate management strategies, and apply the appropriate techniques and strategies in urban stormwater planning and design.



COURSE OUTCOMES

1. Able to classify the aspects of urban drainage scheme which applies the concept of environmental friendly drainage in civil engineering.
2. Able to analyse urban drainage design alternative solutions based on the practices of the relevant authorities.
3. Able to design urban drainage systems with regard to sustainable development.
4. Able to explain urban drainage management in a group work.

REFERENCES

1. DID Malaysia. (2012).Urban Stormwater Management Manual for Malaysia, Second Edition, Kuala Lumpur.
2. Chin, D.A., (2013). Water Resources Engineering, 3rd Edition, Prentice Hall, New Jersey.
3. Mc Cuen, R.H. (2005). Hydrologic design and analysis, 3rd Edition, Prentice Hall, New

EAT 477/3
ADVANCED STEEL DESIGN

COURSE SYNOPSIS

This course is to equip civil engineering students with additional knowledge on the design aspect of steel structural elements using EUROCODE 3. This module is a continuation of steel building design by enhancing the fundamental approached in designing steel components. Students will acquire fundamental knowledge to perform steel design for plated structures, composite structures, portal frame and cold formed steel structures. The aim of this subject is to develop professional engineering skills with special emphasis on analysis, and reliability of design approaches.

COURSE OUTCOMES

1. Able to **DESIGN** plate and gantry girders.
2. Able to **DESIGN** composite structures in building.
3. Able to **DESIGN** the stability of portal frame.
4. Able to **DESIGN** cold-formed steel structures.

REFERENCES

1. Martin, L, Purkiss, J (2008). Structural Design of Steelwork to EN 1993 and EN 1994, Third Edition, Butterworth.
2. Trahair, NS, Bradford, MA, Nethercot, DA, Gardner L. (2008) The Behaviour and Design of Steel Structures to EC3. Fourth Edition. Taylor & Francais.
3. Lam, D, Ang, TC, Chiew, SP (2004) Structural Steelwork. Design to limit state theory. Third Edition. Elsevier.

EAT 478/3
BUILDING INFORMATION MODELLING

COURSE SYNOPSIS

Building Information Modelling (BIM) offers a novel approach to design, construction, and facility management in which a digital representation of the building process is used to facilitate the exchange and interoperability of information in digital format. BIM is beginning to change the way buildings look, the way they function, and the ways in which they are designed and built. This course provides an in-depth understanding of BIM technologies, the business and organizational issues associated with its implementation, and the profound advantages that effective use of BIM can provide to all members of a project team.

COURSE OUTCOMES

1. Able to describe contributions of BIM to civil engineering.
2. Able to design complex database of architecture and structure models for modelling libraries in BIM.
3. Able to present complex BIM model through integration of civil engineering database under some supervision.

REFERENCES

1. L. Mahdjoubi, C.A. Brebbia, R. Laing. Building Information Modelling (BIM) in Design, Construction and Operations, John WIT Press, Inc., US, 2015.
2. Brad Hardin, Dave McCool. BIM and Construction Management: Proven Tools, Methods, and Workflows, Second Edition, John Wiley & Sons, Inc., US, 2015.
3. Karen Kensek, Douglas Noble. Building Information Modelling: BIM in Current and Future Practice, John Wiley & Sons, Inc., US, 2014.
4. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston. BIM Handbook: A Guide to Building Information Modelling for Owners, Managers, Designers, Engineers and Contractors, Second Edition, John Wiley & Sons, Inc., US, 2011.
5. Randy Deutsch. BIM and Integrated Design: Strategies for Architectural Practice, John Wiley & Sons, Inc., US, 2011.

CAREER OPPORTUNITIES

Employment prospects and the career of the graduates are broad because they are trained by multi discipline which involves civil, environmental, chemistry and project management. The graduates with Environmental Engineering and Civil Engineering degrees have employment prospects that increasingly widespread in the public and private sectors. The sectors that offer the careers are:

- Oil and gas industry
- Petrochemical industry
- Water treatment and wastewater industries
- Solid waste and hazardous waste industries
- Processing and manufacturing industries
- Research and development institution
- Environmental and civil consultation group
- Government agencies, such as Department of Environmental, Department of Irrigation & Drainage and Public Work Department
- Building / construction industry
- Infrastructure and utility companies
- Education and training institution
- Non-governmental organization (NGOs)

Main career to this programme graduate were as follows:

- Environmental engineer
- Civil engineer
- Structural engineer
- Geotechnical engineer
- Site engineer
- Building services engineer
- Environmental research officer / executive
- Process engineer
- Occupational safety, health and environmental engineer
- Sales engineer
- QA/QC engineer
- Pollution control engineer
- Process / production engineer


UTAMA
KESELAM
SAFETY

FACULTY OF ENGINEERING TECHNOLOGY

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INTRODUCTION OF FACULTY OF ENGINEERING TECHNOLOGY

The Faculty of Engineering Technology (FEtech)

Faculty of Engineering Technology (Eng-Tech), UniMAP is established at Universiti Malaysia Perlis in 2013's. Its establishment is in line with the objectives of the Technical University in Malaysia under the Malaysian Technical University Network, (MTUN), which is to educate and train highly talented workforce to contribute to the advanced industrial countries, in addition to being a catalyst for national strategies to achieve high-income nation status.

UniMAP has begun to move towards the establishment of the Faculty of Engineering Technology since 2011 with the inception first engineering technology programme namely, Bachelor of Chemical Engineering Technology (Hons) (Biotechnology Industry) under the auspices of the School of Bioprocess Engineering. In 2012 additional four (4) new engineering technology programme under several other engineering school has been introduced :-

1. Bachelor of Mechanical Engineering Technology (Hons) (Machining) managed by the School of Manufacturing Engineering
2. Bachelor of Mechanical Engineering Technology (Hons) (Agriculture Systems) managed by the School of Bioprocess Engineering
3. Bachelor of Electrical Engineering Technology (Hons) (Industrial Power) managed by the School of Electrical Systems Engineering
4. Bachelor of Electronics Engineering Technology (Hons) (Electronic Network Design) managed by the School of Computer and Communication Engineering.

In 2013, in addition to continuing the five (5) existing engineering technology programs, the Faculty of Engineering Technology has begin to offer eight (8) another new programmes :-

1. Bachelor of Chemical Engineering Technology (Hons) (Chemical Process Industry)
2. Bachelor of Engineering Technology in Mechanical Engineering (Hons) (Product Development)
3. Bachelor of Engineering Technology in Mechanical Engineering (Hons) (Material Processing)
4. Bachelor of Engineering Technology in Electrical Engineering (Hons) (Technology Robotic and Automation)
5. Bachelor of engineering Technology in Electronics Engineering (Hons) (Electronic Systems)
6. Bachelor of Engineering Technology in Electronics Engineering (Hons) (Integrated Electronics)
7. Bachelor of Engineering Technology in Electronics Engineering (Hons) (Design Telecommunications Electronics)
8. Bachelor of Engineering Technology in Civil Engineering (Hons) (Construction)

In new Academic Session 2016/2017, new programmes will be offered :-

1. Bachelor of Chemical Engineering Technology (Hons) (Agrofood)-RY01

Engineering Technology at UniMAP offer a unique area where that bridges the existing engineering field, which focuses on the theory and design of engineering applications. Engineering technology is a field that applies the knowledge of applied mathematics and science by learning theory and practical experience in the aaplication of engineering principles through advanced technology practices for public benefit. All engineering technology program at UniMAP employs teaching and learning in a practical oriented approach. Emphasis is practical and laboratory activities which will be given more focus without compromising adequate theoreticaly of content.

In short, the difference that can be drawn between the field of engineering and engineering technology are as follow :-

- Engineering Technology programme will produce a practical engineer, able to deal with problem solving skills and the application of technology
- Teaching and learning will involve a lot of practical work in laboratory and field in addition to not deplete the theoretical contently
- Research will focus on the current technology, especially related to the application of technology, the latest processing and settlement problems.

Although both engineering and engineering technology generally compete in getting the same job, the fact they actually work hand in hand with each other in a group of engineers, technical engineers engineering technology program graduates will be involved more and more to work implementing technology applications, while engineers graduate engineering programs are more focused on the design and planning of a technology.

- **Department of Chemical Engineering Technology**

Description of Chemical Engineering Technology Department

Chemical Engineering Technology Department is offering two programs known as Bachelor of Chemical Engineering Technology (Industrial Biotechnology) and Chemical Engineering Technology (Industrial Chemical Process) program. Those programs are integrated into Chemical Engineering Technology education system that emphasizes on intensive practical skills besides providing adequate communication and soft skills that could equip the graduates to serve in the chemical and biotechnology-based industries.

Bachelor of Chemical Engineering Technology (Industrial Biotechnology) - RY21

Bachelor of Chemical Engineering Technology (Hons) (Industrial Biotechnology) is a program specifically designed to provide students with blended knowledge and skills in biotechnology-based disciplines such as microbiology, fermentation technology and engineering principles for an industrial oriented profession. Those disciplines are integrated into Chemical Engineering Technology education system that emphasizes on intensive practical skills besides providing qdequate communication and soft skills that could equip the graduates to serve in the biotechnology-based industries and biofuels, biopharmaceuticals, enzymes, biomaterials and bioenergy that ensure sustainability and optimization of resources used.

Bachelor of Chemical Engineering Technology (Industrial Chemical Process) - RY20

Bachelor of Chemical Engineering Technology (Hons) (Industrial Chemical Process) is a program designed to complement knowledge, application and skills in the field of chemical engineering technology such as reactor technology, upstream and downstream process and separation, and process safety. This program meets the needs and requirements of the chemical-related industries and equip the graduates with hands-on and applied skills to serve in the chemical process industries such as oleochemical, petrochemical, polymer and oil and gas.

Bachelor of Chemical Engineering Technology (Hons.) (Food Technology) - RY01

Bachelor of Chemical Engineering Technology (Hons) (Food Technology) is a program designed to equip students with knowledge and skill necessary for employment and growth in chemical engineering field with specialization in food technology. This program offers the capacity in theories in order to develop and apply the engineering, sciences, and technology in chemical engineering as well as food and agro-industrial production which closely aligned to market needs with a strong emphasis on application or technical skills.

Career Opportunities

Careers for Chemical Engineering Technology (Industrial Biotechnology) Program in related industries :-
- Biofuel
- Biopharmaceutical
- Enzymes
- Biomaterials
- Bioenergy

Careers for Chemical Engineering Technology (Industrial Chemical Process) Program in related industries :-
- Oleochemical
- Petrochemical
- Polymer
- Oil and gas
- Biofuel
- Biodesel
- Bioenergy
- Biopharmaceutical

Career Opportunities Chemical Engineering Technology (Hons.) (Food Technology) Program in related industries :-
- Chemical Engineering
- Food Technology
- Food Quality Assurance
- Food Processing and Manufacturing
- Chemical/Food Research and Development (R&D)
- Agricultural Food Production
- Agrochemical
  Natural resources



- **Department of Electronic Engineering Technology**

Department of Electronic Engineering Technology is offering four (4) programme known as Bachelor of Electronics Engineering Technology (Hons) (Electronic Systems), Bachelor of Electronic Engineering Technology (Hons) (Integrated), Bachelor of Electronic Engineering Technology (Hons) (electronic Telecommunication Design) and Bachelor of Electronic Engineering Technology (Hons) (Electronic Network Design).

Bachelor of Electronic Engineering Technology (Hons) (Electronic System) - RY40

Bachelor of Electronic Engineering Technology (Hons) (Electronic System) is a programme offered under Department of Electronic Engineering Technology. The programme curriculum which is has been designed is aimed to render the needs of knowledge highly skilled engineering technologist in parallel with Malaysian National Industrial Master Plan aspiration. The programme focuses on industrial exposure, through direct involvement with the industrial sector. This four years programme emphasizes on integrated circuit (IC) design and IC fabrication with include semiconductor technology, microfabrication process technology, microelectronic reliability and failure analysis. In addition, the programme also covers semiconductor physics, Micro-Electro—Mechanical System (MEMS) as well as IC packaging.

Career Opportunities

There is a high demand for highly skilled electronic engineering technologist in private and government sector especially in microelectronic fabrication and failure analsis. Career prospect for our graduates are very promising. Among the fields that may be ventured into by the graduates are :-

- Semiconductor / Microelectronic Fabrication
- Mask Design
- Process and Devices Simulation
- IC Packaging
- Reverse Engineering on ICs

The graduates can look forward for career opportunities in :-

- Research and Development sector in multi-national company, local and small industries, universities and local authorities such as MIMOS and SIRIM
- Semiconductor fabrication industry where product manufacturing process requires "hands – on" expertise
- Electronics, IC Design, Factory Automation, Process, Integrated Process and Production Technologist, R&D Technologist, Executive Manager and Technical Entrepreneur

Bachelor of Engineering Technology (Hons) (Integrated Electronic) - RY44

Bachelor of Electronic Engineering Technology (Hons) (Integrated Electronic) is a programme offered under the Department of Electronic Engineering Technology. The programme curriculum which has been designed is aimed to render the needs of knowledgeable highly skilled engineering technologist in parallel with Malaysian National Industrial Master Plan aspiration. The programme covers both full custom IC design and semi custom IC design for digital, analogue, mixed-signals systems, field programmable gate array (FPGA) applications and system on chip (SoC) desing. The programme also emphasizes on conventional electronic subjects, which include power electronic, electronic instrumentation, control systems, computer architecture and digital signal processing.

Career Opportunities

There is a high demand for highly skilled electronic engineering technologist in provate and government sector especially in IC desing, fabrication and testing. Career prospect for the graduates are very promising. Among the fields that may be ventured into by the graduates are :-

- VHDL- based Design
- Mask Design
- Process and Devices Simulation
- Application Specific ICs (ASICs) and Very Large Scale Integration (VLSI)
- Reverse Engineering on ICs

The graduates can look forward for career opportunities in :-

- Research and Development sector in multi-national company, local and small industries, universities and local authorities such as MIMOS and SIRIM
- Semiconductor fabrication industry where product manufacturing process requires "hands – on" expertise
- Electronics, IC Design, Factory Automation, Process, Integrated Process and Production Technologist, R&D Technologist, Executive Manager and Technical Entrepreneur

Bachelor of Engineering Technology (Hons) (Electronic Telecommunication Design) - RY41

The Bachelor of Engineering Technology (Hons) (electronic Telecommunication Design) is designed to prepare students for careers in the telecommunications industry as well as to address the transfer and continuing education needs of associate degree graduates in Telecommunication or other related disciplines. The programme has a sound foundation of Mathematics and Physics, provides a variety of electives in the Arts, Sciences and the Humanities and is focused on applying current engineering technology methods to the solution of technical problems.

Career Opportunities

Program graduates, known as Telecommunications technologist, are well prepared for a wide range of industry positons in the areas of telecommunications systems. Career prospect for our graduates are very promising. Among the fields that may be ventured into by the graduates are :-

- Telecommunication System and Network
- Transmission and Switching Systems
- Security in Communication Networks
- Optical and Wireless communication
- Internet Technologist
- Telecommunication Technologist

Bachelor of Electronic Engineering Technology (Hons) (Electronic Network Design) - RY43

Students of this programme are equipped with sound theoretical foundation and ample practical work to cater for the high demands of current industry where everything is now connected via electronic network. These industry-driven skills and knowledge include security design, network modelling, router administration and networking programming.

Career Opportunities

Graduates of this programme, known as network design technologist, can expect to venture a career in the computer and communication systems area, which include but not limited to :-

- Network Analysis
- Network Security
- Internetworking
- IP Telephony
- Network Desing
- Data Systems Specialist

- **Department of Electrical Engineering Technology**

Department of Electrical Engineering offers two programmes, Bachelor of Engineering Technology (Electrical) (Hons) (Industrial Power) and Bachelor of Engineering Technology (Electrical) (Hons) (Robotic and Automation)

Industrial Power (RY31)

Bachelor of Engineering Technology (Hons) (Industrial Power) is a programme offered under Department of Electrical Engineering. This programme is focuses on the needs of leading electrical engineering technologies to develop an engineer that have more practical skills and knowledge to solve the real problems at the workplace. This programme is known for quality and responsiveness to industry. In addition to a solid foundation in industrial power concepts, students will learn the most current and relevant topics for today's advanced technologies. Real world theory and applications are emphasizes throughout the in industrial power technology degree program and theory is balanced with extensive hands- on experience.

Career Opportunities

There is a high demand for highly skilled electrical engineer in private and government sector especially in maintenance, operation and electrical services. Career prospect for our graduates are very promising. Among the fields that may be ventured into by the graduates are :-

- Electrical power distribution sector
- Electronic and instrumentation sector
- Renewable energy and energy management sector
- Education sector
- Manufacturing sector

Bachelor of Electrical Engineering (Hons) (Robotic and Automation) (RY32)

Bachelor of Electrical Engineering Technology (Hons) (robotic & Automation) is a new programme offered in UniMAP. This programme is a multi-diciplinary field that is synergistic of electrical, mechanical, electronic, control and computer engineering discipline which enables its graduates having good theoretical and practical-oriented knowledge of integrated mechatronic systems to cater for the needs in the robotics and automation industry.



The curriculum of the programme is designed to produced graduate professionals who equipped with analytical skills and ability to work in all multidisciplinary engineering fields and industries. In addition to a solid foundation in machatronics concepts, Engineering Technology Degree students learn the most current relevant topics for today's advanced technologies. Additionally, the learning environment will be more enjoyable and competitive with good mixture between local and international students.

Career Opportunities

Robotic and Automation Engineering graduates in these areas will have the ability to engage in the design, research and development, consultancy, education, manufacturing, construction, maintenance, sales and management in many industries such as mufacturing, processing, automotive, aviation and shipping, mining and services, communications and building services and medical industries. Among of the firms that had offered employment opportunisities to the graduates of these areas are as follow :-

- Vehicle making and installation firms
- Home making appliances firms
- Electronic product firms
- Plant food processors
- Oil and gas companies
- High-tech firms
- Consultant firms
- Engineering & product development firms
- Automation system firms
- Bio-medical engineering firms
- Software development firms
- Research & development firms
- Hospitals
- Companies, maintenance and repair firms of medical equipment
- Companies, marketing and sale firms of medical equipment
- Manufacturing industry of medical instrumentation
- Education and training (universities, polytechnics and colleges)

- **Department of Mechanical Engineering Technology**

Mechanical Engineering technology activities include the application, testing, manufacturing, field services engineering as well as development and utilisation of latest mechanical and production of tools, machines as well as their products. Hence, this department is committed to prepare the students for a wide range of technological challenges in this exciting field through highest-quality educational programmes. The primary goal is to provide students with a solid technical foundation which enable to readily adaprt to a wide variety of careers within the existing engineering field.

Careers Opportunities

The degree programme in mechanical engineering technology prepares graduates for various possible in manufacturing, sport technology, agricultural and other technical industries which include :-

- Production or process engineer / technologist
- Product engineer / technologist
- Service engineers / technologist
- Quality engineer / technologist
- R & D engineer / technologist
- Agra-based production engineer / technologist
- Agro-based SM / R & D
- Agra-based sales / technical services
- Maintenance and service indudtries
- Electronic packaging / metal / polymer / materials processing industries
- Automotive industries

This department offers four (4) exciting Mechanical engineering Techology degree programmes, namely :-

Mechanical Engineering Technology (Machining) - RY55

This programme prepare the workforces who are productive, innovative, creative and well verse with the state-of-the art technology related to mechanical engineering technology. In essence, the programme curricular is designed to lead towards practical needs so as to produce highly skilled graduates in the field of engineering and technology that meet the recent industrial requirement and other sectors concerned. In particular, this programme emphasises on the applications or utilisations of related knowledge and skills within the spectrum of mechanical and machining technology fields. This includes material and metal cutting technology, management of technology and sustainability. In addition, the required university course allow the students to enchance their communication and thinking skills, as well as ethical elements of professionalism in their careers.

Mechanical Engineering Technology (Agricultural Systems) - RY56

The programme aims to generate engineering technologist who are competent and posses a sound and balanced skill in integrating biological engineering and management principles. The course are delivered based on practical approach that covers basic and applied engineering principles of economics and business management in the agricultural and related industries. The students are also exposed to agra-industrial know-how through courses and skills that are applicable in many related industries. The final semester of the programme is dedicated to the industrial training activitiy attaching the students to relevant industries mainly to enchance their capability and skill in accordance to the market needs.

Mechanical Engineering Technology (Product Development) - RY57

The objectives of this programme is to produce highly skilled qraduates that possess solid foundation knowledge in the general field of mechanical engineering technology and in the areas of product development particularly. The programme has been designed in a holistic manner to provide students with a blend of theoretical knowledge, industrial artistic and technical skills in the discipline of technology-based product development in line with the requirements of the mechanical engineering industry. Therefore, it would help in producing engineering technologist who are responsible in applyinh, preparing, maintaining and development products in all aspects to modern mechanical engineering technology.

Mechanical Engineering Technology (Material Processing Technology) - RY58

The objective of this programme is to produce graduates who are skilled, competitive and have a strong knowledge based in the field of materials processing engineering technology. Graduates will have the capability to demonstrate as a knowledge and talented engineering technologist in problem solving skills, in addition to materials processing, characterization and testing in materials processing technology field.

The course are delivered based on practical approach that covers four main fields which is metal processing, polymer processing, electronic packaging and ceramic processing as well as principles in economics and management. The programme has been designed to cultivate materials engineering technologist who are committed to the important of life-long learning and continuous improvement. Hence, upholding the importance of professionalism and ethics of material processing profession to form a cultured and more developed society.

Career Opportunities

Graduates can seek employment in sporting organisations and institutes, orthopaedic and industrial design companies and can work together with scientists, coaches, athletes, the disables, sporting goods manufacturers, venue managers and other engineers.

Within these organisations and individuals, the sports engineering technologists will have the skills to develop equipment and facilities used by sportspersons including designing sporting goods, rehabilitation devices, apparel, computer simulation models and infrastructure that will improve and enhance athletic performance.

However, being based on a mechanical engineering technology degree, graduates will retain flexibility in the choice of engineering industry for their careers. In most cases graduates will also be able to work wherever mechanical engineering technologists are employed.

- **Department of Civil Engineering Technology**

Currently, Department of Civil Engineering Technology offers one (1) degree programme namely Bachelor of Civil Engineering Technology (Hons) (Constructuion). This programme will be offered under auspices of School of Environemtal Engineering located at Kompleks Pusat Pengajian Jejawi 3, Jejawi, Arau, Perlis.

Civil Engineering Technology (Construction) - RY11

This programme is design to equip students with the essential knowledge and skill needed to enter careers in construction, operation, maintenance of the built environment and global insfrastructure. Therefore, the graduate of this programme will have skills in the construction, testing, operation and maintenance of building and infrastructure. They also will have the ability to utilize basic construction documents to participate in construction activities.



Career Opportunities

Employment prospects and the career of the graduates are broad because this programme combines the necessary skills in three important fields : Construction Management, Engineering and Entrepreneurship. These skills are necessary to successfully manage construction projects. In our programme, students learn how to build projects, prepare construction estimates, generate project schedules, handle field opearions, administer construction contracts, use surveying equipment, perform structural design (wood, concrete and steel structures), understand accounting principles, determine economical feasibility and communicate with others effectively. These skills position our students to succeed employments as :-

- Contractor
- Developer
- Survey Contractor
- Construction Inspector
- Material Tester
- Building Inspector
- Estimator
- Sales Engineer
- Installation Supervisor
- Quality Control Supervisor
- Structural Detailer
- Project Coordinator / Manager



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BACHELOR OF CIVIL ENGINEERING TECHNOLOGY (HONOURS) (CONSTRUCTION) - RY11

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of civil engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Ability to apply knowledge of mathematics, science, engineering fundamental and an engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Ability to solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialisation.

PO3
Ability to design solutions for broadly-defined construction engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Ability to plan and conduct experimental investigations for broadly-defined problems, using data from relevant sources.

PO5
Ability to select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.

PO6
Ability to function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Ability to communicate effectively with the engineering community and society at large.

PO8
Ability to demonstrate an awareness of and consideration for societal. Health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Ability to demonstrate an understanding of professional ethics, responsibilities and norms of construction engineering technology practices.

PO10
Ability to understand awareness of management, business practices and entrepreneurship in construction engineering technology.

PO11
Ability to demonstrate an understanding of the impact of construction engineering practices, taking into account the need for sustainable development.

PO12
Ability to recognise the need for professional development and to engage in independent and lifelong learning.

CURRICULUM STRUCTURE FOR BACHELOR OF CIVIL ENGINEERING TECHNOLOGY (HONOURS) (CONSTRUCTION) - RY11

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (108)	PAT 101/2 Fundamental of Engineering Mechanics	PAT 151/3 Fundamental of Solid Mechanic	PAT 201/2 Structural Theory	PAT 251/2 Structural Analysis	PAT 302/3 Construction Technology 1	PAT 351/3 Structure Design 2	PAT 401/3 Industrialized Building Construction Technology	PIT 304/12 Industrial Training
	PAT 102/3 Physic Technology	PAT 152/3 Fundamental of Fluid Mechanic	PAT 202/3 Hydraulic and Hydrology	PAT 255/3 Building Services 2	PAT 301/3 Structure Design 1	PAT 353/3 Basic Environmental Engineering and Management	PAT 402/4 Construction Technology Integrated Project	
	PAT 103/2 Introduction to Civil Engineering Technology	PAT 153/3 Geomatic	PAT 203/2 Soil Mechanic	PAT 252/3 Construction Project Management	PAT 303/3 Highway and Traffic Technology	PAT 354/4 Final Year Project 1	PAT 454/6 Final Year Project 2	
	PAT 104/2 Technical Drawing	PAT 154/2 Construction Drawing	PAT 204/3 Construction Material	PAT 254/3 Construction Value Estimation	PAT 304/2 Contract and Site Administration	PAT 352/3 Construction Technology 2		
			PAT 205/3 Building Services 1	PAT 256/3 Management of Occupational Safety and Health	PAT 308/3 PAT 309/3 Elective 1	PAT 358/3 PAT 359/3 Elective 2	PAT 408/3 PAT 409/3 Elective 3	
				PAT 253/3 Geotechnic				
Common Core (15)	PQT 111/3 Mathematic for Engineering Technology I	PQT 112/3 Mathemathic for Engineering Technology II	PQT 213/3 Mathemathic for Engineering Technology III		PTT 444/3 Engineering Technologist in Society	PTT 333/3 Engineering Technology Management		
University Required (19)	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UVW 410/2 University Malay Language		UUW 224/2 Engineering Entrepreneurship				
	UUT 122/2 Skills and Technology in Communication							
	UZW 1XX/1 Co-Curricular Activities	UZW 1XX/1 Co-Curricular Activities	UZW 1XX/1 Co-Curricular Activities	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies				
	UUW 322/2 Thinking Skill	UVW211/2 English for General Purposes**/ UVW XXX/2 Option Subjects*	UVW 312/2 English for Technical Communication					
	UVA111/2 Foundation English							
142	19	19	19	21	17	19	16	12

Total Units for Graduation = 142

Elective Courses

Elective 1: **PAT 308/3** Financial and Human Resources Management / **PAT 309/3** Building Survey
Elective 2: **PAT 358/3** Construction Technology of Highway and Bridge / **PAT 359/3** Construction Risk Management
Elective 3: **PAT 408/3** Advanced Structure Design / **PAT 409/3** Highrise Buiding Technology



LIST OF COURSES

BACHELOR OF CIVIL ENGINEERING TECHNOLOGY (CONSTRUCTION)

- PAT 101/2 FUNDAMENTAL OF ENGINEERING MECHANICS
- PAT 102/3 PHYSIC TECHNOLOGY
- PAT 103/2 INTRODUCTION TO CIVIL ENGINEERING TECHNOLOGY
- PAT 104/2 TECHNICAL DRAWING 1
- PAT 151/3 FUNDAMENTAL OF SOLID MECHANICS
- PAT 152/3 FUNDAMENTAL OF FLUID MECHANICS
- PAT 153/3 GEOMATIC
- PAT 154/3 CONSTRUCTION DRAWING
- PAT 201/2 STRUCTURAL THEORY
- PAT 202/3 HYDRAULIC AND HYDROLOGY
- PAT 203/2 SOIL MECHANICS
- PAT 204/3 CONSTRUCTION MATERIALS
- PAT 205/3 BUILDING SERVICES I
- PAT 251/2 STRUCTURAL ANALYSIS
- PAT 252/3 CONSTRUCTION PROJECT MANAGEMENT
- PAT 253/3 GEOTECHNIC
- PAT 254/3 CONSTRUCTION VALUE ESTIMATION
- PAT 255/3 BUILDING SERVICES II
- PAT 256/3 MANAGEMENT OF OCCUPATIONAL SAFETY AND HEALTH
- PAT 301/3 STRUCTURE DESIGN 1
- PAT 302/3 CONSTRUCTION TECHNOLOGY 1
- PAT 303/3 HIGHWAY AND TRAFFIC TECHNOLOGY
- PAT 304/2 CONTRACT AND SITE ADMINISTRATION
- PAT 308/3 FINANCIAL AND HUMAN RESOURCES MANAGEMENT
- PAT 309/3 BUILDING SURVEY
- PAT 351/3 STRUCTURE DESIGN 2
- PAT 353/3 ENVIRONMENTAL MANAGEMENT
- PAT 352/3 CONSTRUCTION TECHNOLOGY 2
- PAT 358/3 CONSTRUCTION TECHNOLOGY OF HIGHWAY AND BRIDGE
- PAT 359/3 CONSTRUCTION RISK MANAGEMENT
- PAT 401/3 INDUSTRIALIZED BUILDING SYSTEM CONSTRUCTION TECHNOLOGY
- PAT 402/3 CONSTRUCTION TECHNOLOGY INTEGRATED PROJECT
- PAT 408/3 ADVANCED STRUCTURE DESIGN
- PAT 409/3 CONSTRUCTION TECHNOLOGY OF HIGHRISE BUILDING
- PAT 454/4 FINAL YEAR PROJECT I
- PAT 454/6 FINAL YEAR PROJECT II

COURSE SYLLABUS

PAT 101/2
FUNDAMENTAL OF ENGINEERING MECHANICS

COURSE SYNOPSIS

The aim of this course is to enable the students to learn the Fundamentals of engineering mechanics. In engineering mechanics portion, students will be introduced to fundamentals and principles of static and dynamics mechanics. Resultant and equilibrium of coplanar force system as well as spatial force system will be covered in static portion while kinematics of particle in dynamics potion. In material engineering portion, the student will be also taught on structure of crystalline solids and strength of material.

COURSE OUTCOMES

1. Ability to explain basic concept of force vector and solve problem related to force vector.
2. Ability to construct free body diagram and ability to solve problem related to equilibrium of rigid body.
3. Ability to solve problems related to kinematics of a particle.
4. Ability to explain basic concepts of material strength as well as their mechanic properties

LIST OF EXPERIMENTS

Lab 1: Equilibrium of beam
Lab 2: Tensile test
Lab 3: Rockwell Hardness Test

REFERENCES

1. Hibbeler, R.C. Engineering Mechanics Statics. 12th Ed. , Prentice Hall, 2010.
2. Hibbeler, R.C. Engineering Mechanics Dynamics. 12th Ed. , Prentice Hall, 2010.
3. Peter Schiavone, Hibbeler, R.C. Engineering Mechanics Statics Study Pack. 12th Ed. , Prentice Hall, 2010.
4. Peter Schiavone, Hibbeler, R.C. Engineering Mechanics Dynamics Study Pack. 12th Ed. , Prentice Hall, 2010.
5. William D. Callister, Jr. Material Science and Engineering An Introduction, 5th Ed, 2000.
6. Cheng. Statics and Strength of Materials, 2nd Ed. ,McGraw-Hill, 1998

PAT 102/3
PHYSIC TECHNOLOGY

COURSE SYNOPSIS

This course aims to teach students on understanding basic concept on physics towards technology and its applications especially in engineering. At the end of this course students must be able to calculate and solve basic physics problems that related to heat, lighting, electricity, magnetism and acoustics. The students must also be able to demonstrate the theory and its applications.

COURSE OUTCOMES

1. Ability to explain fundamental physics concepts in technology.
2. Ability to solve basic physics calculation and formula.
3. Ability to apply concepts of physics in technology through understanding in lab experiments.
4. Ability to evaluate overall important physics phenomena related to building services.

LIST OF EXPERIMENTS

Lab 1: Lightings
Lab 2: Magnetisms
Lab 3: Acoustic
Lab 4: Electricity

REFERENCES

1. Poh Liong Yong, "Physics" Oxford Fajar, 2012
2. Cebeci, T. "Convective Heat Transfer" 2nd Rev, Springer, 2002
3. Nichols, D. H. (2002). Physics for technology: with applications in industrial control electronics. Prentice Hall
4. Hunt, B. J. (2010). Pursuing power and light: technology and physics from James Watt to Albert Einstein. John Hopkins University Press
5. Muller, R. A. (2010). Physics and Technology for Future Presidents: An Introduction to the Essential Physics Every World Leader Needs to Know. Princeton University Press

PAT 103/2
INTRODUCTION TO CIVIL ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

This course provides further discussion and explanation related to role of civil engineering technology in society, unit systems and their applications, solutions of engineering problems and use of computer software in civil engineering problems.

COURSE OUTCOMES

1. Ability to evaluate the role of civil engineering technology in society.
2. Ability to estimate using unit systems and analyze their applications in engineering problems.



3. Ability to analyze solutions for engineering problems by algebra and trigonometry principles.
4. Ability to evaluate computer software in civil engineering problems.

REFERENCES

1. Purushothama Raj.P., Basic civil engineering, 3rd Edn., Dhanam Publications, Chennai, 2001.
2. Natarajan, K V, Basic Civil Engineering, 11th Edition, Dhanalakshmi Publications, Chennai, 2001.
3. Punmia, B.C., et.al Building Construction, Laxmi Publishers, New Delhi ,2002.
4. Venugopal K., Engineering Drawing and Grahics + Auto CAD, 4th edition, New Age International Publication Ltd., 2004
5. Chen, Wai-Fah, Liew, J. Y. Richard. The civil engineering handbook [electronic resource] / edited by W.F. Chen and J.Y. Richard Liew. Boca Raton [FL], CRC Press, , c2003.

PAT 104/2
TECHNICAL DRAWING 1

COURSE SYNOPSIS

This subject aims to equip students with fundamental technical drawing skills namely geometry, projection, orthography, isometric, oblique sketch and cross section. These skills are fundamental knowledge that required for Construction Drawing course that will be offered in semester 2 of year 1. Students will be taught to draw manually and by using AutoCAD software.

COURSE OUTCOMES

1. Ability to apply basic skills of geometry.
2. Ability to illustrate orthographic projection, isometric and oblique drawing.
3. Ability to APPLY basic geometry by using CAD software.

STUDIO WORKS

1. Introduction to basics engineering drawings
2. Manual drawing techniques in civil engineering
3. Isometric drawings
4. Contours, earthwork cut and fills
5. Architectural, Mechanical & Electrical Drawings
6. Civil and structural engineering Drawings
7. Water and Sanitary Installation Drawings
8. Road and Drainage Drawings
9. Reinforced Concrete Detailing

REFERENCES

1. James H. Earle, "Engineering Design Graphics", 11th ed. Pearson Prentice-Hall, 2004
2. Gary R Bertoline, Eric N Wiebe, "Technical Graphics Communication. 3rd Ed. , McGraw-Hill, 2003.
3. Parker M. A. and Pickup F. (1991), "Engineering Drawing with Worked Examples", Vol. I and II", 3rd edition, Stanley Thornes (publishers) Ltd., England, U.K., 1991.
4. David A. Madsen, Terence M. Shumaker, David P. Madsen. Civil drafting technology 7th ed: Prentice Hall , c2010.
5. David L. Goetsch, William S. Chalk, John A. Nelson. Technical drawing 4th ed. Delmar Publishing , 2000

PAT 151/3
BASIC SOLID MECHANICS

COURSE SYNOPSIS

This course will be focused on basic principles and terminology of solid mechanics which begins with the concept of stress and strain, mechanical behaviour of engineering materials, methods to solve important types of solid mechanics problems and ability to apply this knowledge for solution of simple problems of practical importance. The important mechanical properties of materials and separate treatments of axial load, torsion, and bending are also discussed. The transverse shear along with a discussion on the state of stress results from combined loadings will be covered in this course, as well as the concepts for transforming multiaxial states of stress and in similar manner, the methods for strain transformation. For a further summary, student will be taught the applications of beams and shaft that cover on the design and deflection parts. Besides that the buckling of column also will be exposed to the student.

COURSE OUTCOMES

1. Ability to evaluate the deformation, shear and bending moment, stress and strain reaction of structural member under axial load.
2. Ability to demonstrate the light structure experiment by using laboratory manual.
3. Ability to communicate affectively during laboratory interview session based on laboratory works.
4. Ability to cooperate in group activities during laboratory session.

LIST OF EXPERIMENTS

1. Tensile test
2. Torsion
3. Bending moment
4. Shear force
5. Beam
6. Strut Buckling
7. Rockwell Hardness Test

REFERENCES

1. R.C Hibbeler' "Mechanics of Materials", 7th Ed, Prentice Hall, 2008.
2. Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf.,"Mechanics of Materials". 3rd Edition. McGraw Hill, 2004.
3. Gere, "Mechanics of materials, Thomson, Brookes/Cole, 2004
4. Megson, T.H.G., "Structural and Stress Analysis", Butterworth: Heinemann, 2002.
5. E.Popov., "Mechanics of materials", Prentice Hall, 1983

PAT 152/3
FLUID MECHANICS

COURSE SYNOPSIS

This course provides student with knowledge in patterns of movement of fluid particles. By the end of this subject student will be expected to understand the basic characteristics of fluid mechanics and fluid statics, be able to analyze the hydrostatics and basic hydrodynamics in fluid. Student also will be able to analyze and differentiate between the flow in pipe and flow in open channels. In this subject, student will be introduced to the Darcy-Weisbach equation, Moody diagram, Energy losses in pipelines, Minor losses and analysis multiple pipe systems.

COURSE OUTCOMES

1. Ability to analyse and solve various properties, static theories, mechanic theories and pipeline system of fluids in written under rest condition and the application of the law of force and motion.
2. Ability to demonstrate lab work/ experiment by using lab manual.
3. Ability to cooperate in a group activity during lab session.
4. Ability to explain to lecturer in lab interview during lab work/experiment

REFERENCES

1. Duncan, W.J., Thom, A.S. & A.D. Young. 1970. Mechanic of fluids, 2nd Edition. London.
2. Fatimah, M.N., Faridah, J.S. dan G.K. Goh. 1991. Mekanik Bendalir untuk Kejuruteraan Awam. UTM, Johor: Unit Penerbitan Akademik.
3. Robertson, J.A. and C.T.Crowe. 1985. Engineering Fluid Mechanics. 3rd Edition. New York: Houghton Mifflin.
4. Robert, L.M. 2000. Applied Fluid Mechanics. 5th Edition. United States of America: Prentice Hall.
5. John F. Douglas, Janusz M. Gasiorek, John A. Swaffield. Fluid mechanics; 4th ed: Prentice Hall , 2000.

PAT 153/3
GEOMATIC

COURSE SYNOPSIS

In this course, student will be introduced to basic surveying involved in engineering. Starting from linear measurement on plane, student will do leveling after they learn 2 different data logging. With their knowledge in tapping and leveling, they have to do traversing and tachymetry. Lastly, student will be test in real work, in geomatic camp.

COURSE OUTCOMES

1. Ability to understand basic concept of geomatic.
2. Ability to perform surveying task and procedures.
3. Ability to transform data to other format (e.g : map, excel and etc)

LIST OF EXPERIMENTS

1. Introduction to Distance Measurement and Bearing
2. Introduction to Levelling Work (Collimation and Rise & Fall Method)
3. Traversing With Compass and Theodolite
4. Introduction to Tacheometry
5. Introduction to Electronic Distance Measurement (EDM) With Total Station
6. Geomatic Camp

REFERENCES

1. Barry Kavanagh, Surveying Principles and Applications. Pearson. (2009).
2. Ghilani Wolf., Elementary Surveying, An Introduction to Geomatics, Twelfth Edition, Pearson International Edition.
3. Ab. Hamid Mohamed, Asas Ukur Kejuruteraan, Penerbit Universiti Teknologi Malaysia.
4. Barry F. Kavanagh. Geomatics ; Prentice Hall , c2003.
5. Kavanagh, B.F." Geomatic" Prentice Hall, 2003



PAT 154/3
CONSTRUCTION DRAWING

COURSE SYNOPSIS

The course equips students with construction drawings skill either manually practice or computer-aid software. Students are exposed to the preparation of construction drawings which include architectural drawing, mechanical and electrical drawing, and civil and structural drawing. In the end of the course, students enable to distinguish between these types of construction drawings and enable to prepare construction drawing by manually and computer-aid software.

COURSE OUTCOMES

1. Ability to classify types of construction drawings and symbols that used in standard practice.
2. Ability to explain the plumbing and sanitary systems and problems related to design, operation and maintenance in modern building.
3. Ability to evaluate fundamental mechanical and electrical design in relation to building facilities.
4. Ability to elaborate building facilities systems and problems related to design, operation and maintenance in modern building.

STUDIO WORKS

1. Architectural, Mechanical & Electrical Drawings.
2. Civil and structural engineering Drawing.
3. Introduction to Computer Aided Drafting
4. CAD of Architectural, Mechanical and Electrical Drawings
5. CAD of Civil and Structural Engineering Drawings
6. CAD of Water and Sanitary Installation Drawings
7. CAD of Road and Drainage Drawings

REFERENCES

1. Zurflieh, Thomas P, AutoCAD 2004: 3D drawing and solid modeling, Prentice-Hall, 2005
2. Shwarna Lockhart, A tutorial Guide to AutoCAD 2005, Prentice-Hall, 2005
3. Mark Dix & Paul Riley, Discovering AutoCAD 2002 One step at a time, Prentice-Hall, 2003
4. Seeley IH. (1998). Building Quantities Explained 5th Revised edition, Macmillan.
5. Terry D. Metz. Title AutoCAD 2002 a building approach, Prentice Hall , 2003
6. James A. Leach, AutoCAD 2002 instructor : a student guide to complete coverage of AutoCAD's commands and features, McGraw-Hill, 2002.

PAT 201/2
STRUCTURE THEORY

COURSE SYNOPSIS

This course provides students with a clear and thorough presentation of the theory and application of structural analysis as it applies to beams, trusses and frames. It introduces analysis of statically determinate structures for beams, trusses and frames. Besides that, It also introduces deformations analysis of statically determinate structures using virtual work method for trusses, beams, and frames.

COURSE OUTCOMES

1. Ability to calculate internal member forces for determinate structural systems.
2. Ability to illustrate internal member forces diagram for determinate structural systems.
3. Ability to determine deformations for determinate structural systems.
4. Ability to sketch deformations for determinate structural systems.

REFERENCES

1. Kassimali, A., "Structural Analysis", Fourth Edition, Cengage Learning, 2011.
2. Hibbeler, R.C., "Structural Analysis", Seventh Edition, Prentice-Hall, 2009.
3. McKenzie W.M.C., "Examples in Structural Analysis" Taylor & Francis, 2006.
4. Connor, J.J., and Faraji, S., "Fundamentals of Structural Engineering" Springer, 2013
5. Pandit, G.S. and Gupta, S.P. "Structural Analysis: A Matrix Approach" Tata McGraw Hill, 2008

PAT 202/3
HYDRAULIC AND HYDROLOGY

COURSE SYNOPSIS

This course provides student knowledge in Uniform Flow; Chezy equation , Ganguillet-Kutter, Bazin and Manning. Student will be able to understand Open Design Channel and Energy and Momentum Principle. Student also will be able to differentiate between laminar flow and turbulent flow and to understand the theory of transportation of sediment.

COURSE OUTCOMES

1. Ability to understand the Chezy equation , Ganguillet-Kutter, Bazin and Manning and to analyze open design channel: cannot erode
2. Ability to analyze the Energy and Momentum Principle
3. Ability to differentiate between laminar and Turbulent Flow
4. Ability to understand theory of sedimentation and analyze open channel design: erode

REFERENCES

1. V.T. Chow, 1988, *Open Channel Hydraulic*, Mc Graw Hill International Francis, J.R.D. dan P. Minton, 1986. Civil Engineering Hydraulics Arnold, Edward Arnold Ltd., London.
2. French, R.H., 1986. Open-Channel Hydraulics, McGraw-Hill, New York. Henderson, F.M., 1966. Open Channel Flow, The Macmillan Company, New York.
3. Das, M.M. and Saikia, M.D."Hydrology", PHI Learning Private Limited, 2009
4. Musy, A. and Higy, C. "Hydrology: A Science of Nature" Taylor and Francis Group, 2011
5. Brooks, K. N.,"Hydrlogy and Management of Watersheds", Iowa State University Oxford, 2003

PAT 203/2
SOIL MECHANICS

COURSE SYNOPSIS

The course introduces the students with the basic and background of the properties and behavior of soil deposits and the applications of soil mechanics theory. It includes brief introduction on geological and physical characteristics of soils. Also includes identification, classification and description of rock and soil for engineering purposes. Application of mechanics on soil such as phase relationship, compaction, permeability and seepage, stresses and effective stresses, shear strength and consolidation are also covered.

COURSE OUTCOMES

1. Ability to identify, classify and differentiate the different types of soil and rock including their properties.
2. Ability to discuss the seepage and permeability concept and solve problem involving flow nets.
3. Ability to solve calculation problem using mechanics involving physical properties, compaction and effective stress.
4. Ability to employ the shear strength theory to determine shear strength parameters of soils.
5. Ability to explain the process of consolidation and solving problems using one-dimensional consolidation theory.

LIST OF EXPERIMENTS

1. Rock Identifications
2. Sieve and Hydrometer Analysis
3. Liquid Limit and Plastic Limit Test
4. Constant Head Permeability Test
5. Standard Proctor Compaction Test

REFERENCES

1. R. F. Craig, 'Soil Mechanics' , E & FN Spon, 1997
2. M. Budhu, 'Soil Mechanics & Foundations', Wiley, 1999.
3. J.H Atkinson, 'An introduction to the mechanics of soils and foundation, through critical state soil mechanics', McGraw Hill, 1993
4. R. Whitlow, ' Basic soil mechanics', Prentice Hall, 2001
6. Karl Terzaghi, Ralph B. Peck & Gholamreza Mesri, 'Soil mechanics in engineering practice', John Wiley and Sons, 1996

PAT 204/3
CONSTRUCTION MATERIALS

COURSE SYNOPSIS

This course provides an introductory overview of the various materials used in construction. After receiving an introduction into fundamental principles of structural, physical and long-term performance, students learn about material and product manufacturing techniques and how they relate to mechanical and non-mechanical properties of the various materials. Common construction methods are introduced and building details are explored.

COURSE OUTCOMES

1. Ability to **COMPARE** and **IDENTIFY** material properties (physical, structural) for most common and advanced building materials,
2. Ability to **IDENTIFY** and **UNDERSTANDING** the typical and potential applications of building materials.
3. Ability to **IDENTIFY** crucial problem areas in manufacture and applications of building materials
4. Ability to **IDENTIFY** and **UNDERSTANDING** of importance of experimental verification of material properties.

REFERENCES

1. Mehta, Scarborough, Armpriest, "Building Construction: Principles, Materials, and Systems, Second Edition". Pearson / Prentice Hall, 2013 ISBN-13: 978-0-13-214869-6
2. Spence, W.P., "Construction materials, methods and techniques: building for sustainable future", 3rd Edition, Delmar/Cengage Learning, 2011
3. Popovics, S. "Concrete Materials: Properties, specifications and testing" Nayos Publication, 1992
4. Wright, P.H."Highway Engineering" John Willey and Sons, 2004
5. Eisengh, V.D. "Steel: a Handbook for Materials Research and Engineering" Springer-Verlag, 2003

PAT 205/3
BUILDING SERVICES I

COURSE SYNOPSIS

An overview on overall building facilities and understanding towards its functionalities in building is the main objectives in this course. Students must be able to explain the function of building services and how it's important to a building. Student also need to produce a simple mechanical and electrical design that always been expected from a Building Technologist.

COURSE OUTCOMES

1. Ability to understand the building facilities systems in modern buildings and problems related to design, operation and maintenance.
2. Ability to calculate fundamental design related to building facilities for an application.

REFERENCES

1. David, V Chadderton" Building Services Engineering:4th Ed" Taylor & Francis, 2004
2. Hall, F. and Greeno, R. "Building Services Handbook" Elsevier/ Butterworth Heinemann, 2009
3. Fredrick, P.M. "Building Services Engineering" VDM Publishing House, 2009
4. Hall, F. and Greeno, R. "Building Services Handbook" Elsevier/ Butterworth Heinemann, 2005
5. Knight, J. And Jones, P. "Building Services Pocket Book" Burlington Mass, Newness, 2004

PAT 251/2
SRUCTURAL ANALYSIS

COURSE SYNOPSIS

This course provides students with a clear and through presentation of the theory and application of structural analysis as it applies to beams, trusses and frames. It introduces analysis of statically indeterminate structures for beams, trusses and frames. Two method are introduces in this analysis of statically indeterminate structures using method of consistent deformations and moment distribution.

COURSE OUTCOMES

1. Ability to illustrate internal member forces diagram for indeterminate structural systems by using Method of Consistent Deformations.
2. Ability to assess the changes in internal member forces exerted for different types of structural system materials by using Moment Distribution Method.
3. Ability to analyze indeterminate structural system by using software / computer approach based on stiffness method.

LIST OF EXPERIMENTS

Lab 1: Trusses System
1. Forces in truss
    1. Statically Determinate System
    2. Statically Indeterminate System
2. Deflection of trusses

Lab 2: Beam
3. Forces in beam
    1. Statically Determinate System
    2. Statically Indeterminate System
4. Deflection of beam

Lab 3: Portal frame
5. Forces in frame
    1. Statically Determinate System
    2. Statically Indeterminate System

Lab 4: Deflection of frame

REFERENCES

1. Kassimali, A., "Structural Analysis", Fourth Edition, Cengage Learning, 2011.
2. Hibbeler, R.C., "Structural Analysis", Seventh Edition, Prentice-Hall, 2009.
3. Connor, J.J., and Faraji, S., "Fundamentals of Structural Engineering" Springer, 2013
4. Laible, J.P. "Structural Analysis" Holt-Saunders (Japan), 1985
5. Pandit, G.S. and Gupta, S.P. "Structural Analysis: A Matrix Approach" Tata McGraw Hill, 2008

PAT 252/3
CONSTRUCTION PROJECT MANAGEMENT

COURSE SYNOPSIS

This course aims to teach students on how to apply the project management skills throughout overall project life cycle. The role of engineering management is to assess the appropriateness of a given project, estimate its value, and justify it from an engineering standpoint. At the end of the course, students will be able to identify and discuss issues and challenges faced by engineers relating to project management in project life cycle.

COURSE OUTCOMES

1. Ability to analyze and evaluate the process of project management, develop work plans, do cost estimation and perform project evaluation
2. Ability to perform project management activities and to solve issues in site construction.

REFERENCES

1. R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, *Engineers in Society,* Mc Graw Hill 2nd edition.
2. S. Park Chan, *Fundamentals Engineering Economics*, 2nd ., Prentice-Hall. (2008)
3. Stanley E. P., Samuel J. M., Jack R.M, Scot M.S, Margaret M. Sutton; (2008); *Project Management : Planning, Scheduling, and Controlling Projects,* John Wiley & Sons Inc. USA
4. Lock, D. "Project Management"Burlington, Gower Publishing Limited, 2007
5. Klopenborg, T.J. "Project Management: A Contemporary Approach" South-Western Cengage Learning, 2009

PAT 253/3
GEOTECHNIC

COURSE SYNOPSIS

This course provides further discussion and explanation related to soil engineering. The topics cover in this course includes site investigation, bearing capacity and design of shallow foundation and pile foundation, lateral earth pressure, and slope stability. At the end of the course, students should be able to apply theory and practical to solve problem related to geotechnical engineering.

COURSE OUTCOMES

1. Ability to discuss issues in geotechnical engineering and explain site investigation methods.
2. Ability to analyze soil bearing capacity and design for shallow foundations and pile foundations.
3. Ability to analyze active and passive pressure according to Rankine's and Coulomb's theories.
4. Ability to analyze the stability of the slope in term of factor of safety.

LABS

1. JKR / McKintosh Probe Test
2. One dimensional Consolidation test
3. Triaxial test
4. Direct shear test

REFERENCES

1. Das, B.M. 'Principles of Geotechnical Engineering', Thomson, 2007.
2. Das, B.M. 'Principles of Foundation Engineering', Thomson, 2004.
3. Handy, R.L. 'Geotechnical Engineering, Soil and Foundation Principles and Practise', Mc Graw Hill, Fifth Edition, 2007.
4. Gofar, N. & Kassim, K.A., 'Introduction to Geotechnical Engineering', Prentice Hall, 2007.
5. Budhu, M., 'Soil Mechanics and Foundations', John & Wiley, 2nd Edition, 2007.

PAT 254/3
CONSTRUCTION VALUE ESTIMATION

COURSE SYNOPSIS

This course involve with quantity survey which is an important part in construction field. In this course student will be taught on the method used in estimating cost for construction material and how to evaluate construction cost based on Standard Method of Measurement issued by Public Work Department (JKR).

COURSE OUTCOMES

1. Ability to explain fundamental concept of quantity surveying
2. Ability to classify type and method in quantity surveying work
3. Ability to estimate value construction based on Standard Method of measurement issued by Public Work Department (JKR)

REFERENCES

1. Kavanagh, B.F. and S.J. Glenn Bird. 1992. Surveying : Principles and Applications. 3rd. Edition. New Jersey: Prentice Hall.
2. Kennedy, M. 1996. The Global Positioning System and GIS: An Introduction. New York: Ann Abor Press Inc.
3. McCormac, J.C. 1991. Surveying : Fundamentals. 2nd. Edition. New Jersey: Prentice Hall.
4. Ahamd Abdullah. Anggaran kos bangunan, 2nd edition, Pearson Prentice hall 2011

5. Edition, Peurifoy, R.L. and Oberlander, G.D. Estimating Construction Cost, 5th Edition Mc Graw Hill (2002)

PAT 255/3
BUILDING SERVICES II

COURSE SYNOPSIS

To highlight the importance of information and all building facilities such communication systems, electrical distribution system, building automation systems and public addressing systems in modern buildings. To summarize the understanding on mechanical services in building and ability to explains the operations and functionality of each service.Both services need to understand in a manner that considering energy efficiency spirit throughout building life cycles.

COURSE OUTCOMES

1. Ability to understand the electrical distribution systems in modern buildings and problems related to design, operation and maintenance.
2. Ability to discuss, appreciates, and summarizes majority existing definitions of buildings terminologies and explains towards sustainability in building.

REFERENCES

1. David, V Chadderton" Building Services Engineering:4th Ed" Taylor & Francis, 2004
2. Fred hall, 2012, Building Services Handbook, Routledge, 2012

PAT 256/3
MANAGEMENT OF OCCUPATIONAL SAFETY AND HEALTH

COURSE SYNOPSIS

Students will be exposed to Malaysian related laws and regulations on occupational safety and health (e.g. OSHA 1994) and environment (e.g. EQA 1974) and how to interpret the requirements stipulated under these documents. This course will also provide students the necessary information in identifying hazards, assessment and managing the risks that may be harmful to humans in the workplace.

COURSE OUTCOMES

1. Ability to explain the legal requirement of occupational safety and health laws and regulations. And OUTLINE OSH management system in managing the hazards and risks in the work place.
2. Ability to study the occupational hazards and evaluate associated risks at the work place
3. Ability to identify effective remedial or mitigation measures to control the hazards and risks at workplace. .
4. Ability to practice and perform - OSH management system, OSH laws, HIRARC in construction safety.

REFERENCES

1. Goetsch, D.L. (2010) Occupational Safety and Health for Technologist, Engineers and Managers, 7th. Ed. Pearson Prentice Hall.
2. Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders, 2007 (amended at 5th April), International Law Book Services, Malaysia.
3. Environmental Quality Act & Regulations, 2006 (amended up to April), MDC Publishers Sdn. Bhd., Malaysia.
4. Hughes P. and Ferrett E. (2010) Introduction to International Health and Safety at Work. Butterworth-Heinemann, Amsterdam.
5. Brauer R.L. (2006) Safety and Health for Engineers, 2nd Ed, Wiley, New Jersey.
6. Asfahl C.R. and David W. Rieske D. W. (2010) Industrial Safety and Health Management, 6th Ed. Pearson Prentice Hall.

PAT 301/3
STRUCTURAL DESIGN 1

COURSE SYNOPSIS

The course is designed to provide the student with a basic understanding of the behavior of reinforced concrete members and structures; to provide a basic understanding of standards methods of analysis and design of reinforced concrete building. This course covers the design load, design member, reinforced concrete design, foundation and retaining walls. The basic design of steel structures. Stretching member, column and beams. Properties and structural steel members.

COURSE OUTCOMES

1. Ability to identify physical properties of concrete materials; defined concrete proportions and testing; justify selection of concrete materials and mix proportion.
2. Ability to design concrete structures based on the British Standard BS 8110
3. Ability to describe basic concept of steel members, connections and structures behavior.
4. Ability to design steel structures elements based on the British Standard BS 5950

LIST OF EXPERIMENTS

Lab 1: Properties of cement
Lab 2: Properties of aggregate
Lab 3: Concrete mix design and test on wet concrete
Lab 4: Reinforcement properties
Lab 5: Concrete properties

REFERENCES

1. BS5950: Part 1: 1990. Structural Use Steelwork in Building
2. BS8110: Part 1: 1997. Structural Use of Concrete-Code of Practice for Design and Construction
3. Chanakya, A. (1994). "Design of Structural Elements: Conrete, Steelwork, Masonary, ad Timber Design to Britishh Standards & Eurocods". London: E & FN Spon
4. Jack C.McCormac, James K. Nelson, "Design of Reinforced Concrete", Sixth Edition, John Wiley & Sons, Inc. 2005
5. William T. Segui,"Steel Design", 4th Edition, Thomson, 2007

PAT 302/3
CONSTRUCTION TECHNOLOGY 1

COURSE SYNOPSIS

Construction Technology I is an instructional program that prepares an individual for employment or continued education in the occupations of Carpentry, Electrical Wiring, Masonry, or Plumbing. It is a basic course teaching fundamentals of safety, tools, math, and basic carpentry, electrical, masonry, and plumbing skills.

COURSE OUTCOMES

1. Explain safety practices and procedures
2. Ability to identify use of tools and equipment and estimate materials from blueprints
3. Ability to explain about carpentry and electrical wiring tools and the scope of work
4. Ability to explain about masonry and plumbing tools and the scope of work

REFERENCES

1. Roy Chudley and Roger Greeno(2005), Construction Technology.
2. Eric Fleming (2005), Construction Technology: An Illustrated Introduction.
3. M. Y. L. Chew, Construction technology for tall buildings, 4th revised ed. World Scientific Publishing, 2012.
4. Michael T. Kubal, Construction waterproofing handbook 2nd ed. McGraw-Hill, 2008.
5. Michael Chew Yit Lin, Construction technology for tall buildings 2nd ed. World Scientific , 2001

PAT 303/3
HIGHWAY AND TRAFFIC TECHNOLOGY

COURSE SYNOPSIS

The course introduces the students with the basic and background of the traffic road and highway technology. The sub-topics discussed are characteristics of drivers, pedestrians, vehicles and road, fundamentals of traffic light, traffic flow, including volume, speed and density, traffic engineering studies, geometric design of road, two and multi-lanes highway. Students will be taught briefly on materials related to asphalt, bitumen and concrete, flexible and rigid pavements.

COURSE OUTCOMES

1. Ability to understand traffic flow fundamentals and relationship between volume, speed and density.
2. Ability to understand the transportation planning process, forecast travel demand and design highway drainage structures
3. Ability to discuss the flexible pavement includes the methods of pavement design
4. Ability to discuss the Rigid pavement includes the methods of pavement design

LIST OF EXPERIMENTS

1. Marshall Test
2. Penetration Test
3. Softening Point Test
4. Extraction of Bitumen from Bituminous Mixture
5. Sieve Analysis of Extracted Aggregate
6. Capacity of Unsignalised Intersections

REFERENCES

1. Principle of Highway Engineering and Traffic Analysis , Fred L. Mannering, Scott B. Washburn, Walter P. Kilareski, John Wiley & Son, 2009.
2. Traffic and Highway Engineering, Fourth Edition, Nicholas J. Garber and Lester A. Hoel, 2009 Cengage Learning
3. Traffic Engineering Design, Principles and Practice, Second edition, 2005, Elsevier Butterworth-Heinemann
4. AASHTO Guide For Design Of Pavement Structures, 1993, American Association Of State Highway And Transportation Officials
5. Arahan Teknik Jalan 5/85, Jabatan Kerja Raya, Manual Of Paveent Design



PAT 304/2
CONTRACT AND SITE ADMINISTRATION

COURSE SYNOPSIS

The administration of a project including award of the contract, progress claims, instructions, variations, rise and fall calculations, certificates, claims, cash flow and dispute resolution. Conditions of standard form of domestic and international building contract. Develop the company safety program and hazard communication program.

COURSE OUTCOMES

1. Ability to analyze and compare the major types of contracts commonly adopted in the construction industry.
2. Ability to prepare and analyze the use of various construction documents and the administrative process.
3. Ability to decide the construction documents provided by a construction manager including the practice of value engineering & constructability.
4. Ability to recommend the principles of quality and safety management systems.

REFERENCES

1. Sidney M. Levy (2007), "Project Management in Construction", 5th edition, McGraw Hill.
2. Michael O'Reilly (1999), "Civil Engineering Construction Contracts", 2nd edition, Thomas Telford.
3. John Murdoch & Will Hughes, Construction Contracts - Law and Management" Spon Press, Taylor & Francis Group.
4. Keith Collier, "Construction Contracts" Reston Publishing Company, Inc., Reston, Verginia.
5. Gould, Frederick E. & Joyce Nancy E., (2009), "Construction Project Management", 3rd ed., Pearson Education International.

PAT 308/3
FINANCIAL AND HUMAN RESOURCES MANAGEMENT

COURSE SYNOPSIS

This course aims to provide the students with knowledge on how to apply the financial management skills and economic techniques in evaluating the cost of overall project. The role of engineering economics is to assess the appropriateness of a given project, estimate its value, and justify it from a technologist standpoint. At the end of the course, students will be able to identify and discuss issues and challenges faced by engineers relating to financial management in the current economic scenarios. The syllabus comprises scope management including project authorization, scope definition, personnel control, human resources management and finalization. Cost management including project costing, resource planning, budgeting and controlling financial completion are also emphasized. In addition, this course will also expose students to the time management including activity sequencing, duration estimating, scheduling, progress control, monitoring and forecasting.

COURSE OUTCOMES

1. Ability to discuss and describe the general project management
2. Ability to describe three major components in project management (planning, execution and project evaluation)
3. Ability to use project planning and scheduling technique available in construction management
4. Ability to analyze the project cash flow requirements, project monitoring, and control

REFERENCES

1. O'Sullivan / Sheffin, (2001), Economics: Principles and Tools, Prentice Hall
2. R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, Engineers in Society, Mc Graw Hill 2nd edition.
3. S. Park Chan, Fundamentals Engineering Economics, 2nd ., Prentice-Hall. (2008)
4. Stanley E. P., Samuel J. M., Jack R.M, Scot M.S, Margaret M. Sutton, Project Management : Planning, Scheduling, and Controlling Projects, John Wiley & Sons Inc. USA, 2008
5. Rajitha S. Kumar, M. Sarngadharan, Financial analysis for management decisions, PHI Learning, 2011

PAT 309/3
BUILDING SURVEY

COURSE SYNOPSIS

The subject is to provide a structural survey, equipment required and information required for surveying of building on site. This include recording of data, preparation and presentation of reports, and legal obligations of a Building Surveyor. The subject is designed to provide to a rigorous training to students with professional recognition in the specific field of Building Surveying. The professional Building Surveyor will play the major role as consultants in planning for maintenance of public and privately owned buildings to optimise their uses, safety and value thus, safeguarding the interest of the owners and the public.

COURSE OUTCOMES

1. Ability to understand and identify structural survey, equipment and information required.
2. Ability to compare, discuss, and identify type of survey on site, method uses, recording data, preparation and presentation of reports and legal obligation of a Build
3. Ability to identify and evaluate and understand the identification of cause and defect in building structures, finishes and services and remedial action temporary supporting works. ing Suryevor.

REFERENCES

1. Tomlinson, T. A. "Foundation Design and Construction" 5th edition, Longman 1986
2. Marshall, D., Worthing, D., Heath, R. "Understanding Housing Defects" 3rd edition, Estates Gazette, 2009.
3. Glover, P. "Building Surveys"7th Edition. Routledge, 2008.
4. Birchall, S., Ramus, J., Griffiths, P. "Contract Practice for Surveyors". 4th Edition. Routledge, 2006.
5. Buchan, R. D., Fleming, F. W., Grant, F. "Estimating for Builders and Surveyors" 2nd Edition. Routledge, 2003.

PAT 351/3
STRUCTURAL DESIGN 2

COURSE SYNOPSIS

The aim of this course is to introduce students to the fundamental principles about the structural behaviour and design criteria of Prestressed Concrete Structures and Timber Design. This course delivers knowledge and understanding of the principles of prestressed concrete, pertaining to both its analysis and design aspects. This course also introduces students to timber and masonry as structural member. Student will be able to design timber joint using nail and other mechanical fasteners, design unreinforced and reinforced masonry structural elements and structures.

COURSE OUTCOMES

1. Ability to identify the key aspects of design and material requirements for prestressed concrete.
2. Ability to apply code requirements on the design of prestressed concrete and gain knowledge on factors considered in design.
3. Ability to describe basic concept of timber members, connections and structures behavior.
4. Ability to design timber structures elements.

REFERENCES

1. Mosley,W.H., Bungey, J.H. and Hulse, R. 1999. Reinforced Concrete Design. London : Palgrave.
2. Kong, F.C. and Evans, R.H. 1998. Reinforced and Prestressed Concrete. London. Spon Press.
3. Desch, H.E.," Timber, Its Structure, Properties and Utilisation," Mac Millan Press. (Latest Edition)
4. Lin, T.Y., Vennard, J., Burns, N.H. and Burns, N.D. 1981. Design of Prestressed Concrete Structures. John Wiley & Sons.
5. Mat Lazim Zakaria, "Rekabentuk Struktur Kayu Menurut MS544", Dewan Bahasa dan Pustaka

PAT 353/3
ENVIRONMENTAL MANAGEMENT

COURSE SYNOPSIS

This course focuses on principal elements of environmental management, including Environmental Management System (EMS) and ISO 14000. Other important parts that will be taught are Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP). Both portions deal with the utilization of a common resource that is environment, and complied with the regulations and guidelines of Department of Environment for the project activity. Students will be also introduced to the measurement & calibration systems in environmental management, and learn the quantitative risk assessment.

COURSE OUTCOMES

1. Ability to describe the requirements in implementing an ISO 14001, as well as EMS costing and audits
2. Ability to describe and outline the EIA process & methods in Malaysia
3. Ability to identify and describe the measuring instruments and calibration systems in environmental management
4. Ability to identify and explain the quantitative risk assessment

REFERENCES

1. Morris, A.S. (2003) ISO 14000 Environmental Management Standards Engineering and Financial Aspects. New York, John Wiley & Sons
2. Aminatuzuhariah Megat Abdullah (2007) Introduction to Environmental Management, UTM Publisher.



3. Sheldon, C. and Yoxon, M. (2006) Environmental Management Systems: A Step-by-Step Guide to Implementation and Maintenance. Sterling, VA, Earthscan, 3rd Ed.
4. Fundamentals of Environmental Management / Steven L. Erickson, Brian J. King. Environmental Management, Wiley Publication, 1999.
5. Environmental Management and Engineering / editors, Ahmad Farhan Mohd.Sadullah,T. W. Sam, Penerbit Universiti Sains Malaysia , 2004
6. Barrow, Christopher J. Environmental management for sustainable development 2nd ed. Routledge Publication, 2006.

PAT 352/3
CONSTRUCTION TECHNOLOGY 2

COURSE SYNOPSIS

Construction Technology II is an instructional program that prepares an individual for employment or continued education in the occupation of Carpentry. Construction Technology II is a continuation of Construction Technology 1 and provides advanced instruction and practical applications in the Carpentry area.

COURSE OUTCOMES

1. Explain the history of trade and apprentice program
2. Explain floor system and building materials.
3. Ability to explain about carpentry and electrical wiring tools and the scope of work in advanced.
4. Ability to explain about masonry and plumbing tools and the scope of work in advanced.

REFERENCES

1. Roy Chudley and Roger Greeno(2005), Construction Technology.
2. Eric Fleming (2005), Construction Technology: An Illustrated Introduction.
3. M. Y. L. Chew, Construction technology for tall buildings, 4th revised ed. World Scientific Publishing, 2012.
4. Michael T. Kubal, Construction waterproofing handbook 2nd ed. McGraw-Hill, 2008.
5. Michael Chew Yit Lin, Construction technology for tall buildings 2nd ed. World Scientific , 2001

PAT 358/3
CONSTRUCTION TECHNOLOGY OF HIGHWAY AND BRIDGE

COURSE SYNOPSIS

This course introduces the advance knowledge of highway technology including highway location, design and traffic system. Earthwork is also considered as sub-topics in this course apart from types of pavement, design, rehabilitation, culverts and drainage system. Course also covered the fundamental of bridge technology including conceptual of bridge design, superstructure, substructure, construction and maintenances of bridge.

COURSE OUTCOMES

1. Ability to understand the transportation development process and earthwork for highway constructions and design
2. Ability to explain and analyze flexible and rigid pavement design
3. Ability to discuss the fundamental of bridge and bridge superstructure
4. Ability to explain the bridge substructure, bridge construction and its maintenance aspect

REFERENCES

1. Roger L.Brockenbrough Kenneth J.Boedecker, Jr.," HIGHWAY ENGINEERING HANDBOOK", McGraw-Hill,2004.
2. Fred L. Mannering, Scott B. Washburn, Walter P. Kilareski "Principle Oh Highway Engineering and Traffic Analysis", John Wiley & Son, 2009.
3. C.A.O'Flaherty, "Transport Planning and Traffic Engineering", John Wiley & Son, 1997.
4. Ed. Wai-Fah Chen and Lian Duan, "Bridge Engineering Handbook", Boca Raton: CRC Press, 2000.
5. S. Ponnuswamy," Bridge Engineering", McGraw-Hill Education, 2008.

PAT 359/3
CONSTRUCTION RISK MANAGEMENT

COURSE SYNOPSIS

This course introduces the concepts and principles of risk management in construction industry. Students will be exposed to the risks management and how to manage the risks during construction process. This course also covered risk in development projects, risk analysis and identification, risk assessment and risk reduction in construction.

COURSE OUTCOMES

1. Ability to understand and describe the definition of risk management, objectives of risk management and risk management process.

2. Ability to explain and analyze risk in development projects including risk management, risk of damage to the project and risks to the people
3. Ability to discuss the risk assessment, risk analysis and risk identification.
4. Ability to explain the risk reduction in construction stage including strategic planning and risk transfer.

REFERENCES

1. Alias A., Hussin A.A., "Pengurusan Risiko Dalam Projek Pembinaan", Penerbit USM, 2002
2. Edward R. Fisk, Wayne D. Reynolds, "Construction Project Administration", Pearson Prentice-Hall, 2006
3. Carillion Services Limited. (2005). Defects in Buildings: Symptoms, Investigation, Diagnosis and Cure. The Statitionery Office Limited, Norwich.
4. Hilson, David, "Managing Risk in Projects", Ashgate Publishing Group, 2008
5. Roger Flanagan, George Norman,"Risk Management and Construction", Blackwell Science, 1993

PAT 401/3
INDUSTRIALIZED BUILDING SYSTEM CONSTRUCTION TECHNOLOGY

COURSE SYNOPSIS

This course is designed to expose students to the concepts of IBS which includes the advantages and disadvantages using IBS in Construction, Roadmap of IBS and the usage of IBS. It also highlighted the concept of Score Calculation and submission, Principal of Modular Coordination in IBS and concepts of buildibility. Joints and tolerances will also be discussed. Enhancement through mini project and hands-on project will be done to further strengthen their knowledge on subject matter.

COURSE OUTCOMES

1. Ability to classify the concept of IBS modern construction technology.
2. Ability to evaluate the Principle of Score calculation and its submissions.
3. Ability to decide Concept of Modular Coordination in IBS, Joints and Tolerances.
4. Ability to discusss precast concrete building element.

REFERENCES

1. Sarja. "Open and Industrialized Building". Taylor & Francis. 2010
2. Abraham Warzaski. "Industralised and Automated Building Systems: A Managerial Approach". Second Edition. Tylor & Francis Group. 2005.
3. Albert G. H. Dietz. "Industrialized Building Systems for Housing". The MIT Press. 1971.
4. Ram S. Gupta. "Principles of Structural Design: Wood, Steel, and Concrete". Taylor & Francis. 2010.
5. S.G.Bruggeling, G.F. Huyghe. "Prefabrication With Concrete". Taylor & Francis, 1991

PAT 402/3
CONSTRUCTION TECHNOLOGY INTEGRATED PROJECT

COURSE SYNOPSIS

In this course, student will work in group of five to solve a construction related project. This given project task is a capstone project. All the knowledge and practical skill like design, construction method, construction material, project management and so on, that they have gain from three years study in this program will be used in this course to accomplish the given project. At the end of the course, students, project proposal will be evaluate by experienced construction industry practitioner

COURSE OUTCOMES

1. Ability to work in group effectively to accomplish a design project
2. Ability to propose design with the best construction method and the most effective cost and management
3. Ability to use effective communication skill and professional ethic

REFERENCES

1. Kavanagh, B.F. and S.J. Glenn Bird. 1992. Surveying : Principles and Applications. 3rd. Edition. New Jersey: Prentice Hall.
2. Kennedy, M. 1996. The Global Positioning System and GIS: An Introduction. New York: Ann Abor Press Inc.
3. McCormac, J.C. 1991. Surveying : Fundamentals. 2nd. Edition. New Jersey: Prentice Hall.
4. Ahamd Abdullah. Anggaran kos bangunan, 2nd edition, Pearson Prentice hall 2011
5. Edition, Peurifoy, R.L. and Oberlander, G.D. Estimating Construction Cost, 5th Edition Mc Graw Hill (2002)

PAT 408/3
ADVANCED STRUCTURAL DESIGN

COURSE SYNOPSIS

This course is an extension of the structural design 1 and structural design 2. Student will be taught to design special civil engineering structures like water retaining structure, earth retaining structure, substructure and pre-stressed concrete structure. Since this course



is an elective course, students who have interest in structural design are encouraged to choose this subject.

COURSE OUTCOMES

1. Ability to design earth retaining structures
2. Ability to design water retaining structure
3. Ability to design substructure
4. Ability to design pre-stressed concrete structure

REFERENCES

1. Mosley, W. H., Bungey J.H. and Hulse R. (1999). Reinforced Concrete Design. 5th Edition. Palgrave
2. Chu-Kia W. and Salmon C.G. (2002). Reinforced Concrete Design. 6th Edition. John Wiley and Sons.
3. Sinha S.N. (2002). Reinforced Concrete Design. 2nd Edition. McGraw-Hill
4. McCormac J.C. and Nelson J.K. (2005). Design of Reinforced Concrete. 6th Edition. John Wley and Sons
5. Allen A.H. (1988). Reinforced Concerete Design to BS 8110: Simply Explained. Spon Press

PAT 409/3
CONSTRUCTION TECHNOLOGY OF HIGHRISE BUILDING

COURSE SYNOPSIS

This course is an introduction to the construction technology used to build highrise building. Besides that, this course also will touch on the best and new practices being used during construction to protect public and to mitigate overhead hazard. Analysis of highrise building also will be taught in this course.

COURSE OUTCOMESs

1. Ability to determine type and function of each construction technology used to build highrise building
2. Ability to comprehend type and function of highrise building systems
3. Ability to identify and mitigate hazard during highrise construction
4. Ability to carry out structure analysis on the highrise building

REFERENCES

1. Irwin A. W., "Design of shear walls buildings", CIRIA Report No. 102, London, 1984.
2. Smith B S., "Analysis of tall concrete buildings".
3. A K Marsono, "Tall Building System : Analysis and Design", 2009.
4. OVE ARUP AND PARTNERS, "Design of deep beam", CIRIA Report No. 42, London, 1987.
5. Kozak J, " Steel concrete structure for multi storey building".

PAT 354/4
FINAL YEAR PROJECT I

COURSE SYNOPSIS

This is an individual research project in connection with a special engineering problem and under the guidance of an academic staff. The project undertaken may fall under one of the following areas: Mathematical analysis, experimental tests, computer simulation, hardware and/ software development, to their field of interest. At the end of the project, each student prepares an engineering report, presents and demonstrates findings and results of the project work.

COURSE OUTCOMES

1. Ability to modulate and utilize academic knowledge and practical experience in conducting an academic project.
2. Ability to think objectively, analytically and critically in identifying and solving problem in systematic manner. Ability to create innovative/ commercialization
3. Ability to work independently in conducting and completing an academic project.
4. Ability to present the proposal and final product orally and graphically.

REFERENCES

1. Donald H. McBurney and Teresa L. White, (2007). Research Methods, 7th Edition, Thompson Wadsworth.
2. Daniel Holtom&Elizaberth Fisher, (1999). Enjoy Writing Your Science Thesis or Disertation, Imperial College Press.
3. Leo Finkelstein, Jr., (2008). Pocket Book of Technical Writing for Engineers and Scientist. 3rd Edition, McGraw Hill.
4. Kirkman, J. "Good Style: Writing for Sciences and Technology" E&FN Spon, 1992
5. Beer, D.F. and McMurrey, D."A Guide to Writing as an Engineer". 3rd Edition, John Willey and Sons, 2009

PAT 454/6
FINAL YEAR PROJECT II

COURSE SYNOPSIS

This subject is the continuity of Final Year Project I. In this subjects students will conduct experimental tasks which has been planned during the Final Year Project I. Students also will completing their thesis report during this subject. In this subject, students will be also exposed to journal writing.

COURSE OUTCOMES

1. Ability to CONCLUDE the data of analyses and findings for the research project based on research objectives and research problems during presentation session.
2. Ability to EXECUTE the research project with disciplines, standard procedures and protocols.
3. Ability to APPLY outcome of the research project towards sustainability in terms of economic, social, technology and environmental impacts in the FYP thesis, during presentation session and quiz.
4. Ability to OUTLINE the significance of research project in terms of commercialization value in the FYP Thesis and during presentation session.
5. Ability to WRITE UP research project report and short article at the end of the course.

REFERENCES

1. Donald H. McBurney and Teresa L. White, (2007). Research Methods, 7th Edition, Thompson Wadsworth.
2. Daniel Holtom&Elizaberth Fisher, (1999). Enjoy Writing Your Science Thesis or Disertation, Imperial College Press.
3. Leo Finkelstein, Jr., (2008). Pocket Book of Technical Writing for Engineers and Scientist. 3rd Edition, McGraw Hill.
4. Kirkman, J. "Good Style: Writing for Sciences and Technology" E&FN Spon, 1992
5. Beer, D.F. and McMurrey, D."A Guide to Writing as an Engineer". 3rd Edition, John Willey and Sons, 2009



BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS) (INDUSTRIAL CHEMICAL PROCESS) - RY20

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of **chemical engineering** as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to define and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.

CURRICULUM STRUCTURE FOR BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS) (INDUSTRIAL CHEMICAL PROCESS) - RY20

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (99) & Elective (9)	PCT 111/3 Engineering Skills	PTT 156/4 Principles of Chemical Process	PTT 251/3 Thermodynamics for chemical engineering	PTT 254/3 Mass Transfer for chemical engineering	PTT 355/3 Process Control & Dynamics	PTT 353/3 Final Year Project I	PTT 451/5 Final Year Project II	INDUSTRIAL TRAINING (LI) PIT XXX
	PLT 121/3 Electrical Technology	PTT 154/2 Introduction to Process Instrumentations	PTT 252/3 Fluid Mechanics	PTT 255/3 Reaction Engineering	PTT 356/3 Separation Engineering	PTT 351/2 Safety & Loss Prevention	PTT 452/3 Plant Design Project 2	
	PTT 152/2 Physical Chemistry	PTT 155/3 Organic Chemistry	PTT 253/3 Heat Transfer for chemical engineering	PTT 260/3 Bioresource Processing Technology	PTT 352/3 Environmental Engineering	PTT 354/3 Plant Design Project 1	PTT 458/2 Quality Assurance & Control in Chemical Engineering	
	PTT 153/3 Materials Engineering	PTT 158/3 Analytical Chemistry	PTT259/3 Oleochemical Process & Products	PTT 261/2 Plant Utilities	PTT 365/3 Petroleum & Gas Processing Technology	PTT 366/3 Polymer Processing Technology	PTT 459/3 Particle Processing Technology	
	PTT 157/2 Engineering Graphics for Chemical Engineering			PTT 262/3 Renewable energy				
					Elective 1/3	Elective 2/3	Elective 3/3	
Common Core (15)	PQT 111/3 Mathematics for Engineering	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III			PTT 333/3 Engineering Technology Management	PTT 444/3 Engineering Technologist in Society	
University Required (19)		UUT 122/2 Skills & Technology in Communication						
	UVW 410/2 University Malay Language	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UUW 224/2 Engineering Entrepreneurship	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies	UUW 322/2 Thinking Skills			
	*UVA 111/2 Foundation English	**UVW 211/2 English for General Purposes		XXX/2 Option Subjects				
	UZW 1XX/1 Co-Curricular Activity	UZW 1XX/1 Co-Curricular Activity	UZW 1XX/1 Co-Curricular Activity	UVW 312/2 English for Technical Communication				
Total Credit	19	20	18	20	17	17	19	12

Total Units for Graduation =142

ELECTIVE 1:	ELECTIVE 2:	ELECTIVE 3:
A. PTT 367/3 Industrial Electrochemistry B. PTT 361/3 Scale up and Optimization	A. PTT 363/3 Pharmaceutical Processing Technology B. PTT 364/3 Advanced Membrane Technology & Application	A. PTT 454/3 Introduction to Biochemistry B. PTT 457/3 Food Processing Technology

*Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW 211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW 312 English for Technical Communication



LIST OF COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS)
(INDUSTRIAL CHEMICAL PROCESS)

- **PLT 121/3 ELECTRICAL TECHNOLOGY**
- **PTT 152/2 PHYSICAL CHEMISTRY**
- **PTT 153/3 MATERIALS ENGINEERING**
- **PTT 154/2 INTRODUCTION TO PROCESS INSTRUMENTATIONS**
- **PTT 155/3 ORGANIC CHEMISTRY**
- **PTT 156/4 PRINCIPLES OF CHEMICAL PROCESS**
- **PTT 157/2 ENGINEERING GRAPHICS FOR CHEMICAL ENGINEERING**
- **PTT 158/3 ANALYTICAL CHEMISTRY**
- **PTT 251/3 THERMODYNAMICS FOR CHEMICAL ENGINEERING**
- **PTT 252/3 FLUID MECHANICS**
- **PTT 253/3 HEAT TRANSFER FOR CHEMICAL ENGINEERING**
- **PTT 254/3 MASS TRANSFER FOR CHEMICAL ENGINEERING**
- **PTT 255/4 REACTION ENGINEERING**
- **PTT 259/3 OLEOCHEMICAL PROCESS & PRODUCTS**
- **PTT 260/3 BIORESOURCE PROCESSING TECHNOLOGY**
- **PTT 262/3 RENEWABLE ENERGY**
- **PTT 261/2 PLANT UTILITIES**
- **PTT 351/2 SAFETY & LOSS PREVENTION**
- **PTT 352/3 ENVIRONMENTAL ENGINEERING**
- **PTT 353/3 FINAL YEAR PROJECT 1**
- **PTT 354/3 PLANT DESIGN PROJECT 1**
- **PTT 355/3 PROCESS CONTROL & DYNAMICS**
- **PTT 356/3 SEPARATION ENGINEERING**
- **PTT 365/3 PETROLEUM & GAS PROCESSING TECHNOLOGY**
- **PTT 366/3 POLYMER PROCESSING TECHNOLOGY**
- **PTT 451/5 FINAL YEAR PROJECT 2**
- **PTT 452/3 PLANT DESIGN PROJECT 2**
- **PTT 458/2 QUALITY ASSURANCE & CONTROL IN CHEMICAL ENGINEERING**
- **PTT 459/3 PARTICLE PROCESSING TECHNOLOGY**

COURSE SYLLABUS

PLT 121/3
ELECTRICAL TECHNOLOGY

COURSE SYNOPSIS

This course is offered to non-electrical engineering background. This course introduces the basic electrical circuit theory, DC and AC circuits, basic principles of 3-phase AC circuits and magnetic circuits. This course also covers the fundamental of electronic components such as semiconductors, diodes and transistors. The laboratory sessions cover the concepts being discussed in lectures.

COURSE OUTCOMES

1. Ability to demonstrate the application of the principle elements of DC and AC circuits, principles of electricity including Kirchhoff's of currents and voltage.
2. Ability to explain parameters of theree phase AC system for Wye and Delta connection, and also the basic concepts of electronic components.
3. Ability to explain the basic concept of magnetism and electromagnetism and its application in DC and AC machines.

REFERENCES

1. Bird, J. Electrical Circuit Theory and Technology. 4th Edition. Elcevier. 2010.
2. Boylestad, R. Introductory CircuitAnalysis. 12th Edition. Pearson. 2010.
3. Bishop, O. Electronic Circuits and Systems. 3rd Edition. Elsevier. 2010.
4. Donald, C. Standard Handbook of Electronic Engineering. McGraw-Hill professional. 2004.
5. Gustafson, R.J and Morgan, M.T, 2004. Fundamentals of Electricity for Agriculture. 3rd Edition. ASAE.

PTT 152/2
PHYSICAL CHEMISTRY

COURSE SYNOPSIS

The course discusses the concept of equilibrium in terms of thermodynamics, particularly enthalphy and entrophy. The course also covers the calculations of material equilibrium, reaction equilibrium, reaction kinetics, phase diagrams and equilibrium electrochemistry.

COURSE OUTCOMES

1. Ability to apply the basic concepts, laws and principles in physical chemistry.
2. Ability to calculate problems concerning material equilibrium, standard thermodynamic function and reaction equilibrium in ideal gas mixture.
3. Ability to analyze problems concerning chemical kinetics, phase diagrams and electrochemistry.

REFERENCES

1. Levine, I. N. (2009). *Physical Chemistry, 6th Edition*, McGraw Hill: New York.
2. Atkins, P. and de Paula, J. (2010). *Physical Chemistry, 9th Edition*, Oxford University Press: United Kingdom.
3. Thomas, E and Reid, P. (2010). *Physical Chemistry, 2nd Edition*, Pearson Prentice Hall.
4. Bahl, B.S., Bahl, A., and Tuli, G.D. (2006). *Essentials of Physical Chemistry*. S. Chand: New Delhi.
5. Engel, T., Reid, P., and Drobny, G. (2007). Physical Chemistry for the Life Sciences, 1st Edition, Prentice Hall.

PTT 153/3
MATERIALS ENGINEERING

COURSE SYNOPSIS

This course covers introduction to material science and engineering which emphasizes on material properties and structures. The course encompasses the fundamental of material structure, class of material properties, and measurement of the properties. The common micro-structural characteristics of different material classes as well as some features of biomaterials also embedded in the course.

COURSE OUTCOMES

1. Abilty to describe types of material families, material structures, and material characteristics.
2. Ability to demonstrate the behavior of structural materials, the phases in material and material reliability.
3. Ability to analyze the suitability of material in engineering-related projects.

REFERENCES

1. Smith, W.F. and Hashemi, J. (2011). Foundations of Materials Science and Engineering, 5th Edition, McGrawhill.
2. Askeland, D.R., Fulay, P.P., Wright, W.J. (2010). The Science and Engineering of Materials, 6th Edition, Cengage Learning.
3. Ashby, M., Shercliff, H. and Cebon, D., A., (2007). Materials: engineering, science, processing, and design, Elsevier.
4. Ashby, M. and Jones, D.R.H. (2006). Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann.



5. Sharma, C.P. (2004). Engineering material properties and applications of metal and alloys, Prentice Hall, New Delhi.

PTT 154/2
INTRODUCTION TO PROCESS INSTRUMENTATION

COURSE SYNOPSIS

The course begins with an introduction to process instruments involved in the process industries, followed by introduction to fundamentals of industrial valves which consists of many type of valves. This is complemented with the ability to employ and analyse the ISA (The Instrumentation Systems and Automation Society) symbology and tagging systems. This course also discusses the design and development of the process flow diagram as well as the piping and instrumentation diagram of a simple and complex system.

COURSE OUTCOMES

1. Ability to interpret the operational aspects of different types of valves.
2. Ability to apply the appropriate ISA Symbology for the process flow diagram (PFD) and sketch the process flow diagram.
3. Ability to differentiate appropriate ISA Symbology for Piping & Instrumentation Diagram (P & ID).

REFERENCES

1. Liptak, B.G. Process Control and Optimization. 4th Edition, CRC Press, Florida. (2005)
2. Smith, C.A and Corriprio, A. Principles and Practice of Automatic Process Control. 3rd Edition, John Wiley & Sons, New York, (2006).
3. McCabe, W.L., Smith, J.C and Harriot, P. Unit Operations of Chemical Engineering, 7th Edition. McGraw-Hill, New York, (2005).
4. Patience, G.S. Instrumentation Method and Instrumentation for Chemical Engineers. 1st Edition, Elsevier, Oxford, UK, (2013).
5. Towler, G. and Sinnot, R. Chemical Engineering Design: Principle, Practice and Economics of Plant and Process Design, 2nd Edition, Butterworth-Heinemann, Oxford, UK, (2013).
6. McAcinew, T. and Mulley,R. Control System Documentation: Applying Symbols and Identification, 2nd Edition, ISA Press, (2005).

PTT 155/2
ORGANIC CHEMISTRY

COURSE SYNOPSIS

This course introduces the fundamental theories of alkanes, alkenes and alkynes and their related reactions. Then, focusing on conformational analysis of alkanes and emphasizing on the nucleophilic substitution reaction of alkyl halides. The course also covers on physical and chemical properties as well as chemical reactions involving alcohol and ether, aldehyde and ketone, carboxylic acid and aromatic compound. The application of organic chemical process in chemical and biotechnological industry is discussed.

COURSE OUTCOMES

1. Ability to explain the chemical and physical properties of each functional group.
2. Ability to distinguish the chemical reaction and reaction mechanism of functional group.
3. Ability to analyze the knowledge of organic chemical process in biotechnology and chemical industries.

REFERENCES

1. Bruice P.Y. Organic Chemistry 7th Edition. Pearson Prentice Hall. 2014.
2. William H.B., Brent L.I., Eric V.A. and Christopher S.F. Organic Chemistry 7th Edition. Brooks/Cole, Changes Learing. Singapore. 2014.
3. Solomons T.W.G. and Fryhe C.B. Organic Chemistry. 10th Edition. John Wily and Son. Inc. 2011.
4. Smith J.G. Organic Chemistry. 4th Edition. McGraw Hill. New York. 2014.
5. Bruice P.Y. Essential Organic Chemistry. Pearson International. Prentice Hall. 2006.
6. John Macmurray. Organic Chemistry. 5th. Brooks/Cole. 2000.

PTT 156/4
PRINCIPLE OF CHEMICAL PROCESSES

COURSE SYNOPSIS

This course highlights the basic concept of chemical processes involving material and energy balances in various processing systems. Exposure on the fundamental of material and energy balances are emphasized through the knowledge of process types, process variables and evaluation of the different chemical systems involving single and multiple systems as well as the nonreactive and reactive processes.

COURSE OUTCOMES

1. Ability to apply knowledge of engineering fundamentals to define chemical process methodologies and solve the basic calculations in chemical process engineering.

2. Ability to analyze information broadly and calculate material balances in chemical systems theoretically and practically using appropriate tools and techniques.
3. Ability to calculate energy balances of chemical processes and analyze the combination of material and energy balances for chemical systems theoretically and practically using appropriate tools and techniques.

REFERENCES

1. Felder, R.M and Rousseau, R.W. Elementary Principles of Chemical processes. 3rd ed. John Wiley & Sons, Inc. New York. 2005
2. Himmelblau, D.M., and Riggs, J.B. Basic Principles and Calculations in Chemical Engineering. Prentice Hall, New Mexico. 2004
3. Towler, G. and Sinnott, R. Chemical Engineering Design; Principles, Practice and Economics of Plant and Process Design, Elsevier Inc. Amsterdam. 2008
4. Hanyak Jr, M. E. Chemical Process Simulation. MEH, New York. 2012
5. Ghasem, N. Computer Method in Chemical Engineering. CRC Press, Florida. 2012
6. Denn, M. M. Chemical Engineering: An Introduction. Cambridge University Press, New York. 2012.

PTT 157/2
ENGINEERING GRAPHICS FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course introduces the techniques of engineering graphics to visualize, understand engineering drawings and to develop skill and accuracy in producing drawings. The application of computer graphics using AutoCAD software package is integrated part of the course.

COURSE OUTCOMES

1. Ability to use geometric construction, multiview, sectional view, 2D and 3D modelings in engineering drawings.
2. Ability to use dimensioning and tolerance in engineering drawings.
3. Ability to apply drawing techniques in engineering drawing.

REFERENCES

1. Finkelstein, E. and Ambrosius, L. AutoCAD 2015 and AutoCAD LT 2015 Bible. Indianapolis, Indiana: Wiley. 2014.
2. Bertoline R.G. and Wiebe N.E. Fundamentals of Graphics Communication. New York: McGraw Hill International. 2007.
3. Ibrahim Zeid. CAD/CAM Theory and Practice. New York: McGraw Hill International. 2010
4. James R. C. Chemical Process Equipment: Selection and Design. Texas: Gulf Professional Publishing. 2005
5. Calmettes J.M. Best of 3D Virtual Product Design. Singapore: Page One Publishing Pte. Ltd. 2005
6. Giesecke, F. E. Engineering Graphics. Upper Saddle River, NJ: Pearson/ Prentice Hall. 2004.

PTT 158/3
ANALYTICAL CHEMISTRY

COURSE SYNOPSIS

The first part of the course covers the basic principle of analytical chemistry which includes data analysis and its interpretation. The second part provides an introduction and application of classical analytical methods such as gravimetry and titrimetry as well as modern methods in analytical chemistry such as chromatographic and spectroscopic technique.

COURSE OUTCOMES

1. Ability to understand and apply the basic chemical concepts that are particularly important to analytical chemistry.
2. Ability to understand and apply basic principle of different analytical techniques and to calculate and solve analytical problems by intergrating different analytical techniques.
3. Ability to propose the use of different analytical techniques.

REFERENCES

1. Christian, G. D., Analytical Chemistry. 7th Edition. Wiley. USA., 2014.
2. Harris, Daniel C., Quantitative Analytical Chemistry. 8th Edition. W. H. Freeeman. USA., 2010.
3. Skoog. D. A., West, D. M., Holler, F. J., Fundamental of Analytical Chemistry. 9th Edition. Saunders College Publication. USA. 2013.
4. Harvey, D., Modern Analytical Chemistry. McGraw-Hill. USA., 2000.
5. Keeley, D. and Haines, P.J., Analytical Chemistry. Oxford:Bio Scientific. USA., 2002.
6. Khopkar, S. M., Basic concept of Analytical Chemistry. 3rd Edition. New Age International Publisher. USA., 2008

PTT 251/3
THERMODYNAMICS FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course introduces students to the basic thermodynamics for chemical engineering application and problem solving which covers first and second laws of thermodynamics. The course also highlights substances properties, mass and energy analysis, entropy, refrigeration



cycles as well as thermodynamic property relation and solution, and chemical and phase equilibrium.

COURSE OUTCOMES

1. Ability to apply the fundamentals properties and law of thermodynamics in engineering system.
2. Ability to analyze heat, work and energy of the system and thermodynamic property relations.
3. Ability to synthesize the theory of the solution of thermodynamics, gas mixtures and chemical and phase equilibrium.

REFERENCES

1. Cengel, Y.A. and Boles, M.A. Thermodynamics-An engineering Approach, 8th edition, McGraw-Hill, New York. 2014.
2. Koretsky, M.D. Engineering and Chemical Thermodynamics, John Wiley and Sons. 2014.
3. Smith, J.M., Van Ness, H.C., Abbott, M. M. Introduction to Chemical Engineering Thermodynamics, 7th Edition, McGraw – Hill, New York. 2005.
4. Narayanan, K.V. A Text Book of Chemical Engineering Thermodynamics, Prentice-Hall India. 2010.
5. Moran, M.J., Shapiro, H.N., Boettner, D.D. and Bailey, M.B. Principles of Engineering Thermodynamics, 7th Edition, John Wiley & Sons. 2011.
6. Rajput, R.K. Engineering Thermodynamics, 3rd Edition, Jones and Bartlett Learning. 2009.

PTT 252/3
FLUID MECHANICS

COURSE SYNOPSIS

This course emphasizes fundamental concepts and problem-solving techniques. It covers properties of fluid, pressure, mass, Bernoulli and energy equations, momentum analysis of flow system, dimensional analysis and modelling and fluid flows (internal flows, differential analysis of fluid flow, external flows and compressible flow)

COURSE OUTCOMES

1. Ability to classify fluid flows and analyze essential parameters describing them.
2. Ability to analyze pressures, forces and stability in fluid systems (closed and open systems) and the link between conserved quantities and the equations of fluid mechanics.
3. Ability to classify common devices for measuring pressure, flow rates and turbo macheneris

REFERENCES

1. Cengel, Y. A., and Cimbala, J. M. Fluid Mechanics: Fundamental and Applications, 3rd Edition, McGraw-Hill, 2014.
2. White, F.M. Fluid Mechanics (SI Units), 7th revised edition, McGraw-Hill, 2011.
3. Douglas, J.F., Gasiorek, J.M., Swaffield, J.A. and Jack, L. Fluid Mechanics, 6th revised edition, Pearson Education, 2011.
4. Munson, B.R., Okiishi, T.H. and Huebsch, W.W. Fluid Mechanics, 7th revised edition, John Wiley & Sons, 2013.
5. Munson, B.R., Young, D.F., Okiishi, T.H. and Huebsch, W.W. Fundamentals of Fluid Mechanics, 7th revised edition, John Wiley & Sons, 2012.
6. Crowe, C.T., Elger, D.F., Roberson, J.A and B.C. Williams, Engineering Fluid Mechanics, , 10th revised edition, John Wiley & Sons, 2012.

PTT 253/3
HEAT TRANSFER FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course emphasizes the fundamental concepts and problem-solving techniques related to heat transfer in process engineering. The fundamental theoretical concepts and mechanisms of conduction, convection and radiation of heat transfer and the design fundamentals of basic industrial heat exchangers are analyzed. The use of various equations to estimate total heat capacity and overall heat transfer coefficient, subsequently to be applied to calculate the duty of heat transfer equipment are also presented and discussed.

COURSE OUTCOMES

1. Ability to demonstrate the principles of conduction, convection, and radiation heat transfer.
2. Ability to analyze the problems related to heat transfer process.
3. Ability to analyze the heat exchanger systems related to industries.

REFERENCES

1. Holman J.P. Heat Transfer. 10th Edition, McGraw-Hill, New York., 2010.
2. Incropera F. P & De Witt D. P. Fundamentals of heat and mass transfer, 6th Edition, Wiley, New York., 2006.

3. Coulson J.M and Richardson J.F. Coulson and Richardson's Chemical Engineering Volume 1. 6th Edition, Elsevier., 2008.
4. McCabe W.L., Smith J.C and Harriot P. Unit Operations of Chemical Engineering, McGraw Hill, New York., 2005.
5. Geankoplis C.J. Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey., 2003.
6. Kreith F., Manglik R. M. and Bohn M. S. Principles of Heat Transfer, 7th Edition, Global Engineering, United States., 2011

PTT 254/3
MASS TRANSFER FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course emphasizes the fundamental concepts and problem-solving techniques on mass transfer operations and principles. This course provides the knowledge on mass transfer operations at basic to an intermediate level that covers with the theoretical and analytical background to solve the mass transfer operations problems. Topics to be covered include mass transfer mechanism which is diffusion, Ficks Law, Maxwell Law, and principles of absorption, evaporation and drying.

COURSE OUTCOMES

1. Ability to demonstrate the diffusion mass transfer principles.
2. Ability to calculate the mass transfer coefficient.
3. Ability to analyze mass transfer systems related to industry.

REFERENCES

1. Geankoplis, C.J., Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey, 2003.
2. Treybal, R.E., Mass Transfer Operations. McGraw Hill, USA, 2000.
3. McCabe, W.L., Smith, J. and Harriot, P., Unit Operation of Chemical Engineering. McGraw Hill International Edition, 6th Edition, 2001.
4. Seader, J.D. and Henley, E.J., Separation Process Principles. 2nd Edition, John Wiley & Sons, 2006.
5. Theodore, L. and Ricci, F. Mass Transfer Operations for the Practicing Engineer. Wiley-Interscience, 2010.
6. Benitez, J. Principles and Modern Applications of Mass Transfer Operations. Wiley-Interscience, 2nd Edition, 2011.

PTT 255/3
REACTION ENGINEERING

COURSE SYNOPSIS

This course highlights the principles of chemical reactions engineering involving knowledge exploitation of industrial scale reactor design. Fundamental concepts are emphasized through the knowledge of mole balance, conversion and reactor sizing as well as rate law and stoichiometry. Problem-solving techniques are also applied in solving various problem related to isothermal reactor design, collection and analysis of rate data, multiple reaction, catalysis and catalytic reaction mechanism.

COURSE OUTCOMES

1. Ability to demonstrate the principles of chemical reaction engineering design for industrial reactors.
2. Ability to analyze and solve various problem related to reactor design and reaction process.
3. Ability to classify catalyst and develop the catalytic reaction mechanism in a heterogeneous reaction.

REFERENCES

1. Fogler, H. S., Elements of Chemical Reaction Engineering. 6th Edition. Prentice Hall Inc. U.S., 2011.
2. Davis, M. E and Davis, R. J., Fundamentals of Chemical Reaction Engineering. 1st Edition. Mc Graw Hilll, U.S., 2002
3. Fogler, H. S., Essentials of Chemical Reaction Engineering. 1st Edition. Prentice Hall. U.S., 2010.
4. Doraiswamy, L.K and Deniz Uner, Chemical Reaction Engineering: Beyond the Fundamental. CRC Press, 2014.
5. Bruce Nauman, E., Chemical Reactor Design, Optimization and Scale up. 2nd Edition. John Wiley & Sons, 2008.
6. Levenspiel, O., Chemical Reaction Engineering. 3rd Edition. Wiley India Pvt Limited, 2006.

PTT 259/3
OLEOCHEMICAL PROCESS & PRODUCTS

COURSE SYNOPSIS

This course emphasize to the palm oil and oleochemical industries in Malaysia, processes involved in palm oil mills, palm oil refineries and any related process to production of oil from various plants. Besides that, this course also discusses the major oleochemical products in the industry, application of the products and formulation, the quality management and troubleshooting.



COURSE OUTCOMES

1. Ability to define and describe the oleochemical basic concept.
2. Ability to describe and explain the important processes in oleochemical industry.
3. Ability to describe and apply the oleochemical products and formulations.

REFERENCES

1. O'Brien, R.D. Fats and Oil Formulating and Processing for Application. CRC Press. 2003.
2. Shahidi, F. Bailey's Industrial Oil and Fat Products. 6th Edition. John Wiley & Sons Inc. 2005.
3. O'Brien, R.D. Farr, W.E. and Wan, P.J. Introduction to Fats and Oil Technology. 3rd Revised Edition. AOCS Press. 2008.
4. Gunstone, F.D. The Lipid Handbook. Blackwell Pub. 2004.
5. Erhan, S.Z. Industrial uses of Vegetable Oil. AOCS Press. 2005.

PTT 260/3
BIORESOURCE PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course aim to enrich students with the knowledge of bioresource utilization. The course include understanding the need and demand of bioresources industries by learning the types of bioresources, highlighting the important role of bioresources as raw material in industrial processing, knowledge on different types of bioresources processing technology, potential application of bioresources and challenges of bioresource in traditional chemical industry.

COURSE OUTCOMES

1. Ability to explain the need, principle and demand of bioresource industry as renewable resources
2. Ability to explain and distinguish the different types of bioresources processing technology
3. Ability to examine the application and environmental impact and economic factor of this renewable resource

REFERENCES

1. Abdul Khalil Shawkataly dan Rozman Hj. Din (2004). *Gentian dan Komposit Lignoselulosik*, Pulau Pinang: Penerbit Universiti Sains Malaysia.
2. Bowyer, J.L., Rubin Shmulsky, and Haygreen, J.G. (2007). *Forest Products and Wood Science: An Introduction*, Ames, Iowa: Blackwell Pub.
3. Rowell, R.M. (2005). *Handbook of Wood Chemistry and Wood Composites*, Boca Raton, Fla.: Taylor & Francis.
4. Daniel Gay, Suong V. Hoa (2007). *Composite Materials: Design and Applications*, Boca Raton, FL: CRC Press.
5. Ashok Pandey (2005). *Concise Encyclopedia of Bioresource Technology*, New Delhi: Viva Books.

PTT 261/2
PLANT UTILITIES

COURSE SYNOPSIS

This course covers the requirement of different utilities for the process plant, along with its generation and its effective utilization. Main utilities required for process plants are water, steam, air & refrigerants. Steam & non-steam heating media are important for conversion of raw material to products in reactors & to elevate the temperature in the chemical processes. Refrigeration is important to maintain the temperature in the process plant. Compressed air, process air is used in processes & instrument air is used in pneumatic devices & controls.

COURSE OUTCOMES

1. Ability to describe the process involved water in chemical plant
2. Ability to explain and distinguish the principles involved Steam & non-steam heating
3. Ability to explain and distinguish the principles involved air and refrigerant

REFERENCES

1. Industrial Chemistry by Shashi Chawla, Dhanpat Rai and Sons Publication
2. Plant Utilities by Dr. Mujawar, Nirali Prakashan Publication
3. Plant Economics by Peter Timmerhans, McGraw Hill
4. Heat Transfer by D.S. Kumar
5. Plant Utilities by D.B. Dhone, Nirali Prakshan Publication

PTT 262/3
RENEWABLE ENERGY

COURSE SYNOPSIS

This subject aims to introduce students to renewable energy resources, their technology application and environmental assessments. The course includes renewable energy sources such as solar, wind power, geothermal, hydro and biomass. More emphasis is given to bioenergy technologies to convert biomass into biofuels. The course has been designed to provide students with a knowledge of the renewable energy sources and the engineering skills associated with them.

COURSE OUTCOMES

1. Ability to explain the principle and the environmental aspect of renewable energy.
2. Ability to explain and distinguish the different types of renewable energy resources.
3. Ability to evaluate and compare the biomass energy process in producing biofuels.

REFERENCES

1. John Twidell and Tony Weir, Renewable energy resources 3rd edition, New York, Taylor and Francis Group, 2015.
2. Vaughn Nelson, Introduction to Renewable Energy, New York,CRC Press, 2011.
3. John Andrews and Nick Jelley, Energy Science – Principles, Technologies, and Impacts, Oxford University Press, 2007.
4. J.F. Manwell, J.G. McGowan, and A.L. Rogers, Wind Energy Explained – Theory, design and application, John Wiley & Sons Ltd, 2002.
5. Robert Ehrlich, Renewable Energy:A First Course, CRC Press,2013.

PTT 351/2
SAFETY & LOSS PREVENTION

COURSE SYNOPSIS

The course emphasizes the technical fundamentals of process safety. Students are exposed to the issues in safety associated with toxicology, industrial hygiene, source and dispersion models. Students are then taught about characteristics and possible prevention steps of fires and explosions. Subsequently, they are also exposed to the concept and design of relief system, hazard identification as well as risk assessment. The course is concluded with the lesson in accident investigation.

COURSE OUTCOMES

1. Ability to analyze the type of hazards and dispersion models in chemical engineering processes.
2. Ability to recommend suitable methods to prevent fires and explosion and to design relief system for process vessels.
3. Ability to evaluate safety procedures and designs using proper hazard identification and accident investigation techniques.

REFERENCES

1. D.A. Crowl, J.F. Louvar, Chemical Process Safety; Fundamentals with Applications. Prentice Hall, Second Edition. New Jersey, 2002.
2. P.L. Frank, Loss and Prevention in the Process Industries. Volume 1&2, London, Butterworth, 1980.
3. J.M. Coulson, and J.F. Richardson, Chemical Engineering. Volume 6, Pergamon Press, Oxford, 1983.
4. R.E. Sanders, Chemical Process Safety; Leaning from Case Histories. Elsevier Butterworth, Heinemann, Third Edition. Amsterdam, 2005.
5. V. 7 Marshall, S. Ruheman, Fundementals of Process Safety. Rugby; ICehmE, UK., 2001.

PTT 352/3
ENVIRONMENTAL ENGINEERING

COURSE SYNOPSIS

This course introduces the cause, effect and method to control pollution from industries. The course covers the three major categories of industrial pollution; water pollution, air pollution and industrial waste management. In the first part, the course includes the source and types of water pollutants, environmental regulations pertaining to waste water discharge, and techniques to treat waste water before discharging to the environment. The second part of the course covers the source and effect of air pollution, regulations requirement for air pollution control, and technology to control air pollution emissions from industries. The third part covers the management of industrial waste that includes definition of scheduled waste, scheduled waste regulations, and techniques to manage the waste.

COURSE OUTCOMES

1. Ability to analyze legislative act for waste management in industry.
2. Ability to analyze types of pollution emission from industries and effect of industrial pollution to the environment and public health.
3. Ability to propose air pollution control and wastewater treatment system.

REFERENCES

1. Davis, M.L., and Cornwell, D.A., Introduction to Environmental Engineering, McGraw Hill, 4th Edition, 2008.
2. Viessman, W. Jr., Hammer, M.J., Perez, E. M., and Chadik, P. A., Water Supply and Pollution Control, Pearson, 2009.
3. Gerard Kiely, Environmental Engineering, McGraw Hill, 1998.
4. Environmental Quality Act 1974. iv. Peirce J J., Vesilind, P. A., and Weiner, R., Environmental Pollution and Control, 4th Edition, Butterworth-Heinemann, 1998.
5. Cornbitt, R. A., Environmental Engineering, 2nd Edition, McGraw Hill.

PTT 353/3
FINAL YEAR PROJECT 1

COURSE SYNOPSIS

This course consists of combination between guided supervision and independent study focusing on the technique of identification of problem statements, research objectives, conducting literature review and proposing research methodology. This course also covers scientific and technical guidance on thesis writing as well as preparation and submission of the project proposal. Presentation of the research proposal to the internal examiners is conducted.

COURSE OUTCOMES

1. Ability to analyze scientific information including standards, code of practice, journals, policies, field data, relevant to the specific research to be undertaken and relate with societal and global issues.
2. Ability to develop problem statements and research objectives of the project.
3. Ability to plan research methodology incorporating clear fundamentals, theories and benchmarked against standard practices governing the research project.
4. Ability to prepare and defend research proposal with effective communication skills.

REFERENCES

1. Rowena, M. (2006). How to write a thesis. Open University Press. England.
2. Hoang, P. (2006). Springer Handbook of Engineering Statistic. Springer-Verlang, London.
3. Leo Finkelstein Jr., (2008). Pocket book of technical writing for engineers and scientists, third edition, Mc Graw-Hill international edition, Singapore.
4. A Guide To Student Final Year Project (2003). UniMAP.
5. Bailey, S. (2003). A practical guide for students. TJ International Ltd. USA.

PTT 354/3
PLANT DESIGN PROJECT 1

COURSE SYNOPSIS

This course introduces preliminary design of a process plant to the students. This includes process creation and analysis, selection and design for the principal equipment needed in a process based on the process structure approach. ASPEN PLUS will be implemented throughout the course in the process flow sheeting and equipment design.

COURSE OUTCOMES

1. Ability to create process flow sheets involving reactions, separations and other operations.
2. Ability to design unit operations in plant based on stoichiometry, thermodynamics, separation, reaction and other engineering principles.
3. Ability to develop the mass and energy balances of a major selection of the process plant.

REFERENCES

1. Sinnott, R.K., Chemical Engineering Design. Vol.6, 3rd Edition. Butterworth-Heinemann., 2012.
2. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S., Product and Process Design Principles: Synthesis, Analysis and Evaluation., 3rd Edition. John Wiley & Sons, New Jersey, 2010.
3. Green, D., Perry, R., Perry's Chemical Engineers' Handbook, McGraw Hill Professional., 2007.
4. Peters, M.S. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers. 5th Edition. McGraw-Hill, New York., 2002.
5. Richardson, J.F., Peacock, D.G., Chemical Engineering: Chemical & Biochemical Reactors & Process Control. Vol.3, 3rd ed. Butterworth-Heinemann., 2007.

PTT 355/3
PROCESS CONTROL & DYNAMICS

COURSE SYNOPSIS

The course aims to introduce the concept of process control by applying theoretical models of chemical processes for steady and unsteady-state models (dynamic model) of chemical processes. Topics to be covered such as dynamic behavior of processes including Laplace transform, transfer function models, dynamic behavior of first-order and second-order processes. Introduction to feedback control also will be learned in this course including feedback controllers, control system instrumentation, overview of control system design and dynamic behavior of closed-loop control system, PID controller design, tuning, and troubleshooting. The theories are supported by performing laboratory experiments.

COURSE OUTCOMES

1. Ability to analyze basic concepts of process control and theoretical model of chemical processes.
2. Ability to develop dynamic behavior of process control.
3. Ability to evaluate the feedback and feedforward control system for chemical processes.

REFERENCES

1. Seborg, D.E., Edgar, T.F., Mellicamp D.A. "Process Dynamic and Control" John-Wiley, 3rd Edition. (2011).
2. Riggs, J.B. "Chemical and Bioprocess Control" Pearson. (2006).
3. John Francis Richardson, John Metcalfe Coulson, Peacock D.G. "Coulson & Richardson's Chemical Engineering: Chemical & biochemical reactors & Process control"Elsevier. (2007).
4. Marlin, T. "Process Control: Designing Processes and Control System for Dynamic Performance " McGraw-Hill. (2006).
5. Coughonowr "Process system, Analysis and Control", 3rd edition, McGraw-Hill. (2008).

PTT 356/4
SEPARATION ENGINEERING

COURSE SYNOPSIS

This course emphasizes the theory and basic principles of separation processes based on equilibrium stage concepts and mass transfer rate control. This course provides the knowledge of basic design criteria required for binary and multi component separations processes. Topics to be covered include liquid-liquid extraction, vapour-liquid extraction (distillation), solid-fluid extraction (leaching, crystallization and adsorption), mechanical-physical separation process (filtration and centrifugation), and membrane separation technology.

COURSE OUTCOMES

1. Ability to apply principles and theory to examine basic design/operation of liquid-liquid extraction, leaching and crystallization equipment.
2. Ability to apply and calculate based on principles of mechanical-physical separation process and membrane separation process.
3. Ability to apply principles and theory to develop basic design/operation of adsorption tower, and distillation column.

REFERENCES

1. Seader, J.D., Henley, E. and Roper, D.K., Separation Process Principles: Chemical and Biochemical. 3rd Edition, Wiley, 2010.
2. Coulson, JM. and Richardson, J.F., Chemical Engineering Volume 2. 5th Edition, Elsevier-Science, 2002.
3. Geankoplis, C.J., Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey, 2003.
4. Wankat, P.C., Separation Process Engineering. 2nd Edition, Prentice Hall, New Jersey, 2006.
5. Green, D. and Perry, R., Perry's Chemical Engineers' Handbook. 8th Edition, McGraw-Hill Professional, 2007.

PTT 365/3
PETROLEUM & GAS PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course introduces the students to processes and technology involved in oil and gas production field. Topics covered include the history and background of refinery process, separation of produced fluids and treatment of crude oil. Apart from that, student will also be exposed to the field processing and treatment of natural gas as well as petroleum refinery process.

COURSE OUTCOMES

1. Ability to recognize and explain background, formation and production of oil and gas and explain the basic refinery process.
2. Ability to describe and compare the separation process of produced fluids and treatment process of crude oil and natural gas.
3. Ability to demonstrate understanding and distinguish process and technology involved to process products from each level of petroleum refining.

REFERENCES

1. Abdel Aal, H. K., Mohamed Aggour & Fahim, M. A. 2003. Petroleum & Gas Processing, Marcel Dekker.
2. Robert E. Maples. 2000. Petroleum Refinery Process Economics. 2nd Edition. Pennwell Corp.
3. Robert A. Meyers. 2004. Handbook of Petroleum Refining Processes. 3rd Edition. McGraw Hill.
4. Ozren Osic. 2005. Oil Refineries in the 21st Century. John Wiley.
5. William C. Lyons, Joseph Zaba. 1996. Standard Handbook of Petroleum and Natural Gas Engineering.

PTT 366/3
POLYMER PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course emphasis the fundamental of chemistry, structure and characterization of polymer. The properties of polymer



such as rheology, mechanical, thermal and others behavior are also included in this course. The course also covers the processing technology of the polymer which comprises of extrusion, mixing and injection molding. The course is concluded with the application and properties of polymer product which consists of failure and damage analysis of polymer.

COURSE OUTCOMES

1. Ability to analyze the chemistry, structure and characterization of polymer
2. Ability to analyze failure and damage pf polymer based on the properties of polymer
3. Ability to evaluate the processing methods of polymer

REFERENCES

1. J. R. Fried, Polymer Science & Technology; Prentice Hall, Second Edition. New Jersey, 2014
2. Z. Tadmor and C. G. Gogos, Principles of Polymer Processing, 2nd Edition, A John Wiley & Sons, Inc., 2006
3. T. A. Osswald and G. Menges, Material Science of Polymers for Engineers, 3rd Edition, Hanser, 1995.
4. R. Griskey, Polymer Process Engineering, Springer Science Business Media, B.V 1995.
5. A. Ram, Fundamentals of Polymer Engineering, New York: Plenum Press,1997

PTT 451/5
FINAL YEAR PROJECT II
(PRE-REQUISITE: PTT 353/3 FINAL YEAR PROJECT I)

COURSE SYNOPSIS

This course consists of combination between guided supervision and independent study focusing on the techniques of conducting laboratory and/or field experiments. This course also covers on the implementation of research activities and monitored based on research plan, data analysis, interpretation and conclusion. The students are required to write, submit and defend their thesis to the internal examiners.

COURSE OUTCOMES

1. Ability to plan activities pertaining to research project to meet the required research objectives and datelines.
2. Ability to assess techniques and modern tools to solve research problems.
3. Ability to evaluate experimental data and deduce good conclusion.
4. Ability to produce standard thesis and defend the findings.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition. England: Open University Press., 2011.
2. Hoang, P., Springer Handbook of Engineering Statistic. London: Springer-Verlang., 2006.
3. Bailey, S., A practical guide for students. USA: TJ International Ltd., 2003.
4. A Guide to Student Final Year Project. UniMAP, 2003.
5. San Francisco State University. Guidelines for the preparation and submission of theses and written creative works. San Francisco State University, 2003.

PTT 452/3
PLANT DESIGN PROJECT 2
(PRE-REQUISITE: PTT 354/3 PLANT DESIGN PROJECT 1)

COURSE SYNOPSIS

This course utilizes the knowledge gained by the student's in earlier courses and applies in the complete design a plant. The plant design includes cost estimation, profitability analysis, piping and instrumentation, plant control, waste management, plant safety, reliability and operability and plant layout. ASPEN PLUS will be implemented throughout the course in the process plant design.

COURSE OUTCOMES

1. Ability to create a piping and instrumentation diagram (P&ID) and identify potential control system of the designed project
2. Ability to recommend suitable safety and waste management.
3. Ability to evaluate economic profitability analysis of the designed project.

REFERENCES

1. Peters, M.S. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers. 5th Edition. McGraw-Hill, New York., 2004.
2. Sinnott, R.K., Chemical Engineering Design. Vol.6, 3rd Edition. Butterworth-Heinemann., 2012.
3. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S., Product and Process Design Principles: Synthesis, Analysis and Evaluation., 3rd Edition. John Wiley & Sons, New Jersey, 2010.
4. Green, D., Perry, R., Perry's Chemical Engineers' Handbook, McGraw Hill Professional., 2007.

5. Richardson, J.F., Peacock, D.G., Chemical Engineering: Chemical & Biochemical Reactors & Process Control. Vol.3, 3rd Edition. Butterworth-Heinemann., 2007.

PTT 458/2
QUALITY ASSURANCE & CONTROL IN CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course covers the principles of quality assurance and quality control that can be applied in related fields of chemical engineering. The course covers related process and standard commonly used in industry. The course also discuss on the statistical method and acceptance sampling as tool and techniques that broadly implemented in quality assurance and quality control.

COURSE OUTCOMES

1. Ability to examine and apply the principles for quality assurance, quality control and management improvement.
2. Ability to formulate the processes in quality assurance and quality control with statistical method.
3. Ability to evaluate the suitable sampling and testing procedure in quality assurance and quality control.

REFERENCES

1. Piotr Konieczka and Jacek Namieśnik, Quality Assurance and Quality Control in the Analytical Chemical Laboratory, CRC Press, 2009.
2. Wenclawiak, B.W., Koch, M., and Hadjicostas, E. (Eds). Quality Assurance in Analytical Chemistry, Training and teaching, Springer, Berlin Heidelberg, 2004.
3. Werner, F., Dammann, V., and Donnevert, G. Quality assurance in analytical chemistry: applications in environmental, food, and materials analysis, biotechnology, and medical engineering. 2nd Edition, Wiley, 2007.
4. Haider, S.I., and Asif, S.E. Quality Control Training Manual: Comprehensive Training Guide for API, Finished Pharmaceutical and Biotechnologies Laboratories, CRC Press, 2011.
5. American Society for Quality (ASQ). Quality assurance for the chemical and process industries, A Manual for Good Practices, 2nd Edition, ASQ Quality Press, 1999.

PTT 459/3
PARTICLE PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course emphasizes the fundamental concepts and problem-solving techniques on particle processing technology. This course covers many of the aspects related to particle processing and handling, including particle analysis, particle flow pattern, particle separation, storage and transporting of particles, mixing and segregation, particle size reduction and enlargement, as well as hazard of fine powders.

COURSE OUTCOMES

1. Ability to analyze the fundamental of the particles and particulate systems.
2. Ability to evaluate the mechanism and unit operation used for particle processing and handling.
3. Ability to develop a proficient use of mathematics and science skills in solving chemical engineering problems associated with particulate processes.

REFERENCES

1. Rhodes, M.J., Introduction to Particle Technology. 2nd Edition, Wiley, 2008.
2. Holdich, R.G., Fundamentals of Particle Technology. Midland Information Technology and Publishing, 2002.
3. McCabe, W.L., Smith, J. and Harriot, P., Unit Operation of Chemical Engineering. McGraw Hill International Edition, 6th Edition, 2001.
4. Teipei, U., Enegetic Materials: Particle Processing and Characterization. Wiley, 2004.
5. Coulson, J.M., Richardson, J.F., Chemical Engineering. Pergamon Press, 1999.

ELECTIVES SUBJECTS;
PTT 367/3
INDUSTRIAL ELECTROCHEMISTRY

COURSE SYNOPSIS

This subject aims to provide students with the fundamental concepts on electrochemistry and electrode processes. Examples of application of electrochemistry are also presented. This course will integrate the fundamental concepts with electrochemical applications such as electroplating, batteries, fuel cells, corrosion and electroanalysis.

COURSE OUTCOMES

1. Ability to demonstrate the importance of knowledge of electrochemistry
2. Ability to evaluate integrate the fundamental concepts with electrochemical applications such as electroplating, batteries, fuel cells, corrosion and electroanalysis.
3. Ability to design the application of most recent developments in electrochemical technology.

REFERENCES

1. Derek Pletcher and Frank C Walsh, "Industrial Electrochemistry", 2nd edition, Springer Netherlands, 2012.
2. Dell, R. M., Rand, D. A. J., Understanding Batteries Royal Society of Chemistry 2001
3. Ullmann's "Encyclopedia of Industrial Chemistry", John Wiley & Sons, Vol.6, pp: 399- 481, 2003.
4. C. Rajagopal and K. Vasu – conversion coatings, 1st Edn. Tata McGraw Hill, New Delhi 2000.
5. Schlesinger, M., Paunovic, M. Modern Electroplating John Wiley 2000

PTT 361/3
SCALE UP AND OPTIMIZATION

COURSE SYNOPSIS

This course covers introduction to scale-up methods, pilot plants, models and principles used in chemical/ biotechnological processes. The content of the course also consists of theory and applications of optimization techniques. The knowledge of scale up and optimization techniques are applied to solve problems related to chemical processes.

COURSE OUTCOMES

1. Ability to apply principles of scale up and to analyze scale up methods in related chemical processes.
2. Ability to demonstrate theories of optimization and to analyze optimization methods in related chemical processes.
3. Ability to develop a solution to chemical processes related problems using selected scale up and optimization methods.

REFERENCES

1. M. Zlokarnik, "Scale-up in Chemical Engineering", Wiley-VCH (2006).
2. T.F. Edgar, D.M. Himmelblau, L.S. Lasdon, "Optimization of Chemical Processes", Second Edition McGraw-Hill International Edition, Chemical Engineering Series (2001).
3. S.S.Rao, "Engineering Optimization Theory and Practice", Fourth edition, New Age International Publishers, India (2009).
4. K. Deo, "Optimization Techniques", Wiley Eastern (1995).
5. M. Zlokarnik, "Dimensional Analysis and Scale-up in Chemical Engineering.", Springer Verlag, Berlin, Germany (1991).

PTT 363/3
PHARMACEUTICAL PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course provides an overview of the pharmaceutical processing technology include Particle size reduction, powder mixing, granulation and, drying, tabletting, coating, hard and soft capsules, microparticles, milling, sieving, mixing solid substances, granulating, tableting, coating and dosages formulation includes liquid dosage (solutions, suspensions, emulsions, sterile/parenteral dosage forms), solid dosage (tablets, capsules), semisolid topical dosage (Gels, ointments, creams, pastes) and injectables.

COURSE OUTCOMES

1. Ability to evaluate the pharmaceutical production and dose formulation.
2. Ability to design pharmaceutical production facilities and processes.
3. Ability to demonstrate and assess pharmaceuticals Processing technique.

REFERENCES

1. Bennet, B. and Cole, G. Pharmaceutical Production: An Engineering Guide. Warwickshire: Institution of Chemical Engineers (IChemE)., 2003.
2. Aulton M. E., Pharmaceutics. The science of dosage form design. 2nd Edition. London: Churchill Livingstone., 2002.
3. David J. am Ende, Chemical Engineering in the Pharmaceutical Industry: R&D to Manufacturing, New Jersey, USA: John Wiley & Sons, Inc., 2011.
4. Blacker A. John, Williams Mike T., Pharmaceutical Process Development - Current Chemical and Engineering Challenges, Royal Society of Chemistry, UK: Cambridge.2011.
5. Anthony J. Hickey, David Ganderton. Pharmaceutical Process Engineering: 2nd Edition. New York: Informa Healthcare., 2009
6. Sambamurthy K., Pharmaceutical Engineering. New Delhi: New Age International Publishers. 2012

PTT 364/3
ADVANCED MEMBRANE TECHNOLOGY AND APPLICATIONS

COURSE SYNOPSIS

This course emphasizes the fundamental concepts of membrane science which are the membrane materials and characterization, transport theory which are Fick's Law Diffusion and solution diffusion model. Evaluation on the idea of concentration polarizations in the membrane are been emphasized. The fundamental concept is applied in membrane applications that are used in

industries such as reverse osmosis, micro and ultrafiltration, gas separation and pervapourization and also for medical application such as hemodialysis, drug delivery and blood oxygenators.

COURSE OUTCOMES

1. Ability to differentiate membrane types, membrane materials and membrane surface characterization.
2. Ability to evaluate the transport theory and concentration polarization in membrane processes.
3. Ability to evaluate the fundamental concept of membrane theory in membrane application processes.

REFERENCES

1. Baker, R.W. Membrane Technology and Applications. 3rd Edition, John Wiley and Sons, England. (2012)
2. Norman, N. Li. Anthony G. Fane, Winston Ho, W. S. & Matsuura T. Advanced Membrane Technology and Applications. John Wiley and Sons, New Jersey (2008).
3. Hilal N., Khayet M. & Wright C.J. Membrane modification: Technology and Applications. CRC Press, Florida. (2012).
4. Coulson J.M & Richardson J.F. Chemical Engineering Volume 2: Particle Technology and Separation Processes 5th Edition Butterworth-Heinemann. (2012).
5. Mc Cabe W.L., Smith J. & Harriot P. Unit Operation of Chemical Engineering. 7th Edition. McGraw-Hill, London. (2005).

PTT 454 / 3
INTRODUCTION TO BIOCHEMISTRY

COURSE SYNOPSIS

The course aims to introduce the concept of biochemistry including the properties and structure of water, classification and function of biomolecules such as carbohydrates, lipids and amino acids, role of proteins and enzymes in biochemistry, electron transport, citric acid cycle and photosynthesis.

COURSE OUTCOMES

1. Ability to identify basic structure, properties, functions and classification of biomolecules.
2. Ability to discuss structure, function and kinetic properties of enzymes and their roles in metabolism.
3. Ability to ilustrate electron transport, citric acid cycle and photosynthesis.
4. Ability to analyze enzyme and nucleic acids extraction and isolation

REFERENCES

1. Campbell, M.K. & Farrell, S.O. (2011). Biochemistry 7th Edition. Brooks/Cole.
2. McKee, T. & McKee, J. (2003). Biochemistry, 3rd Edition, McGraw Hill. New York.
3. Voet D. & Voet, J.G. (2010). Biochemistry 4th Edition, John Wiley & Sons, New York.
4. Elliott, W.H. & Elliott, D.C. (2005). Biochemistry 3rd Edition. Oxford University Press
5. Zarina Zakaria, Harbant Singh, Muhammad Syarhabil Ahmad, Noorulnajwa Diyana Yaacob, Syazliana Aizee, Rozaini Abdullah, Syazni Zainul Kamal, Khadijah Hanim, Mohd Fahrurrazi Tompang, Huzairy Hassan. (2011). Biochemistry: Essential for Engineers. Universiti Malaysia Perlis.

PTT 457/3
FOOD PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course covers multidisciplinary fields of food processing technology and related industries. Topics covered include food science, sensory and nutritional properties of foods, food spoilage, food production systems and preservation processes including thermal and non-thermal processes, chilling and freezing, freeze-drying, irradiation, extrusion, packaging, texturization, mechanical separation and food technology.

COURSE OUTCOMES

1. Ability to differentiate the principles of food processing technology.
2. Ability to evaluate the effects of processing on sensory and nutritional properties of food.
3. Ability to evaluate problems involved in food production.

REFERENCES

1. Singh, R.P., Introduction to Food Engineering. , 2008
2. Campbell-Platt, G., Food Science and Technology. John Wiley, New York., 2009
3. Toledo, R.T. Fundamental of Food Process Engineering. SpringerLink., 2007
4. Smith, P.G., Introduction to Food Process Engineering., SpringerLink., 2011
5. Shetty, K., Paliyath, G., Pometto, A. and Levin, R.E., Food Biotechnology. CRC Press Boca Raton., 2006



BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS) (FOOD TECHNOLOGY) - RY01

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of chemical engineering as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to define and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.

CURRICULUM STRUCTURE FOR BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS) (FOOD TECHNOLOGY) - RY01

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (87) & Elective (9)	PTT 153/2 Materials Engineering	PTT 152/2 Physical Chemistry	PTT 251/3 Thermodynamics for Chemical Engineering	PTT 255/3 Reaction Engineering	PTT 351/2 Safety & Loss Prevention	PTT 353/3 Final Year Project 1	PTT 451/5 Final Year Project 2	PIT 314 INDUSTRIAL TRAINING
	PTT 155/3 Organic Chemistry	PTT 158/3 Analytical Chemistry	PTT 252/3 Fluid Mechanics	PTT 254/3 Mass Transfer for Chemical Engineering	PTT 355/3 Process Control & Dynamics	PTT 354/3 Plant Design Project 1	PTT 452/3 Plant Design Project 2	
	PTT 157/2 Engineering Graphics for Chemical Engineering	PTT 156/4 Principles of Chemical Process	PTT 253/3 Heat Transfer for Chemical Engineering	PTT 272/3 Food Science & Biochemistry	PTT 356/3 Separation Engineering	PTT 375/3 Food Waste Management & Utilization	PTT 471/3 Food Product Development & Commercialization	
	PCT 111/3 Engineering Skills	PTT 154/2 Introduction to Process Instrumentation	PTT 271/3 Food Microbiology	PTT 273/3 Postharvest Technology	PTT 371/3 Analysis & Instrumentation for Food Technology	PTT 376/3 Quality & Safety Management System in Food Production		
	PLT 121/3 Electrical Technology				PTT 372/4 Food Processing & Preservation			
					Elective 1/3 (A1 or B1)	Elective 2/3 (A2 or B2)	Elective 3/3 (A3 or B3)	
Common Core (15)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III			PTT 333/3 Engineering Technology Management	PTT 444/3 Engineering Technologist in Society	
University Required (19 or 21)	*UVA 111/2 Foundation English	**UVW 211/2 English for General Purposes	UVW 312/2 English for Technical Communication	UUW XXX/2 Option Subject				
		UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UVW 410/2 University Malay Language	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies				
		UUT 122/2 Skills & Technology in Communication		UUW 322/2 Thinking Skill				
	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UUW 224/2 Engineering				
142	18	21/19	20	18/20	18	18	17	12

Total Units for Graduation = 142

Elective 1	Elective 2	Elective 3
A. PTT 373/3 (3+0) Fats & Oil Technology B. PTT 374/3 (3+0) Food Ingredients	A. PTT 377/3 (3+0) Functional Foods & Nutraceuticals B. PTT 378/3 (3+0) Dairy & Meat Technology	A. PTT 472/3 (3+0) Food Packaging Technology B. PTT 473/3 (3+0) Poultry & Fish Technology

*Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW 211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW 312 English for Technical Communication



LIST OF COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS)
(FOOD TECHNOLOGY)

- **PLT 121/3 ELECTRICAL TECHNOLOGY**
- **PTT 152/2 PHYSICAL CHEMISTRY**
- **PTT 153/3 MATERIALS ENGINEERING**
- **PTT 154/2 INTRODUCTION TO PROCESS INSTRUMENTATION**
- **PTT 155/3 ORGANIC CHEMISTRY**
- **PTT 156/4 PRINCIPLE OF CHEMICAL PROCESSES**
- **PTT 157/2 ENGINEERING GRAPHICS FOR CHEMICAL ENGINEERING**
- **PTT 158/3 ANALYTICAL CHEMISTRY**
- **PTT 251/3 THERMODYNAMICS FOR CHEMICAL ENGINEERING**
- **PTT 252/3 FLUID MECHANICS**
- **PTT 253/3 HEAT TRANSFER FOR CHEMICAL ENGINEERING**
- **PTT 271/3 FOOD MICROBIOLOGY**
- **PTT 254/3 MASS TRANSFER FOR CHEMICAL ENGINEERING**
- **PTT 255/3 REACTION ENGINEERING**
- **PTT 272/3 FOOD SCIENCE & BIOCHEMISTRY**
- **PTT 273/3 POSTHARVEST TECHNOLOGY**
- **PTT 351/2 SAFETY & LOSS PREVENTION**
- **PTT 355/3 PROCESS CONTROL & DYNAMIC**
- **PTT 356/4 SEPARATION ENGINEERING**
- **PTT 371/3 ANALYSIS & INSTRUMENTATION FOR FOOD TECHNOLOGY**
- **PTT 372/4 FOOD PROCESSING & PRESERVATION**
- **PTT 373/3 FATS AND OIL TECHNOLOGY (ELECTIVE)**
- **PTT 374/3 FOOD INGREDIENTS (ELECTIVE)**
- **PTT 353/3 FINAL YEAR PROJECT 1**
- **PTT 354/3 PLANT DESIGN PROJECT 1**
- **PTT 375/3 FOOD WASTE MANAGEMENT & UTILIZATION**
- **PTT 376/3 QUALITY & SAFETY MANAGEMENT SYSTEM IN FOOD PRODUCTION**
- **PTT 377/3 FUNCTIONAL FOODS & NUTRACEUTICALS(ELECTIVE)**
- **PTT 378/3 DAIRY AND MEAT TECHNOLOGY(ELECTIVE)**
- **PTT 451/5 FINAL YEAR PROJECT II**
- **PTT 452/3 PLANT DESIGN PROJECT 2**
- **PTT 471/3 FOOD PRODUCT DEVELOPMENT & COMMERCIALIZATION**
- **PTT 472/3 FOOD PACKAGING TECHNOLOGY (ELECTIVE)**
- **PTT 473/3 POULTRY AND FISH TECHNOLOGY (ELECTIVE)**

COURSE SYLLABUS

PLT 121/3
ELECTRICAL TECHNOLOGY

COURSE SYNOPSIS

This course is offered to non-electrical engineering background. This course introduces the basic electrical circuit theory, DC and AC circuits, basic principles of 3-phase AC circuits and magnetic circuits. This course also covers the fundamental of electronic components such as semiconductors, diodes and transistors. The laboratory sessions cover the concepts being discussed in lectures.

COURSE OUTCOMES

1. Ability to demonstrate the application of the principle elements of DC and AC circuits, principles of electricity including Kirchhoff's of currents and voltage.
2. Ability to explain parameters of theree phase AC system for Wye and Delta connection, and also the basic concepts of electronic components.
3. Ability to explain the basic concept of magnetism and electromagnetism and its application in Dc and AC machines.

REFERENCES

1. Bird, J. Electrical Circuit Theory and Technology. 4th Edition. Elcevier. 2010.
2. Boylestad, R. Introductory CircuitAnalysis. 12th Edition. Pearson. 2010.
3. Bishop, O. Electronic Circuits and Systems. 3rd Edition. Elsevier.2010.
4. Donald, C. Standard Handbook of Electronic Engineering. McGraw-Hill professional.2004.

PTT 152/2
PHYSICAL CHEMISTRY

COURSE SYNOPSIS

The course discusses the concept of equilibrium in terms of thermodynamics, particularly enthalphy and entrophy. The course also covers the calculations of material equilibrium, reaction equilibrium, reaction kinetics, phase diagrams and equilibrium electrochemistry.

COURSE OUTCOMES

1. Ability to apply the basic concepts, laws and principles in physical chemistry.
2. Ability to calculate problems concerning material equilibrium, standard thermodynamic function and reaction equilibrium in ideal gas mixture.
3. Ability to analyze problems concerning chemical kinetics, phase diagrams and electrochemistry.

REFERENCES

1. Levine, I. N. Physical Chemistry, 6th Edition, McGraw Hill: New York. 2006.
2. Atkins, P. and de Paula, J. Physical Chemistry, 9th Edition, Oxford University Press: United Kingdom. 2010.
3. Thomas, E and Reid, P. Physical Chemistry, 2nd Edition, Pearson Prentice Hall. 2010.
4. Bahl, B.S., Bahl, A., and Tuli, G.D. Essentials of Physical Chemistry. S. Chand: New Delhi. 2006.
5. Engel, T., Reid, P., and Drobny, G. Physical Chemistry for the Life Sciences, 1st Edition, Prentice Hall. 2007.

PTT 153/3
MATERIALS ENGINEERING

COURSE SYNOPSIS

This course covers introduction to material science and engineering which emphasizes on material properties and structures. The course encompasses the fundamental of material structure, class of material properties, and measurement of the properties. The common micro-structural characteristics of different material classes as well as some features of biomaterials also embedded in the course.

COURSE OUTCOMES

1. Abilty to describe types of material families, material structures, and material characteristics.
2. Ability to demonstrate the behavior of structural materials, the phases in material and material reliability.
3. Ability to analyze the suitability of material in engineering-related projects.

REFERENCES

1. Smith, W.F. and Hashemi, J. Foundations of Materials Science and Engineering, 5th Edition, McGrawhill. 2011.
2. Askeland, D.R., Fulay, P.P., Wright, W.J. The Science and Engineering of Materials, 6th Edition, Cengage Learning. 2010.
3. Ashby, M., Shercliff, H. and Cebon, D., A. Materials: engineering, science, processing, and design, Elsevier. 2007.
4. Ashby, M. and Jones, D.R.H. Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann. 2006.



5. Sharma, C.P. Engineering material properties and applications of metal and alloys, Prentice Hall, New Delhi. 2004.

PTT 154/2
INTRODUCTION TO PROCESS INSTRUMENTATION

COURSE SYNOPSIS

The course begins with an introduction to process instruments involved in the process industries, followed by introduction to fundamentals of industrial valves which consists of many type of valves. This is complemented with the ability to employ and analyse the ISA (The Instrumentation Systems and Automation Society) symbology and tagging systems. This course also discusses the design and development of the process flow diagram as well as the piping and instrumentation diagram of a simple and complex system.

COURSE OUTCOMES

1. Ability to interpret the operational aspects of different types of valves.
2. Ability to apply the appropriate ISA Symbology for the process flow diagram (PFD) and sketch the process flow diagram.
3. Ability to differentiate appropriate ISA Symbology for Piping & Instrumentation Diagram (P & ID).

REFERENCES

1. Liptak, B.G. Process Control and Optimization. 4th Edition, CRC Press, Florida. 2005.
2. Smith, C.A and Corriprio, A. Principles and Practice of Automatic Process Control. 3rd Edition, John Wiley & Sons, New York. 2006.
3. McCabe, W.L., Smith, J.C and Harriot, P. Unit Operations of Chemical Engineering, 7th Edition. McGraw-Hill, New York. 2005.
4. Patience, G.S. Instrumentation Method and Instrumentation for Chemical Engineers. 1st Edition, Elsevier, Oxford, UK. 2013.
5. Towler, G. and Sinnot, R. Chemical Engineering Design: Principle, Practice and Economics of Plant and Process Design, 2nd Edition, Butterworth-Heinemann, Oxford, UK. 2013.
6. McAcinew, T. and Mulley,R. Control System Documentation: Applying Symbols and Identification, 2nd Edition, ISA Press. 2005.

PTT 155/3
ORGANIC CHEMISTRY

COURSE SYNOPSIS

This course introduces the fundamental theories of alkanes, alkenes and alkynes and their related reactions. Then, focusing on conformational analysis of alkanes and emphasizing on the nucleophilic substitution reaction of alkyl halides. The course also covers on physical and chemical properties as well as chemical reactions involving alcohol and ether, aldehyde and ketone, carboxylic acid and aromatic compound. The application of organic chemical process in chemical and biotechnological industry is discussed.

COURSE OUTCOMES

1. Ability to explain the chemical and physical properties of each functional group.
2. Ability to distinguish the chemical reaction and reaction mechanism of functional group.
3. Ability to analyze the knowledge of organic chemical process in biotechnology and chemical industries.

REFERENCES

1. Bruice P.Y. Organic Chemistry 7th Edition. Pearson Prentice Hall. 2014.
2. William H.B., Brent L.I., Eric V.A. and Christopher S.F. Organic Chemistry 7th Edition. Brooks/Cole, Changes Learing. Singapore. 2014.
3. Solomons T.W.G. and Fryhe C.B. Organic Chemistry. 10th Edition. John Wily and Son. Inc. 2011.
4. Smith J.G. Organic Chemistry. 4th Edition. McGraw Hill. New York. 2014.
5. Bruice P.Y. Essential Organic Chemistry. Pearson International. Prentice Hall. 2006.
6. John Macmurray. Organic Chemistry. 5th. Brooks/Cole. 2000.

PTT 156/4
PRINCIPLE OF CHEMICAL PROCESSES

COURSE SYNOPSIS

This course highlights the basic concept of chemical processes involving material and energy balances in various processing systems. Exposure on the fundamental of material and energy balances are emphasized through the knowledge of process types, process variables and evaluation of the different chemical systems involving single and multiple systems as well as the nonreactive and reactive processes.

COURSE OUTCOMES

1. Ability to apply knowledge of engineering fundamentals to define chemical process methodologies and solve the basic calculations in chemical process engineering.

2. Ability to analyze information broadly and calculate material balances in chemical systems theoretically and practically using appropriate tools and techniques.
3. Ability to calculate energy balances of chemical processes and analyze the combination of material and energy balances for chemical systems theoretically and practically using appropriate tools and techniques.

REFERENCES

1. Felder, R.M and Rousseau, R.W. Elementary Principles of Chemical processes. 3rd ed. John Wiley & Sons, Inc. New York. 2005
2. Himmelblau, D.M., and Riggs, J.B. Basic Principles and Calculations in Chemical Engineering. Prentice Hall, New Mexico. 2004
3. Towler, G. and Sinnott, R. Chemical Engineering Design; Principles, Practice and Economics of Plant and Process Design, Elsevier Inc. Amsterdam. 2008
4. Hanyak Jr, M. E. Chemical Process Simulation. MEH, New York. 2012
5. Ghasem, N. Computer Method in Chemical Engineering. CRC Press, Florida. 2012
6. Denn, M. M. Chemical Engineering: An Introduction. Cambridge University Press, New York. 2012.

PTT 157/2
ENGINEERING GRAPHICS FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course introduces the techniques of engineering graphics to visualize, understand engineering drawings and to develop skill and accuracy in producing drawings. The application of computer graphics using AutoCAD software package is integrated part of the course.

COURSE OUTCOMES

1. Ability to use geometric construction, multiview, sectional view, 2D and 3D modelings in engineering drawings.
2. Ability to use dimensioning and tolerance in engineering drawings.
3. Ability to apply drawing techniques in engineering drawing.

REFERENCES

1. Finkelstein, E. and Ambrosius, L. AutoCAD 2015 and AutoCAD LT 2015 Bible. Indianapolis, Indiana: Wiley. 2014.
2. Bertoline R.G. and Wiebe N.E. Fundamentals of Graphics Communication. New York: McGraw Hill International. 2007.
3. Ibrahim Zeid. CAD/CAM Theory and Practice. New York: McGraw Hill International. 2010
4. James R. C. Chemical Process Equipment: Selection and Design. Texas: Gulf Professional Publishing. 2005
5. Calmettes J.M. Best of 3D Virtual Product Design. Singapore: Page One Publishing Pte. Ltd. 2005
6. Giesecke, F. E. Engineering Graphics. Upper Saddle River, NJ: Pearson/ Prentice Hall. 2004.

PTT 158/3
ANALYTICAL CHEMISTRY

COURSE SYNOPSIS

The first part of the course covers the basic principle of analytical chemistry which includes data analysis and its interpretation. The second part provides an introduction and application of classical analytical methods such as gravimetry and titrimetry as well as modern methods in analytical chemistry such as chromatographic and spectroscopic technique.

COURSE OUTCOMES

1. Ability to understand and apply the basic chemical concepts that are particularly important to analytical chemistry.
2. Ability to understand and apply basic principle of different analytical techniques and to calculate and solve analytical problems by intergrating different analytical techniques.
3. Ability to propose the use of different analytical techniques.

REFERENCES

1. Christian, G. D., Analytical Chemistry. 7th Edition. Wiley. USA., 2014.
2. Harris, Daniel C., Quantitative Analytical Chemistry. 8th Edition. W. H. Freeeman. USA., 2010.
3. Skoog. D. A., West, D. M., Holler, F. J., Fundamental of Analytical Chemistry. 9th Edition. Saunders College Publication. USA. 2013.
4. Harvey, D., Modern Analytical Chemistry. McGraw-Hill. USA., 2000.
5. Keeley, D. and Haines, P.J., Analytical Chemistry. Oxford:Bio Scientific. USA., 2002.
6. Khopkar, S. M., Basic concept of Analytical Chemistry. 3rd Edition. New Age International Publisher. USA., 2008

PTT 251/3
THERMODYNAMICS FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course introduces students to the basic thermodynamics for chemical engineering application and problem solving which covers first and second laws of thermodynamics. The course also highlights substances properties, mass and energy analysis, entropy, refrigeration



cycles as well as thermodynamic property relation and solution, and chemical and phase equilibrium.

COURSE OUTCOMES

1. Ability to apply the fundamentals properties and law of thermodynamics in engineering system.
2. Ability to analyze heat, work and energy of the system and thermodynamic property relations.
3. Ability to synthesize the theory of the solution of thermodynamics, gas mixtures and chemical and phase equilibrium.

REFERENCES

1. Cengel, Y.A. and Boles, M.A. Thermodynamics-An engineering Approach, 8th edition, McGraw-Hill, New York. 2014.
2. Koretsky, M.D. Engineering and Chemical Thermodynamics, John Wiley and Sons. 2014.
3. Smith, J.M., Van Ness, H.C., Abbott, M. M. Introduction to Chemical Engineering Thermodynamics, 7th Edition, McGraw – Hill, New York. 2005.
4. Narayanan, K.V. A Text Book of Chemical Engineering Thermodynamics, Prentice-Hall India. 2010.
5. Moran, M.J., Shapiro, H.N., Boettner, D.D. and Bailey, M.B. Principles of Engineering Thermodynamics, 7th Edition, John Wiley & Sons. 2011.
6. Rajput, R.K. Engineering Thermodynamics, 3rd Edition, Jones and Bartlett Learning. 2009.

PTT 252/3
FLUID MECHANICS

COURSE SYNOPSIS

This course emphasizes fundamental concepts and problem-solving techniques. It covers properties of fluid, pressure, mass, Bernoulli and energy equations, momentum analysis of flow system, dimensional analysis and modelling and fluid flows (internal flows, differential analysis of fluid flow, external flows and compressible flow)

COURSE OUTCOMES

1. Ability to classify fluid flows and analyze essential parameters describing them.
2. Ability to analyze pressures, forces and stability in fluid systems (closed and open systems) and the link between conserved quantities and the equations of fluid mechanics.
3. Ability to classify common devices for measuring pressure, flow rates and turbo macheneris

REFERENCES

1. Cengel, Y. A., and Cimbala, J. M. Fluid Mechanics: Fundamental and Applications, 3rd Edition, McGraw-Hill, 2014.
2. White, F.M. Fluid Mechanics (SI Units), 7th revised edition, McGraw-Hill, 2011.
3. Douglas, J.F., Gasiorek, J.M., Swaffield, J.A. and Jack, L. Fluid Mechanics, 6th revised edition, Pearson Education, 2011.
4. Munson, B.R., Okiishi, T.H. and Huebsch, W.W. Fluid Mechanics, 7th revised edition, John Wiley & Sons, 2013.
5. Munson, B.R., Young, D.F., Okiishi, T.H. and Huebsch, W.W. Fundamentals of Fluid Mechanics, 7th revised edition, John Wiley & Sons, 2012.
6. Crowe, C.T., Elger, D.F., Roberson, J.A and B.C. Williams, Engineering Fluid Mechanics, , 10th revised edition, John Wiley & Sons, 2012.

PTT 253/3
HEAT TRANSFER FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course emphasizes the fundamental concepts and problem-solving techniques related to heat transfer in process engineering. The fundamental theoretical concepts and mechanisms of conduction, convection and radiation of heat transfer and the design fundamentals of basic industrial heat exchangers are analyzed. The use of various equations to estimate total heat capacity and overall heat transfer coefficient, subsequently to be applied to calculate the duty of heat transfer equipment are also presented and discussed.

COURSE OUTCOMES

1. Ability to demonstrate the principles of conduction, convection, and radiation heat transfer.
2. Ability to analyze the problems related to heat transfer process.
3. Ability to analyze the heat exchanger systems related to industries.

REFERENCES

1. Holman J.P. Heat Transfer. 10th Edition, McGraw-Hill, New York., 2010.
2. Incropera F. P & De Witt D. P. Fundamentals of heat and mass transfer, 6th Edition, Wiley, New York., 2006.

3. Coulson J.M and Richardson J.F. Coulson and Richardson's Chemical Engineering Volume 1. 6th Edition, Elsevier., 2008.
4. McCabe W.L., Smith J.C and Harriot P. Unit Operations of Chemical Engineering, McGraw Hill, New York., 2005.
5. Geankoplis C.J. Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey., 2003.
6. Kreith F., Manglik R. M. and Bohn M. S. Principles of Heat Transfer, 7th Edition, Global Engineering, United States., 2011

PTT 271/3
FOOD MICROBIOLOGY

COURSE SYNOPSIS

The subject covers a broad spectrum of food microbiology in food industry. The emphasis is on discussion of the history, habitats, taxonomy, and growth parameters of microorganisms in food; interpret types of microorganisms and/or their products in foods. Food preservation and some properties of psychrotrophs, thermophiles, and radiation-resistant bacteria and distinguish indicators of food safety and quality, principles of quality control, microbial criteria and foodborne diseases.

COURSE OUTCOMES

1. Ability to describe the characteristics of foodborne, waterborne, and spoilage microorganims, as well as methods of their isolation, detection, and identification.
2. Ability to analyze the intrinsic and extrinsic conditions affecting the growth, survival and death of microorganisms in foods.
3. Ability to assess indicators of food safety and quality, principles of quality control, microbial criteria and foodborne diseases.

REFERENCES

1. Adams, M. R. and Moss, M. O. Food Microbiology, The Royal Society of Chemistry, 4th Edition. 2015.
2. Garg, N. , Garg, K. L., and Mukerji, K. G. Laboratory Manual of Food Microbiology. I. K. International Pvt Ltd. 2010.
3. Hayes, R. Food Microbiology and Hygiene. Springer. 2013.
4. Ray, B. and Bhunia, A. Fundamental Food Microbiology, Taylor and Francis Group, 5th Edition. 2013.
5. Jay, J. M. Modern Food Microbiology, Aspen Publishers, Inc. 2012.

PTT 254/3
MASS TRANSFER FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course emphasizes the fundamental concepts and problem-solving techniques on mass transfer operations and principles. This course provides the knowledge on mass transfer operations at basic to an intermediate level that covers with the theoretical and analytical background to solve the mass transfer operations problems. Topics to be covered include mass transfer mechanism which is diffusion, Ficks Law, Maxwell Law, and principles of absorption, evaporation and drying.

COURSE OUTCOMES

1. Ability to demonstrate the diffusion mass transfer principles.
2. Ability to calculate the mass transfer coefficient.
3. Ability to analyze mass transfer systems related to industry.

REFERENCES

1. Geankoplis, C.J., Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey, 2003.
2. Treybal, R.E., Mass Transfer Operations. McGraw Hill, USA, 2000.
3. McCabe, W.L., Smith, J. and Harriot, P., Unit Operation of Chemical Engineering. McGraw Hill International Edition, 6th Edition, 2001.
4. Seader, J.D. and Henley, E.J., Separation Process Principles. 2nd Edition, John Wiley & Sons, 2006.
5. Theodore, L. and Ricci, F. Mass Transfer Operations for the Practicing Engineer. Wiley-Interscience, 2010.
6. Benitez, J. Principles and Modern Applications of Mass Transfer Operations. Wiley-Interscience, 2nd Edition, 2011.

PTT 255/3
REACTION ENGINEERING

COURSE SYNOPSIS

This course highlights the principles of chemical reactions engineering involving knowledge exploitation of industrial scale reactor design. Fundamental concepts are emphasized through the knowledge of mole balance, conversion and reactor sizing as well as rate law and stoichiometry. Problem-solving techniques are also applied in solving various problem related to isothermal reactor design, collection and analysis of rate data, multiple reaction, catalysis and catalytic reaction mechanism.



COURSE OUTCOMES

1. Ability to demonstrate the principles of chemical reaction engineering design for industrial reactors.
2. Ability to analyze and solve various problem related to reactor design and reaction process.
3. Ability to classify catalyst and develop the catalytic reaction mechanism in a heterogeneous reaction.

REFERENCES

1. Fogler, H. S., Elements of Chemical Reaction Engineering. 6th Edition. Prentice Hall Inc. U.S. 2011.
2. Davis, M. E and Davis, R. J., Fundamentals of Chemical Reaction Engineering. 1st Edition. Mc Graw Hilll, U.S. 2002
3. Fogler, H. S., Essentials of Chemical Reaction Engineering. 1st Edition. Prentice Hall. U.S., 2010.
4. Doraiswamy, L.K and Deniz Uner, Chemical Reaction Engineering: Beyond the Fundamental. CRC Press. 2014.
5. Bruce Nauman, E., Chemical Reactor Design, Optimization and Scale up. 2nd Edition. John Wiley & Sons. 2008.
6. Levenspiel, O., Chemical Reaction Engineering. 3rd Edition. Wiley India Pvt Limited. 2006.

PTT 272/3
FOOD SCIENCE & BIOCHEMISTRY

COURSE SYNOPSIS

This course focuses on the fundamental concepts of food science with emphasis on quality and deteriorative factors in food. This course also highlighted on chemical/biochemical reaction of carbohydrate, lipids, proteins, vitamins, water and minerals in fresh and processed foods with respect to food quality and health. It also covers on how biochemical and functional properties, enzymes and food additives (emulsifiers, pigments, colours, flavours, sweeteners, preservatives, etc). Metabolism and processes of nutritive aspect of food constituents are also emphasized.

COURSE OUTCOMES

1. Ability to apply the basic principles of food science and biochemistry into real-world food science and nutritional studies.
2. Ability to differentiate the chemical structure of food components including proteins, carbohydrates, fats and vitamins; and how these structures determines functional behaviour of these food components with respect to food quality, nutrition and safety.
3. Ability to proporse the chemical interactions with food components and their effects on the sensory, nutrition composition and functional properties of foods.

REFERENCES

1. Alais, C. & Linden, G. Food Biochemistry. Springer-Science+Business Media B.V. 1991.
2. Simpson B.K. Food Biochemistry and Food Processing. 2nd Edition. Wiley-Blackwell. 2012.
3. Brody, T. Nutritional Biochemistry. 2nd Edition. Academic Press. 1999.
4. Yildiz, F. Advanced in Food Chemistry. CRC Press. 2010.
5. Michael Eskin, N.A. Biochemistry of Food. Academic Press INC. 1990.

PTT 273/3
POSTHARVEST TECHNOLOGY

COURSE SYNOPSIS

This course provides the overview on postharvest handling technology of agricultural produce. The course emphasizes the basic of postharvest handling technology, pre-harvest and harvesting factors affecting the postharvest quality, postharvest operations in the packinghouse and appropriate equipment or chemicals that relates to postharvest treatments and storage of agricultural products, quality assurance and preparation of fresh-cuts, and postharvest socio-economics.

COURSE OUTCOMES

1. Ability to analyze the chemical and physical properties of agricultural products in order to apply the appropriate post-harvest handling technology.
2. Ability to manage the factors during pre-harvest, harvesting and postharvest handlings that affect the quality of the produces
3. Ability to assess the socio-economic factors and impact to prevent losses in post-harvest operation.

REFERENCES

1. Kader. A. Post Harvest for Horticultural Crops. 3rd Edition, University of California. 2012.
2. Rees, D, Farrell, G and Orchard, Journal of Crop Postharvest: Science and Technology: Perishables. Blackwell Publishing Ltd, west Sussex, UK. 2012.
3. Gopinadhan Paliyath, Dennis P. Murr, Avtar K. Handa, Susan Lurie. Postharvest Biology and Technology of Fruits, Vegetables, and Flowers. Wiley Blackwell. 2009.

4. Wills, R.B.H., McGlasson, W.B. and Graham, D. Postharvest: An introduction to the physiology and handling of fruit, vegetables and ornamentals. University of New South Wales Press. 2007.
5. Wojciech J. Florkowski, Robert L. Shewfelt, Stanley E. Prussia, Bernhard Brueckner. Postharvest handling: A systems approach. Elsevier/Academic Press. 2014.

PTT 351/2
SAFETY & LOSS PREVENTION

COURSE SYNOPSIS

The course emphasizes the technical fundamentals of process safety. Students are exposed to the issues in safety associated with toxicology, industrial hygiene, source and dispersion models. Students are then taught about characteristics and possible prevention steps of fires and explosions. Subsequently, they are also exposed to the concept and design of relief system, hazard identification as well as risk assessment. The course is concluded with the lesson in accident investigation.

COURSE OUTCOMES

1. Ability to analyze the type of hazards and dispersion models in chemical engineering processes.
2. Ability to recommend suitable methods to prevent fires and explosion and to design relief system for process vessels.
3. Ability to evaluate safety procedures and designs using proper hazard identification and accident investigation techniques.

REFERENCES

1. D.A. Crowl, J.F. Louvar, Chemical Process Safety; Fundamentals with Applications. Prentice Hall, Second Edition. New Jersey. 2002.
2. P.L. Frank, Loss and Prevention in the Process Industries. Volume 1&2, London, Butterworth. 1980.
3. J.M. Coulson, and J.F. Richardson, Chemical Engineering. Volume 6, Pergamon Press, Oxford. 1983.
4. R.E. Sanders, Chemical Process Safety; Leaning from Case Histories. Elsevier Butterworth, Heinemann, Third Edition. Amsterdam. 2005.
5. V. 7 Marshall, S. Ruheman, Fundementals of Process Safety. Rugby; ICehmE, UK. 2001.

PTT 355/3
PROCESS CONTROL & DYNAMIC

COURSE SYNOPSIS

The course aims to introduce the concept of process control by applying theoretical models of chemical processes for steady and unsteady-state models (dynamic model) of chemical processes. Topics to be covered such as dynamic behavior of processes including Laplace transform, transfer function models, dynamic behavior of first-order and second-order processes. Introduction to feedback control also will be learned in this course including feedback controllers, control system instrumentation, overview of control system design and dynamic behavior of closed-loop control system, PID controller design, tuning, and troubleshooting. The theories are supported by performing laboratory experiments.

COURSE OUTCOMES

1. Ability to analyze basic concepts of process control and theoretical model of chemical processes.
2. Ability to develop dynamic behavior of process control.
3. Ability to evaluate the feedback and feedforward control system for chemical processes.

REFERENCES

1. Seborg, D.E., Edgar, T.F., Mellicamp D.A. Process Dynamic and Control. John-Wiley, 3rd Edition. 2011.
2. Riggs, J.B. Chemical and Bioprocess Control. Pearson. 2006.
3. John Francis Richardson, John Metcalfe Coulson, Peacock D.G. Coulson & Richardson's Chemical Engineering: Chemical & biochemical reactors & Process control. Elsevier. 2007.
4. Marlin, T. Process Control: Designing Processes and Control System for Dynamic Performance. McGraw-Hill. 2006.
5. Coughonowr. Process system, Analysis and Control. 3rd edition, McGraw-Hill. 2008.

PTT 356/4
SEPARATION ENGINEERING

COURSE SYNOPSIS

This course emphasizes the theory and basic principles of separation processes based on equilibrium stage concepts and mass transfer rate control. This course provides the knowledge of basic design criteria required for binary and multi component separations processes. Topics to be covered include liquid-liquid extraction, vapour-liquid extraction (distillation), solid-fluid extraction (leaching, crystallization and adsorption),



mechanical-physical separation process (filtration and centrifugation), and membrane separation technology.

COURSE OUTCOMES

1. Ability to apply principles and theory to examine basic design/operation of liquid-liquid extraction, leaching and crystallization equipment.
2. Ability to apply and calculate based on principles of mechanical-physical separation process and membrane separation process.
3. Ability to apply principles and theory to develop basic design/operation of adsorption tower, and distillation column.

REFERENCES

1. Seader, J.D., Henley, E. and Roper, D.K., Separation Process Principles: Chemical and Biochemical. 3rd Edition, Wiley. 2010.
2. Coulson, JM. and Richardson, J.F., Chemical Engineering Volume 2. 5th Edition, Elsevier-Science. 2002.
3. Geankoplis, C.J., Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey. 2003.
4. Wankat, P.C., Separation Process Engineering. 2nd Edition, Prentice Hall, New Jersey. 2006.
5. Green, D. and Perry, R., Perry's Chemical Engineers' Handbook. 8th Edition, McGraw-Hill Professional. 2007.

PTT 371/3
ANALYSIS & INSTRUMENTATION FOR FOOD TECHNOLOGY

COURSE SYNOPSIS

This course dealing with the development, application and study of analytical procedures for characterizing the properties of foods such as itsstructure, physicochemical properties, sensory attributesand their constituents. Analysis and specific instrumentation techniques involve are chromatography (HPLC, GC and TLC), spectrometry (UV vis Spectrophometer, Mass Spectrometry, FTIR, AAS and NMR) electroanalytical (Potentiometry), electrophoresis, microscopy (Compound, Stereo Microscope and Scanning Electron Microscopes) and proximate analyses (protein, carbohydrate, fat, fiber, ash and moisture).

COURSE OUTCOMES

1. Ability to explain the principles behind the analytical techniques used in food analysis (primarily chemical and physical analyses)
2. Ability to distinguish the isolation and chemical analysis of food component in relation to the chemical and physical properties.
3. Ability to propose the most suitable analysis and instrumentation technique for specific food samples.

REFERENCES

1. Nielsen, S.S. Food Analysis. 4th Edition, Springer +Science Business Media. 2014.
2. Pomeranz, Y. & Meloan, C.E. Food Analysis Theory and Practice. 3rd Edition, Chapman & Hall, New York London 1994.
3. Pico, Y. Chemical Analysis of Food: Techniques and Applications. Academic Press as imprint of Elsevier. 2012.

PTT 372/4
FOOD PROCESSING & PRESERVATIO

COURSE SYNOPSIS

This course covers multidisciplinary field of applied physical sciences combines science, microbiology, and engineering education for food and related industries. Topics to be covered include introduction to food processing, preservation processes, the most common food engineering unit operations, refrigeration, freezing, evaporation, dehydration, membrane separation, extrusion and packaging. It also covers the understanding of the impact of processing and storage conditions on the physical properties and structure of pre- and post-processed materials. Detail guidance in carrying out specific design calculations. The theory is supported by performing several laboratory experiments.

COURSE OUTCOMES

1. Ability to apply and differentiate the principles of food processing and preservation.
2. Ability to analyze the effects of processing on sensory and nutritional properties of food.
3. Ability to evaluate the problems involved in food production and preservation.

REFERENCES

1. Fellows, P. Food Processing Technology: Principles and Practice. CRC Press NY. 2009.
2. Singh, R.P. Introduction to Food Engineering. Academic Press. 2013.
3. Campbell-Platt, G. Food Science and Technology. John Wiley, New York. 2011.

4. Toledo, R.T. Fundamental of Food Process Engineering. SpringerLink. 2012.
5. Smith, P.G. Introduction to Food Process Engineering., SpringerLink. 2011.

PTT 373/3
FATS AND OIL TECHNOLOGY (ELECTIVE)

COURSE SYNOPSIS

This course provides students with the knowledge and concepts of the processing techniques and technologies of fats and oil, methods used to assess the quality, handling and preservation of the oils and fats products.

COURSE OUTCOMES

1. Ability to differentiate the sources of edible fats and oil, their physicochemical and biochemical properties as well as their function as ingredient in food
2. Ability to distinguish the processing techniques and technology as well as methods used to assess the quality of the variety of fats and oil products
3. Ability to predict the best methods of handlings and preservation of fats and oil products according to their types and properties

REFERENCES

1. Hoffman, G. (2013). The Chemistry and Technology of Edible Oils and Fats and Their High Fat Products. 2nd Edition. Academic Press. Hamm, W., Hamilton, R. J., Calliauw, G. (2013). Edible Oil Processing. 2nd Edition. Wiley-Blackwell.
2. Hui, Y. H., Ozgul-Evranoz, E. (2012). Handbook of Plant-based Fermented Food and Beverages Technology. 2nd Edition. CRC Press.
3. Lawson, H. W. (2013). Foods Oils and Fats: Technology, Utilization and Nutrition. 2nd Edition. Springer.
4. Hamilton, R. J. (2012). Recent Advances in Chemistry and Technology of Fats and Oils. Elsevier.
5. Gunstone, F. D. (2011). Vegetable Oils in Food Technology: Composition, Properties and Uses. 2nd Edition. Wiley-Blackwell.

PTT 374/3
FOOD INGREDIENTS (ELECTIVE)

COURSE SYNOPSIS

This course provides knowledge in major food ingredients such as water, carbohydrates, lipids, proteins and flavors with other constituent of foods. This includes different categories of food ingredients such as flour, gums, spices, starch, vitamins and other food additives. The course also emphasizes on technical information in the area of ingredient interactions pertaining to foods in order to optimize ingredient performance and obtaining quality food products.

COURSE OUTCOMES

1. Ability to explain the mechanism of the techno-functionality or bio-functionality of ingredients.
2. Ability to propose the right ingredients for food production.
3. Ability to predict and explain the effect of the interaction between ingredient and complex food matrix under different conditions.

REFERENCES

1. Sadler, M. J. Foods, Nutrients and Food Ingredients with Authorised EU Health Claims. Woodhead Publishing. 2013.
2. John, S., Functional Food Ingredients and Nutraceuticals. 2nd Edition. Taylor & Francis Group. 2016.
3. Zuidam, N. J., Encapsulation Technologies for Active Food Ingredients and Food Processing. Springer. 2010
4. Igoe, R. S. Dictionary of Food Ingredients. 5th Edition. Springer. 2011
5. Gaonkar, A. G., McPherson, A. Ingredient Interactions: Effects on Food Quality. 2nd Edition. Taylor & Francis Group. 2005

PTT 353/3
FINAL YEAR PROJECT 1

COURSE SYNOPSIS

This course consists of combination between guided supervision and independent study focusing on the technique of identification of problem statements, research objectives, conducting literature review and proposing research methodology. This course also covers scientific and technical guidance on thesis writing as well as preparation and submission of the project proposal. Presentation of the research proposal to the internal examiners is conducted.

COURSE OUTCOMES

1. Ability to analyze scientific information including standards, code of practice, journals, policies, field data, relevant to the specific research to be undertaken and relate with societal and global issues.
2. Ability to develop problem statements and research objectives of the project.
3. Ability to plan research methodology incorporating clear fundamentals, theories and benchmarked against standard practices governing the research project.

4. Ability to prepare and defend research proposal with effective communication skills.

REFERENCES

1. Rowena, M. How to write a thesis. Open University Press. England. 2006.
2. Hoang, P. Springer Handbook of Engineering Statistic. Springer-Verlang, London. 2006.
3. Leo Finkelstein Jr. Pocket book of technical writing for engineers and scientists, third edition, Mc Graw-Hill international edition, Singapore. 2008.
4. A Guide To Student Final Year Project. UniMAP. 2003.
5. Bailey, S. A practical guide for students. TJ International Ltd. USA. 2003.

PTT 354/3
PLANT DESIGN PROJECT 1

COURSE SYNOPSIS

This course introduces preliminary design of a process plant to the students. This includes process creation and analysis, selection and design for the principal equipment needed in a process based on the process structure approach. ASPEN PLUS will be implemented throughout the course in the process flow sheeting and equipment design.

COURSE OUTCOMES

1. Ability to create process flow sheets involving reactions, separations and other operations.
2. Ability to design unit operations in plant based on stoichiometry, thermodynamics, separation, reaction and other engineering principles.
3. Ability to develop the mass and energy balances of a major selection of the process plant.

REFERENCES

1. Sinnott, R.K., Chemical Engineering Design. Vol.6, 3rd Edition. Butterworth-Heinemann. 2012.
2. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S., Product and Process Design Principles: Synthesis, Analysis and Evaluation., 3rd Edition. John Wiley & Sons, New Jersey. 2010.
3. Green, D., Perry, R., Perry's Chemical Engineers' Handbook, McGraw Hill Professional. 2007.
4. Peters, M.S. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers. 5th Edition. McGraw-Hill, New York. 2002.
5. Richardson, J.F., Peacock, D.G., Chemical Engineering: Chemical & Biochemical Reactors & Process Control. Vol.3, 3rd ed. Butterworth-Heinemann. 2007.

PTT 375/3
FOOD WASTE MANAGEMENT & UTILIZATION

COURSE SYNOPSIS

This course covers the food sources of pollution, their effect on the environment and properties of food waste materials. It emphasizes on the physical, chemical and biological treatment processes of food wastes in relation to pollution control and waste utilization in relation to pollution problems and technologies for utilization for sustainable environmental. It also provides the knowledge of legislative act that governs environmental management.

COURSE OUTCOMES

1. Ability to analyze types of pollution emission from industries and effect of industrial pollution to the environment and public health.
2. Ability to plan strategies to control, reduce, and monitor pollution.
3. Ability to evaluate the key current environmental problems as well as the legislative act for waste management in industry.

REFERENCES

1. Joshi, V., K. Food Processing Waste Management: Treatment and Utilization Technology. New India Pub. Agency. 2011.
2. Davis, M.L., and Cornwell, D.A. Introduction to Environmental Engineering. McGraw Hill, 4th Edition. 2008.
3. Gerard Kiely, Environmental Engineering, McGraw Hill, 1998.
4. Wang, L. K (2006) Waste Treatment in the Food Processing Industry, Taylor & Francis
5. William, T.P., Waste Treatment and Disposal. 2nd Edition, John Wiley, 2005
6. Hammer, M.J and Hammer M.J Jr. Water and Wastewater Technology. 5th Edition in SI Unit, Prentice Hall. 2004.

PTT 376/3
QUALITY & SAFETY MANAGEMENT SYSTEM IN FOOD PRODUCTION

COURSE SYNOPSIS

This course covers the integration of all functions and processes within an organization in order to achieve continuous improvement of the quality and safety of food production. It covers hazard analysis critical control point (HACCP), good manufacturing practice

(GMP) and good hygiene practices (GHP), ISO 22000, and other non-food-safety issues such as bio-security policy and registration, environmental policy, as well as kosher, organic, vegan and halal certifications.

COURSE OUTCOMES

1. Ability to explain the principles of quality and safety management system in food production.
2. Ability to analyze the effectiveness of each quality and safety management system in maintaining quality and prevention of food safety hazards.
3. Ability to critically evaluate the issues related to food quality and safety management system.

REFERENCES

1. King, H. Food Safety Management: Implementing Food Safety Programs. Springer. 2013.
2. Motar Jemi, Y. and Lelieveld, H. Food Safety Management: a Practical Guide for the Food Industry. Academic Press. 2013.
3. Lima, G. P. P. and Vianello, F. Food Quality, Safety and Technology. Springer. 2013.
4. Varzakas, T. and Tzia, C. Handbook of Food Processing: Food Safet, Quality, and Manufacturing Processes. CRC Press. 2015.
5. Luning, P.A. and Marcelis, W.J. (2009). Food Quality Management: Technological and Managerial Principles and Practices. Wageningen Academic Publisher.

PTT 377/3
FUNCTIONAL FOODS & NUTRACEUTICALS (ELECTIVE)

COURSE SYNOPSIS

This course examines the relation of functional foods and nutraceuticals to food and drugs. The safety and efficacy of individual functional foods and nutraceuticals products, and the regulatory issues that influence the development and commercialization of functional foods and nutraceuticals in global markets are emphasize.

COURSE OUTCOMES

1. Ability to apply various research tools in determining the efficacy of functional foods and nutraceuticals.
2. Ability to analyze the safety and efficacy of individual functional foods and nutraceutical products.
3. Ability to evaluate the effect of functional foods and nutraceuticals in health promotion and disease prevention and treatment.

REFERENCES

1. Aluko, R. E. Functional Foods and Nutraceuticals. Springer. 2012.
2. Goldberg, I. Functional Foods: Designer Foods, Pharmafoods, Nutraceuticals. Springer. 2012.
3. John, S., Functional Food Ingredients and Nutraceuticals. 2nd Edition. Taylor & Francis Group. 2016.
4. Bagchi, D., Preuss, H., Swaroop, A. Nutraceuticals and Functional Foods in Human Health and Disease Prevention. Taylor & Francis. 2015.
5. Bagchi, D., Lau, F. C., Ghosh, D. K. Biotechnology in Functional Foods and Nutraceuticals. CRC Press. 2010.

PTT 378/3
DAIRY AND MEAT TECHNOLOGY (ELECTIVE)

COURSE SYNOPSIS

This course provides students with the knowledge and concepts of the processing techniques and technologies to produce variety types of dairy and meat products, methods used to assess the quality, handling and preservation of the dairy and meat products.

COURSE OUTCOMES

1. Ability to demonstrate the understanding on composition and properties of dairy and meat
2. Ability to distinguish the processing techniques and technology as well as method used to assess the quality of dairy and meat products
3. Ability to predict the best methods of handlings and preservation of dairy and meat products.

REFERENCES

1. Pearson, A. M., Duson, T. R. (2013). Production and Processing of Healthy Meat, Poultry and Fish Products. 2nd Edition. Blackie Academic & Professional.
2. Nollet, L. M. L. (2012). Handbook of Meat, Poultry and Seafood Quality. 2nd Edition. Wiley.
3. Breidensten, B. C., Kinsman, D. M. (2013). Muscle Food: Meat Poultry and Seafood Technology. 2nd Edition. Springer.
4. NCPS Boards of Consultant & Engineers. (2013). The Complete Technology Book on Meat, Poultry and Fish Processing. 2nd Edition. NIIR Project Consultancy Services.
5. Guerrero-Legarrata, I. (2010). Handbook on Poultry Science and Technology. Wiley.

6. Bratt, L. (2010). Fish Canning Handbook. 2nd Edition. Wiley.

PTT 451/5
FINAL YEAR PROJECT II
(PRE-REQUISITE: PTT 353/3 FINAL YEAR PROJECT 1)

COURSE SYNOPSIS

This course consists of combination between guided supervision and independent study focusing on the techniques of conducting laboratory and/or field experiments. This course also covers on the implementation of research activities and monitored based on research plan, data analysis, interpretation and conclusion. The students are required to write, submit and defend their thesis to the internal examiners.

COURSE OUTCOMES

1. Ability to plan activities pertaining to research project to meet the required research objectives and datelines.
2. Ability to assess techniques and modern tools to solve research problems.
3. Ability to evaluate experimental data and deduce good conclusion.
4. Ability to produce standard thesis and defend the findings.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition. England: Open University Press. 2011.
2. Hoang, P., Springer Handbook of Engineering Statistic. London: Springer-Verlang. 2006.
3. Bailey, S., A practical guide for students. USA: TJ International Ltd. 2003.
4. A Guide To Student Final Year Project. UniMAP. 2003.
5. San Francisco State University. Guidelines for the preparation and submission of theses and written creative works. San Francisco State Univerity. 2003.

PTT 452/3
PLANT DESIGN PROJECT 2
(PRE-REQUISITE: PTT 354/3 PLANT DESIGN PROJECT 1)

COURSE SYNOPSIS

This course utilizes the knowledge gained by the student's in earlier courses and applies in the complete design a plant. The plant design includes cost estimation, profitability analysis, piping and instrumentation, plant control, waste management, plant safety, reliability and operability and plant layout. ASPEN PLUS will be implemented throughout the course in the process plant design.

COURSE OUTCOMES

1. Ability to create a piping and instrumentation diagram (P&ID) and identify potential control system of the designed project
2. Ability to recommend suitable safety and waste management.
3. Ability to evaluate economic profitability analysis of the designed project.

REFERENCES

1. Peters, M.S. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers. 5th Edition. McGraw-Hill, New York. 2004.
2. Sinnott, R.K., Chemical Engineering Design. Vol.6, 3rd Edition. Butterworth-Heinemann. 2012.
3. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S., Product and Process Design Principles: Synthesis, Analysis and Evaluation. 3rd Edition. John Wiley & Sons, New Jersey. 2010.
4. Green, D., Perry, R., Perry's Chemical Engineers' Handbook, McGraw Hill Professional. 2007.
5. Richardson, J.F., Peacock, D.G., Chemical Engineering: Chemical & Biochemical Reactors & Process Control. Vol.3, 3rd Edition. Butterworth-Heinemann. 2007.

PTT 471/3
FOOD PRODUCT DEVELOPMENT & COMMERCIALIZATION

COURSE SYNOPSIS

This course studies the different categories of new food products, identifies reasons for product success and product failure. It also covers on the developing an innovation strategy, gap analysis, product development processes, knowledge- and consumer-based for product development. It includes food product planning and marketing mix strategies, product pricing, promotion and distribution.

COURSE OUTCOMES

1. Ability to analyze the product gap based on knowledge and consumer requirements.
2. Ability to predict product opportunities for commercialization.
3. Ability to develop an optimized food product prototype that can be launched.

REFERENCES

1. Fuller, G. W. New Food Product Development: From Concept to Marketplace. 3rd Edition, CRC Press. 2011.
2. Smith, J. and Charter, E. Functional Food Product Development. Wiley. 2011.
3. Howard, R., Moscowitz, I., Saguy, S. and Straus, T. An Integrated Approach to New Food Product Development. CRC Press. 2009.
4. Brody, A. L. and Lord, J. B. Developing New Food Products for a Changing Marketplace. 2nd Edition, CRC Press. 2007.
5. Aramouni, F. and Deschenes, K. Methods for Developing New Food Products: An Instructional Guide. DEStech Publications Inc. 2014.

PTT 472/3
FOOD PACKAGING TECHNOLOGY
(ELECTIVE)

COURSE SYNOPSIS

The course provides the students with the basic knowledge regarding food packaging materials, equipments and technology. It provides an overview of the packaging science and technology applied to the preservation and shelf life, distribution and marketing of various food products. This course also explains the different procedures and food safety requirements for developing, evaluating and testing of food packages in accordance to international standards.

COURSE OUTCOMES

1. Ability to demonstrate the importance and functions of a packaging system in relation to food preservation.
2. Ability to analyze the properties, economic use and manufacture of packaging materials (glass, plastic, paper and aluminium).
3. Ability to assess the interaction mechanism of packaging materials with various food products to maximise quality and shelf-life of the products.

REFERENCES

1. Coles, R. and Kirwan, M.J. Food and Beverage Packaging Technology, 2nd Edition, Wiley-Blackwell. 2011.
2. Robertson, G.L. Food packaging: Principles and practice, CRC Press. 2012.
3. Morris, S.A. Food and Package Engineering, Wiley-Blackwell. 2011.
4. Kerry, J. and Butler, P. Smart Packaging Technologist for fast moving consumer, Wiley. 2008.
5. Lee, D.S, Yam, K.L and Piergiovanni, L. Food Packaging Science and Technology: Packaging and Converting Technology, CRC Press. 2008.

PTT 473/3
POULTRY AND FISH TECHNOLOGY
(ELECTIVE)

COURSE SYNOPSIS

This course provides students with the knowledge and concepts of the processing techniques and technologies to produce variety types of fish and poultry products, methods used to assess the quality , handling and preservation of the products originating from fish and poultry.

COURSE OUTCOMES

1. Ability to demonstrate the understanding on chemical and biochemical constitution of muscle and fish.
2. Ability to distinguish the processing techniques and technology as well as method used to assess the quality of variety types of fish and poultry products.
3. Ability to predict the best methods of handlings and preservation of fish and poultry products.

REFERENCES

1. Pearson, A. M., Duson, T. R. (2013). Production and Processing of Healthy Meat, Poultry and Fish Products. 2nd Edition. Blackie Academic & Professional.
2. Nollet, L. M. L. (2012). Handbook of Meat, Poultry and Seafood Quality. 2nd Edition. Wiley.
3. Breidensten, B. C., Kinsman, D. M. (2013). Muscle Food: Meat Poultry and Seafood Technology. 2nd Edition. Springer.
4. NCPS Boards of Consultant & Engineers. (2013). The Complete Technology Book on Meat, Poultry and Fish Processing. 2nd Edition. NIIR Project Consultancy Services.
5. Guerrero-Legarrata, I. (2010). Handbook on Poultry Science and Technology. Wiley.
6. Bratt, L. (2010). Fish Canning Handbook. 2nd Edition. Wiley.



BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS) (INDUSTRIAL BIOTECHNOLOGY) - RY21

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of chemical engineering as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply Knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage inindependent and lifelong learning.

CURRICULUM STRUCTURE FOR BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS) (INDUSTRIAL BIOTECHNOLOGY) - RY21

YEAR	FIRST		SECOND		THIRD		FOURTH		
SEMESTER	I	II	III	IV	V	VI	VII	VIII	
Discipline Core (99) & Elective (9)	PLT 121/3 Electrical Technology	PTT 155/3 Organic Chemistry	PTT 251/3 Thermodynamics for Chemical Engineering	PTT 252/3 Fluid Mechanics	PTT 351/2 Safety & Loss Prevention	PTT 353/3 Final Year Project I	PTT 451/5 Final Year Project II	INDUSTRIAL TRAINING (LI) PIT 314	
	PTT 152/2 Physical Chemistry	PTT 156/4 Principles of Chemical Process	PTT 255/3 Reaction Engineering	PTT 253/3 Heat Transfer for Chemical Engineering	PTT 356/3 Separation Engineering	PTT 354/3 Plant Design Project 1	PTT 452/3 Plant Design Project 2		
	PTT 153/3 Materials Engineering	PTT 157/2 Engineering Graphics for Chemical Engineering	PTT 254/3 Mass Transfer for Chemical Engineering	PTT 257/4 Biochemistry & Enzyme Technology	PTT 357/3 Cell & Tissue Culture Technology	PTT 355/3 Process Control & Dynamics	PTT 453/3 Issues & Commercialization in Biotechnology		
	PTT 154/2 Introduction to Process Instrumentation	PTT 158/3 Analytical Chemistry	PTT 256/4 Industrial Microbiology	PTT 258/3 Biomolecular & Genetic Engineering	PTT 358/2 Waste Management & Utilization	PTT 358/3 Biopharmaceutical Technology			
	PCT 111/3 Engineering Skills				PTT 359/4 Upstream & Downstream Processing Technology				
					Elective 1/3 (A1 or A2)	Elective 2/3 (B1 or B2)	Elective 3/3 (C1 or C2)		
Common Core (15)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III			PTT 333/3 Engineering Technology Management	PTT 444/3 Technologist in Society		
University Required (19)	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	*UVA 111/2 Foundation English	**UVW 211/2 English for General Purposes	UUW XXX/2 Option Subject	UVW 312/2 English for Technical Communication				
	UUT 122/2 Skills & Technology in Communication	UVW 410/2 University Malay Language	UUW 322/2 Thinking Skill	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies					
	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UUW 224/2 Engineering Entrepreneurship					
142	21	18	20	17	19	18	17	12	MUET Band 2,3
142	21	18	18	19	19	18	17	12	MUET Band 4, 5, 6

Total Units for Graduation = 142

Elective 1
A1. PTT 360/3 Biotechnology Facility Design
A2. PTT 361/3 Scale up & Process Optimization

Elective 2
B1. PTT 363/3 Bioactive Compounds Extraction Technology
B2. PTT 364/3 Sustainable Green Technology

Elective 3
C1. PTT 456/3 Bioenergy Production Technology
C2. PTT 457/3 Food Processing Technology

*Uncredited.Compulsory to students with MUET Band 2 only. This course is prerequisite to UVW 211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This is a prerequisite to UVW 312 English for Technical Communication.

LIST OF COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS)
(INDUSTRIAL BIOTECHNOLOGY)

- **PLT 121/3 ELECTRICAL TECHNOLOGY**
- **PTT 152/2 PHYSICAL CHEMISTRY**
- **PTT 153/3 MATERIALS ENGINEERING**
- **PTT 154/2 INTRODUCTION TO PROCESS INSTRUMENTATION**
- **PTT 155/2 ORGANIC CHEMISTRY**
- **PTT 156/4 PRINCIPLE OF CHEMICAL PROCESSES**
- **PTT 157/2 ENGINEERING GRAPHICS FOR CHEMICAL ENGINEERING**
- **PTT158/3 ANALYTICAL CHEMISTRY**
- **PTT 251/3 THERMODYNAMICS FOR CHEMICAL ENGINEERING**
- **PTT 252/3 FLUID MECHANICS**
- **PTT 253/3 HEAT TRANSFER FOR CHEMICAL ENGINEERING**
  (PRE-REQUISITE: PTT 156/4 PRINCIPLE OF CHEMICAL PROCESSES)
- **PTT 254/3 MASS TRANSFER FOR CHEMICAL ENGINEERING**
- **PTT 255/3 REACTION ENGINEERING**
- **PTT 256/4 INDUSTRIAL MICROBIOLOGY**
- **PTT 258/3 BIOMOLECULAR AND GENETIC ENGINEERING**
- **PTT 257/4 BIOCHEMISTRY & ENZYME TECHNOLOGY**
- **PTT 351/2 SAFETY & LOSS PREVENTION**
- **PTT 353/3 FINAL YEAR PROJECT 1**
- **PTT 354/3 PLANT DESIGN PROJECT 1**
  (PRE-REQUISITE: PTT 253/3 HEAT TRANSFER FOR CHEMICAL ENGINEERING)
- **PTT 355/3 PROCESS CONTROL & DYNAMIC**
- **PTT 356/4 SEPARATION ENGINEERING**
- **PTT 360/2 WASTE MANAGEMENT AND UTILIZATION**
- **PTT 357/3 CELL AND TISSUE CULTURE TECHNOLOGY**
- **PTT 358/3 BIOPHARMACEUTICAL TECHNOLOGY**
- **PTT 359/3 UPSTREAM AND DOWNSTREAM PROCESSING TECHNOLOGY**
- **PTT 360/3 BIOTECHNOLOGY FACILITY DESIGN**
- **PTT 361/3 (3+0) SCALE UP & PROCESS OPTIMIZATION**
- **PTT 363/3 BIOACTIVE COMPOUNDS EXTRACTION TECHNOLOGY**
- **PTT 364/3 SUSTAINABLE GREEN TECHNOLOGY**
- **PTT 451/5 FINAL YEAR PROJECT II**
  (PRE-REQUISITE: PTT 353/3 FINAL YEAR PROJECT 1)
- **PTT 452/3 PLANT DESIGN PROJECT 2**
- **PTT 453/3 ISSUES AND COMMERCIALIZATION IN BIOTECHNOLOGY**
- **PTT 456/3 BIOENERGY PRODUCTION TECHNOLOGY**
- **PTT 457/3 FOOD PROCESSING TECHNOLOGY**

COURSE SYLLABUS

PLT 121/3
ELECTRICAL TECHNOLOGY

COURSE SYNOPSIS

This course is offered to non-electrical engineering background. This course introduces the basic electrical circuit theory, DC and AC circuits, basic principles of 3-phase AC circuits and magnetic circuits. This course also covers the fundamental of electronic components such as semiconductors, diodes and transistors. The laboratory sessions cover the concepts being discussed in lectures.

COURSE OUTCOMES

1. Ability to demo demonstrate the application of the principle elements of DC and AC circuits, principles of electricity including Kirchhoff's of currents and voltage.
2. Ability to explain parameters of theree phase AC system for Wye and Delta connection, and also the basic concepts of electronic components.
3. Ability to explain the basic concept of magnetism and electromagnetism and its application in Dc and AC machines.

REFERENCES

1. Bird, J. Electrical Circuit Theory and Technology. 4th Edition. Elcevier. 2010.
2. Boylestad, R. Introductory CircuitAnalysis. 12th Edition. Pearson. 2010.
3. Bishop, O. Electronic Circuits and Systems. 3rd Edition. Elsevier.2010.
4. Donald, C. Standard Handbook of Electronic Engineering. McGraw-Hill professional.2004.

PTT 152/2
PHYSICAL CHEMISTRY

COURSE SYNOPSIS

The course discusses the concept of equilibrium in terms of thermodynamics, particularly enthalphy and entrophy. The course also covers the calculations of material equilibrium, reaction equilibrium, reaction kinetics, phase diagrams and equilibrium electrochemistry.

COURSE OUTCOMES

1. Ability to apply the basic concepts, laws and principles in physical chemistry.
2. Ability to calculate problems concerning material equilibrium, standard thermodynamic function and reaction equilibrium in ideal gas mixture.
3. Ability to analyze problems concerning chemical kinetics, phase diagrams and electrochemistry.

REFERENCES

1. Levine, I. N. (2009). *Physical Chemistry, 6th Edition*, McGraw Hill: New York.
2. Atkins, P. and de Paula, J. (2010). *Physical Chemistry, 9th Edition*, Oxford University Press: United Kingdom.
3. Thomas, E and Reid, P. (2010). *Physical Chemistry, 2nd Edition*, Pearson Prentice Hall.
4. Bahl, B.S., Bahl, A., and Tuli, G.D. (2006). *Essentials of Physical Chemistry*. S. Chand: New Delhi.
5. Engel, T., Reid, P., and Drobny, G. (2007). Physical Chemistry for the Life Sciences, 1st Edition, Prentice Hall.

PTT 153/3
MATERIALS ENGINEERING

COURSE SYNOPSIS

This course covers introduction to material science and engineering which emphasizes on material properties and structures. The course encompasses the fundamental of material structure, class of material properties, and measurement of the properties. The common micro-structural characteristics of different material classes as well as some features of biomaterials also embedded in the course.

COURSE OUTCOMES

1. Abilty to DESCRIBE types of material families, material structures, and material characteristics.
2. Ability to DEMONSTRATE the behavior of structural materials, the phases in material and material reliability.
3. Ability to ANALYZE the suitability of material in engineering-related projects.

REFERENCES

1. Smith, W.F. and Hashemi, J. (2011). Foundations of Materials Science and Engineering, 5th Edition, McGrawhill.
2. Askeland, D.R., Fulay, P.P., Wright, W.J. (2010). The Science and Engineering of Materials, 6th Edition, Cengage Learning.
3. Ashby, M., Shercliff, H. and Cebon, D., A., (2007). Materials: engineering, science, processing, and design, Elsevier.
4. Ashby, M. and Jones, D.R.H. (2006). Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann.

5. Sharma, C.P. (2004). Engineering material properties and applications of metal and alloys, Prentice Hall, New Delhi.

PTT 154/2
INTRODUCTION TO PROCESS INSTRUMENTATION

COURSE SYNOPSIS

The course begins with an introduction to process instruments involved in the process industries, followed by introduction to fundamentals of industrial valves which consists of many type of valves. This is complemented with the ability to employ and analyse the ISA (The Instrumentation Systems and Automation Society) symbology and tagging systems. This course also discusses the design and development of the process flow diagram as well as the piping and instrumentation diagram of a simple and complex system.

COURSE OUTCOMES

1. Ability to INTERPRET the operational aspects of different types of valves.
2. Ability to APPLY the appropriate ISA Symbology for the process flow diagram (PFD) and sketch the process flow diagram.
3. Ability to DIFFERENTIATE appropriate ISA Symbology for Piping & Instrumentation Diagram (P & ID).

REFERENCES

1. Liptak, B.G. Process Control and Optimization. 4th Edition, CRC Press, Florida. (2005)
2. Smith, C.A and Corriprio, A. Principles and Practice of Automatic Process Control. 3rd Edition, John Wiley & Sons, New York, (2006).
3. McCabe, W.L., Smith, J.C and Harriot, P. Unit Operations of Chemical Engineering, 7th Edition. McGraw-Hill, New York, (2005).
4. Patience, G.S. Instrumentation Method and Instrumentation for Chemical Engineers. 1st Edition, Elsevier, Oxford, UK, (2013).
5. Towler, G. and Sinnot, R. Chemical Engineering Design: Principle, Practice and Economics of Plant and Process Design, 2nd Edition, Butterworth-Heinemann, Oxford, UK, (2013).
6. McAcinew, T. and Mulley,R. Control System Documentation: Applying Symbols and Identification, 2nd Edition, ISA Press, (2005).

PTT 155/2
ORGANIC CHEMISTRY

COURSE SYNOPSIS

This course introduces the fundamental theories of alkanes, alkenes and alkynes and their related reactions. Then, focusing on conformational analysis of alkanes and emphasizing on the nucleophilic substitution reaction of alkyl halides. The course also covers on physical and chemical properties as well as chemical reactions involving alcohol and ether, aldehyde and ketone, carboxylic acid and aromatic compound. The application of organic chemical process in chemical and biotechnological industry is discussed.

COURSE OUTCOMES

1. Ability to EXPLAIN the chemical and physical properties of each functional group.
2. Ability to DISTINGUISH the chemical reaction and reaction mechanism of functional group.
3. Ability to ANALYZE the knowledge of organic chemical process in biotechnology and chemical industries.

REFERENCES

1. Bruice P.Y. Organic Chemistry 7th Edition. Pearson Prentice Hall. 2014.
2. William H.B., Brent L.I., Eric V.A. and Christopher S.F. Organic Chemistry 7th Edition. Brooks/Cole, Changes Learing. Singapore. 2014.
3. Solomons T.W.G. and Fryhe C.B. Organic Chemistry. 10th Edition. John Wily and Son. Inc. 2011.
4. Smith J.G. Organic Chemistry. 4th Edition. McGraw Hill. New York. 2014.
5. Bruice P.Y. Essential Organic Chemistry. Pearson International. Prentice Hall. 2006.
6. John Macmurray. Organic Chemistry. 5th. Brooks/Cole. 2000.

PTT 156/4
PRINCIPLE OF CHEMICAL PROCESSES

COURSE SYNOPSIS

This course highlights the basic concept of chemical processes involving material and energy balances in various processing systems. Exposure on the fundamental of material and energy balances are emphasized through the knowledge of process types, process variables and evaluation of the different chemical systems involving single and multiple systems as well as the nonreactive and reactive processes.

COURSE OUTCOMES

1. Ability to APPLY knowledge of engineering fundamentals to define chemical process methodologies and solve the basic calculations in chemical process engineering.

2. Ability to analyze information broadly and CALCULATE material balances in chemical systems theoretically and practically using appropriate tools and techniques.
3. Ability to calculate energy balances of chemical processes and ANALYZE the combination of material and energy balances for chemical systems theoretically and practically using appropriate tools and techniques.

REFERENCES

1. Holman J.P. Heat Transfer. 10th Edition, McGraw-Hill, New York., 2010.
2. Incropera F. P & De Witt D. P. Fundamentals of heat and mass transfer, 6th Edition, Wiley, New York., 2006.
3. Coulson J. M and Richardson J. F. Coulson and Richardson's Chemical Engineering Volume 1. 6th Edition, Elsevier., 2008.
4. McCabe W. L., Smith J. C and Harriot P. Unit Operations of Chemical Engineering, McGraw Hill, New York., 2005.
5. Geankoplis C.J. Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey., 2003.
6. Kreith F., Manglik R. M. and Bohn M. S. Principles of Heat Transfer, 7th Edition, Global Engineering, United States., 2011.

PTT 157/2
ENGINEERING GRAPHICS FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course introduces the techniques of engineering graphics to visualize, understand engineering drawings and to develop skill and accuracy in producing drawings. The application of computer graphics using AutoCAD software package is integrated part of the course.

COURSE OUTCOMES

1. Ability to USE geometric construction, multiview, sectional view, 2D and 3D modelings in engineering drawings.
2. Ability to USE dimensioning and tolerance in engineering drawings.
3. Ability to APPLY drawing techniques in engineering drawing.

REFERENCES

1. Finkelstein, E. and Ambrosius, L. AutoCAD 2015 and AutoCAD LT 2015 Bible. Indianapolis, Indiana: Wiley. 2014.
2. Bertoline R.G. and Wiebe N.E. Fundamentals of Graphics Communication. New York: McGraw Hill International. 2007.
3. Ibrahim Zeid. CAD/CAM Theory and Practice. New York: McGraw Hill International. 2010
4. James R. C. Chemical Process Equipment: Selection and Design. Texas: Gulf Professional Publishing. 2005
5. Calmettes J.M. Best of 3D Virtual Product Design. Singapore: Page One Publishing Pte. Ltd. 2005
6. Giesecke, F. E. Engineering Graphics. Upper Saddle River, NJ: Pearson/ Prentice Hall. 2004.

PTT 158/3
ANALYTICAL CHEMISTRY

COURSE SYNOPSIS

The first part of the course covers the basic principle of analytical chemistry which includes data analysis and its interpretation. The second part provides an introduction and application of classical analytical methods such as gravimetry and titrimetry as well as modern methods in analytical chemistry such as chromatographic and spectroscopic technique.

COURSE OUTCOMES

1. Ability to understand and APPLY the basic chemical concepts that are particularly important to analytical chemistry.
2. Ability to understand and APPLY basic principle of different analytical techniques and to CALCULATE and solve analytical problems by intergrating different analytical techniques.
3. Ability to PROPOSE the use of different analytical techniques.

REFERENCES

1. Christian, G. D., Analytical Chemistry. 7th Edition. Wiley. USA., 2014.
2. Harris, Daniel C., Quantitative Analytical Chemistry. 8th Edition. W. H. Freeeman. USA., 2010.
3. Skoog. D. A., West, D. M., Holler, F. J., Fundamental of Analytical Chemistry. 9th Edition. Saunders College Publication. USA. 2013.
4. Harvey, D., Modern Analytical Chemistry. McGraw-Hill. USA., 2000.
5. Keeley, D. and Haines, P.J., Analytical Chemistry. Oxford: Bio Scientific. USA., 2002.
6. Khopkar, S. M., Basic concept of Analytical Chemistry. 3rd Edition. New Age International Publisher. USA., 2008.



PTT 251/3
THERMODYNAMICS FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course introduces students to the basic thermodynamics for chemical engineering application and problem solving which covers first and second laws of thermodynamics. The course also highlights substances properties, mass and energy analysis, entropy, refrigeration cycles as well as thermodynamic property relation and solution, and chemical and phase equilibrium.

COURSE OUTCOMES

1. Ability to apply the fundamentals properties and law of thermodynamics in engineering system.
2. Ability to analyze heat, work and energy of the system and thermodynamic property relations.
3. Ability to synthesize the theory of the solution of thermodynamics, gas mixtures and chemical and phase equilibrium.

REFERENCES

1. Cengel, Y.A. and Boles, M.A. Thermodynamics-An engineering Approach, 8th edition, McGraw-Hill, New York. 2014.
2. Koretsky, M.D. Engineering and Chemical Thermodynamics, John Wiley and Sons. 2014.
3. Smith, J.M., Van Ness, H.C., Abbott, M. M. Introduction to Chemical Engineering Thermodynamics, 7th Edition, McGraw – Hill, New York. 2005.
4. Narayanan, K.V. A Text Book of Chemical Engineering Thermodynamics, Prentice-Hall India. 2010.
5. Moran, M.J., Shapiro, H.N., Boettner, D.D. and Bailey, M.B. Principles of Engineering Thermodynamics, 7th Edition, John Wiley & Sons. 2011.
6. Rajput, R.K. Engineering Thermodynamics, 3rd Edition, Jones and Bartlett Learning. 2009.

PTT 252/3
FLUID MECHANICS

COURSE SYNOPSIS

This course emphasizes fundamental concepts and problem-solving techniques. It covers properties of fluid, pressure, mass, Bernoulli and energy equations, momentum analysis of flow system, dimensional analysis and modelling and fluid flows (internal flows, differential analysis of fluid flow, external flows and compressible flow)

COURSE OUTCOMES

1. Ability to **classify** fluid flows and analyze essential parameters describing them.
2. Ability to **analyze** pressures, forces and stability in fluid systems (closed and open systems) and the link between conserved quantities and the equations of fluid mechanics.
3. Ability to **classify** common devices for measuring pressure, flow rates and turbo macheneris

REFERENCES

1. Cengel, Y. A., and Cimbala, J. M. Fluid Mechanics: Fundamental and Applications, 3rd Edition, McGraw-Hill, 2014.
2. White, F.M. Fluid Mechanics (SI Units), 7th revised edition, McGraw-Hill, 2011.
3. Douglas, J.F., Gasiorek, J.M., Swaffield, J.A. and Jack, L. Fluid Mechanics, 6th revised edition, Pearson Education, 2011.
4. Munson, B.R., Okiishi, T.H. and Huebsch, W.W. Fluid Mechanics, 7th revised edition, John Wiley & Sons, 2013.
5. Munson, B.R., Young, D.F., Okiishi, T.H. and Huebsch, W.W. Fundamentals of Fluid Mechanics, 7th revised edition, John Wiley & Sons, 2012.
6. Crowe, C.T., Elger, D.F., Roberson, J.A and B.C. Williams, Engineering Fluid Mechanics, , 10th revised edition, John Wiley & Sons, 2012.

PTT 253/3
HEAT TRANSFER FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course emphasizes the fundamental concepts and problem-solving techniques related to heat transfer in process engineering. The fundamental theoretical concepts and mechanisms of conduction, convection and radiation of heat transfer and the design fundamentals of basic industrial heat exchangers are analyzed. The use of various equations to estimate total heat capacity and overall heat transfer coefficient, subsequently to be applied to calculate the duty of heat transfer equipment are also presented and discussed.

COURSE OUTCOMES

1. Ability to demonstrate the principles of conduction, convection, and radiation heat transfer.
2. Ability to analyze the problems related to heat transfer process.
3. Ability to analyze the heat exchanger systems related to industries.

REFERENCES

1. Holman J.P. Heat Transfer. 10th Edition, McGraw-Hill, New York., 2010.
2. Incropera F. P. & De Witt D. P. Fundamentals of heat and mass transfer, 6th Edition, Wiley, New York., 2006.
3. Coulson J.M. and Richardson J.F. Coulson and Richardson's Chemical Engineering Volume 1. 6th Edition, Elsevier., 2008.
4. McCabe W.L., Smith J.C and Harriot P. Unit Operations of Chemical Engineering, McGraw Hill, New York., 2005.
5. Geankoplis C.J. Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey., 2003.
6. Kreith F., Manglik R. M. and Bohn M. S. Principles of Heat Transfer, 7th Edition, Global Engineering, United States., 2011

PTT 254/3
MASS TRANSFER FOR CHEMICAL ENGINEERING

COURSE SYNOPSIS

This course emphasizes the fundamental concepts and problem-solving techniques on mass transfer operations and principles. This course provides the knowledge on mass transfer operations at basic to an intermediate level that covers with the theoretical and analytical background to solve the mass transfer operations problems. Topics to be covered include mass transfer mechanism which is diffusion, Ficks Law, Maxwell Law, and principles of absorption, evaporation and drying.

COURSE OUTCOMES

1. Ability to demonstrate the diffusion mass transfer principles.
2. Ability to calculate the mass transfer coefficient.
3. Ability to analyze mass transfer systems related to industry.

REFERENCES

1. Geankoplis, C.J., Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey, 2003.
2. Treybal, R.E., Mass Transfer Operations. McGraw Hill, USA, 2000.
3. McCabe, W.L., Smith, J. and Harriot, P., Unit Operation of Chemical Engineering. McGraw Hill International Edition, 6th Edition, 2001.
4. Seader, J.D. and Henley, E.J., Separation Process Principles. 2nd Edition, John Wiley & Sons, 2006.
5. Theodore, L. and Ricci, F. Mass Transfer Operations for the Practicing Engineer. Wiley-Interscience, 2010.
6. Benitez, J. Principles and Modern Applications of Mass Transfer Operations. Wiley-Interscience, 2nd Edition, 2011.

PTT 255/3
REACTION ENGINEERING

COURSE SYNOPSIS

This course highlights the principles of chemical reactions engineering involving knowledge exploitation of industrial scale reactor design. Fundamental concepts are emphasized through the knowledge of mole balance, conversion and reactor sizing as well as rate law and stoichiometry. Problem-solving techniques are also applied in solving various problem related to isothermal reactor design, collection and analysis of rate data, multiple reaction, catalysis and catalytic reaction mechanism.

COURSE OUTCOMES

1. Ability to demonstratethe principles of chemical reaction engineering design for industrial reactors.
2. Ability to analyze and solve various problem related to reactor design and reaction process.
3. Ability to classify catalyst and developthe catalytic reaction mechanism in a heterogeneous reaction.

REFERENCES

1. Fogler, H. S., Elements of Chemical Reaction Engineering. 6th Edition. Prentice Hall Inc. U.S., 2011.
2. Davis, M. E and Davis, R. J., Fundamentals of Chemical Reaction Engineering. 1st Edition. Mc Graw Hilll, U.S., 2002
3. Fogler, H. S., Essentials of Chemical Reaction Engineering. 1st Edition. Prentice Hall. U.S., 2010.
4. Doraiswamy, L.K and Deniz Uner, Chemical Reaction Engineering: Beyond the Fundamental. CRC Press, 2014.
5. Bruce Nauman, E., Chemical Reactor Design, Optimization and Scale up. 2nd Edition. John Wiley & Sons, 2008.
6. Levenspiel, O., Chemical Reaction Engineering. 3rd Edition. Wiley India Pvt Limited, 2006.

PTT 256/4
INDUSTRIAL MICROBIOLOGY

COURSE SYNOPSIS

The course refreshes microbial fundamentals which include characterization of micro-organisms; aseptic techniques, microscopy, microbial



structure, nutrition, energy generation, reproduction, control of microbial populations and microbial diversity as well as strain improvement for new products and productivity improvement. This course also emphasize on the microbiological industry development, scope of microbiological industries, microbes in microbiological industries, biomass and metabolite production, microbes in bioremediation and in waste treatment industries

COURSE OUTCOMES

1. Ability to demonstrate practical skills in fundamental microbiological methods.
2. Ability to develop bioprocessing systems for industrial products by applying fundamentals of microbial classification, physiology and metabolisms.
3. Ability to evaluate microbiological processes involved in applications production of a range of industrial products.

REFERENCES

1. Okafor, N. 2007. Modern Industrial Microbiology and biotechnology. Science Publishers.
2. Willey J. M., Sherwood L. M., Woolverton C. J. 2008. Prescott, Harley and Klein's Microbiology, 7th Edition, McGraw-Hill, N. York.
3. Black J. G. 2005. Microbiology: principles and explorations, John Wiley, New York.
4. Pelczar M. J., Chan, E. C. S. and Krieg N. R. 2005. Microbiology: concepts and applications, McGraw-Hill, Boston.
5. Waites, M. J., Morgan, N. L., Rockey, J. S. and Higton, G. 2001. Microbiology Industry: An Introduction. Blackwell Science.
6. Baltz, R. H., Davies, J. E., Demain, A. L. 2010. Manual of Industrial Microbiology and Biotechnology. ASM Press.

PTT 258/3
BIOMOLECULAR AND GENETIC ENGINEERING

COURSE SYNOPSIS

This course provides fundamental knowledge on molecular biology and the basic principles of genetic engineering which encompass the doctrines of DNA, RNA, and protein biosynthesis. This course also covers on the regulations of their interactions and the techniques employed in gene cloning and recombinant DNA technology.

COURSE OUTCOMES

1. Ability to DEMONSTRATE on the mechanisms of bio-molecular machines construction and regulation in obtaining genomic information.
2. Ability to DIFFERENTIATE various types of mutations and repair mechanisms.
3. Ability to DISTINGUISH techniques involving genetic modifications.

REFERENCES

1. Allison, L. A. (2011). Fundamental Molecular Biology. 2nd Ed. New York: John Wiley & Sons.
2. Watson, J. D., Hopkins, N. H., Roberts, J.W., Seitz, J. A., & Weiner, A. M. (2008). Molecular Biology of the Gene. 6th Ed. California: Benjamin Cummings Publishing.
3. Malacinski, G. M. (2005). Essentials of Molecular Biology. 4th Ed. Massachusetts: Jones and Bartlett Publishers.
4. Brown, T. A. (1995). Gene Cloning: An Introduction. 3rd Ed. Nelson Thornes Limited.
5. Stephenson, F. H. (2010). Calculations for Molecular Biology and Biotechnology: A Guide to Mathematics in the Laboratory. 2nd Ed. London: Academic Press.

PTT 257/4
BIOCHEMISTRY & ENZYME TECHNOLOGY

COURSE SYNOPSIS

This course covers the fundamentals of biochemistry and its application in enzyme technology. It is designed to introduce student to the properties and structure of water, classification and function of important biomolecules such as carbohydrates, lipids and amino acids, mechanisms of electron transport, citric acid and photosynthesis, and role of proteins and enzymes in biochemistry. The course also covers applications of free and immobilized enzymes in food, chemical and pharmaceutical industries, as well as probable future trends in enzyme technology.

COURSE OUTCOMES

1. Ability to APPLY biochemistry tools in practical works effectively.
2. Ability to DIFFERENTIATE basic properties and classification of important biomolecules.
3. Ability to ANALYZE the processes that occur in living organisms and relate the reactions with one another.
4. Ability to ASSESS the enzyme reaction kinetics for biotechnology application.

REFERENCES

1. Campbell, M.K. & Farrell, S.O. (2011). Biochemistry 7th Edition. Brooks/Cole.
2. McKee, T. & McKee, J. (2003). Biochemistry, 3rd Edition, McGraw Hill. New York.
3. Voet D. & Voet, J.G. (2010). Biochemistry 4th Edition, John Wiley & Sons, New York.
4. Klaus Buchholz, K., Kasche, V., and Bornscheuer, U. T. (2012). Biocatalysts and Enzyme Technology. 2nd Ed. Weinheim, Germany: Wiley-Blackwell.
5. Elliott, W.H. & Elliott, D.C. (2005). Biochemistry 3rd Edition. Oxford University Press.
6. Zarina Zakaria and Harbant Singh (2015). Introductory Biochemistry for Engineering and Technology. Universiti Malaysia Perlis Publisher.

PTT 351/2
SAFETY & LOSS PREVENTION

COURSE SYNOPSIS

The course emphasizes the technical fundamentals of process safety. Students are exposed to the issues in safety associated with toxicology, industrial hygiene, source and dispersion models. Students are then taught about characteristics and possible prevention steps of fires and explosions. Subsequently, they are also exposed to the concept and design of relief system, hazard identification as well as risk assessment. The course is concluded with the lesson in accident investigation.

COURSE OUTCOMES

1. Ability to ANALYZE the type of hazards and dispersion models in chemical engineering processes.
2. Ability to RECOMMEND suitable methods to prevent fires and explosion and to design relief system for process vessels.
3. Ability to EVALUATE safety procedures and designs using proper hazard identification and accident investigation techniques.

REFERENCES

1. D.A. Crowl, J.F. Louvar, Chemical Process Safety; Fundamentals with Applications. Prentice Hall, Second Edition. New Jersey, 2002.
2. P.L. Frank, Loss and Prevention in the Process Industries. Volume 1&2, London, Butterworth, 1980.
3. J.M. Coulson, and J.F. Richardson, Chemical Engineering. Volume 6, Pergamon Press, Oxford, 1983.
4. R.E. Sanders, Chemical Process Safety; Leaning from Case Histories. Elsevier Butterworth, Heinemann, Third Edition. Amsterdam, 2005.
5. V. 7 Marshall, S. Ruheman, Fundementals of Process Safety. Rugby; ICehmE, UK., 2001.

PTT 353/3
FINAL YEAR PROJECT 1

COURSE SYNOPSIS

This course consists of combination between guided supervision and independent study focusing on the technique of identification of problem statements, research objectives, conducting literature review and proposing research methodology. This course also covers scientific and technical guidance on thesis writing as well as preparation and submission of the project proposal. Presentation of the research proposal to the internal examiners is conducted.

COURSE OUTCOMES

1. Ability to ANALYZE scientific information including standards, code of practice, journals, policies, field data, relevant to the specific research to be undertaken and relate with societal and global issues.
2. Ability to DEVELOP problem statements and research objectives of the project.
3. Ability to PLAN research methodology incorporating clear fundamentals, theories and benchmarked against standard practices governing the research project.
4. Ability to prepare and DEFEND research proposal with effective communication skills.

REFERENCES

1. Rowena, M. (2006). How to write a thesis. Open University Press. England.
2. Hoang, P. (2006). Springer Handbook of Engineering Statistic. Springer-Verlang, London.
3. Leo Finkelstein Jr., (2008). Pocket book of technical writing for engineers and scientists, third edition, Mc Graw-Hill international edition, Singapore.
4. A Guide To Student Final Year Project (2003). UniMAP.
5. Bailey, S. (2003). A practical guide for students. TJ International Ltd. USA.



PTT 354/3
PLANT DESIGN PROJECT 1

COURSE SYNOPSIS

This course introduces preliminary design of a process plant to the students. This includes process creation and analysis, selection and design for the principal equipment needed in a process based on the process structure approach. ASPEN PLUS will be implemented throughout the course in the process flow sheeting and equipment design.

COURSE OUTCOMES

1. Ability to CREATE process flow sheets involving reactions, separations and other operations.
2. Ability to DESIGN unit operations in plant based on stoichiometry, thermodynamics, separation, reaction and other engineering principles.
3. Ability to DEVELOP the mass and energy balances of a major selection of the process plant.

REFERENCES

1. Sinnott, R.K., Chemical Engineering Design. Vol.6, 3rd Edition. Butterworth-Heinemann., 2012.
2. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S., Product and Process Design Principles: Synthesis, Analysis and Evaluation., 3rd Edition. John Wiley & Sons, New Jersey, 2010.
3. Green, D., Perry, R., Perry's Chemical Engineers' Handbook, McGraw Hill Professional., 2007.
4. Peters, M.S. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers. 5th Edition. McGraw-Hill, New York., 2002.
5. Richardson, J.F., Peacock, D.G., Chemical Engineering: Chemical & Biochemical Reactors & Process Control. Vol.3, 3rd ed. Butterworth-Heinemann., 2007.

PTT 355/3
PROCESS CONTROL & DYNAMIC

COURSE SYNOPSIS

The course aims to introduce the concept of process control by applying theoretical models of chemical processes for steady and unsteady-state models (dynamic model) of chemical processes. Topics to be covered such as dynamic behavior of processes including Laplace transform, transfer function models, dynamic behavior of first-order and second-order processes. Introduction to feedback control also will be learned in this course including feedback controllers, control system instrumentation, overview of control system design and dynamic behavior of closed-loop control system, PID controller design, tuning, and troubleshooting. The theories are supported by performing laboratory experiments.

COURSE OUTCOMES

1. Ability to ANALYZE basic concepts of process control and theoretical model of chemical processes.
2. Ability to DEVELOP dynamic behavior of process control.
3. Ability to EVALUATE the feedback and feedforward control system for chemical processes.

REFERENCES

1. Seborg, D.E., Edgar, T.F., Mellicamp D.A. "Process Dynamic and Control" John-Wiley, 3rd Edition. (2011).
2. Riggs, J.B. "Chemical and Bioprocess Control" Pearson. (2006).
3. John Francis Richardson, John Metcalfe Coulson, Peacock D.G. "Coulson & Richardson's Chemical Engineering: Chemical & biochemical reactors & Process control"Elsevier. (2007).
4. Marlin, T. "Process Control: Designing Processes and Control System for Dynamic Performance " McGraw-Hill. (2006).
5. Coughonowr "Process system, Analysis and Control", 3rd edition, McGraw-Hill. (2008).

PTT 356/4
SEPARATION ENGINEERING

COURSE SYNOPSIS

This course emphasizes the theory and basic principles of separation processes based on equilibrium stage concepts and mass transfer rate control. This course provides the knowledge of basic design criteria required for binary and multi component separations processes. Topics to be covered include liquid-liquid extraction, vapour-liquid extraction (distillation), solid-fluid extraction (leaching, crystallization and adsorption), mechanical-physical separation process (filtration and centrifugation), and membrane separation technology.

COURSE OUTCOMES

1. Ability to APPLY principles and theory to EXAMINE basic design/operation of liquid-liquid extraction, leaching and crystallization equipment.
2. Ability to APPLY and CALCULATE based on principles of mechanical-physical separation process and membrane separation process.
3. Ability to APPLY principles and theory to DEVELOP basic design/operation of adsorption tower, and distillation column.

REFERENCES

1. Seader, J.D., Henley, E. and Roper, D.K., Separation Process Principles: Chemical and Biochemical. 3rd Edition, Wiley, 2010.
2. Coulson, JM. and Richardson, J.F., Chemical Engineering Volume 2. 5th Edition, Elsevier-Science, 2002.
3. Geankoplis, C.J., Transport Processes and Separation Process Principles: Includes Unit Operations. 4th Edition, Prentice Hall, New Jersey, 2003.
4. Wankat, P.C., Separation Process Engineering. 2nd Edition, Prentice Hall, New Jersey, 2006.
5. Green, D. and Perry, R., Perry's Chemical Engineers' Handbook. 8th Edition, McGraw-Hill Professional, 2007.

PTT 360/2
WASTE MANAGEMENT AND UTILIZATION

COURSE SYNOPSIS

The course introduces the main aspects of utilization of the food industry waste and the treatments necessary to discard waste to environmental acceptors which emphasize on the exigency for utilization and treatment of food waste according to the ISO 14001. Topics cover include technology of anaerobic fermentation for biogas production, specific degradation of solid wastes including their direct practical applicability, as well as composting of agricultural and food waste.

COURSE OUTCOMES

1. Ability to propose and demonstrate methods to purify biologically processed materials.
2. Ability to choose appropriate instrumentation, equipment, and steps required in bio separation systems and applications.
3. Ability to analyze and compare alternative separation approaches and systems.

REFERENCES

1. Sivasankar, B. (2011) Bioseparations: Principles and Technique, Prentice Hall.
2. McCabe, W. L., Smith, J. C., and Harriott, P. (2004) Unit Operations of Chemical Engineering, McGraw-Hill.
3. Geankoplis, C.J. (2003) Transport Processes and Separation Process Principles, Prentice Hall.
4. Harrison, R.G., Todd, P., Rudge S.R., and Petrides D.P. (2002) Bioseparations Science and Engineering, Oxford University Press.
5. Ladisch, M. R. (2001) Bioseparations Engineering: Principles, Practice and Economics, Wiley-Interscience.

PTT 357/3
CELL AND TISSUE CULTURE TECHNOLOGY

COURSE SYNOPSIS

This course introduces the basic knowledge of plant and animal cell and tissue cultures with the incorporation of current technology. The topic covers include media preparation, sterilization methods, aseptic techniques in cell culture and applications of plant and animal cell and tissue cultures in various fields.

COURSE OUTCOMES

1. Ability to operate laboratory equipment and sterilization methods for plant and animal tissue cultures.
2. Ability to differentiate techniques involved in plant and animal tissue cultures.
3. Ability to evaluate importance uses of plant and animal tissue culture technology in industrial biotechnology.

REFERENCES

1. Robert, N. T. and Dennis, J. G. Plant Tissue Culture, Development and Biotechnology. CRC Press. (2011)
2. Ian, R.F. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications. 6th Edition, Wiley-Blackwell. (2010)
3. Sathyanarayana, B. N. and Varghase, D. B. Plant Tissue Culture: Practices and New Experimental Protocols. I. K. International Pvt. Ltd. (2007)
4. Neumann, K.-H. and Kumar, A., Imani, J. Plant Cell and Tissue Culture - A Tool in Biotechnology: Basics and Application (Principles and Practice), Springer. (2009)
5. Sheelendra, M. Animal Cell Culture: Concept and Application. Alpha Science International. (2008)
6. Michael, B. Animal Cell Culture and Technology. 2nd Edition, Garland Science/ BIOS Scientific Publishers. (2004)

PTT 358/3
BIOPHARMACEUTICAL TECHNOLOGY

COURSE SYNOPSIS

This course provides a balanced overview of the biopharmaceutical industry, in terms of categorizing the products currently available, and illustrating the drug develop and delivery processes. It also focuses on several traditional and advanced biopharmaceutical drug development and isolated process.



COURSE OUTCOMES

1. Ability to CATEGORIZE various biopharmaceuticals and ILLUSTRATING biopharmaceuticals regulatory compliance.
2. Ability to DESIGN and DEMONSTRATE production process of biopharmaceuticals.
3. Ability to DESIGH and EVALUATE the biotechnology products in the development of biopharmaceuticals technology.

REFERENCES

1. Walsh.G, Biopharmaceuticals: Biochemistry and biotechnology, John Wiley & Sons Lt, 2006
2. Walsh, G, Pharmaceutical biotechnology : Concepts and Applications, John Wiley & Sons Ltd, Chichester, West Sussex , England, 2007
3. Kathleen Laura Hefferon, Biopharmaceuticals in Plants: Toward the Next Century of Medicine, CRC Press, 2009
4. Jörg Knäblein, Modern Biopharmaceuticals: Design, Development and Optimization, Wiley-VCH, 2005
5. Feroz Jameel, Susan Hershenson, Formulation and Process Development Strategies for Manufacturing Biopharmaceuticals, Wiley, 2010

PTT 359/3
UPSTREAM AND DOWNSTREAM PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course provides an introduction to the fundamental ideas of the preparation and conversion of cell biology into new product. It highlights the upstream process involving biological system and media design, types of bioreactor and analysis of various types of bioreactor system for microbial, animal and plant cell cultures as well as solid state fermentation. For downstream process, it involves precipitation, solvent extraction and different types of chromatographic techniques.

COURSE OUTCOMES

1. Ability to ANALYZE the principle and calculation involves in the upstream process development.
2. Ability to ANALYZE the principle and calculation involves in the downstream process development.
3. Ability to EVALUATE the bioreactor design and purification techniques.

REFERENCES

1. Shuler, M. L. and Kargi, F. (2001). Bioprocess Engineering: Basic Concepts." 2nd ed. Prentice Hall PTR, Upper Saddle River, NJ.
2. Harrison, R.G. Todd, P., Rudge S.R. and Petrides D.P. (2003)." Bioseparations Science and Engineering", Oxford University Press.
3. McCabe, W. L., Smith, J. C. and Harriott, P. (2004). "Unit Operations of Chemical Engineering", McGraw-Hill.
4. Geankoplis, C.J. (2003). "Transport Processes and Separation Process Principles", Prentice Hall.
5. Doran, P. M. (2006). Bioprocess Engineering Principles. Academic Press, London.
6. Najafpour, G.A. (2007). Biochemical Engineering and Biotechnology. Elsevier B.V., Amsterdam.

PTT 360/3
BIOTECHNOLOGY FACILITY DESIGN

COURSE SYNOPSIS

This course exposes the overview of biotechnology facility design that parallel to the regulatory compliance according to current Good Manufacturing Practices (cGMP) and documentation for validation of biotechnology facility. The topics emphasize on general equipment design involves in producing and processing biological products, instrumentation and controls in bioprocess, aseptic processing and sanitary design, as well as utilities system.

COURSE OUTCOMES

1. Ability to ANALYZE the bioprocess equipment, process flow, interactions between facility areas, critical equipment parameters and the design issues.
2. Ability to CREATE aseptic processing and relate with the idea of sanitary design.
3. Ability to EVALUATE the importance of GMP in manufacturing and be able to write validation documentation.

REFERENCES

1. Rehm, H. J. and Reed, G. Biotechnology Facility Design and Process Validation. Weinheim, Germany: Wiley. 2008.
2. Andrew, A. S., and Terry, J. Good Design Practices for GMP Pharmaceutical Facilities. Taylor & Francis., 2005.
3. Beatrice, M.G. Biotechnology Facility Design and Process Validation. Biotechnology 2nd Edition. New Jersey, USA: John Wiley & Sons, Inc., 2008.

4. Beth, H.J. Pilot Plants: Design and Operation. Encyclopaedia of Industrial Biotechnology. New Jersey, USA: John Wiley & Sons, Inc., 2009.
5. Bjorn K.L, Nancy, A.D. and Kim L.N. Bioprocess Engineering: System, Equipment and Facilities. (Edited version). New York, John Wiley & Sons, 2005.
6. Jeffery, N. O. Biopharmaceutical Facility Design and Validation. Encyclopaedia of Industrial Biotechnology. New Jersey, USA: John Wiley & Sons, Inc., 2013.
7. Rathore, A. S., and Sofer, G. Process Validation in Manufacturing og Biopharmaceuticals: Guidelines, Current Practices, and Industrial Case Studies. Taylor & Francis., 2005.

PTT 361/3
SCALE UP & PROCESS OPTIMIZATION

COURSE SYNOPSIS

This course covers introduction to scale-up methods, pilot plants, models and principles used in biotechnological processes involving bioreactor design and oxygen transfer rate. The content of the course also consists of theory and applications of optimization techniques. The course also teach students to solve problems related to biotechnological processes by applying or modifying a scale up and optimization techniques.

COURSE OUTCOMES

1. Ability to understand scale up procedures in biotechnological processes involving bioreactor design, dynamic models and oxygen transfer rate.
2. Ability to apply the knowledge of optimization and optimum design and an overview of optimization methods in biotechnological processes.
3. Ability to identify, formulate and solve problems related to biotechnological processes by applying or modifying a scale up and optimization techniques.

REFERENCES

1. M. Zlokarnik, "Scale-up in Chemical Engineering", Wiley-VCH (2006).
2. T.F. Edgar, D.M. Himmelblau, L.S. Lasdon, "Optimization of Chemical Processes", Second Edition McGraw-Hill International Edition, Chemical Engineering Series (2001).
3. S.S.Rao, "Engineering Optimization Theory and Practice", Fourth edition, New Age International Publishers, India (2009).
4. K. Deo, "Optimization Techniques", Wiley Eastern (1995).
5. M. Zlokarnik, "Dimensional Analysis and Scale-up in Chemical Engineering.", Springer Verlag, Berlin, Germany (1991).

PTT 363/3
BIOACTIVE COMPOUNDS EXTRACTION TECHNOLOGY

COURSE SYNOPSIS

This course highlights on the knowledge of technology applications in extraction of bioactive compounds. Exposure on the origins of the natural bioactive compound and its uses are discussed prior to emphasize on the principles and critical aspects of various technology-assisted extraction techniques. Further steps in extraction involving structural modifications of compound are included and the industrial applications of the extraction technologies are also discussed.

COURSE OUTCOMES

1. Ability to categorize the types and occurrence of natural bioactive compounds from various sources and analyze the uses of these compounds in related industries.
2. Ability to distinguish different methods and technologies of extraction and analyze the principles of various extraction techniques.
3. Ability to examine advance extraction steps for compound purification and propose appropriate extraction technologies for industrial applications.

REFERENCES

1. M. Angela A. Meireles, 2009. Extracting bioactive compounds for food products, CRC Press,
2. Jose L. Martinez. 2008. Supercritical fluid extraction of nutraceuticals and bioactive compounds, CRC Press,
3. Steven M. Colegate, Russell J. Molyneux, 2007. Bioactive Natural Products: Detection, Isolation, and Structural Determination, Second Edition, CRC,
4. Manuel Aguilar, Jose Luis Cortina. 2008. Solvent Extraction and Liquid Membranes: Fundamentals and Applications in New Materials (Ion Exchange and Solvent Extraction), CRC,
5. EugÂne Vorobiev. 2008. Electrotechnologies for Extraction from Food Plants and Biomaterials (Food Engineering Series), Springer.

PTT 364/3
SUSTAINABLE GREEN TECHNOLOGY

COURSE SYNOPSIS

This course highlights on the knowledge of technology applications in Green Chemistry by using different tools for



sustainability such as chemical catalyst and bio-catalyst. The course next focuses on the exposure of different types of renewable energies (eg solar thermal energy, solar photovoltaics, wind energy, geothermal energy, hydro power energy, wave and tidal energy) and its technology are emphasized prior to discussion on Green Building Design with approaches of sustainable site and landscape. Different strategies of High-Performance Building Energy Design for energy reduction in Green Building are further discussed in details.

COURSE OUTCOMES

1. Ability to demonstrate the need of sustainable green technologies based on the current energy and environmental issues.
2. Ability to explain and distinguish the different types of renewable energy resources and different tools for sustainable Green Chemistry.
3. Ability to compare different strategies and approaches for Green Buildings technology design.

REFERENCES

1. John Twidell and Tony Weir, Renewable energy resources 3rd edition, New York, Taylor and Francis Group, 2015.
2. Charles J. Kibert, Sustainable Construction: Green Building Design and Delivery, 4th Edition Wiley, 2016.
3. John Andrews and Nick Jelley, Energy Science – Principles, Technologies, and Impacts, Oxford University Press, 2007.
4. Brebbia, C. A.Reniers, G.2011. Sustainable Chemistry. Boston : WIT, 2011.Call number: TP155.2.E58 .S97 2011.
5. Allen, D. T., Shonnard, D. R. 2002. Green Engineering: Environmentally Conscioue Design of Chemical Processes. Call number: TP155.2.E58 .A54 2002.

PTT 451/5
FINAL YEAR PROJECT II
(Pre-requisite: PTT 353/3 Final Year Project 1)

COURSE SYNOPSIS

This course consists of combination between guided supervision and independent study focusing on the techniques of conducting laboratory and/or field experiments. This course also covers on the implementation of research activities and monitored based on research plan, data analysis, interpretation and conclusion. The students are required to write, submit and defend their thesis to the internal examiners.

COURSE OUTCOMES

1. Ability to PLAN activities pertaining to research project to meet the required research objectives and datelines.
2. Ability to ASSESS techniques and modern tools to solve research problems.
3. Ability to EVALUATE experimental data and deduce good conclusion.
4. Ability to produce standard thesis and DEFEND the findings.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition. England: Open University Press., 2011.
2. Hoang, P., Springer Handbook of Engineering Statistic. London: Springer-Verlang., 2006.
3. Bailey, S., A practical guide for students. USA: TJ International Ltd., 2003.
4. A Guide To Student Final Year Project. UniMAP, 2003.
5. San Francisco State University. Guidelines for the preparation and submission of thesesand written creative works. San Francisco State Univerity, 2003.

PTT 452/3
PLANT DESIGN PROJECT 2
(Pre-requisite: PTT 354/3 Plant Design Project 1)

COURSE SYNOPSIS

This course utilizes the knowledge gained by the student's in earlier courses and applies in the complete design a plant. The plant design includes cost estimation, profitability analysis, piping and instrumentation, plant control, waste management, plant safety, reliability and operability and plant layout. ASPEN PLUS will be implemented throughout the course in the process plant design.

COURSE OUTCOMES

1. Ability to CREATE a piping and instrumentation diagram (P&ID) and identify potential control system of the designed project
2. Ability to RECOMMEND suitable safety and waste management.
3. Ability to EVALUATE economic profitability analysis of the designed project.

REFERENCES

1. Peters, M.S. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers. 5th Edition. McGraw-Hill, New York., 2004.
2. Sinnott, R.K., Chemical Engineering Design. Vol.6, 3rd Edition. Butterworth-Heinemann., 2012.

3. Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S., Product and Process Design Principles: Synthesis, Analysis and Evaluation., 3rd Edition. John Wiley & Sons, New Jersey, 2010.
4. Green, D., Perry, R., Perry's Chemical Engineers' Handbook, McGraw Hill Professional., 2007.
5. Richardson, J.F., Peacock, D.G., Chemical Engineering: Chemical & Biochemical Reactors & Process Control. Vol.3, 3rdEdition. Butterworth-Heinemann., 2007.

PTT 453/3
ISSUES AND COMMERCIALIZATION IN BIOTECHNOLOGY

COURSE SYNOPSIS

The course covers the current status in biotechnology research and commercialization aspects of biotechnology products. There also information on patenting, intellectual property and licensing of biotechnology products as well as developing business plans to meet the market needs. Also covers are preparation of pre-commercialization phase and entrepreneurial skills should be possesses by the students.

COURSE OUTCOMES

1. Ability to ASSESS the commercial aspects of biotechnology products.
2. Ability to select a potential product and PREPARE a business plan for that particular product.
3. Ability to APPRAISE entrepreneurial skills and cultures for success entrepreneur's business.

REFERENCES

1. Anon. Commercialization: Beginner's Module, An article from Akedemi Kepimpinan Pengajian Tinggi (AKEPT) workshop for Research Commercialization, 17 May 2014.
2. Daria Mochly-Rosen & Kevin Grimes. Commercialization and Entrepreneurship, In: A Practical Guide to Drug Development in Academia. Springer International Publishing. 2014.
3. Wynand C., J. Gobler, Frikkie van Niekerk. A proposed Management Framework for Commercialization of Expertise at Public Universities. In: Innovation Through Knowledge Transfer. Springer Berlin Heidelberg. 2010.
4. Shreefal S. Mehta, Commercializing Successful Biomedical Technologies: Basic Principles for the Development of Drugs, Diagnostics and Devices, Cambridge University Press, 2008
5. Maureen D. McKelvey, Annika Rickne, Jens Laage-Hellman, The Economic Dynamics Of Modern Biotechnology, Edward Elgar Publishing, 2004
6. Cecile Niewwenhuizen. Entrepreneuship Skills. Double Storey Publishers; (2nd edition).2009.

PTT 456/3
BIOENERGY PRODUCTION TECHNOLOGY

COURSE SYNOPSIS

The course explains in detail global energy sources, fossil fuels, and renewables, Biomass Feedstocks, biofuels. processing conditions and alternative applications of biorenewable feedstocks. Liquid and Gaseous Biofuels, including main liquid biofuels such as bioethanol, biodiesel, biogas, biohydrogen, liquid and gaseous fuels from the Fischer–Tropsch synthesis are addressed in detail. Discussion on Thermochemical Conversion Processes covers the utilization of biorenewables, Biofuel Economy and Biofuel Policy are also included.

COURSE OUTCOMES

1. Ability to differentiate different sources and types of bioenergy.
2. Ability to analyze economic and environmental impact of bioenergy.
3. Ability to demonstrate production process of bioenergy.

REFERENCES

1. Ayhan Demirbas. (2009). Green Energy and Technology, Springer-Verlag London Ltd.
2. Caye M.Drapcho, Nghiem Phu Nhuan, Terry H. Walker. (2008) Biofuels Engineering Process Technology, The McGraw-Hill Companies.
3. **Wilfred Vermerris. (2008).** Genetic Improvement of Bioenergy Crops, Springer.
4. **Frano Barbir, Sergio Ulgiati. (2008).** Sustainable Energy Production and Consumption: Benefits, Strategies and Environmental Costing, Springer.
5. Dwight Tomes, Prakash Lakshmanan, David Songstad. (2010). Biofuels: Global Impact on Renewable Energy, Production Agriculture, and Technological Advancements, Springer.

PTT 457/3
FOOD PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This course covers multidisciplinary fields of food processing technology and related industries. Topics covered include food science, sensory and nutritional properties of foods, food spoilage, food production systems and preservation

processes including thermal processes, chilling and freezing, freeze-drying, direct-heating, irradiation, extrusion, packaging, texturization, mechanical separation and food biotechnology.

COURSE OUTCOMES

1. Ability to DIFFERENTIATE the principles of food processing technology.
2. Ability to EVALUATE the effects of processing on sensory and nutritional properties of food.
3. Ability to EVALUATE problems involved in food production.

REFERENCES

1. Fellows, P., Food Processing Technology: Principles and Practice, CRC Press NY., 2009.
2. Singh, R.P., Introduction to Food Engineering. , 2008
3. Campbell-Platt, G., Food Science and Technology. John Wiley, New York., 2009.
4. Toledo, R.T. Fundamental of Food Process Engineering. SpringerLink., 2007.
5. Smith, P.G., Introduction to Food Process Engineering., SpringerLink., 2011.
6. Shetty, K., Paliyath, G., Pometto, A. and Levin, R.E., Food Biotechnology. CRC Press Boca Raton., 2006.

BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY (HONOURS) (INDUSTRIAL POWER) - RY31

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of electrical engineering as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialisation.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE FOR BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY (HONOURS) (INDUSTRIAL POWER) – RY31

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (105)	PLT 101/3 Computer programming	PLT 105/3 Electric Circuit Theory I	PLT 201/3 Electric Circuit Theory II	PLT 205/4 Electrical Machines Technology I	PLT 301/4 Electrical Machines Technology II	PLT 340/4 Final Year Project I	PLT 440/6 Final Year Project II	PIT 304/12 Industrial Training
	PLT 102/2 Computer Aided Drafting (CAD)	PLT 106/3 Digital Electronics	PLT 202/3 Measurement & Instrumentation	PLT 206/3 Microcontroller System	PLT 302/3 Electrical Installation I	PLT 306/3 Electrical Installation II	PLT 401/3 Power System Protection & Switchgear	
	PCT 111/3 Engineering Skills I	PLT 107/3 Electronics I	PLT 203/3 Electronics II	PLT 207/3 Power Electronic	PLT 303/3 Electrical Drives	PLT 307/3 *Programmable Logic Controller (PLC)*	**PLT 4XX/3 Elective II	
		PLT 108/3 Engineering Skills II	PLT 204/3 Electromagnetic Field Theory	PLT 208/3 Communication System	PLT 304/4 Electrical Power System	*PLT 3XX/3 Elective I	***PLT 4XX/3 Elective III	
				PLT 209/3 Signal & Systems	PLT 305/3 Control System Technology			
Common Core (18)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III					
	PLT 104/3 Engineering Science					PTT 333/3 Engineering Technology Management	PTT 444/3 Technologist in Society	
University Require (19)	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UUW 224/2 Engineering Entrepreneurship	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies	UUW 322/2 Thinking Skills		
	UUT 122/2 Skills & Technology in Communication	UVW 410/2 University Malay Language	UVW XXX/2 English for General Purposes	UVW 312/2 English for Technical Communication				
	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UVA 111/0 Foundation English	UVW XXX/2 Option subjects					
144	19	18	20	20	19	18	18	12
Total Units for Graduation 142								

Elective I Elective II Elective III
A1: PLT 308/3 Power Quality B1: PLT 402/3 Industrial Automation C1: PLT 404/3 Renewable Energy System
A2: PLT 309/3 Substation Engineering B2: PLT 403/4 High Voltage Technology C2: PLT 405/3 Energy Efficiency & Management

LIST OF COURSES

BACHELOR OF ENGINEERING TECHNOLOGY (ELECTRICAL) (HONS) (INDUSTRIAL POWER)

- PLT 101/3 COMPUTER PROGRAMMING
- PLT 102/2 COMPUTER AIDED DRAFTING (CAD)
- PLT 104/3 ENGINEERING SCIENCE
- PLT 105/3 ELECTRIC CIRCUIT THEORY 1
- PLT 106/3 DIGITAL ELECTRONICS
- PLT 107/3 ELECTRONICS 1
- PLT 108/3 ENGINEERING SKILLS II
- PLT 201/3 ELECTRIC CIRCUIT THEORY II
- PLT 202/3 MEASUREMENT & INSTRUMENTATION
- PLT 203/3 ELECTRONICS II
- PLT 204/3 ELECTROMAGNETIC FIELD THEORY
- PLT 205/4 ELECTRICAL MACHINES TECHNOLOGY I
- PLT 206/3 MICROPROCESSOR SYSTEM & MICROCONTROLLER
- PLT 207/3 POWER ELECTRONICS
- PLT 208/3 COMMUNICATIONS SYSTEM
- PLT 209/3 SIGNAL & SYSTEMS
- PLT 301/4 ELECTRICAL MACHINES TECHNOLOGY II
- PLT 302/3 ELECTRICAL INSTALLATION I
- PLT 303/3 ELECTRICAL DRIVES
- PLT 304/4 ELECTRICAL POWER SYSTEM
- PLT 305/3 CONTROL SYSTEM TECHNOLOGY
- PLT 340/4 FINAL YEAR PROJECT I
- PLT 306/3 ELECTRICAL INSTALLATION DESIGN II
- PLT 307/3 PROGRAMMABLE LOGIC CONTROLLER (PLC)
- PLT 308/3 POWER QUALITY
- PLT 309/3 SUBSTATION MAINTENANCE
- PLT 440/6 FINAL YEAR PROJECT II
- PLT 401/3 POWER SYSTEM PROTECTION AND SWITCHGEAR
- PLT 402/3 INDUSTRIAL AUTOMATION
- PLT 403/3 HIGH VOLTAGE TECHNOLOGY
- PLT 404/3 RENEWABLE ENERGY
- PLT 405/3 ENERGY EFFICIENCY AND MANAGEMENT



COURSE SYLLABUS

PLT 101/3
COMPUTER PROGRAMMING

COURSE SYNOPSIS

One of the aspects of a good engineer is to have the capability of integrating the hardware and the software, thus an electrical engineer should be competence in programming. This course introduces basic programming using high level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, familiarize with the programming tools such as organization chart, flowchart and pseudo code and then to implement them by developing C program.

COURSE OUTCOMES

1. Ability to **differentiate** programming concepts and principles.
2. Ability to **apply** programming techniques and tools such as flowchart and pseudo code to design computer programs.
3. Ability to **design** engineering related problems using computer programming techniques.

REFERENCES

1. Cheng, H. (2010). C for Engineers and Scientists. McGraw Hill.
2. Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., (2006). C How To Program. Pearson-Prentice Hall.
3. Sprankle, Maureen. (2006). Problem Solving and Programing Concepts. 7th Edition. Prentice Hall.
4. Hanly, J.R. and Koffman, E.B. (2001). C Program Design for Engineers. 2nd Ed. Addison-Wesley.
5. Al Kelley, Ira Pohl. (2000). C by Dissection: The Essentials of C Programming. 4th ed. Addison-Wesley.

PLT 102/2
COMPUTER AIDED DRAFTING (CAD)

COURSE SYNOPSIS

This is a core subject. It will expose the students to understand the concepts of Computer Aided Drafting. Student also would able to illustrate engineering drawing, 2D and 3D modeling and construct a product drawing.

COURSE OUTCOMES

1. Ability to apply fundamental concepts of Computer Aided Drafting.
2. Ability to illustrate engineering drawing by using proper techniques.
3. Ability to use of Computer Aided Drafting to construct a simple product drawing.
4. Ability to perform in groups to illustrate 2D and 3D modeling.

REFERENCES

1. Alan J Kalameja. (2008). AutoCAD 2008 Tutor for Engineering Graphics'. Delmar Learning.
2. James A. Leach. (2007). AutoCAD 2007 instructor: a student guide to complete coverage of Autocad's commands and features. McGraw Hill.
3. David Frey. (2007). AutoCAD 2007 & AutoCAD LT 2007: no experience required. In:Wiley.
4. Paul Whelan; alih bahasa, T.H. Lai. (1999). AutoCAD LT:cara mudah. Federal Publications.

PLT 104/3
ENGINEERING SCIENCE

COURSE SYNOPSIS

This course aims to introduce to the Electrical Engineering students the knowledge on the principles of material engineering and thermal fluid. It includes aspects related to material engineering, thermodynamics and fluid mechanics.

COURSE OUTCOMES

1. Ability to describe and analyze the Mechanical, Electrical and Magnetic properties of materials.
2. Ability to understand, apply and analyze concepts and principles of Fluid Statics, Bernoulli and Energy Equations.
3. Ability to understand, apply and analyze concepts and principles of First Law and Second Law of Thermodynamics.

REFERENCES

1. William D. Callister, Jr. (2007). Materials Science and Engineering: An Introduction. 7th ed.
2. Yunus A. Cengel, Robert H. Turner. (2005). Fundamentals of Thermal-Fluid Sciences. Int ed. McGraw-Hill.
3. Lim Poh Seng, Tay Seng How, Koh Kok Pin. (2003). Strength of Materials for Polytechnic. Revised ed. Prentice Hall.
4. Robert L. Mott. (2006). Applied Fluid Mechanics. 6th ed. Pearson.

PLT 105/3
ELECTRIC CIRCUIT THEORY 1

COURSE SYNOPSIS

This course covers topics of introduction to the DC circuit's covers fundamental laws and theorems. Students also

get knowledge about AC circuits that introduces phasors and sinusoidal steady state analysis. This course intends to give the students knowledge on understanding three-phase balance systems.

COURSE OUTCOMES

1. Ability to explain important equations to solve problems in DC circuits.
2. Ability to analyze the first and second order circuits containing passive elements, DC sources and switches using differential equations.
3. Ability to evaluate circuit parameters containing sinusoidal steady-state sources using complex impedances and phasor representations.

REFERENCES

1. Charles K. Alexander, Matthew N.O Sadiku. (2013). Fundamentals of Electric Circuits. 5th Edition. Mc Graw Hill.
2. Nilson, J.W.,Riedel, S.A . (2010). Electric Circuits. 9th Edition. Prentice Hall.
3. Irwin, J.D., Nelms, R.M. (2008). Basic Engineering Circuit Analysis. 9th Edition. John Wiley.
4. Robbins, A.H, Miller, W.C. (2006). Circuit Analysis: Theory and Practice. 4th Edition. McGraw Hill.

PLT 106/3
DIGITAL ELECTRONICS

COURSE SYNOPSIS

Basically this introductory circuit course can be divided into two parts. Part I, consisting of chapter 1 through 4, is devoted to DC circuits. It covers fundamental laws and theorems, circuit analytical techniques, passive and active elements. Part 2, consisting of chapter 5 through 7, deals with AC circuits. It introduces phasors, sinusoidal steady state analysis, using previous analytical techniques under sinusoidal steady state excitation, RLC circuits, AC power calculations and power factor correction and rms values.

The aim of this course is to introduce students to the basic knowledge in the digital electronics. The lectures and laboratories cover the following topics: Numbering System, Algebraic Switching, Boolean Function, Combinational Logic and Sequential Logic Circuit.

COURSE OUTCOMES

1. Ability to explain and use the basic principles of numbering system and basic theory of binary system in digital electronics
2. Ability to design and optimizes logic circuit using Boolean functions and Karnaugh maps
3. Ability to design digital system applications using combinational and sequential logic design techniques.

REFERENCES

1. Rosni Abu Kassim, Nooritawati Md Tahir, (2010) Introduction to Electric Circuits, Wiley.
2. David E. Jhonson.(2010). Sistem Digit, Pearson Education, Penerbit Universiti Teknologi Malaysia Press.
3. Floyd. TL. (2009). Digital Fundamentals. 10th Ed. Prentice Hall.
4. Ronald J. Tocci.(2007) Digital Systems – Principles and Applications. 10th Edition, Prentice Hall.
5. Godse, Atul P. Godse, Deepali A. Godse, Gurpreet Singh Ghai. (2007). Digital Electronics, Technical Publications Pune.

PLT 107/3
ELECTRONICS 1

COURSE SYNOPSIS

This subject will expose the students with basic electronic devices. It provides a depth study on the concept of PN junction, operation and characteristics of the diode. The students will be emphasized to half wave rectifiers, Full wave rectifiers, Power Supply Filter and Regulators, Clipper and Clamper Diode circuits and Voltage Multipliers. The students also will learn about the special-purpose of zener diode in terms of its characteristics and applications. Bipolar Junction Transistors (BJTs) and various types of Field-Effect Transistor which are Junction Field-Effect Transistor (JFET) and the Metal Oxide Semiconductor Field-Effect Transistor (MOSFET) will be introduced in this course as well. Basic theories, principles and practical are stressed in this course.

COURSE OUTCOMES

1. Ability to explain and differentiate the fundamental concepts of electronic devices.
2. Ability to analyze the basic operations of electronic devices such as diode, BJT and various types of FET.
3. Ability to calculate and analyze the basic biasing circuits using datasheet.

REFERENCES

1. Neamen Donald A. (2010). Microelectronics :Circuit Analysis and Design. 4th ed. McGraw Hill, Int. Ed.
2. Robert L. Boleystad. (2009). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
3. T. Robert Paynter. (2009). Introductory Electronic Devices and Circuits. 10th ed. Prentice Hall.

4. Puspa Inayat Khalid, Rubita Sudirman, Siti Hawa Ruslan. (2001). Modul Pengajaran Elektronik 1. Edisi ke-3.

PLT 108/3
ENGINEERING SKILLS II

COURSE SYNOPSIS

This is the core subject which is 100% practical and carried out 3 units credit hours. This course contains modules to provide students with engineering skills such as Printed Circuit Board (PCB) fabrication, computer assembled and networking and and electrical domestic wiring.

COURSE OUTCOMES

1. Ability to apply and construct the basic skills and standard practiced of domestic wiring.
2. Ability to apply and construct the basic skills and standard practiced of PCB and electronic component fitting.
3. Ability to apply and construct the basic skills and standard practiced of computer assemble and networking

REFERENCES

1. Haji Md. Nasir. (1997). Panduan Pendawaian Elektrik Domestik. 24th Edition, IBS Buku Sdn. Bhd.
2. Steward, W.E. and Stubbs, T.A. (2005). Modern Wiring Practice: design and installation. 12th Edition, Newnes.
3. Pethebridge, K. and Nesson, I. (2002). Electrical Wiring Practice. 6th Edition, Mc-GrawHill.
4. Othman Shariff, Manual Asas Kerosakan dan Baik Pulih Komputer Peribadi, Venton Publishing,2002.
5. Bruce Hallberg, Networking: A Beginner's Guide, 2005, Mc-GrawHill.

PLT 201/3
ELECTRIC CIRCUIT THEORY II

COURSE SYNOPSIS

This is a core subject. It will expose the students to the circuit analysis using Laplace and Fourier Transform. Student also would able to explain the concept of mutual inductance, frequency response of AC circuit and two port network.

COURSE OUTCOMES

1. Ability to explain and analyze special types of circuit such as mutual inductance and two port networks.
2. Ability to analyze electric circuits using Laplace Transform for the circuit comprising passive elements.
3. Ability to analyze the concepts of frequency response for AC circuits and construct Bode plot for various types of transfer function.
4. Ability to analyze electric circuits using Fourier Series and Fourier Transform for the circuit comprising passive elements.

REFERENCES

1. Charles K Alexander and Matthew Sadiku. (2013). Fundamentals of Electric Circuits. 5th Edition. McGraw-Hill.
2. Nilsson, J. W. and Riedel, S.A. (2010). Electric Circuits. 9th Edition. Prentice Hall, New Jersey.
3. Dorf, R.C., Svodoba, J.A. (2010). Introduction to electric circuits. 8th Edition. John Wiley.
4. Robert L. Boylestad. (2010). Introductory Circuit Analysis, 12th Edition. Pearson.
5. Hyat W.H., Durbin, S.M., Kimmerly, J.E. (2007). Engineering Circuit Analysis, 7th Edition. McGraw Hill.

PLT 202/3
MEASUREMENT & INSTRUMENTATION

COURSE SYNOPSIS

This course covers topics of introduction to the basic concepts of measurement methods and instrumentation. This course intends to give the students knowledge on measuring devices, bridge methods and transducers.

COURSE OUTCOMES

1. Ability to define, describe and analyze the elements of a complete electronic instrumentation and measurement system.
2. Ability to explain and apply the working principles of various sensors and signal conditioning/processing techniques in instrumentation and measurements.
3. Ability to describe and analyze display systems, data acquisition systems and computer interfacing techniques in instrumentation and measurements.

REFERENCES

1. Uday A.Bakshi, Ajay V. Bakshi, K. Shiteeja A. Bakshi. (2007). Electrical Measurements and Measuring Instruments. Pune India. Technical Publications Pune.
2. H.S Kalsi. (2003). Electronics Instrumentation. Tata-McGraw Hill.
3. Ruzairi Hj Abdul Rahim, Herlina Abdul Rahim, Nasaruddin Ahmad, Anita Ahmad. (2003). Pengukuran & Instrumentasi Elektrik. Fakulti Kejuruteraan Elektrik. UTM.
4. Jones L.R, Chin, A.F. (1991). Electronic instruments and measurements. 2nd Edition. Prentice Hall.
5. Bell D.A. (1991). Electronics Instrumentation and measurements. 2nd Edition. Prentice Hall.

PLT 203/3
ELECTRONICS II

COURSE SYNOPSIS

This course is a continuation of electronic circuits in Electronics I. It covers small-signal models and frequency response of amplifier circuits including op-amps at the transistor level. Important electronic circuits that have wide real applications such as Op-Amp Applications (Comparators, Summing Amplifiers, Integrators, Differentiators etc.), Active Filters and Voltage Regulator are also considered.

COURSE OUTCOMES

1. Ability to **analyze** small-signal models and frequency response of basic amplifier circuits. (BJT, FET and operational amplifier).
2. Ability to **design** ideal operational amplifier circuits and various classes of active filters with given design specifications.
3. Ability to **analyze** basic types of voltage regulators.

REFERENCES

1. Thomas L. Floyd. (2011). Electronic Devices. 9th Ed. Prentice Hall.
2. Robert L. Boleystad. (2011). Electronic Devices and Circuit Theory. 11th ed. Prentice Hall.
3. Neamen Donald A. (2009). Microelectronics: Circuit Analysis and Design. 4th ed. McGraw Hill, Int. Ed.
4. Adel S. Sedra, Kenneth C. Smith. (2009). Microelectronics Circuits. 6th Ed. Oxford University Press.
5. Bogart T. F. (2003). Electronic Devices and Circuits. 6th Ed. Prentice Hall.

PLT 204/3
ELECTROMAGNETIC FIELD THEORY

COURSE SYNOPSIS

The purpose of this course is to learn the basic theory and analysis of electromagnetic. Student should be able to understand the basic concept of electrostatics, magneto statics and dynamics. Student should also understand the theory and application of transmission line.

COURSE OUTCOMES

1. Ability to explain the concept of vector analysis in electromagnetic theory.
2. Ability to explain and analyze the concept of electrostatic.
3. Ability to explain and analyze the concept of magneto static.
4. Ability to apply the concept of electromagnetic in transmission line analysis.

REFERENCES

1. Matthew N.O. Sadiku. (2008). Element of Electromagnetics. 3rd Edition. Amazon.
2. U.A. Bakshi and A.V.Bakshi. (2007). Electromagnetic Fields. 1st Edition. Technical Publications Pune.
3. Stuart M Wentworth. (2005). Fundamentals of Electromagnetics with Engineering Applications. Wiley.
4. William H.Hayt, John A Buck. (2006). Engineering Electromagnetics. 6th Edition. McGraw Hill. International ed.
5. Fawwaz T Ulaby. (2004). Fundamentals of Applied Electromagnetics. Pearson. Prentice Hall

PLT 205/4
ELECTRICAL MACHINES TECHNOLOGY I

COURSE SYNOPSIS

The practical and laboratory work are designed to give the students the practical perspective of the single phase, three phase transformer and DC machine. Practical based on experiments are the main practical work for the students in this course. They are given the opportunity to fully utilize the current available facilities to realize the knowledge of practical transformer and DC machine.

COURSE OUTCOMES

1. Ability to define and explain the machinery principle and magnetic circuits and its application to the electrical machines.
2. Ability to explain, apply and analyze the operation and performance of a transformer, DC andAC machines.
3. Ability to determine and analyze the parameters for DC Machines.
4. Ability to apply the related software tools in understanding the principle of electrical machines.

REFERENCES

1. Kothari. D.P, Nagrath. I.J. (2010). Electric Machines. 4th Edition. Tata McGraw Hill. New Delhi.
2. Stephen J. Chapman. (2005). Electric Machinery Fundamentals. 4th Edition. McGraw-Hill.
3. Wildi, T. (2005). Electrical Machine, Drives and Power System. 6th Edition. Prentice-Hall.

PLT 206/3
MICROPROCESSOR SYSTEM & MICROCONTROLLER

COURSE SYNOPSIS

The aims of this course is to study the PIC 18 microcontroller architecture, its programming language (assembly and C) and basic interfacing with input and output devices. These knowledge are gathered and applied to design a simple microcontroller based system.

COURSE OUTCOMES

1. Ability to explain the basic microcontroller architecture.
2. Ability to analyze and write a microcontroller programming language in assembly and C program.
3. Ability to interface the input and output devices with microcontroller.
4. Ability to design a simple microcontroller based system and present in group.

REFERENCES

1. Katzen, S. (2010). The Essential PIC18® Microcontroller (Computer Communications and Networks). Springer.
2. Brey, B.B. (2008). Applying PIC18 Microcontroller: Architecture, Programming and Interfacing using C and Assembly. Prentice Hall.
3. Mazidi, M.A, Mckinlay, R.D, and Causey, D. (2008). PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18. Prentice Hall.
4. Bates, M. (2006). Interfacing PIC Microcontrollers: Embedded Design by Interactive Simulation. Newness.
5. Huang, H.W. (2005). PIC Microcontroller: An Introduction to Software and Hardware Interfacing. Thomson & Delmar Learning.

PLT 207/3
POWER ELECTRONICS

COURSE SYNOPSIS

This course introduces power electronics concepts as a multidisciplinary and interdisciplinary applications oriented technology emphasizing the main criterion of electrical energy conversion; AC-DC, AC-AC, DC-DC and DC-AC converter performance via waveform analyses. It also covers electronic devices such as diodes and transistors, but emphasis is on circuit topology and function rather than on devices. Primary background required is the understanding the voltage-current relationships for linear devices as well as the concept of Fourier series.

COURSE OUTCOMES

1. Ability to **analyze** operation and applications of power electronic devices and addressing the needs of EMC requirements.
2. Ability to **evaluate** the performance of AC-DC and AC-AC converters.
3. Ability to **evaluate** the performance of DC-DC and DC-AC converters.

REFERENCES

1. Muhammad H. Rashid, 'Power Electronics: Circuits, Devices & Applications', 4th Ed., Pearson, Prentice Hall, 2013.
2. Daniel W. Hart, 'Power Electronics', 1st Ed., McGraw Hill, 2011.
3. Andrzej M. Trzynadlowski, 'Introduction to Modern Power Electronics', 2nd Ed., Wiley, 2010.
4. Robert Perret, 'Power Electronics: Semiconductor Devices', NJ: Wiley, 2009.
5. Robert W. Erickson, Dragan Maksimovic, 'Fundamentals of Power Electronics', 2nd Ed., Springer, 2012.

PLT 208/3
COMMUNICATIONS SYSTEM

COURSE SYNOPSIS

This course aims to introduce students the basic principles and concepts of communication system including the basic elements of communications such as modulation techniques (amplitude modulation, angle modulations and digital modulations), transmission channels and medium. In addition, signal propagations and noise in communication system also discussed.

COURSE OUTCOMES

1. Ability to distinguish the basic requirement of communication systems and the essential of communication system.
2. Ability to differentiate the different types of modulation.
3. Ability to evaluate and analyze noise in communication system.

REFERENCES

1. Wayne Tomasi. (2004) 'Electronic Communications Systems: Fundamentals Through Advanced', 5th Ed., Pearson Prentice Hall.
2. Ian Glover, Peter M. Grant. (2009). Digital Communications. Prentice Hall.
3. Louis E. Frenzel. (2007). Principles of Electronic Communication Systems. McGraw-Hill.
4. William D. Stanley and John M. Jeffords. (2006). Electronic communications: principles and systems. Thomson Delmar Learning.
5. Jeffrey S. Beasley, Gary M. Miller. (2005). Modern electronic Communication. Pearson/Prentice Hall.

PLT 209/3
SIGNAL & SYSTEMS

COURSE SYNOPSIS

This course aims to introduce students the basic of signals and systems. To learn how certain input to a system will produce the required output. Understand signal spectrum concept and the method being utilized to analyze signal and its relations.

COURSE OUTCOMES

1. Ability to identify type and analyze waveform of the signals and its characteristic in engineering systems.
2. Ability to analyze signals and determine the process of the systems.
3. Ability to explain and calculate the system response using variable methods.
4. Ability to prepare a report in relevant topics using various resources.

REFERENCES

1. Charles L. Philips, John M. Parr, Eve A. Riskin. (2003). Signals, Systems and Transforms. 3rd Edition. Prentice Hall International Edition.
2. Simon Haykin, Barry Van Veen. (1999). Signals and Systems. 2nd Edition. Wiley.
3. Fred J. Taylor. (1994). Principles of Signals and Systems. McGraw Hill International Edition.

PLT 301/4
ELECTRICAL MACHINES TECHNOLOGY II

COURSE SYNOPSIS

Electrical Machines Technology II is intended to give the students deep knowledge about the three phase system, single phase, three phase induction motor, synchronous machine, motor starter, testing and maintenance of electrical machines. This course focuses on the following concepts: The practical and laboratory work are designed to give the students the practical perspective of the three phase system, three phase AC motor, open and fix motor, star-delta starter and testing the AC motor. Practical based on experiments are the main practical work for the students in this course. They are given the opportunity to fully utilize the current available facilities to realize the knowledge of practical three phase system and AC motor.

COURSE OUTCOMES

1. Ability to define and explain the three phase system and its application to the electrical machines.
2. Ability to define and explain the single phase, synchronous and three phase motor and its application to the electrical machines.
3. Ability to determine and analyze parameters for AC Machines and the used of the motor starter.
4. Ability to apply related testing, maintenance and software tools in understanding the principle of electrical machines.

REFERENCES

1. Stephen J. Chapman. (2011). Electric Machinery Fundamentals. 5th Edition. McGraw-Hill.
2. Bhattacharya S.K. (2009). Electrical Machines. 3rd Edition. McGraw-Hill.
3. D.P. Kothari and I.J. Nagrath Hughes. (2008). Electric Machines. 4th Edition. Tata McGraw-Hill.
4. Theraja B.L. (2007). A Text Book of Electrical Technology, Volume II (Electrical Machines. S. Chand & Company Ltd.
5. Wildi, T. (2005). Electrical Machine, Drives and Power System. 6th. Edition. Prentice-Hall.

PLT 302/3
ELECTRICAL INSTALLATION I

COURSE SYNOPSIS

This course uses a combination of theory and practical 'hands on' project assignment to demonstrate and reinforce the principles. Students in this course are expected to work through the project assignments. The project assignments are based on actual installations and projects in low voltage system.

COURSE OUTCOMES

1. Describe, explain and apply the IEE Regulations and IEC Standards.
2. Define the general characteristics of an electrical installation.
3. Design electrical lighting and power requirements for building and specific applications.
4. Design electrical lighting and power installations for specific application

REFERENCES

1. N.Hasnizam & M.Rafi. (2011). Lectures Notes: Electrical Installation Design. PPKSE.
2. G.Stokes & J.Bradley. (2009). A Practical Guide To The Wiring Regulations – 17th Edition IEE Wiring Regulations (BS 7671:2008). 4th edition. John Wiley & Sons.
3. BSI & IEE. (2008). BS 7671 (2008) Requirements For Electrical Installations – IEE Wiring Regulations. 17th Edition. Polestar Wheatones.
4. T.Linsley. (2008). Basic Electrical Installation Work. 5th edition. UK: Elsevier & Newnes Press.
5. T.Linsley. (2008). Advanced Electrical Installation Work. 5th edition. UK: Elsevier & Newnes Press.



PLT 303/3
ELECTRICAL DRIVES

COURSE SYNOPSIS

This course provides the student an exposure application of Power Electronics for electric motor drives. It emphasize on fundamental concepts of power electronic drives, electrical machines types and related applications. The aspects of load characteristic and matching drives to load also discussed.

COURSE OUTCOMES

1. Ability to evaluate converters parameters for controlling DC motor drives.
2. Ability to evaluate converters parameters for controlling AC motor drives.
3. Ability to analyze the effect of dynamic load.
4. Ability to analyze the braking to the drive requirement.

REFERENCES

1. Muhammad H. Rashid. (2013). Power Electronics: Circuits, Devices and Application. Fourth Edition. Prentice Hall International Inc. New Jersey
2. Austin Hughes. (2013). Electric Motor and Drives: Fundamentals, Types and Application. 4th Edition. USA: Newnes.
3. Jens Weidauer. (2014). Electrical Drives: Principles, Planning, Application, Solutions. 5th Edition. UK: Publicis.
4. Ned Mohan. (2012). Electric Machines and Drives. 1st Edition. UK: Wiley.
5. Theodore Wildi. Electrical Machines, Drives and Power Systems. 6th Edition. UK: Pearson Education Limited.
6. S. K. Pillai.(2014). Basics of Electrical Drives. 4th Edition. UK: New Academic Science.
7. El-Sharkawi A. Mohamed (2000). Fundamentals of Electric Drives. A division of Thomson Learning. USA

PLT 304/4
ELECTRICAL POWER SYSTEM

COURSE SYNOPSIS

This course is a basic principle in power system engineering which covers the topics of generation, transmission and distribution systems. The sub-topics that will be emphasized are such as the per-unit system, transmission line parameters and models, load characteristics, representations of components in power systems, symmetrical fault and unsymmetrical fault.

COURSE OUTCOMES

1. Ability to **demonstrate** types and operation of power system generations in groups..
2. Ability to **analyse** single-line diagram problems using the per-unit system.
3. Ability to **analyse** the transmission line parameters and models in power system.
4. Ability to **analyse** the load characteristics and distribution system components in power system.
5. Ability to **evaluate** symmetrical fault and unsymmetrical fault in power system.

REFERENCES

1. J. Duncan Glover (2012). Power System Analysis & Design. 5th Edition. Cengage Learning.
2. Hadi Saadat. (2004). Power System Analysis. 3rd Edition. PSA Publishing
3. Theodore R. Bosela. (2003). Electrical Systems Design. Pearson Education.
4. Dugan, Roger C. (2003). Electrical Power Systems Quality. 2nd Edition. McGraw Hill.
5. Chapman, Stephen J. (2002). Electric Machinery and Power System Fundamental. McGraw Hill.

PLT 305/3
CONTROL SYSTEM TECHNOLOGY

COURSE SYNOPSIS

This course is an introduction to control systems theory involving different areas of applications, comprises of three major parts: Part I - Control Systems Representations -representation of physical systems by differential equation, transfer function, state-space modeling, block diagram techniques and signal flow graph. Part II – Control Systems Performance Analysis - analysis of systems in terms of transient response, stability and steady-state errors. Root locus and frequency response techniques are used for higher order systems. Part III – Control Systems Design - design of controllers and compensators for systems via root locus and frequency response.

COURSE OUTCOMES

1. Ability to obtain the mathematical model for electrical and mechanical systems.
2. Ability to analyze system's time-domain with response to test inputs. Analysis includes the determination of the system stability.
3. Ability to analyze system's frequency-domain with response to test inputs. Analysis includes the determination of the system stability.
4. Ability to design PID, lead and lag controllers based on the analysis of the system's response.

REFERENCES

1. Nise, N. S. (2008). Control Systems Engineering. 5th edition. John Wiley.

2. Ogata, K. (2002). Modern Control Systems. 4th edition. Addison-Wesley Company.
3. Dorf, R.C. & Bishop, R.H. (2001). Modern Control Systems. 9th edition. Addison-Wesley Company.
4. Kuo, B.C. (1997). Automatic Control Systems. 7th edition. Prentice-Hall Pub Co.

PLT 340/4
FINAL YEAR PROJECT I

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing is necessary for each final-year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to explain a project in a technical report.
4. Ability to present and defend effectively project proposal to selected audience.
5. Ability to identify commercialization potential for proposed project.

PLT 306/3
ELECTRICAL INSTALLATION DESIGN II

COURSE SYNOPSIS

This course covers on the theoretical principle and calculation involving characteristics, selection criteria, preventive and predictive maintenance of diesel generator and uninterruptible power supply in order to achieve maximum efficiency, reliability, and longevity.

The course also covers on the theoretical principle, application, basic design and selection of bus duct system and lightning protection system.

COURSE OUTCOMES

1. Ability to **EXPLAIN** the fundamental operations of diesel generator system.
2. Ability to **EVALUATE** the operation of generators in parallel and design the synchronizing system for parallel generator.
3. Ability to apply and **DESIGN** the uninterrupted power supply.
4. Ability to explain and **SELECT** the bust duct and performing all necessary calculations.
5. Ability to **DESIGN** the lightning protection system for commercial buildings and facilities.

REFERENCES

1. Paul Cook. (2008). Electrical Installation Design Guide: Calculations for Electricians L.L.J. Mohan. (2003). Diesel Generator Handbook. Butterworth Heinemann.
2. Ismail Kasikci. (2004). Analysis and Design of Low voltage Power Systems. Wiley-Vch Verlag GmBH & Co.
3. K.C. Agrawal. (2001). Industrial Power Engineering and Application Handbook. Butterworth-Heinemann.
4. American National Standards Institute. (1986). ANSI/IEEE Std 944-1986 – IEEE Recommendation Practice for the Application and Testing of Uninterruptible Power Supplies for Power Generation Stations. The Institute of Electrical and Electronics Engineers.

PLT 307/3
PROGRAMMABLE LOGIC CONTROLLER (PLC)

COURSE SYNOPSIS

The student will be expose to programmable logic controller (PLC), PLC components, PLC programming and operational procedure. PLC is capable to perform more complex motion and process control applications.

COURSE OUTCOMES

1. Ability to explain ladder diagram that will perform a specified operation using PLC programming.
2. Ability to design a specified operation using PLC programming in applications of industrial electronic control.

REFERENCES

1. Jacob, M. (1995). Industrial Control Electronics. Prentice Hall.
2. Webb, J., Greshock, K. (1993). Industrial Control Electronics. 2nd Edition. Prentice Hall.

PLT 308/3
POWER QUALITY

COURSE SYNOPSIS

This course will help students to understand the basics of the power quality. This course intends to give the students knowledge on power quality terms and definitions.

COURSE OUTCOMES

1. Ability to apply the basic principles of measurement electrical power transmission.



2. Ability to apply the concept of distribution system for current and voltage measurement.
3. Ability to apply the concept of power quality.
4. Ability to use the basic principle of energy management on power system economics.

REFERENCES

1. Kusko, A. T., Marc T. (2007). Power Quality in Electrical Systems. McGraw-Hill Professional Publishing.
2. Dugan, R. S., Surya M., Mark F. (2002). Electrical Power Systems Quality. McGraw-Hill Professional Publishing.
3. Kennedy, B. W. (2000). Power Quality Primer. McGraw-Hill Professional Publishing.

PLT 309/3
SUBSTATION MAINTENANCE

COURSE SYNOPSIS

This course introduces aspects of the fundamentals and considerations of substation maintenance, configuration, bus bar and safety requirement. This course describes the functions of various substation main equipments, substation auxiliary included protection design against internal and external fault. The students also learn how to measure soil resistivity and resistance grounding, substation grounding design, furthermore calculation of the ground grid substation. This course will cover the principle elements of task to maintenance of a substation. Latter in this course, they will learn and practice how to test and maintain substation

COURSE OUTCOMES

1. Ability to explain fundamentals and considerations of substation design.
2. Ability to describe operation, maintenance, selection and functions of substation equipments part and ability to design simple bus bar.
3. Ability to measure resistivity and grounding resistance and ability to design and analysis ground grid substation and safety requirement.
4. Ability to identify and calculate parameters in protection system of substation equipments caused by internal and external faults.
5. Ability to calculate capacity and service substation areas, explain foundation and structure of substation and test some substation equipments.

REFERENCES

1. John MC Donald. (2007). Electrical Power Substations Engineering. 2nd Edition. CRC Press.
2. Rao, S. (2003). Electrical Substation Engineering & Practice. Khana Publishers.
3. Garzon Ruben D. (2002). High Voltage Circuit Breaker. Marcel Decker Inc.
4. Colin Bayliss. (2002). Transmission and Distribution electrical engineering. Newness.

PLT 440/6
FINAL YEAR PROJECT II

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing is necessary for each final-year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The research area is mainly on electrical engineering technology.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to explain a complete project in a technical report (dissertation).
4. Ability to present and defend effectively project findings to selected audience.
5. Ability to identify commercialization potential for developed project.

PLT 401/3
POWER SYSTEM PROTECTION AND SWITCHGEAR

COURSE SYNOPSIS

This course introduces varieties of Circuit Breakers, Isolator, Earthing Switch, Bus-bar and Relays for protection of Generators, Motor, Transformers from short circuit, over voltage and other hazards caused by internal and external faults. This course also describes various Neutral grounding of the equipment related to protection systems.

COURSE OUTCOMES

1. Ability to explain and calculate restriking phenomenon, operation and selection of switchgear equipment.
2. Ability to identify abnormal condition on equipment, application, choice of protective relay correctly.
3. Ability to explain causes of overvoltage, Evaluate application of Arrester to equipment protection the related insulation coordination problems and necessity of earthing neutral.
4. Ability to analyse the neutral grounding concept and performance.

REFERENCES

1. Gupta J. B. (2010). Switchgear and Protection. S. K. Kataria & Sons.
2. B. Ravindranat and M. Chander (2008). Power System Protection and Switchgear. New Age International Publisher.
3. Rao, S. S (2004). Switchgear Protection and Power Systems. Khanna Publishers.
4. Leslie Hewitson, Mark Brown and Ramesh Balakrishnan(2004). Practical Power Systems Protection. Elsevier.
5. Badri Ram, and D.N (1995). Power System Protection and Switchgear. Tata McGraw-Hill.

PLT 402/3
INDUSTRIAL AUTOMATION

COURSE SYNOPSIS

This course will expose to the students about the properties and applications of concept of automation in industry, industrial automation tool, open and closed-loop process control systems and distinguish between their dynamics, principles of stability, disturbance rejection and robustness of control systems to process variations. The course also provides the student with basic skills useful in identifying the concepts of automated in machines and equipment and describe the terms and phrases associated with industrial automation. This course cover topics related to control pressure, level, temperature, flow and automation in the process industry. These include a study on industrial sensors and actuators, industrial controllers such as computer-based control. The control strategies for specific process applications and the applications of PLC's to industrial processes and design PLC programs to solve sequential control problems are also provide in this course.

COURSE OUTCOMES

1. Ability to describe the properties and applications of concept of automation in industry, industrial automation tool, open- and closed-loop process control systems and distinguish between their dynamics, principles of stability, disturbance rejection and robustness of control systems to process variations.
2. Ability to describe, summarise and evaluate of hydraulic, pneumatic and electronic automation systems, the operation of the different controller modes and their practical limitations, determine their response to standard inputs and to process disturbances in open- and closed-loop, the stability of given control systems.
3. Identify and outline the common control strategies for specific process applications, and the applications of PLC's to industrial processes and design PLC programs to solve sequential control problems.

REFERENCES

1. Terry Bartelt (2006). Industrial Control Electronics; Devices, Systems and Application. Third Edition. Thomson Delmar Learning.
2. C. D. Johnson (2002). Process Control Instrumentation Technology. Prentice Hall.
3. Poppovik Bhatkar. Distributed Computer Control for Industrial Automation. Dekkar Publications.
4. Webb and Reis. Programmable Logic Controllers: Principles and Applications. PHI.
5. S.K.Singh. Computer Aided Process Control. PHI.

PLT 403/3
HIGH VOLTAGE TECHNOLOGY

COURSE SYNOPSIS

This course focus on phenomena of high voltage surges and insulation coordination for power systems, characteristics of conduction and breakdown of gas, liquid and solid dielectrics, generation of high voltages and currents, measurement of high voltages and currents, `non-destructive testing (NDT) for high voltage components, detection and measurement of discharge process.

COURSE OUTCOMES

1. Ability to explain the concept of high voltage engineering and calculate various breakdown parameters and identify applications of vacuum dielectrics, liquid dielectrics, solid dielectrics, and composite dielectrics.
2. Ability to explain, calculate and analyze the concept of generations and measurements of high voltage AC, DC, Impulse voltage and impulse current generators.
3. Ability to explain the over-voltage phenomena and the related insulation coordination problems and analyze types of high voltage testing for electrical apparatus and non-destructive materials.

REFERENCES

1. S. Naidu & V. Kamaraju (2003). High Voltage Engineering. 3rd Edition. McGrawHill.
2. E. Kuffel & M. Abdullah (2000). High Voltage Engineering. 2rd Edition. Pergamon Press.
3. Arrilaga, J (1998). High Voltage Direct Current Transmission. 2rd Edition. IEE.
4. Davies T (1998). Protection of Industrial Power Systems. 2nd Edition. Newness.

PLT 404/3
RENEWABLE ENERGY

COURSE SYNOPSIS

This course will introduce students with conversion, storage, integration and economic assessment techniques for renewable energy systems. This course also enables students to assess and design basic system configuration from major renewable energy technologies for both standalone and grid-connected power generation.

COURSE OUTCOMES

1. Ability to explain the fundamental principles of major renewable energy technologies.
2. Ability to analyze and solve problems on both technical and economic aspect of renewable energy systems.
3. Ability to design and evaluate appropriate system configuration based on given application.

REFERENCES

1. John Twidell and Anthony D. Weir (2006). Renewable Energy Resources. 2nd Edition. Taylor & Francis.
2. John A. Duffie, William A. Beckman. (2006). Solar Engineering of Thermal Processes. John Wiley & Sons.
3. Mukund R. Patel. (2005). Wind and Solar Power Systems: Design, Analysis and Operation. 2nd Edition. CRC Press.
4. Gilbert M. Masters. (2004). Renewable and Efficient Electrical Power Systems. John Wiley & Sons.
5. J. Larminie, A. Dicks. (2003). Fuel Cells System Explained. 2nd Edition. John Wiley & Sons.

PLT 405/3
ENERGY EFFICIENCY AND MANAGEMENT

COURSE SYNOPSIS

This course exposes the students to the energy efficiency and energy management in order to reduce energy costs and promote economic and environmental sustainability. At the end of this course, students will be exposed to the techniques for energy audit such as analyzing energy consumptions and design a solution for energy saving programs. In addition, safety aspect of electrical equipment will also be exposed to the student to create awareness and safe working practice.

COURSE OUTCOMES

1. Ability to apply the basic principles of measurement electrical power transmission.
2. Ability to apply the concept of distribution system for current and voltage measurement.
3. Ability to apply the concept of power quality.
4. Ability to use the basic principle of energy management on power system economics.

REFERENCES

1. Frank Kreith and D. Yogi Goswami (2008). Energy Management and Conservation Handbook. CRC Press.
2. Frank Kreith, Ronald E. West (2007). CRC Handbook of Energy Efficiency. CRC Press.
3. Wayne C. Turner (2005). Energy Management Handbook. Fairmont Press Inc.
4. Gilbert M. Masters. (2004). Renewable And Efficient Electric Power Systems. John Wiley and Sons.
5. Joel N. Swisher, Gilberto de Martino Jannuzi, and Robert Y. Redlinger. Tools and methods for Integrated Resource Planning: Improving Energy efficiency and protecting the Environment. UNEP Collaborating Centre on Energy and Environment.

BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY (HONOURS) (ROBOTICS & AUTOMATION TECHNOLOGY) - RY32

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of electrical engineering as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialisation.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE FOR BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY (HONOURS) (ROBOTICS & AUTOMATION TECHNOLOGY) - RY32

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (105)	PLT 101/3 Computer programming	PLT 105/3 Electric Circuit Theory I	PLT 201/3 Electric Circuit Theory II	PLT 206/3 Microcontroller System	PLT 303/3 Electrical Drives	PLT 340/4 Final Year Project I	PLT 440/6 Final Year Project II	INDUSTRIAL TRAINING PLT400/12
	PLT 102//2 Computer Aided Drafting (CAD)	PLT 106/3 Digital Electronics	PLT 202/3 Measurement & Instrumentation	PLT 207/3 Power Electronic	PLT 305/3 Control System Technology	PLT 307/3 Programmable Logic Controller	PLT 42x/3 Elective II	
	PCT 111/3 Engineering Skills I	PLT 107/3 Electronics I	PLT 203/3 Electronics II	PLT 208/3 Communication System	PLT 223/3 Machine Design	PLT 322/3 Industrial Process Control	PLT 42x/3 Elective III	
		PLT 108/3 Engineering Skills II	PLT 221/3 Principles of Thermo-Fluid and Materials	PLT 209/3 Signal and Systems	PLT 224/3 Pneumatics & Hydraulic Systems	PLT 326/3 Industrial Automation		
				PLT 222/3 Applied Mechanics	PLT 321/3 Industrial Networking	PLT 327/3 Industrial Robotics		
						PLT 32x/3 Elective I		
Common Core (18)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III					
	PLT 104/3 Engineering Science				PTT 333/3 Engineering Technology Management		PTT 444/3 Engineering Technologist in Society	
University Required (19)	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies							
	UVA 111/0 Foundation English	UVW XXX/2 English for General Purpose (EGP)		UVW 312/2 English for Technical Communication (ETC)			UUW XXX/2 Option subjects	
	UUT 122/2 Skills & Technology in Communication	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UUW 410/2 University Malay Language	UUW 224/2 Engineering Entrepreneurship	UUW 322/2 Thinking Skills			
	UZW 1XX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity					
142	19	18	20	19	20	19	18	12

Total Units for Graduation 142

Elective I	Elective II	Elective III
A1: PLT 329/3 Advanced Control System A2: PLT 328/3 Robotic Control	B1: PLT 423/3 Material Handling and Identification B2: PLT 424/3 Automated Guided Vehicle	C1: PLT 422/3 Mechatronics Systems C2: PLT 425/3 Vision Systems

**Foundation English – MUET Band 2; EGP – Band 2, 3; ETC – Band 2, 3, 4, 5, 6; Option - Band 4, 5, 6

LIST OF COURSES

BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY (HONS.)
(ROBOTIC & AUTOMATION TECHNOLOGY)

- **PLT 101/3 COMPUTER PROGRAMMING**
- **PLT 102/2 COMPUTER AIDED DRAFTING (CAD)**
- **PLT 104/3 ENGINEERING SCIENCE**
- **PLT 105/3 ELECTRIC CIRCUIT THEORY 1**
- **PLT 106/3 DIGITAL ELECTRONICS**
- **PLT 107/3 ELECTRONICS 1**
- **PLT 108/3 ENGINEERING SKILLS II**
- **PLT 201/3 ELECTRIC CIRCUIT THEORY II**
- **PLT 203/3 ELECTRONICS II**
- **PLT 202/3 MEASUREMENT & INSTRUMENTATION**
- **PLT 206/3 MICROPROCESSOR SYSTEM & MICROCONTROLLER**
- **PLT 207/3 POWER ELECTRONICS**
- **PLT 208/3 COMMUNICATIONS SYSTEM**
- **PLT 209/3 SIGNAL & SYSTEMS**
- **PLT 221/3 PRINCIPLES OF THERMO FLUID AND MATERIALS**
- **PLT 222/3 APPLIED MECHANICS**
- **PLT 223/3 MACHINE DESIGN**
- **PLT 224/3 PNEUMATICS AND HYDRAULIC SYSTEM**
- **PLT 303/3 ELECTRICAL DRIVES**
- **PLT 305/3 CONTROL SYSTEM TECHNOLOGY**
- **PLT 307/3 PROGRAMMABLE LOGIC CONTROLLER (PLC)**
- **PLT 321/3 INDUSTRIAL NETWORKING**
- **PLT 322/3 INDUSTRIAL PROCESS CONTROL**
- **PLT 326/3 INDUSTRIAL AUTOMATION**
- **PLT 327/3 INDUSTRIAL ROBOTICS**
- **PLT 328/3 ROBOTIC CONTROL**
  (ELECTIVE A1)
- **PLT 329/3 ADVANCED CONTROL SYSTEM**
  (ELECTIVE A2)
- **PLT 340/4 FINAL YEAR PROJECT I**
- **PLT 423/3 MATERIAL HANDLING AND IDENTIFICATION**
  (ELECTIVE B1)
- **PLT 424/3 AUTOMATED GUIDED VEHICLE**
  (ELECTIVE B2)
- **PLT 422/3 MECHATRONIC SYSTEMS**
  (ELECTIVE C1)
- **PLT 425/3 VISION SYSTEMS**
  (ELECTIVE C2)
- **PLT 440/6 FINAL YEAR PROJECT II**



COURSE SYLLABUS

PLT 101/3
COMPUTER PROGRAMMING

COURSE SYNOPSIS

The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with the programming tools such as organization chart, IPO chart, flowchart and pseudo code and then to implement them by developing C program.

COURSE OUTCOMES

1. Ability to define and describe programming concepts and principles.
2. Ability to apply programming techniques and tools such as flowchart and pseudo code to design computer programs.
3. Ability to apply GNU/Linux for coding, compiling, executing and debugging computer programs.

REFERENCES

1. Cheng, H. (2010). C for Engineers and Scientists. McGraw Hill.
2. Deitel, Sudin S. (2006). C How To Program. Pearson-Prentice Hall.
3. Hanly, J.R. and Koffman, E.B. (2001). C Program Design for Engineers. 2nd Edition. Addison- Wesley.

PLT 102/2
COMPUTER AIDED DRAFTING (CAD)

COURSE SYNOPSIS

This is a core subject. It will expose the students to understand the concepts of Computer Aided Drafting. Student also would able to illustrate engineering drawing, 2D & 3D modelling and construct a product drawing.

COURSE OUTCOMES

1. Ability to apply fundamental concepts of Computer Aided Drafting.
2. Ability to illustrate engineering drawing by using proper techniques.
3. Ability to use of Computer Aided Drafting to construct a simple product drawing.
4. Ability to perform in groups to illustrate 2D and 3D modeling.

REFERENCES

1. Alan J Kalameja. (2012). AutoCAD 2012 Tutor for Engineering Graphics'. Delmar Learning.
2. James A. Leach. (2007). AutoCAD 2007 instructor: a student guide to complete coverage of Autocad's commands and features. McGraw Hill.
3. David Frey. (2007). AutoCAD 2007 & AutoCAD LT 2007: no experience required. In:Wiley.
4. Paul Whelan; alih bahasa, T.H. Lai. (1999). AutoCAD LT:cara mudah. Federal Publications.

PLT 104/3
ENGINEERING SCIENCE

COURSE SYNOPSIS

This course aims to introduce to the Electrical Engineering students the knowledge on the principles of material engineering and thermal fluid. It includes aspects related to material engineering, thermodynamics and fluid mechanics.

COURSE OUTCOMES

1. Ability to describe and analyze the Mechanical, Electrical and Magnetic properties of materials.
2. Ability to understand, apply and analyze concepts and principles of Fluid Statics, Bernoulli and Energy Equations.
3. Ability to understand, apply and analyze concepts and principles of First Law and Second Law of Thermodynamics.
4. Ability to work in team and communicate effectively.

REFERENCES

1. William D. Callister, Jr. (2012). Materials Science and Engineering: An Introduction. 9th ed.
2. Yunus A. Cengel, Robert H. Turner. (2005). Fundamentals of Thermal-Fluid Sciences. Int ed. McGraw-Hill.
3. Lim Poh Seng, Tay Seng How, Koh Kok Pin. (2003). Strength of Materials for Polytechnic. Revised ed. Prentice Hall.
4. Robert L. Mott. (2006). Applied Fluid Mechanics. 6th ed. Pearson.

PLT 105/3
ELECTRIC CIRCUIT THEORY 1

COURSE SYNOPSIS

This course covers topics of introduction to the DC circuit's covers fundamental laws and theorems. Students also get knowledge about AC circuits that introduces phasors and sinusoidal steady state analysis. This course intends to give the students knowledge on understanding three-phase balance systems.

COURSE OUTCOMES

1. Ability to derive importantequations to solve problems in DC circuits.
2. Ability to analyze the first and second order circuits containing passive elements, DC sources and switches using differential equations.
3. Ability to calculate circuit parameters containing sinusoidal steady-state sources using complex impedances and phasor representations.

REFERENCES

1. Nilson, J.W.,Riedel, S.A . (2013). Electric Circuits. 10th Edition. Prentice Hall.
2. Irwin, J.D., Nelms, R.M. (2008). Basic Engineering Circuit Analysis. 9th Edition. John Wiley.
3. Robbins, A.H, Miller, W.C. (2006). Circuit Analysis: Theory and Practice. 4th Edition. McGraw Hill.

PLT 106/3
DIGITAL ELECTRONICS

COURSE SYNOPSIS

Basically this introductory circuit course can be divided into two parts. Part I, consisting of chapter 1 through 4, is devoted to DC circuits. It covers fundamental laws and theorems, circuit analytical techniques, passive and active elements. Part 2, consisting of chapter 5 through 7, deals with AC circuits. It introduces phasors, sinusoidal steady state analysis, using previous analytical techniques under sinusoidal steady state excitation, RLC circuits, AC power calculations and power factor correction and rms values.

The aim of this course is to introduce students to the basic knowledge in the digital electronics. The lectures and laboratories cover the following topics: Numbering System, Algebraic Switching, Boolean Function, Combinational Logic and Sequential Logic Circuit.

COURSE OUTCOMES

1. Ability to explain and use the basic principles of numbering system and basic theory of binary system in digital electronics
2. Ability to design and optimizes logic circuit using Boolean functions and Karnaugh maps
3. Ability to design digital system applications using combinational and sequential logic design techniques.

REFERENCES

1. Floyd. TL. (2012). Digital Fundamentals. 10th Ed. Prentice Hall.
2. Rosni Abu Kassim, Nooritawati Md Tahir, (2010) Introduction to Electric Circuits, Wiley.
3. David E. Jhonson.(2010). Sistem Digit, Pearson Education, Penerbit Universiti Teknologi Malaysia Press.
4. Ronald J. Tocci.(2007) Digital Systems – Principles and Applications. 10th Edition, Prentice Hall.
5. Godse, Atul P. Godse, Deepali A. Godse, Gurpreet Singh Ghai. (2007). Digital Electronics, Technical Publications Pune.

PLT 107/3
ELECTRONICS 1

COURSE SYNOPSIS

This subject will expose the students with basic electronic devices. It provides a depth study on the concept of PN junction, operation and characteristics of the diode. The students will be emphasized to Half wave rectifiers, Full wave rectifiers,Power Supply Filter and Regulators, Clipper and Clamper Diode circuits and Voltage Multipliers. The students also will learn about the special-purpose of zener diode in terms of its characteristics and applications. Bipolar Junction Transistors (BJTs) and various types of Field-Effect Transistor which are Junction Field-Effect Transistor (JFET) and the Metal Oxide Semiconductor Field-Effect Transistor (MOSFET) will be introduced in this course as well. Basic theories, principles and practical are stressed in this course.

COURSE OUTCOMES

1. Ability to explain and differentiate the fundamental concepts of electronic devices.
2. Ability to analyze the basic operations of electronic devices such as diode, BJT and various types of FET.
3. Ability to calculate and analyze the basic biasing circuits using datasheet.



REFERENCES

1. Neamen Donald A. (2013). Microelectronics :Circuit Analysis and Design. 5th ed. McGraw Hill, Int. Ed.
2. Robert L. Boleystad. (2009). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
3. T. Robert Paynter. (2009). Introductory Electronic Devices and Circuits. 10th ed. Prentice Hall.
4. Puspa Inayat Khalid, Rubita Sudirman, Siti Hawa Ruslan. (2001). Modul Pengajaran Elektronik 1. Edisi ke-3.

PLT 108/3
ENGINEERING SKILLS II

COURSE SYNOPSIS

This is the core subject which is 100% practical and carried out 3 units credit hours. This course contains modules to provide students with engineering skills such as Printed Circuit Board (PCB) fabrication and design module and electrical domestic wiring.

COURSE OUTCOMES

1. Ability to use OrCAD software to construct PCB circuit board.
2. Ability to apply and construct the basic skills and standard practiced of PCB layout design and fabrication process.
3. Ability to apply and construct the basic skills and standard practiced of domestic wiring.

REFERENCES

1. Steward, W.E. and Stubbs, T.A. (2010). Modern Wiring Practice: design and installation. 12th Edition, Newnes.
2. William J.Palm III. (2001). MATLAB for Engineering Students. McGraw Hill.
3. ORCAD Capture & Layout User's Guide Manual. Cadence design Systems, Inc.
4. Pethebridge, K. and Nesson, I. (2002). Electrical Wiring Practice. 6th Edition, Mc-GrawHill.

PLT 201/3
ELECTRIC CIRCUIT THEORY II

COURSE SYNOPSIS

This is a core subject. It will expose the students to the circuit analysis using Laplace and Fourier Transform. Student also would able to explain the concept of mutual inductance, frequency response of AC circuit and two port network.

COURSE OUTCOMES

1. Ability to explain and analyze special types of circuit such as mutual inductance and two port networks.
2. Ability to analyze electric circuits using Laplace Transform for the circuit comprising passive elements.
3. Ability to analyze the concepts of frequency response for AC circuits and construct Bode plot for various types of transfer function.
4. Ability to analyze electric circuits using Fourier Series and Fourier Transform for the circuit comprising passive elements.

REFERENCES

1. Charles K Alexander and Matthew Sadiku. (2013). Fundamentals of Electric Circuits. 5th Edition. McGraw-Hill.
2. Nilsson, J. W. and Riedel, S.A. (2010). Electric Circuits. 9th Edition. Prentice Hall, New Jersey.
3. Dorf, R.C., Svodoba, J.A. (2010). Introduction to electric circuits. 8thEdition. John Wiley.
4. Robert L. Boylestad. (2010). Introductory Circuit Analysis, 12thEdition. Pearson.
5. Hyat W.H., Durbin, S.M., Kimmerly, J.E. (2007). Engineering Circuit Analysis, 7th Edition. McGraw Hill.

PLT 202/3
MEASUREMENT & INSTRUMENTATION

COURSE SYNOPSIS

This course covers topics of introduction to the basic concepts of measurement methods and instrumentation. This course intends to give the students knowledge on measuring devices, bridge methods and transducers.

COURSE OUTCOMES

1. Ability to define, describe and analyze the elements of a complete electronic instrumentation and measurement system.
2. Ability to explain and apply the working principles of various sensors and signal conditioning/processing techniques in instrumentation and measurements.
3. Ability to describe and analyze display systems, data acquisition systems and computer interfacing techniques in instrumentation and measurements.

REFERENCES

1. Uday A.Bakshi, Ajay V.Bakshi, K Shiteeja A. Bakshi. (2012). Electrical Measurements and Measuring Instruments. Pune India.Technical Publications Pune.
2. H.S Kalsi. (2003). Electronics Instrumentation. Tata-McGraw Hill.
3. Ruzairi Hj Abdul Rahim, Herlina Abdul Rahim, Nasaruddin Ahmad, Anita Ahmad. (2003). Pengukuran & Instrumentasi Elektrik. Fakulti Kejuruteraan Elektrik. UTM.

4. Jones L.R, Chin, A.F. (1991). Electronic instruments and measurements. 2nd Edition. Prentice Hall.
5. Bell D.A. (1991). Electronics Instrumentation and measurements. 2nd Edition. Prentice Hall.

PLT 203/3
ELECTRONICS II

COURSE SYNOPSIS

This course is a continuation of electronic circuits in Electronics I. It covers small-signal models and frequency response of amplifier circuits including op-amps at the transistor level. Important electronic circuits that have wide real applications such as Op-Amp Applications (Comparators, Summing Amplifiers, Integrators, Differentiators etc.), Active Filters and Voltage Regulator are also considered.

COURSE OUTCOMES

1. Ability to **analyze** small-signal models and frequency response of basic amplifier circuits. (BJT, FET and operational amplifier).
2. Ability to **design** ideal operational amplifier circuits and various classes of active filters with given design specifications.
3. Ability to **analyze** basic types of voltage regulators.

REFERENCES

1. Thomas L. Floyd. (2011). Electronic Devices. 9th Ed. Prentice Hall.
2. Robert L. Boleystad. (2011). Electronic Devices and Circuit Theory. 11th ed. Prentice Hall.
3. Neamen Donald A. (2009). Microelectronics : Circuit Analysis and Design. 4th ed. McGraw Hill, Int. Ed.
4. Adel S. Sedra, Kenneth C. Smith. (2009). Microelectronics Circuits. 6th Ed. Oxford University Press.
5. Bogart T. F. (2003). Electronic Devices and Circuits. 6th Ed. Prentice Hall.

PLT 206/3
MICROCONTROLLER SYSTEMS

COURSE SYNOPSIS

The aims of this course is to study the PIC 18 microcontroller architecture, its programming language (assembly and C) and basic interfacing with input and output devices. These knowledge are gathered and applied to design a simple microcontroller based system.

COURSE OUTCOMES

1. Ability to explain the basic microcontroller architecture.
2. Ability to analyze and write a microcontroller programming language in assembly and C program.
3. Ability to interface the input and output devices with microcontroller.
4. Ability to design a simple microcontroller based system and present in group.

REFERENCES

1. Katzen, S. (2013). The Essential PIC18® Microcontroller (Computer Communications and Networks). Springer.
2. Brey, B.B. (2008). Applying PIC18 Microcontroller: Architecture, Programming and Interfacing using C and Assembly. Prentice Hall.
3. Mazidi, M.A, Mckinlay, R.D, and Causey, D. (2008). PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18. Prentice Hall.
4. Bates, M. (2006). Interfacing PIC Microcontrollers: Embedded Design by Interactive Simulation. Newness.
5. Huang, H.W. (2005). PIC Microcontroller: An Introduction to Software and Hardware Interfacing. Thomson & Delmar Learning.

PLT 207/3
POWER ELECTRONICS

COURSE SYNOPSIS

This course introduces power electronics concepts as a multidisciplinary and interdisciplinary applications oriented technology emphasizing the main criterion of electrical energy conversion; AC-DC, AC-AC, DC-DC and DC-AC converter performance via waveform analyses. It also covers electronic devices such as diodes and transistors, but emphasis is on circuit topology and function rather than on devices. Primary background required is the understanding the voltage-current relationships for linear devices as well as the concept of Fourier series.

COURSE OUTCOMES

1. Ability to **analyze** operation and applications of power electronic devices and addressing the needs of EMC requirements.
2. Ability to **evaluate** the performance of AC-DC and AC-AC converters.
3. Ability to **evaluate** the performance of DC-DC and DC-AC converters.

REFERENCES

1. Muhammad H. Rashid, 'Power Electronics: Circuits, Devices & Applications', 4th Ed., Pearson, Prentice Hall, 2013.
2. Daniel W. Hart, 'Power Electronics', 1st Ed., McGraw Hill, 2011.

3. Andrzej M. Trzynadlowski, 'Introduction to Modern Power Electronics', 2nd Ed., Wiley, 2010.
4. Robert Perret, 'Power Electronics: Semiconductor Devices', NJ: Wiley, 2009.
5. Robert W. Erickson, Dragan Maksimovic, 'Fundamentals of Power Electronics', 2nd Ed., Springer, 2012.

PLT 208/3
COMMUNICATION SYSTEMS

COURSE SYNOPSIS

This course aims to introduce students the basic principles and concepts of communication system including the basic elements of communications such as modulation techniques (amplitude modulation, angle modulations and digital modulations), transmission channels and medium. In addition, signal propagations and noise in communication system also discussed.

COURSE OUTCOMES

1. Ability to distinguish the basic requirement of communication systems and the essential of communication system.
2. Ability to differentiate the different types of modulation.
3. Ability to evaluate and analyze noise in communication system.

REFERENCES

1. Wayne Tomasi. (2004) 'Electronic Communications Systems : Fundamentals Through Advanced', 5th Ed., Pearson Prentice Hall.
2. Ian Glover, Peter M. Grant. (2009). Digital Communications. Prentice Hall.
3. Louis E. Frenzel. (2007). Principles of Electronic Communication Systems. McGraw-Hill.
4. William D. Stanley and John M. Jeffords. (2006). Electronic communications: principles and systems. Thomson Delmar Learning.
5. Jeffrey S. Beasley, Gary M. Miller. (2005). Modern electronic Communication. Pearson/Prentice Hall.

PLT 209/3
SIGNAL & SYSTEMS

COURSE SYNOPSIS

This course aims to introduce students the basic of signals and systems. To learn how certain input to a system will produce the required output. To understand signal spectrum concept and the method being utilized to analyze signal and its relations.

COURSE OUTCOMES

1. Ability to identify type and analyze waveform of the signals and its characteristic in engineering systems.
2. Ability to analyze signals and determine the process of the systems.
3. Ability to explain and calculate the system response using variable methods.
4. Ability to prepare a report in relevant topics using various resources.

REFERENCES

1. Charles L. Philips, John M. Parr, Eve A. Riskin. (2013). Signals, Systems and Transforms. 7rd Edition. Prentice Hall International Edition.
2. Simon Haykin, Barry Van Veen. (1999). Signals and Systems. 2nd Edition. Wiley.
3. Fred J. Taylor. (1994). Principles of Signals and Systems. McGraw Hill International Edition.

PLT 221/3
PRINCIPLES OF THERMO FLUID AND MATERIALS

COURSE SYNOPSIS

This course aims to introduce to the mechatronic engineering students the basic knowledge on the principles of mechanical sciences. It includes basic aspects related to material engineering, fluid mechanics and Thermodynamics.

COURSE OUTCOMES

1. Ability to describe the Mechanical properties of materials and analyse tensile, compressive, shear stresses & strains, and torsional deformation.
2. Ability to calculate the pressure variation in a static fluid, and to analyze the resulting hydrostatic forces on plane and curved submerged surfaces.
3. Ability to describe, explain and analyze an Energy equation for fluid flow problems.
4. Ability to identify, analyze and solve energy balance problems for closed and steady flow systems and devices.

REFERENCES

1. William D Callister (2012). *Materials Science and Engineering*. 9th Edition, John Wiley & Sons.
2. Yunus A. Cengel and Robert H Hunter (2005). *Fundamentals of Thermal Fluids Sciences*. Int'l Edition, McGraw-Hill.
3. Lim Poh Seng, Tay Seng How and Koh Kok Pin (2003). *Strength of Materials for Polytechnic*, Revised Edition, Prentice Hall.
4. Robert L. Mott (2006). *Applied Fluid Mechanics*. 6th Edition, Pearson.
5. William Fox and Alan T. McDonald (1998). *Introduction to Fluid Mechanic*.

PLT 222/3
APPLIED MECHANICS

COURSE SYNOPSIS

This course covers vector representation of forces, moments and couples of static equilibrium of particles, rigid body and engineering structures, together with analysis of external and internal forces in structure via the methods of free body diagram and properties of cross-sectional areas. The course also elaborates on kinematics and kinetics of system of particles and a rigid bodies in two and three-dimensional spaces covering force and acceleration, linear and angular momentum and energy conservation.

COURSE OUTCOMES

1. Ability to apply the basic principles of statics and dynamics on mechanism and bodies.
2. Ability to analyse systems/problems related to forces, loads, displacement for bodies at rest.
3. Ability to analyse systems/problems related to forces, loads, displacement for bodies in motion.

REFERENCES

1. RC Hibeler, *Engineering Mechanics: Statics and Dynamics*, 12th Edition, Pearson Prentice Halls, 2012.
2. Bedford and Fowler, Engineering Mechanics: Statics and Dynamics, 5th Edition, Pearson Prentice Halls, 2007.
3. Richard G. Budynas and J. Keith Nisbet (2008). *Shigley's Mechanical Engineering Design*. 8th Ed., McGraw Hall.
4. Charles E. Wilson and J. Peter Sandler (2006). *Kinematics and Dynamics of Machinery.*3rd Ed., Pearson Prentice-Hall.

PLT 223/3
MACHINE DESIGN

COURSE SYNOPSIS

This course enables the students to comprehend and identify theoretical design as well as the machine elements that need to be considered in machine design process. This course also encourages the students to think as a machine designer. The concept and principle of machine design taught will be applied in designing machine, focusing on the outcome of innovative student thinking.

COURSE OUTCOMES

1. Ability to discuss, applies, and organizes the concept and principle of design process.
2. Ability to discuss, apply, and organize machine elements and analyze position, velocity and acceleration of a point in a linkage.
3. Ability to analyze, and construct machine elements to develop a mechanism.
4. Ability to apply, analyze and sketch mechanism design (linkage synthesis).

REFERENCES

1. Robert L. Norton (2011). *Design of Machinery*. 6th Ed., McGraw Hill.
2. David H. Myszka (2005). *Machine & Mechanisms: Applied Kinematic Analysis*. Prentice Hall.
3. Richard G. Budynas and J. Keith Nisbet (2008). *Shigley's Mechanical Engineering Design*. 8th Ed., McGraw Hall.
4. Robert L. Mott (2006). *Machine Elements in Mechanical Design.* 4th Ed. in SI Units, Prentice-Hall.
5. Charles E. Wilson and J. Peter Sandler (2006). *Kinematics and Dynamics of Machinery.*3rd Ed., Pearson Prentice-Hall.

PLT 224/3
PNEUMATICS AND HYDRAULIC SYSTEM

COURSE SYNOPSIS

This course discusses basic pneumatics, sensors, electro-pneumatics and hydraulics technologies that are related to industrial application. Students will study the construction and design of circuit by eans of example and exercises.

COURSE OUTCOMES

1. Ability to differentiate and explain type of hydraulics and pneumatics motor, drive and sensors and drive requirements.
2. Ability to justify and analyze power of hydraulics and pneumatics drives parameters based on load characteristics.
3. Ability to explain and calculate converters parameters for hydraulics and pneumatics drives.

REFERENCES

1. Pepperl and Fuchs (2010), Training Package Sensoric, Pepperl and Fuchs.
2. Crosser P., Thomson, J. Basic Pneumatics Textbook, 3rd, Ed. FESTO Didactic, 2002.
3. Jay F. Hooper, Basic Pneumatics, Caroline Academic Press, 2003.

PLT 303/3
ELECTRICAL DRIVES

COURSE SYNOPSIS

This course provides the student an exposure application of Power Electronics for electric motor drives. It emphasize on fundamental concepts of power electronic drives, electrical machines types and related applications. The aspects of load characteristic and matching drives to load also discussed.

COURSE OUTCOMES

1. Ability to differentiate and explain type of motor loads and drive requirements.
2. Ability to justify and analyze power electronic drives parameters based on load characteristics.
3. Ability to explain and calculate converters parameters for power electronic drives.
4. Ability to design and recommend appropriate power electronic drives parameters in electrical machines application.

REFERENCES

1. Muhammad H. Rashid. (2009). Power Electronics : Circuits, Devices and Application. 4th Edition. Prentice Hall International Inc. New Jersey
2. Gopal K.Dubey. (2001). Fundamentals of Electrical Drives, Second Edition. Alpha Science. Kanpur
3. El-Sharkawi A. Mohamed (2000). Fundamentals of Electric Drives. A division of Thomson Learning. USA
4. Bodea Ion, Nasar A.S. (1999). Electric Drives. CRC Press LLC
5. Vedam Subrahmanyam. (1994). Electric Drives : Concepts and Applications. Tata McGraw-Hill

PLT 305/3
CONTROL SYSTEM TECHNOLOGY

COURSE SYNOPSIS

This course is an introduction to control systems theory involving different areas of applications, comprises of three major parts: Part I - Control Systems Representations -representation of physical systems by differential equation, transfer function, state-space modeling, block diagram techniques and signal flow graph. Part II – Control Systems Performance Analysis - analysis of systems in terms of transient response, stability and steady-state errors. Root locus and frequency response techniques are used for higher order systems. Part III – Control Systems Design - design of controllers and compensators for systems via root locus and frequency response.

COURSE OUTCOMES

1. Ability to obtain the mathematical model for electrical and mechanical systems.
2. Ability to analyze system's time-domain with response to test inputs. Analysis includes the determination of the system stability.
3. Ability to analyze system's frequency-domain with response to test inputs. Analysis includes the determination of the system stability.
4. Ability to design PID, lead and lag controllers based on the analysis of the system's response.

REFERENCES

1. Nise, N. S. (2011). Control Systems Engineering. 6th edition. John Wiley.
2. Ogata, K. (2002). Modern Control Systems. 4th edition. Addison-Wesley Company.
3. Dorf, R.C. & Bishop, R.H. (2001). Modern Control Systems. 9th edition. Addison-Wesley Company.
4. Kuo, B.C. (1997). Automatic Control Systems. 7th edition. Prentice-Hall Publishing Company.

PLT 307/3
PROGRAMMABLE LOGIC CONTROLLER (PLC)

COURSE SYNOPSIS

The student will be expose to programmable logic controller (PLC), PLC components, PLC programming and operational procedure. PLC capable to perform more complex motion and process control applications.

COURSE OUTCOMES

1. Ability to explain ladder diagram that will perform a specified operation using PLC programming.
2. Ability to design a specified operation using PLC programming in applications of industrial electronic control.

REFERENCES

1. Jacob, M. (2009). Industrial Control Electronics. 3rd Ed. Prentice Hall.
2. Webb, J., Greshock, K. (1993). Industrial Control Electronics. 2nd Edition. Prentice Hall.

PLT 321/3
INDUSTRIAL NETWORKING

COURSE SYNOPSIS

This subject will cover all the basic principles and concepts of communication system including the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and

medium. In addition, introductions to signal propagations and calculations of signal to noise ratio are also introduced to relate the students with real world applications.

COURSE OUTCOMES

1. Ability to explain the principle of network and communication systems.
2. Ability to obtain mathematical model of modulation.
3. Ability to apply principle of various types of network and communication systems.
4. Ability to select equipments for the industrial network and communication technology.

REFERENCES

1. George Coulouris, Jean Dollimore, Tim Kindberg, (2011) " Distributed Systems: Concepts & Design", 6th Ed., Pearson Education Limited, 2005
2. Richard Zurawski, editor "The Industrial Communication Technology Handbook", CRC Press, 2005.
3. Andrew S. Tanenbaum, Maarten van Steen, "Distributed System: Principles and Paradigms", Prentice-Hall, 2002.
4. Behrouz A. Forouzan, "Data Communications and Networking", 4th Ed., Mc-Graw Hill, 2007.
5. William Stallings, "Data and Computer Communications", 7th Ed., Prentice-Hall, 2004.

PLT 322/3
INDUSTRIAL PROCESS CONTROL

COURSE SYNOPSIS

This course aims to convey the knowledge of state space representation of continuous-time system and discrete-time response and performance, specifications, state space analysis and design, advanced state space control system, projects based on problems drawn from mechatronics and manufacturing.

COURSE OUTCOMES

1. Ability to apply the concepts of control system in state-space and digital control.
2. Ability to analyze the state-space representation of discrete-time systems.
3. Ability to evaluate the performance of control systems design in state-space.

REFERENCES

1. Norman S. Nise, "Control System Engineering", 6th Edition, Wiley, 2012
2. Katsuhiko Ogata; "Modern Control Engineering", 4th Edition, Prentice-Hall, 2002.
3. Benjamin C. Kuo; "Automatic Control Systems", 8th Edition, John Wiley, 2003.
4. Richard C. Dorf, Robert H. Bishop; "Modern control System", 9th Edition, Prentice Hall, 2001
5. Richard Dorf and R.H. Bishop "Modern Control Systems", Addison-Wesley, 1998.

PLT 326/3
INDUSTRIAL AUTOMATION

COURSE SYNOPSIS

This course aims to convey the knowledge of automation technologies. It combines the automation technology principles and its relationship with assembly process and system, the element of sensor, actuator and drive technology as an input/output component in automation technology. It also covers automation technology and technique in terms of hardware and software control, the automation technology issues in design, engineering analysis, planning, tooling and manufacturing.

COURSE OUTCOMES

1. Ability to perform analyzes on automation in a production system.
2. Ability to perform analyzes and evaluate on elements of an automation system.
3. Ability to design and evaluate the automation system for an optimum performance in various applications.

REFERENCES

1. Mikell P. Groover (2010), "Automation, Production Systems, and Computer-Integrated Manufacturing" 4th Edition, Prentice Hall
2. Jon Stenerson (2003), "Industrial Automation and Process Control" 1st Edition, Prentice Hall
3. Frank D. Petruzella (1999), "Programmable Logic Controllers" 2nd Edition, Glencoe/McGraw-Hill
4. Ridley, J.E (1999), "Introduction to Programmable Logic Controller"

PLT 327/3
INDUSTRIAL ROBOTICS

COURSE SYNOPSIS

This Course is designed to introduce various aspects of Robotics such as the types of robots, capabilities, characteristics, Robot Control Systems and Software, Kinematic Analysis, Principles of Inverse Kinematics, Robot Sensors and Drive mechanisms, Robot Work Dell design and Various industrial Applications.



COURSE OUTCOMES

1. Ability to describe the importance of various types of robots and relate them in various industrial applications.
2. Ability to construct and analyze the coordinate representation, transformations and path planning.
3. Ability to construct and analyze robot control systems for various industrial applications.
4. Ability to design a robot work-cell for specific industrial task and measure its validity.

REFERENCES

1. Saeed B Niku (2010). *Introduction to Robotics*. 3rd Ed. John Wiley and Sons.
2. M. P. Groover (1999). *Industrial Robotics*. Mc Graw Hill.
3. K H low (2003). *Robotics : Principles and System Modelling*. Prentice hall.
4. Man Zhihong (2005). *Robotics*. Prentice Hall.

PLT 328/3
ROBOTIC CONTROL
(ELECTIVE A1)

COURSE SYNOPSIS

The objective of this course is to impart knowledge in the application and design aspect of mechatronic system. The course topics include the applications of sensors and transducers, signal conditioning, pneumatic, hydraulic, mechanical and electrical actuators, input and output interfacing, communication systems, programmable logic controllers, microprocessors and fault analysis.

COURSE OUTCOMES

1. Ability to design, develop and construct industrial measurement and instrumentation systems.
2. Ability to design and develop industrial actuation systems.
3. Ability to evaluate, design and construct analog and digital control system using PLC and Microcontroller.
4. Ability to design, construct and evaluate simple mechatronic systems that combine electrical/electronic and mechanical components.

REFERENCES

1. Bolton, W., *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering,* 5th edition, Addison Wesley Longman: Essex England, 2011.
2. D. G. Alciatore and M. B. Histand, *Introduction to Mechatronics and Measurement Systems*. 3rd edition, McGrawHill.
3. D. Shetty and R. A. Kolk, *Mechatronics System Design*, PWS Publishing Co., Boston, MA, 1997.
4. Godfrey C. Onwubolu, "Mechatronics: Principles and Applications", Butterworth-Heinemann 2005.
5. R. Isermann, *Mechatronic Systems: Fundamentals*, Springer-Verlag: Great Britain, 2003.

PLT 329/3
ADVANCED CONTROL SYSTEM
(ELECTIVE A2)

COURSE SYNOPSIS

The aim of this course is to introduce state-space design, non-linear system and digital control. Students also will be exposed to other control methods, like robust control, predictive control and optimal control.

COURSE OUTCOMES

1. Ability to analyze the concepts of state-space design, non-linear system and digital control
2. Ability to derive state-space description from continuous-time and discrete-time systems.
3. Ability to design sate-feedback and digital controller.
4. Ability to evaluate Robust Control, Optimal Control methods.

REFERENCES

1. J R Leigh, "Control Theory", 4th ed. IEE, 2009
2. Charles L. Philips, H. Troy Nagle, "Digital Control Systems Analysis and Design", 3rd ed. Prentice Hall, 1995
3. Gene F. Franklin, J. David Powell, Micheal Workman, "Digital Control of Dynamic Systems", 3rd ed. Addison-Wesley, 1998.
4. M. Gopal, "Digital Control and State Variable Methods", McGraw-Hill, 1997.
5. Kevin Warwick," An Introduction to Control Systems", 2nd ed. World Scientific, 1996

PLT 340/4
FINAL YEAR PROJECT I

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing is necessary for each final-year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.

3. Ability to explain a project in a technical report.
4. Ability to present and defend effectively project proposal to selected audience.
5. Ability to identify commercialization potential for proposed project.

PLT 422/3
MECHATRONIC SYSTEMS
(ELECTIVE C1)

COURSE SYNOPSIS

This course introduces important concepts of Artificial Intelligence (AI) and their applications in mechatronic systems. The concepts include fuzzy logic, neural network, neuro-fuzzy, genetic algorithm and pattern recognition. The mechatronic systems encompass Industrial Automation, Industrial Robotics and Control of process systems.

COURSE OUTCOMES

1. Ability to organize Artificial Intelligence components in mechatronics systems.
2. Ability to display the concepts of pattern recognition and classification.
3. Ability to analyze intelligent control with optimal parameter search for complex industrial systems.
4. Ability to analyze simple expert system for specific requirements.

REFERENCES

1. Sivanandam S N., Paulraj M., "Introduction to Artificial Neural Networks", 4th Edition, 2012, Vikas Publications.
2. Russell S.J., Norvig P., Canny J.F., "Artificial Intelligence: A Modern Approach", Prentice Hall, 2003
3. Rajasekaran. S., Pai G.A.V., "Neural Networks, Fuzzy Logic and Genetic Algorithms", 7th Edition, Prentice Hall India, 2007 By Mukaidono M., Kikuchi H., "Fuzzy Logic for Beginners", World Scientific, 2001.
4. Bolton, W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition, Addison Wesley Longman: Essex England, 2003.
5. D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997

PLT 423/3
MATERIAL HANDLING AND IDENTIFICATION
(ELECTIVE B1)

COURSE SYNOPSIS

This course introduces important concepts of material handling and identification and their applications in automation systems. The concepts include Introduction to Material Transport Sytem, Conveyor system, Storage System, Automated Storage System, Automated Identification and Data Technology, Industrial Machine and Vision System.

COURSE OUTCOMES

1. Ability to explain and analyze the material handling system and its relationship with assembly process
2. Ability to explain and analyze the automated storage system
3. Ability to explain and analyze the automated identification and data capture technology systems.
4. Ability to explain and analyze application of industrial machine vision system.

REFERENCES

1. Mikell P. Groover (2011), "Automation, Production Systems, and Computer-Integrated Manufacturing" 4th Edition, Prentice Hall
2. Plant Layout and Material Handling Innovative Automatic Identification and Location-Based Services
3. Alexander Hornberg (2007),"Handbook of Machine Vision" 2nd Edition, Wiley Publication

PLT 424/3
AUTOMATED GUIDED VEHICLE
(ELECTIVE B2)

COURSE SYNOPSIS

This course introduces the students the concepts and design of wheeled and walking robot mechanisms with a study on their kinematics and dynamics aspects. The course also introduces the principles and applications of Autonomous Guided Vehicles (AGV).

COURSE OUTCOMES

1. Ability to apply various locomotion systems in mobile robotic applications.
2. Ability to analyze the force-torque requirements of the mobile robots and select the most suitable actuator.
3. Ability to solve the kinematics problems for mobile robots.
4. Ability to apply suitable sensors and control systems for the wheeled mobile robot mechanisms.
5. Ability to analyze various autonomous guidance systems in mobile robotics application.



REFERENCES

1. Thomas Braunl, "Embedded Robotics – Mobile robot design and applications with embedded systems", Springer, NY, 2012
2. H R Everett, "Sensors for mobile robots – Theory and Application" , A K Peters Ltd, Mass, USA, 1995.
3. M P Groover, "Automation, Production systems and Computer Integrated Manufacturing", Prentice hall, NJ, 1990
4. Phillp John McKerrow, "Introduction to Robotics", Addison Wesley, NY, 1998
5. Man Zhihong, ' Robotics", Pearson Prentice Hall, Singapore, 2005

PLT 425/3
VISION SYSTEMS
(ELECTIVE C2)

COURSE SYNOPSIS

This course is designed to introduce the basic concepts of machine vision and provide an understanding of the concepts of vision as well as image acquisition and processing. Basic techniques for classification and neural network will also be introduced. The course also helps the students to develop the ability of designing machine vision systems for industrial applications.

COURSE OUTCOMES

1. Ability to formulate the components of machine vision systems, as well as image acquisition and sampling techniques.
2. Ability to relate color image processing, morphological image processing and segmentation techniques.
3. Ability to design machine vision module utilizing image processing concepts and classification methods.

REFERENCES

1. G. Bellettini, V. Beorchia, M. Paolini, F. Pasquarelli; Shape Reconstruction from Apparent Contours, Springer, 2015, ISBN 978-3-662-45190-8.
2. J. Beyerer, F. Leon Puente, C. Frese; Machine Vision, Springer, ISBN 978-3-662-47794-6, 2015.
3. F. Camastra, A. Vinciarelli. Machine Learning for Audio, Image and Video Analysis, Springer, 2015, ISBN 978-1-4471-6734-1.
4. M. E. Celebi, M. Lecca, B. Smolka, (Eds.); Color Image and Video Enhancement, Springer, 2015, ISBN 978-3-319-09362-8.
5. H. Cheng; Sparse Representation, Modeling and Learning in Visual Recognition, Springer, 2015, ISBN 978-1-4471-6713-6.
6. W. Jackson; Digital Image Compositing Fundamentals, Springer, ISBN 978-1-4842-1639-2, 2015.

PLT 440/6
FINAL YEAR PROJECT II

COURSE SYNOPSIS

Small-scaled research project that inclined towards designing is necessary for each final-year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The research area is mainly on electrical engineering technology.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to explain a complete project in a technical report (dissertation).
4. Ability to present and defend effectively project findings to selected audience.
5. Ability to identify commercialization potential for developed project.

CAREER OPPORTUNITIES

Robotics and Automation Engineering graduates in these areas will have the ability to engage in the design, research and development, consultancy, education, manufacturing, construction, maintenance, sales and management in many industries such as manufacturing, processing, automotive, aviation and shipping, mining and services, communications and building services and medical industries. Among of the firms that had offered employment opportunities to the graduates of these areas are as follows:

- Vehicle making and installation firms
- Home making appliances firms
- Electronic products firms
- Plant food processors
- Oil and gas companies
- High-tech firms
- Consultant firms
- Engineering & product development firms
- Automation system firms
- Bio-medical engineering firms
- Software development firms
- Research & development agencies
- Hospitals
- Companies, maintenance and repair firms of medical equipment
- Companies, marketing and sale firms of medical equipment
- Manufacturing industry of medical instrumentation
- Education and training (universities, polytechnics and colleges)

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC SYSTEM) - RY40

PROGRAMME OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of electronic engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to define and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE FOR BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC SYSTEM) - RY40

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (102)	PGT 101/3 Electric Circuit Principles	PGT 105/3 Electrical Engineering Technology	PGT 211/3 Electromagnetic Theory	PGT 213/3 Analogue Electronics II	PGT 301/3 Communication System	PGT 300/4 Final Year Project I	PGT 400/6 Final Year Project II	PXX 4XX/12 Industrial Training
	PGT 102/3 Engineering Science	PGT 104/3 Digital Electronics	PGT 201/3 Microprocessor	PGT 206/3 Computer Architecture	PGT 320/3 Power Electronics	PGT 312/3 Modern Control Systems		
	PGT 103/3 Computer Technology	PGT 106/3 C Programming	PGT 202/3 Analogue Electronics I	PGT 220/3 VLSI Design	PGT 330/3 Microelectronic Fabrication Technology	PGT 332/3 Semiconductor Packaging	PGT 420/3 Instrumentation	
	PGT 120/3 Engineering Material	PGT 107/2 Writing in Engineering Technology	PGT 207/3 Object Oriented Programming	PGT 205/3 Signal and Systems	PGT 331/3 Nanoelectronic Fundamental	PGT 333/3 Reliability & Failure Analysis	PGT 4XX/3 Elective II	
						PGT 3XX/3 Elective I	PGT XXX/3 Elective III	
Common Core (21)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III	PQT 274/3 Statistics for Engineering Technology	PTT 333/3 Engineering Technology Management	PTT 444/3 Technologist in Society		
	PCT 111/3 Engineering Skills							
University Required (19)		UVW 410/2 University Malay Language	UUW 224/2 Engineering Entrepreneurship	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies	UUW 322/2 Thinking Skills			
		UUT 122/2 Skills and Technology in Communication		UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UVW 312/2 English for Technical Communication			
	UZW XXX/1 Co-Curriculum	UZW XXX/1 Co-Curriculum	UZW XXX/1 Co-Curriculum					
		*UVA 111 Foundation English	UUW XXX/2 Option OR **UVW 211/2 English for General Purposes					
	19	19	20	19	19	19	15	12
University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curriculum, Option Subject								
Total Units for Graduation = 142								

Elective I: PGT 334/3-Nanosystem Design OR PGT 323/3-Verification on Chip
Elective II: PGT 430/3-Micro-Electro-Mechanical System OR PGT 421/3-Semiconductor Testing
Elective III: PGT 310/3-Digital Signal Processing OR PGT 431/3-Optoelectronic System

*Uncredited. Compulsory to students with MUET Band 2 only. This course is a pre-requisite to UVW 211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a pre-requisite to UVW 312 English for Technical Communication.

LIST OF COURSES

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS)(ELECTRONIC SYSTEM)

- PGT 101/3 ELECTRIC CIRCUIT PRINCIPLES
- PGT 102/3 ENGINEERING SCIENCE
- PGT 103/3 COMPUTER TECHNOLOGY
- PGT 120/3 MATERIAL ENGINEERING
- PGT 105/3 ELECTRICAL ENGINEERING TECHNOLOGY
- PGT 104/3 DIGITAL ELECTRONICS
- PGT 106/3 C PROGRAMMING
- PGT 107/2 WRITING IN ENGINEERING TECHNOLOGY
- PGT 211/3 ELECTROMAGNETIC THEORY
- PGT 201/3 MICROPROCESSOR
- PGT 202/3 ANALOG ELECTRONICS I
- PGT 207/3 OBJECT-ORIENTED PROGRAMMING
- PGT 213/3 ANALOG ELECTRONICS II
- PGT 206/3 COMPUTER ARCHITECTURE
- PGT 220/3 VLSI DESIGN
- PGT 205/3 SIGNALS AND SYSTEMS
- PGT 301/3 COMMUNICATION SYSTEMS
- PGT 320/3 POWER ELECTRONICS
- PGT 330/3 MICROELECTRONIC FABRICATION TECHNOLOGY
- PGT 331/3 NANOELECTRONIC FUNDAMENTAL
- PGT 312/3 MODERN CONTROL SYSTEMS
- PGT 332/3 SEMICONDUCTOR PACKAGING
- PGT 333/3 RELIABILITY & FAILURE ANALYSIS
- PGT 334/3 NANOSYSTEM DESIGN
- PGT 323/3 VERIFICATION ON CHIP
- PGT 420/3 INSTRUMENTATION
- PGT 430/3 MICRO-ELECTRO-MECHANICAL SYSTEM
- PGT 421/3 SEMICONDUCTOR TESTING
- PGT 310/3 DIGITAL SIGNAL PROCESSING
- PGT 431/3 OPTOELECTRONIC SYSTEM
- PGT 300/4 FINAL YEAR PROJECT I
- PGT 400/4 FINAL YEAR PROJECT II



COURSE SYLLABUS

DISCIPLINE CORE

PGT 101/3
ELECTRIC CIRCUIT PRINCIPLES

COURSE SYNOPSIS

This course covers introduction to the basic of electrical measurements, Ohm's Law, Series and Parallel Circuits, Circuit Theorems and Conversions and RLC circuits. This course will expose the students to the elements and principles of electrical circuit theory with appropriate to any RLC circuit applications. The laboratory sessions will complement the theories given in a class.

REFERENCES

1. Thomas L. Floyd. Principles of Electric Circuits, Pearson Prentice Hall, 2009 (Floyd 9e)
2. Alenxander and Sadiku. Fundamentals Of Electric Circuits, McGraw-Hill, 2007
3. Nilsson and Riedel, Electric Circuits, Pearson Prentice Hall, 2008
4. Thomas L.Floyd, Electric Circuit Fundamental 8 Edition

PGT 102/3
ENGINEERING SCIENCE

COURSE SYNOPSIS

This course covers introduction to physic and science which are force and motion, circular motion, work, power and energy, electrostatic, magnetism and electric current and resistance. Fundamental physics is combined with problem solving and engineering skills through suitable experiments. This course will expose the students to the elements and principles of basic concepts of physics and its application.

REFERENCES

1. Jerry Wilson, Anthony Buffa. "College Physics", 7th ed., Pearson Education,2009
2. Giambattista,Richardson,Richardson, "College Physics", McGraw Hill Internationatial Ed., 2007.
3. Stephen T.Thornton, Andrew Rex. "Modern Physics for Scientists & Engineers", 2nd ed, Brooks Cole, 1999.
4. W. Bolton. "Engineering Science". Fourth Edition. Newnes. 2001

PGT 103/3
COMPUTER TECHNOLOGY

COURSE SYNOPSIS

This course prepares the student to be familiar with computer hardware and software available in the market. The hardware includes CPU, memories and I/O such as monitor, keyboard and mouse. Computer software contains various Operating Systems (OS) such as Android, GNU/Linux, Microsoft and Apple based OS. Introduction to Free Open Source Software (FOSS) concept and philosophy, various applications such as Office Suite (word processor and spread sheet) will be explained.

REFERENCES

1. Randal E. Bryant and David R. O'Hallaron, "Introduction to Computer Systems: A Programmer's Perspective", Second edition Prentice Hall.
2. William Stallings " Computer Organization and Architecture", Eight edition Pearson
3. M. Morris Mano, "Computer System Architecture", Third Edition, Prentice-Hall.
4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", Fifth Edition, McGraw Hill

PGT 120/3
MATERIAL ENGINEERING

COURSE SYNOPSIS

The course is tailored to give students a broad introduction to material properties and limitations. The subject will cover class of material properties, measurement of the properties, and fundamental knowledge to make material selection with better properties. The common micro-structural features of different material classes will be outlined in order to relate material with its process as well as performance.

REFERENCES

1. Ashby, M., Shercliff, H. and Cebon, D., A., (2007). Materials: engineering, science, processing, and design, Elsevier.
2. Ashby, M. and Jones, D.R.H. (2005). Engineering Materials I: An Introduction to Properties, Applications, and Design, 3rd Edition, Elsevier, Butterworth Heinemann.
3. Ashby, M. and Jones, D.R.H. (2006). Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann.
4. Sharma, C.P. (2004). Enginjeering material properties and applications of metal and alloys, Prentice Hall, New Delhi.
5. Rajput, R.K. (2000). Engineering Materials. S.Chand & Companu, New Delhi.

PGT 105/3
ELECTRICAL ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

This course emphasizes basic electrical engineering which consists of three parts; the introduction of electrical systems, instrumentation, electrical machines and drives. This course also provides knowledge in the field of power transmission, machinery, instrumentation and power processing meter. Teaching and learning involves theoretical, simulation of computer aided design (CAD) software and also practical skills in the fields of electricity and electromagnetism, transformer, Alternating Current (AC) and Direct Current (DC) machines.

REFERENCES

1. Chapman S.J., "Electric Machinery Fundamentals", Fifth Edition, 2009, McGraw Hill, Singapore.
2. C.S Rangan, G.R. Sarma & V.S. Mani, "Instrumentation Devices & System" Tata, McGraw-Hill Publishing Company Limited, 2004.
3. Bhas S. Guru & Huseyin R. Hiziroglu, "Electric Machinery and Transformers", 2001, Oxford University Press.
4. A.K. Sawhney & P.Sawhney, "A Course in Electronic and Electrical Measurement and Instrumentation" Dhanpat Rai & Co. (P) Ltd., 2001.
5. Z.A. Yamayee & J.L. Bala, " Electromechanical Energy Devices & Power Systems", 1994, Wiley & Sons, USA.

PGT 104/3
DIGITAL ELECTRONICS

COURSE SYNOPSIS

Introduction and discussion of fundamental of digital circuit design and analysis. The lecture and tutorial exercise covers the following topics: Boolean Algebra, Numbering System, Basic Logic Gates, Combinational Circuit Design, Timing Diagram, Bi-Stable Memory Device and Sequential Circuit Design.

REFERENCES

1. Thomas L. Floyd, "Digital Fundamentals:, 10th Ed., Pearson Prentice Hall, 2009.
2. Floyd. TL, "Digital Fundamentals", 9th Ed., Prentice Hall, 2006.
3. Ronald J. Tocci, "Digital Systems – Principles and Applications", 7th Ed., Prentice Hall, 2003.
4. Nigel, P.C. "A First Course in Digital Electronics", 1st Ed., Prentice Hall, 1999.

PGT 106/3
C PROGRAMMING

COURSE SYNOPSIS

This course introduces basic programming using high-level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with programming tools such as flowcharts and pseudo code and then to implement them by developing C programmes.

REFERENCES

1. Deitel and Deitel, Sudin, S.,Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2012.
2. Cheng, H., "C for Engineers and Scientists", McGraw Hill, 2010.
3. Hanly, J.R. and Koffman, E.B., "Problem Solving and Program Design in C", 6th Ed., Pearson, 2007.
4. Sprankle and Maureen, "Problem Solving and Programming Concepts" 7th Ed., Prentice Hall, 2006.
5. Etter, D.M., "Engineering Problem Solving with C", 3rd Ed., Prentice Hall, 2004.

PGT 107/2
WRITING IN ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

To expose the students to the common requirements and expectations of writing as an engineering technologist; as well as to the format and techniques of writing various types of engineering technology documents.

REFERENCES

1. Leo Finkelstein Jr (2008). Pocket Book of Technical Writing for Engineers and Scientist, 3rd Ed. (New York: McGraw Hill International Edition
2. Beer, D. (2009). A Guide to Writing as an Engineer, 3rd Ed. (John Wiley, USA)
3. Pfeiffer, W. S., Adkins, K. E. (2010). Technical Communication – A Practical Approach, 7th Ed. (Pearson, USA)
4. Lannon, J. M, Gurak, L. J. (2011) Technical Communication, 12th Ed. (Longman).



PGT 211/3
ELECTROMAGNETIC THEORY

COURSE SYNOPSIS

This is the first course in Electromagnetic Field Theory at the undergraduate level. It provides basic concepts and understanding of fundamental laws of electrostatics and magnetostatics . Applications of these laws for different field configurations are also introduced. The course also introduces transmission line theory and the use of transmission lines as circuit elements. Calculation of transmission line parameters like VSWR, reflection coefficient and impedance matching using Smith's chart is also included in this course.

REFERENCES

1. Fawwaz T. Ulaby, Eric Micielssen, Umberto Ravaioli, "Fundamentals of Applied Electromagnetics", Pearson (Prentice Hall) 2010.
2. Stuart M. Wentworth, "Applied Electromagnetics", John Wiley, USA, 2007.
3. Stuart M. Wentworth, "Fundamental of Electromagnetics with Engineering Applications", Wiley edition, 2005.

PGT 201/3
MICROPROCESSOR

COURSE SYNOPSIS

The aim of this course is to study the Intel 8085 microprocessor architecture and relate that knowledge to the design of microprocessor based systems. This includes the design technique for designing memory, input and output for the systems. The study of 8085 instruction set and various software development tools are also emphasized as the knowledge are needed in the design of the microprocessor-based systems.

REFERENCES

1. R.S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5th Edition, Prentice Hall, 2002.
2. W. Routt, Microprocessor Architecture, Programming, and Systems Featuring the 8085, Thomson Delmar Learning. 2007.
3. Soumitra Kumar Mandal, Microprocessor and Microcontrollers: Architecture, Programming and Interfacing using 8085,8086 and 8051, McGraw Hill, 2011.
4. W. Kleitz, Microprocessor and Microcontroller Fundamentals: The 8085 and 8051 Hardware and Software, Prentice Hall, 1998.
5. B.B. Brey, The 8085A Microprocessor: Software, Programming and Architecture, 2nd Edition, Prentice Hall, 1996.

PGT 202/3
ANALOG ELECTRONICS I

COURSE SYNOPSIS

This course exposes the student the basic knowledge in analog electronic. The exposure encompasses amplifier design based on bipolar and field effect transistors, for single and multi stage, power amplifier, frequency response analysis of amplifiers. Emphasis is placed on basic design aspects and applications. The course has been designed to provide basic analog electronic skills covering theories and practices.

REFERENCES

1. Donald A. Neamen, 'Electronic Circuit Analysis and Design,' 4th Ed., McGraw-Hill, 2010.
2. Boylestad, R.L., Nashelsky, L., 'Electronic Device and Circuit Theory', 10th Ed., Prentice Hall 2009.
3. Floyd, T., 'Electronic Devices', 8th Ed., Pearson Education, Inc, 2008.
4. Adel S. Sedra, Kenneth C. Smith, 'Microelectronic Circuits', 6th Ed., Oxford University Press, 2009.
5. Thomas L.Floyd, 'Electronic devices (Conventional Current Version)', 8th ed., Prentice Hall, 2007

PGT 207/3
OBJECT-ORIENTED PROGRAMMING

COURSE SYNOPSIS

This course discusses the fundamental concepts of programming in the object-oriented paradigm which includes classes and objects, inheritance, polymorphism and exception handling. Students will also learn object-oriented problem solving with attention to general, as well as programming language-specific issues such as application design and development, packages, applets and Graphical User Interface (GUI) using Java Swing.

REFERENCES

1. Wu, C., "A Comprehensive Introduction to Object-Oriented Programming with Java", McGraw Hill, 2008.
2. Liang, "Introduction to Java Programming, Comprehensive Version with MyProgrammingLab" , Pearson Higher Education, 2012.
3. Idris, S., Abu Bakar, M. & Jailani, N., "OO Java: Pengaturcaraan Berorientasikan Objek menggunakan Java", McGraw-Hill, Kuala Lumpur, 2002.
4. Wu, T.C, "An Introduction to Object Oriented Programming with Java ", McGraw Hill, Boston, 2001
5. Bronson, G.J. and Rosenthal, D. " Object-oriented Program Development using Java: a class-centered approach", Thomson/ Course Technology, 2006.

PGT 213/3
ANALOG ELECTRONICS II

COURSE SYNOPSIS

This course offers the students an exposure to the Operational Amplifier: Operation, differential amplifier, common-mode, parameters, basic op-amp, practical op-amp circuits, op-amp datasheet; Applications of op-amp and frequency response: Summing amplifier, Voltage follower, Comparator, Integrator, Differentiator, frequency response and compensation; Feedback Circuits: Concepts of feedback, types of feedback connection, practical feedback circuit, feedback amplifier; oscillator: Basic operating principles of an oscillator, phase shift, Wien Bridge, Crystal oscillator, uni-junction.
Active Analog Filters: Basic filter, filter response characteristics, low-pass filter, high-pass filter, band-pass filter, band-stop filter, frequency response measurement, design of filter, Butterworth, Chebychev and Elliptic

REFERENCES

1. Floyd, T., '*Electronic Devices*', 8th Ed., Pearson Education, Inc., 2007.
2. Boylestead, R.L, and Nashelsky, L., '*Electronic Devices and Circuit Theory*', 7th Ed., Prentice-Hall, 1999.
3. Malvino, A, '*Electronic Principles*', 6th Ed., Mc Graw Hill, 1999

PGT 206/3
COMPUTER ARCHITECTURE

COURSE SYNOPSIS

This course covers both the architectural and organizational aspects of computer systems. Architectural aspects of a system are defined as the features that are available to the operating system kernel such as the instruction set, data representations and peripheral interfaces. On the other hand, organizational aspects of a system are defined as the physical implementations that realize the features given for a system. These include the design of basic building blocks such as the ALU and the control unit, as well as the logic level interface of both internal and external units. This course expects the students to have a good fundamental on digital logic design (both combinatorial and sequential logic).

REFERENCES

1. William Stallings, "Computer Organization and Architecture: Designing for Performance", 8th Edition, Prentice Hall, 2010.
2. John L. Hennessy and David A. Patterson, "Computer Architecture: A Quantitative Approach", 4th Edition, Morgan Kaufmann, 2006.
3. Linda Null, "The Essentials of Computer Organization and Architecture", Jones & Bartlett Pub., 2006.
4. Miles J. Murdocca and Vincent P. Heuring, "Computer Architecture and Organization: An Integrated Approach", Wiley, 2007.

PGT 220/3
VLSI DESIGN

COURSE SYNOPSIS

The course provides the students an exposure on basic logic circuits design, layout design, layout simulation of integrated circuits, as well as basic integrated circuits design techniques.

REFERENCES

1. Wolf, Rabeay, Jan M. Weste, Neil H.E. - CMOS VLSI; A Design Perspective, Compiled by Norina Idris, Norhawati Ahmad, Rizalafande Che Ismail, Muammar Mohamad Isa, Siti Zarina Md Naziri, Muhammad Imran Ahmad. Pearson, 2008.
2. W Weste, Neil H.E. and Harris, D., CMOS VLSI Design- A Circuits and Systems Perspective, Prentice Hall, 2005.
3. Rab aey, J.M., et al., Digital Integrated Circuits – A Design Perspective, 2nd Ed., Prentice-Hall, 2003.
4. Wolf, W., Modern VLSI Design – System on Chip, Prentice Hall, 2002.
5. Wayne Wolf, Modern VLSI Design: IP-Based Design, 2009.
6. Vai, , M. M., VLSI Design, CRC Press, 2001.
7. Uyemura, John P., Chip Design for Submicron VLSI: CMOS Layout and Simulation, SGS Thomson, 2006.

PGT 205/3
SIGNALS AND SYSTEMS

This course introduce student to mathematical foundation and computational tools for processing continuous-time and discrete-time signals in both time and frequency domains. Key concepts and tools introduced and discussed in this class include linear time-invariant systems, impulse response, frequency response, convolution, filtering, sampling, and Fourier transform, Laplace Transform and z-Transform. This course serves as entry and prerequisite for any higher level course in the fields of signal processing, communications, and control.

REFERENCES

1. Charles L. Philips, John M. Parr, Eve A. Riskin, 'Signals, Systems and Transforms', 5th Ed., Pearson, 2014.
2. Alan V. Oppenheim, Alan S. Willsky, and Syed Hamid Nawab, 'Signals and Systems", 2nd Edition, Pearson, 2013.
3. Hwei P. Hsu, "Schaum's Outline of Signals and Systems", Second Edition, McGraw-Hill Companies, Inc, 2011.
4. Hwei P. Hsu, "Schaum's Outline of Signals and Systems", Second Edition, McGraw-Hill Companies, Inc, 2011.
5. Michael J. Roberts, "Fundamental of Signals and Systems", Mc Graw Hill International Ed., 2008.
6. B.P. Lathi, "Linear System & Signals", Oxford University Press, 2005.

PGT 301/3
COMMUNICATION SYSTEMS

COURSE SYNOPSIS

This course will cover basic principles and concepts of communication engineering system such as introduction to the basic elements of communications, information theory and signal analysis. Then student will introduce to and familiar with Amplitude Modulation & Demodulation (AM) and their technique of modulation as well as Frequency Modulation(FM) and demodulation. Some digital modulation technique are also introduce such as Amplitude Shift Keying(FSK), Phase Shift Keying(PSK) and Frequency Shift Keying(FSK) . In addition, some practical system which has been applied in real world such fiber optics and satellite also covered in this course.

REFERENCES

1. Rodge E.Ziemer, Wiliam H. Tranton, Principle of Communication System, 6th Edition, Wiley, 2008.
2. U.A Bakshi, A.P Godse, Analog Communication, 2nd Edition, Technology Publication Pune,2009.
3. Simon Haykin, Mocheal Mohen, An Introduction to Analog and Digital Communication, 2nd Edition, 2006.
4. Wayne Tomasi," Electronic Communication System, Fundamental Through Advanced",5th Ed. Pearson Prentice Hall,2004.
5. Paul Young, Electronics Communications Techniques, 5th Edition, Prentice Hall, 2004
6. Mullet,"Basic Telecommunications:The Physical Layer", Thomson Learning, 2003.

PGT 320/3
POWER ELECTRONICS

COURSE SYNOPSIS

This course introduces Power Electronics as a Multidisciplinary & Interdisciplinary Applications Orientated Technology emphasising the main criterion of energy efficiency. Topics for this course also cover Fundamental Concepts of Power Electronics, Power Semiconductor Devices, Power Electronic Circuits, AC-DC Conversion, AC-AC Conversion, DC-DC Conversion and DC-AC Conversion, including waveform analysis, is developed from the blended skills of theory – simulation - laboratory.

REFERENCES

1. Muhammad H. Rashid. (2013). Power Electronics: Circuits, Devices & Applications. 4rd ed. Pearson: Prentice-Hall.
2. Mohan, Undeland, Robbins. (1995). Power Electronics: Converters, Applications & Design. 2nd ed. John Wiley and Sons, Inc.
3. Cyril W. Lander. (1993). Power Electronics. 3rd ed. McGraw-Hill.
4. Daniel W Hart (1997), Introduction to Power Electronics, Prentice Hall International.
5. J.S.Chitode (2007), Power Electronics, Technical Publications Pune.
6. Issa Batarseh (2004), Power Electronic Circuits, John Wiley & Sons, Inc.

PGT 330/3
MICROELECTRONIC FABRICATION TECHNOLOGY

COURSE SYNOPSIS

This course on advance fabrication technology focuses on the concept and the basics of semiconductor materials, process technology and the fabrication processes of Integrated Circuits (ICs). The students will also be exposed to thefabrication process from oxidation, photolithography, etching, e-beam lithography,diffusion, implantation, metallization and characterization.

REFERENCES

1. Hong Xiao, Introduction to Semiconductor Manufacturing Technology, Prentice Hall, 2001.
2. Introduction to Microelectronic Fabrication, Volume V,Second Edition, Richard C. Jaeger, Prentice Hall, 2002.
3. Semiconductor Devices, Physics and Technology, 2ndEdition, S.M. Sze, John Wiley & Sons, Inc, 2002.
4. Silicon VLSI Technology: Fundamentals, Practice andModeling, James D. Plummer, Michael D. Deal andPeter B. Griffin, Prentice Hall, 2000.
5. G. Timp, Nanotechnology, Springer Verlag, 1999 (General) 6. Nanoimprint Lithography, Stephen Chou, J. Vac. Sci.Technol.B, 14(6), pp.4129, 1996.

PGT 331/3
NANOELECTRONIC FUNDAMENTAL

COURSE SYNOPSIS

Fundamentals of nanotechnology and its application to engineering systems, emphasizing basic principles, materials, measurement tools, fabrication techniques, and applications

REFERENCES

1. Nano-Engineering in Science and Technology by Michael Rieth, World Scinetific Pub Co, 2003.
2. Introduction to Nanotechnology by Charles P. Poole & Frank J. Owens, John-Wiley & Sons, 2003.

PGT 312/3
MODERN CONTROL SYSTEMS

COURSE SYNOPSIS

This course aims to expose student a thorough concept of control systems theory, complements with practical understanding through simulation software and hardware. Topics in this course covers from the concept of control systems, and learn how to derive physical system into mathematical model of systems. Then, next topic will discuss further on the system characteristics, including performance, and the stability. There are several methods to observe the system performance, such as Routh-Hurwitz Criterion, root locus and frequency response. This course involves laboratory and projects (using Quanser and NI LabVIEW) to enhance your understanding and hands-on experience through hardware and simulation.

REFERENCES

1. Richard C. Dorf, Robert H. Bishop, Modern Control Systems, 13th edition, Pearson, 2017.
2. Norman S. Nise, Control System Engineering, 7th edition, Wiley, 2014
3. K. Ogata, Modern Control Engineering, 5th edition, Prentice Hall, 2009.
4. G. Franklin, J.D. Powell and A. Emani-Naeini, Feedback Control and Dynamic Systems, 6th edition, Prentice Hall, 2009.
5. Constantine H. Houpis, Stuart N. Sheldon, Linear Control System Analysis and Design with MATLAB, 6th edition, CRC Press, 2014.

PGT 332/3
SEMICONDUCTOR PACKAGING

COURSE SYNOPSIS

Students will be exposed to Microsystems packaging, the role of packaging in microelectronics, fundamental of IC assembly, general semiconductor process flow, advance material for nanopackaging design for reliability, thermal management, sealing and encapsulation, packaging material and processes, and latest packaging technology trend via latest scientific papers. The students will also be exposed to identifying critical packaging parameters and interpreting data of their own designed experiment. Mathematical modelings in packaging are also introduced.

REFERENCES

1. Advanced Electronic Packaging, Richard K. Ulrich & William D. Brown, John Wiley & Sons Inc.
2. Nanopackaging: Nanotechnologies and Electronics Packaging by James E. Morris.
3. Electronic Packaging Materials and Their Properties (Electronic Packaging Series) by Michael Pecht, Rakish Agarwal, F. Patrick McCluskey, and Terrance J. Dishongh.
4. Fundamentals of Microsystems Packaging, Rao R. Tumala, McGraw-Hill.

PGT 333/3
Reliability & Failure Analysis

COURSE SYNOPSIS

This course is basically divided into two areas: Reliability & Failure Analysis. In the first section of reliability, students will learn the concept of reliability, its terms & definitions, the different types of reliability distributions and also the different types of reliability prediction techniques such as FMEA & FTA. In the second section of failure analysis, students will be exposed to the different types of FA techniques commonly conducted on a failed semiconductor device and the test instrumentation associated with each technique.



REFERENCES

1. Patrick O'Connor (2002). Practical Reliability Engineering, Wiley.
2. Ebeling, C. E. (1997). Reliability and Maintainability Engineering, McGraw Hill.
3. Lawrence C. Wagner, (1999). *Failure Analysis of Integrated Circuits: Tools and Techniques.*: Kluwer Academic Publishers.
4. Perry L. Martin (1999). *Electronic Failure Analysis Handbook*.: McGraw Hill.
5. E. Ajith Amerasekera and Farid N. Najm (1997). *Failure Mechanisms in Semiconductor Devices.* 2nd Ed.: John Wiley & Sons.
6. Friedrich Beck (1998). *Integrated Circuit Failure Analysis: A Guide to Preparation Techniques.* : John Wiley & Sons.

PGT 334/3
NANOSYSTEM DESIGN

COURSE SYNOPSIS

Nanosystem design is an advanced nanosystem course and divided into three parts which are nanosystems design, parallel architecture and complex integrated nanosystems and nanoelectronics and nanowire. Nanosystem design part will cover the topics on basis of nanomaterials, nanoelectronic and nanoarchitectures and application of nanodevices in integrated system. In parallel architecture and complex integrated nanosystems the topics that covered are architecture principles and nanosystems as information-processing machines. Otherwise, in nanoelectronics and nanowire the topics that covered are nanoelectronics with tunneling devices, nanoelectronics with superconducting devices and basic of nanowire development and characterization.

REFERENCES

1. Karl Goser, "Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum Devices", Springer, 2004.
2. Giovanni De Micheli, Yusuf Leblebici, Martin Gijs and Janos Voros, "Nanosystems Design and Technology", Springer US, 2009.
3. K.Goser, P.Glosekotter and J.Dienstuhl, "Nanoelectronics and Nanosystems", Springer Germany, 2004.
4. Alina Voda, "Micro, Nanosystems and Systems on Chips: Modeling, Control, and Estimation", Wiley-ISTE, 2010.
5. Rainer Waser, "Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices", Wiley-VCH, 2003.

PGT 323/3
VERIFICATION ON CHIP

COURSE SYNOPSIS

This course covers issues on test from various angles circuit as well as system levels. It also touches some non-technical issues such as economic point of view and challenges. To test faults it is required to understand and appreciate their types and how they are modeled. This covers test methods for combinational and sequential circuits. Advanced topics which include DFT and BIST are included to create awareness of its importance in today's IC design and test activities.

REFERENCES

1. Zainalabedin Navabi (2011). Digital System Test and Testable Design, Springer Netherland.
2. Chandrasetty, Vikram Arkalgud (2011). VLSI Design, 1st Edition, Springer- Verlag, New York .
3. Ramachandran Seetharaman (2007). Digital VLSI System Design, 1st Edition, Springer Netherland.

PGT 420/3
INSTRUMENTATION

COURSE SYNOPSIS

This course covers the fundamental of electronic instrumentation. This includes the working principle and transduction properties of sensors and transducers. Importance and techniques of signal conditioning is emphasized. Element and principle of data acquisition and their applications are discussed. Modern stand-alone and computer-based measurement instruments are covered.

REFERENCES

1. Kalsi, H.S. "Electronic Instrumentation", Tata McGraw-Hill Publishing Co. Ltd., 2005
2. C.S. Rangan, G.R. Sarmaand V.S. Mani. "Instrumentation Devices & Systems", Tata McrGraw-Hill Publishing Co. Ltd., 2004
3. A.K. Sawhneyand P. Sawhney. "A Course in Electronic and Electrical Measurement and Instrumentation", Dhanpat Rai & Co. (P) Ltd., 2001.

PGT 430/3
MICRO-ELECTRO-MECHANICAL SYSTEM

COURSE SYNOPSIS

This course will focus on design and simulation of N/MEMS devices. The design will include several of analysis types such as structural, electrical and mechanical while the fabrication technology will focus on bulk and surface micromachining. This course will also discuss the application and technology of N/MEMS packaging in various fields.

REFERENCES

1. Nano and Micro-Electromechanical Systems: Fundamentals of Nano and Microengineering by Sergey E. Lyshevski and Sergey Edward Lyshevski.
2. MEMS and NEMS: Systems, Devices, and Structures by Sergey Edward Lyshevski.
3. Foundations of MEMS by Chang Liu

PGT 421/3
SEMICONDUCTOR TESTING

COURSE SYNOPSIS

Most semiconductor manufacturing Test/ Product engineers have weak foundations in device testing concepts, techniques and implementations and that causes them to have difficulties troubleshooting test problems. This course is designed to provide a strong foundation in conceptual understanding of semiconductor device testing. This conceptual knowledge of ATE instrumentation, basic semiconductor devices and test methods will provide the knowledge foundation. This course includes case studies and labs that will help to build critical thinking abilities which are a very important skill for troubleshooting. The course contents start from an understanding of basic electronic devices that are found in any test, application circuits or part of a multi-functional system like diodes, transistors, linear and switching regulators and, converters (DAC/ADCs). Understanding of device data-sheets' electrical parameters and how these parameters affect the end applications and are conceptually measured, are taught. The functions and behaviours of these devices will be critically examined and discussed using a simulation tool. The Automatic Testers' (ATE) conceptual software and hardware architecture portion of the course introduces the participants to this machine that is found in every semiconductor manufacturers' test floor. DC, analog, digital test resources' architectures and theory of operations which all test engineers or aspiring test engineers should know, are provided.

REFERENCES

1. Renesas Electronics, 'Semicoductor Reliability Handbook', Renesas Electronics Corporation, 2017.
2. Guy Perry, 'The Fundamental of Digital Semiconductor Testing', Soft Test, 1996.
3. N.K. Jha, S. Gupta,'Testing of Digital Systems', Cambridge University Press, 2003.

PGT 310/3
DIGITAL SIGNAL PROCESSING

COURSE SYNOPSIS

Digital Signal Processing (DSP) has continued to have a major and increasing impact in many key areas of technology including telecommunication, digital television and media, biomedicine, VLSI design etc. DSP is now at the core of many new and emerging digital products and applications in the information society and is a core subject in most electronic/ computer/communication engineering curricula. This course is designed to give the students the necessary mathematical tools to analyze discrete time signals and systems. The course also includes various techniques for the design of digital filters and their implementations using DSP processors.

REFERENCES

1. S. Salivahanan, A. Vallavaraj, C.Gnanapriya, Digital Signal processing, Second Edition, Tata McGraw Hill Education 2010.
2. Sanjit K. Mitra, Digital Signal Processing, McGraw Hill, 2006.
3. Emmanuel C. Ifeachor, Digital Signal Processing, Prentice Hall.
4. Vinay K Ingle, John G. Proakis, Digital Signal Processing using MATLAB



PGT 431/3
OPTOELECTRONIC SYSTEM

COURSE SYNOPSIS

The students studying this course will develop a basic understanding of the principles and practices of modern optoelectronic device includes fiber optic, semiconductor laser, photodiode and LED.The important functions for applications for these optoelectronic devices will acquire in optoelectronic system such as optical communication and display technology. Practical skills by using software in optical fiber systems and measurement will also be acquired.

REFERENCES

1. S.O.Kasap. Optoelectronics & Photonics: Principles & Practices: International Edition, Pearson Education Limited, 2013.
2. Gerasimos Konstantatos, Edward H. Sargent, Colloidal Quantum Dot Optoelectronics and Photovoltaics, Cambridge University Press, 2013.
3. Shun Lien Chuang, Physics of Photonic Devices, John Wiley & Sons, 2012.
4. Paul Scherz, Simon Monk, Practical Electronics for Inventors, 4th Ed.,McGraw Hill Professional, 2016.

PGT 300/4
FINAL YEAR PROJECT I

PGT 400/4
FINAL YEAR PROJECT II

COURSE SYNOPSIS

This is a research project in connection with engineering technology problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. For both FYP I and II, each student prepares a comprehensive engineering report, present and demonstrate findings and results of the project work.

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC TELECOMMUNICATION DESIGN) - RY41

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of electronic engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognize the need for professional development and to engage in independent and lifelong learning.



STRUCTURE CURRICULUM BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC TELECOMMUNICATION DESIGN) - RY41

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Engineering Core (102)	PGT 110/3 Multimedia Systems	PGT 104/3 Digital Electronics	PGT 210/3 Measurement and Instrumentation	PGT 206/3 Computer Architecture	PGT 301/3 Communication System	PGT 300/4 Final Year Project I	PGT 400/4 Final Year Project II	PIT 304/12 Industrial Training
	PGT 101/3 Electric Circuit Principles	PGT 105/3 Electrical Engineering Technology	PGT 211/3 Electromagnetic Theory	PGT 212/3 Electronic Communication Technology	PGT 310/3 Digital Signal Processing	PGT 313/3 Digital Communication Technology	PGT 410/3 Satellite Technology	
	PGT 102/3 Engineering Science	PGT 106/3 C Programming	PGT 201/3 Microprocessor	PGT 205/3 Signal and Systems	PGT 315/3 RF and Microwave Technology	PGT 314/3 Optical Technology	PGT xxx/3 Elective II	
	PGT 103/3 Computer Technology	PGT 107/2 Writing in Engineering Technology	PGT 202/3 Analog Electronics I	PGT 213/3 Analog Electronics II	PGT 312/3 Modern Control Systems	PGT 311/3 Antenna and Propagation	PGT xxx/3 Elective III	
						PGT xxx/3 Elective I		
Common Core (21)	PQT 111/3 Mathematics I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III	PQT 274/3 Statistics for Engineering Technology	PTT 333/3 Engineering Technology in Management	PTT 444/3 Engineering Technologist in Society		
	PCT 111/3 Engineering Skill							
Compulsory Modules University Required (19)	UZW xxx/1 Co-Curriculum	UVW 410/2 University Malay language	UUW 224/2 Engineering Entrepreneurship	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies	UUW 322/2 Thinking Skill			
		UUW 122/2 IT and Communication Skills	UUW xxx/2 Option subjects or UVW211/2 English for General Purposes	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UVW312/2 English for Technical Communication			
		UZW xxx/1 Co-Curriculum	UZW xxx/1 Co-Curriculum					
Total Credit	19	19	20	19	19	19	15	12

Total Units for Graduation = 142

Elective I, II and III: PGT316 Mobile and wireless Communications, PGT 322 Microcontroller, PGT 411 RF and Electronic Circuit Design, PGT412 Wireless Internetworking Technology, PGT 404 Artificial Intelligence, PGT 402 Mobile Computing

*Students with MUET band 2 must take Foundation English at semester 2, English for General Purposes and English for Technical Communication
*Students with MUET band 3 Will take English for General Purposes and English for Technical Communication
*Students with MUET band 4 and above will take Options subject and English for Technical Communication

LIST OF COURSES

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC TELECOMMUNICATION DESIGN)

- **PGT 101/3 ELECTRIC CIRCUIT PRINCIPLES**
- **PGT 102/3 ENGINEERING SCIENCE PRINCIPLES**
- **PGT 103/3 COMPUTER TECHNOLOGY**
- **PGT 104/3 DIGITAL ELECTRONICS**
- **PGT 105/3 ELECTRICAL ENGINEERING TECHNOLOGY**
- **PGT 106/3 C PROGRAMMING**
- **PGT 107/2 WRITING IN ENGINEERING TECHNOLOGY**
- **PGT 110/3 MULTIMEDIA SYSTEMS**
- **PGT 201/3 MICROPROCESSOR**
- **PGT 202/3 ANALOG ELECTRONICS I**
- **PGT 205/3 SIGNAL AND SYSTEMS**
- **PGT 206/3 COMPUTER ARCHITECTURE**
- **PGT 210/3 MEASUREMENT AND INSTRUMENTATION**
- **PGT 211/3 ELECTROMAGNETIC THEORY**
- **PGT 212/3 ELECTRONIC COMMUNICATION TECHNOLOGY**
- **PGT 213/3 ANALOG ELECTRONICS II**
- **PGT 300/4 FINAL YEAR PROJECT I**
- **PGT 301/3 COMMUNICATION SYSTEM**
- **PGT 310/3 DIGITAL SIGNAL PROCESSING**
- **PGT 311/3 ANTENNA AND PROPAGATION**
- **PGT 312/3 MODERN CONTROL SYSTEMS**
- **PGT 313/3 DIGITAL COMMUNICATION TECHNOLOGY**
- **PGT 314/3 OPTICAL TECHNOLOGY**
- **PGT 315/3 RF AND MICROWAVE TECHNOLOGY**
- **PGT 400/6 FINAL YEAR PROJECT II**
- **PGT 410/3 SATELLITE TECHNOLOGY**
- **PGT 412/3 WIRELESS INTERNETWORNIG TECHNOLOGY**
- **PGT 316/3 MOBILE AND WIRELESS COMMUNICATION**
- **PGT 411/3 RF AND ELECTRONIC CIRCUIT**
- **PIT 304/12 INDUSTRIAL TRAINING**



COURSE SYLLABUS

PGT 110/3
MULTIMEDIA SYSTEM

COURSE SYNOPSIS

Multimedia software systems incorporate various media, such as text, images, video and audio, to provide rich experiences for users. This is a course in the design, implementation and evaluation of multimedia systems. The course include the development and use of various multimedia data types; the design and evaluation of multimedia systems; and to plan, develop and implement multimedia projects.

REFERENCES

1. Shuman, J. E. (2003). *Multimedia concepts, enhanced edition: Illustrated introductory*. Boston, MA: Course Technology. (ISBN: 061911052X)
2. Alber, A. F. (1996). *Multimedia: A management perspective.* Boston, MA: International Thomson Publishing Company.
3. Alessi, S. M., & Trollip, S. R. (2001). *Multimedia for learning: Methods and development*. Needham Heights, MA: Allen and Bacon.

PGT 210/3
MEASUREMENT AND INSTRUMENTATION

COURSE SYNOPSIS

This course covers Theory and Constructional details of Analog instruments. In this course, sources of errors in Energy Meter and their compensation are included together with different types of Power Factor Meters. This course also discusses the use of Cathode ray Oscilloscope and the importance of their components.

REFERENCES

1. A.K. Ghosh. *Introduction to Measurement and Instrumentation 2nd Ed.*, Prentice Hall of India, 2007
2. A.J. Diefenderfer. *Principles of Electronic Instrumentation 3rd Ed.*, Thomson, 1994
3. H.S. Kalsi. *Electronic Instrumentation,* Tata McGraw-Hill Publishing Company Limited, 2005

PGT 211/3
ELECTROMAGNETIC THEORY

COURSE SYNOPSIS

This is the first course in Electromagnetic Field Theory at the undergraduate level. It provides basic concepts and understanding of fundamental laws of electrostatics and magnetostatics . Applications of these laws for different field configurations are also introduced. The course also introduces transmission line theory and the use of transmission lines as circuit elements. Calculation of transmission line parameters like VSWR, reflection coefficient and impedance matching using Smith's chart is also included in this course.

REFERENCES

1. Fawwaz T. Ulaby, Eric Micielssen, Umberto Ravaioli, "Fundamentals of Applied Electromagnetics", Pearson (Prentice Hall) 2010.
2. Stuart M. Wentworth, "Applied Electromagnetics", John Wiley, USA, 2007.
3. Stuart M. Wentworth, "Fundamental of Electromagnetics with Engineering Applications", Wiley edition, 2005.

PGT 212/3
ELECTRONIC COMMUNICATION TECHNOLOGY

COURSE SYNOPSIS

This subject introduces the students about the basic communication components and circuits used in communication systems. This includes the architecture of radio frequency amplifiers, mixers, AM and FM modulators and demodulators, transmitter circuits and receiver's circuits design. Practical exercises such as design, measurement and analyze of the circuit and output signal in the communication systems which improve understanding and develop skills in communication electronic field.

REFERENCES

1. Wayne Tomasi. (2004). *Electronic Communication System, Fundamental Through Advanced.* 5th Ed. Pearson Prentice Hall. (Text)
2. Paul Young. (2004). *Electronics Communications Techniques.* 5th Edition. Prentice Hall.
3. K. Sam Shanmugan. (2002). *Analog and Digital Communication.* Wiley.

PGT 213/3
ANALOG ELECTRONICS II

COURSE SYNOPSIS

This course offers the students an exposure to the Operational Amplifier: Operation, differential amplifier, common-mode, parameters, basic op-amp, practical op-amp circuits, op-amp datasheet; Applications of op-amp and frequency response: Summing amplifier, Voltage follower, Comparator, Integrator, Differentiator, frequency response and compensation; Feedback Circuits: Concepts of feedback, types of feedback

connection, practical feedback circuit, feedback amplifier; oscillator: Basic operating principles of an oscillator, phase shift, Wien Bridge, Crystal oscillator, uni-junction.

Active Analog Filters: Basic filter, filter response characteristics, low-pass filter, high-pass filter, band-pass filter, band-stop filter, frequency response measurement, design of filter, Butterworth, Chebychev and Elliptic

REFERENCES

1. Floyd, T., '*Electronic Devices'*, 8th Ed., Pearson Education, Inc., 2007.
2. Boylestead, R.L, and Nashelsky, L., '*Electronic Devices and Circuit Theory'*,7th Ed., Prentice-Hall, 1999.
3. Malvino, A, '*Electronic Principles'*, 6th Ed., Mc Graw Hill,1999

PGT 310/3
DIGITAL SIGNAL PROCESSING

COURSE SYNOPSIS

Digital Signal Processing (DSP) has continued to have a major and increasing impact in many key areas of technology including telecommunication, digital television and media, biomedicine, VLSI design etc. DSP is now at the core of many new and emerging digital products and applications in the information society and is a core subject in most electronic/ computer/communication engineering curricula. This course is designed to give the students the necessary mathematical tools to analyze discrete time signals and systems. The course also includes various techniques for the design of digital filters and their implementations using DSP processors.

REFERENCES

1. S. Salivahanan, A. Vallavaraj, C.Gnanapriya, Digital Signal processing, Second Edition, Tata McGraw Hill Education 2010.
2. Sanjit K. Mitra, Digital Signal Processing, McGraw Hill, 2006.
3. Emmanuel C. Ifeachor, Digital Signal Processing, Prentice Hall.
4. Vinay K Ingle, John G. Proakis, Digital Signal Processing using MATLAB

PGT 311/3
ANTENNA AND PROPAGATION

COURSE SYNOPSIS

By the end of the course, students will be able to explain basic concept in antennas and propagation. Practical skills in antennas and propagation will also be acquired.

REFERENCES

1. John Daniel Kraus, Ronald J. Marhefka (2002). Antennas for All Applications. McGraw-Hill.
2. Rajeswari Chatterjee (2006). Antenna Theory and Practice. New Age International.
3. Joseph J. Carr (2001). Practical Antenna Handbook. McGraw-Hill.

PGT 312/3
MODERN CONTROL SYSTEMS

COURSE SYNOPSIS

The course aims to give the student a throught but practical understanding on the concept of control systems theory, classical control and modern control methods.

REFERENCES

1. I. J. Nagrath (2005). Control Systems Engineering. New Age International.
2. Stanley M. Shinners (1998). Modern Control System Theory and Design. Wiley - IEEE.
3. P. N. Paraskevopoulos (2002). Modern Control Engineering. Marcel Dekker.

PGT 313/3
DIGITAL COMMUNICATION TECHNOLOGY

COURSE SYNOPSIS

By the end of the course, students will be able to explain basic concept in digital communication technology. Practical skills in digital communication technology will also be acquired.

REFERENCES

1. S. Haykin (2006). Digital Communications. Wiley India Pvt. Ltd.
2. John R. Barry, Edward A. Lee, David G. Messerschmitt (2004). Digital Communication. Springer.
3. B. Sklar (2009). Digital Communications: Fundamentals & Applications. Pearson Education.

PGT 314/3
OPTICAL TECHNOLOGY

COURSE SYNOPSIS

The students studying this module will develop a basic understanding of the principles and practices of modern optoelectronic devices and their important functions for applications in optical communication. Optoelectronic Communications which includes laser, fiber optics and amplifier fundamentals, Semiconductor sources, optical detector, optical amplifiers, optical devices,



introduction to modern optics, tailored to the needs of the optoelectronic, photonics and optical communications industry. Practical skills in optical fiber systems and measurement will also be acquired.

REFERENCES

1. Ghatak and Thyagarajan, Introduction to Fiber Optics, Cambridge University Press,1998.
2. John M. Senior, Optical Fiber Communications; Principles and Practice, 2nd Edition, Prentice-Hall, 1992

PGT 315/3
RF AND MICROWAVE TECHNOLOGY

COURSE SYNOPSIS

This course thoroughly covers the basic principles, analysis, design and measurement techniques necessary for an introductory undergraduate or graduate course in microwave engineering.

REFERENCES

1. Max W. Medley Jr. (1993). Microwave and RF Circuits Analysis, Synthesis and Design. Artech House Inc.
2. Randall W.Rhea (2005). HF Filter Design and Computer Simulation. McGraw Hill Inc.
3. Om P. Gandhi, "Microwave Engineering And Applications", Maxwell Macmillan Int. Edition, 1989.

PGT 410/3
SATELLITE TECHNOLOGY

COURSE SYNOPSIS

The course aims to give the student a thorough but practical understanding of the principles and technological issues of satellite technology.

REFERENCES

1. Dennis Roddy (2001). Satellite Communication. McGraw-Hill Professional.
2. Bruce R. Elbert (2004). The Satellite Communication Applications Handbook. Artech House.
3. Madhavendra Richharia (1999). Satellite Communication Systems. McGraw-Hill Professional.

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC NETWORK DESIGN) - RY43

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Electronic Network Design Technology graduates who are competent in both technology theory and practice.

PEO2
Electronic Network Design Technology graduates who are able to demonstrate leadership and contribute to team success and manage projects in a multi-disciplinary environment.

PEO3
Electronic Network Design Technology graduates who are able to make contributions to knowledge.

PEO4
Electronic Network Design Technology graduates who are able to demonstrate an ethical commitment to the community.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognize the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE FOR BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC NETWORK DESIGN) - RY43

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (102)	PGT 100/3 Networking Fundamentals	PGT 104/3 Digital Electronics	PGT 207/3 Object Oriented Programming	PGT 204/3 Internetworking Technology I	PGT 301/3 Communication Systems	PGT 300/4 Final Year Project I	PGT 400/6 Final Year Project II	PIT 304/12 Industrial Training
	PGT 101/3 Electric Circuit Principles	PGT 105/3 Electrical Engineering Technology	PGT 201/3 Microprocessor	PGT 205/3 Signals and Systems	PGT 302/3 Embedded Software Technology	PGT 305/3 Network Management	PGT 401/3 Network Security Technology	
	PGT 102/3 Engineering Science	PGT 106/3 C Programming	PGT 202/3 Analog Electronics I	PGT 206/3 Computer Architecture	PGT 200/3 Operating Systems	PGT 306/3 Network Modeling	PGT XXX/3 Elective II	
	PGT 103/3 Computer Technology	PGT 107/2 Writing in Engineering Technology	PGT 203/3 Database Management Systems	PGT 303/3 Data Structures	PGT 304/3 Internetworking Technology II	PGT 307/3 Programming for Networking	PGT XXX/3 Elective III	
						PGT XXX/3 Elective I		
Common Core (21)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III	PQT 274/3 Statistics for Engineering Technology	PTT 333/3 Engineering Technology Management	PTT 444/3 Technologist in Society		
	PCT 111/3 Engineering Skills							
University Required (19)	UZW 1XX/1 Co-Curricular Activity	UUT 122/2 Skills and Technology in Communication	UUW 224/2 Engineering Entrepreneurship	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies	UUW 322/2 Thinking Skills			
		UVW 410/2 University Malay Language	UUW XXX/2 Option Subject OR English for General Purposes	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UVW 312/2 English for Technical Communication			
		UZW 1XX/1 Co-Curricular Activity	UZW 1XX/1 Co-Curricular Activity					
142	19	19	20	19	19	19	15	12

Total Units for Graduation 142

Electives: PGT 308 CCNA, PGT 402 Mobile Computing, PGT 403 Web Programming, PGT 404 Artificial Intelligent, PGT 309 Cloud Infrastructure and Services

*Students with MUET band 1 and band 2 - must take Foundation English, English for General Purposes and English for Technical Communication
*Students with MUET band 3 - take English for General Purposes and English for Technical Communication
*Students with MUET band 4 and above - will take Option Subject and English for Technical Communication

LIST OF COURSES

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (ELECTRONIC NETWORK DESIGN)

- PGT 100/3 NETWORKING FUNDAMENTALS
- PGT 101/3 ELECTRIC CIRCUIT PRINCIPLES
- PGT 102/3 ENGINEERING SCIENCE
- PGT 103/3 COMPUTER TECHNOLOGY
- PGT 104/3 DIGITAL ELECTRONICS
- PGT 105/3 ELECTRICAL ENGINEERING TECHNOLOGY
- PGT 106/3 C PROGRAMMING
- PGT 107/2 WRITING IN ENGINEERING TECHNOLOGY
- PGT 200/3 OPERATING SYSTEMS
- PGT 201/3 MICROPROCESSOR
- PGT 202/3 ANALOG ELECTRONICS I
- PGT 203/3 DATABASE MANAGEMENT SYSTEMS
- PGT 204/3 INTERNETWORKING TECHNOLOGY I
- PGT 205/3 SIGNALS AND SYSTEMS
- PGT 206/3 COMPUTER ARCHITECTURE
- PGT 207/3 OBJECT-ORIENTED PROGRAMMING
- PGT 300/4 FINAL YEAR PROJECT I
- PGT 400/6 FINAL YEAR PROJECT II
- PGT 301/3 COMMUNICATION SYSTEMS
- PGT 302/3 EMBEDDED SOFTWARE TECHNOLOGY
- PGT 303/3 DATA STRUCTURES
- PGT 304/3 INTERNETWORKING TECHNOLOGY II
- PGT 305/3 NETWORK MANAGEMENT
- PGT 306/3 NETWORK MODELLING
- PGT 307/3 PROGRAMMING FOR NETWORKING
- PGT 401/3 NETWORK SECURITY TECHNOLOGY
- PIT 304/12 INDUSTRIAL TRAINING
- PGT 308/3 CISCO CERTIFIED NETWORK ASSOCIATE (CCNA)
- PGT 309/3 CLOUD INFRASTRUCTURE AND SERVICES
- PGT 402/3 MOBILE COMPUTING
- PGT 404/3 ARTIFICIAL INTELLIGENT



COURSE SYLLABUS

PGT 100/3
NETWORKING FUNDAMENTALS

COURSE SYNOPSIS

This course prepares the students to know how computers are connected. In addition, students are able to connect the computer to the Internet both wired and wireless. The students are expected to be able to troubleshoot problems that cause network disconnection, slow and effectiveness.

COURSE OUTCOMES

1. Ability to explain the fundamental concept of networking focusing on application, transport and network layer.
2. Ability to apply the knowledge of networking to set up the local area network, to connect two computer together and identify the network IP.
3. Ability to design a small network including topology maps and network maps.

REFERENCES

1. W. Odom and T. Knott, Networking Basics, Cisco Press, 2012.
2. J. F. Kurose, Computer Networking: A Top-Down Approach, 7th Edition, Addison-Wesley, 2011.
3. S. Tanenbaum, Computer Network, 5th Edition. Prentice-Hall, 2011.
4. M. Dye, R. McDonald, A.W. Rufi, Network Fundamentals-CCNA Exploration Companion, Cisco Press, 2008.

PGT 101/3
ELECTRIC CIRCUIT PRINCIPLES

COURSE SYNOPSIS

This course covers introduction to the basic of electrical measurements, Ohm's Law, Series and Parallel Circuits, Circuit Theorems and Conversions and RLC circuits. This course will expose the students to the elements and principles of electrical circuit theory with appropriate to any RLC circuit applications. The laboratory sessions will complement the theories given in a class.

COURSE OUTCOMES

1. Ability to perform the basic concept of electrical measurement and RLC Circuits Theorems
2. Ability to apply the concept of Ohm' Law, Series and Parallel Circuits, and Circuit Theorems for any RLC Circuits.
3. Ability to analyze RLC Circuits related to electric circuits applications

REFERENCES

1. Thomas L. Floyd. Principles of Electric Circuits, Pearson Prentice Hall, 2009 (Floyd 9e)
2. Alenxander and Sadiku. Fundamentals Of Electric Circuits, McGraw-Hill, 2007
3. Nilsson and Riedel, Electric Circuits, Pearson Prentice Hall, 2008
4. Thomas L.Floyd, Electric Circuit Fundamental 8 Edition
5. Richard C. Dorf and James A. Svovoda, Introduction to Electric Circuit

PGT 102/3
ENGINEERING SCIENCE

COURSE SYNOPSIS

This course covers introduction to physic and science which are force and motion, circular motion, work, power and energy, electrostatic, magnetism and electric current and resistance. Fundamental physics is combined with problem solving and engineering skills through suitable tutorials. This course will expose the students to the elements and principles of basic concepts of physics and its application.

COURSE OUTCOMES

1. Ability to describe standard unit, apply the concept of force and motion and analyze work, energy and power principles.
2. Ability to apply circular motion principles in oscillation and wave.
3. Ability to define and apply the basics of electrostatic and electromagnetism and analyze related problem.
4. Ability to explain and calculate electric current and resistivity.

REFERENCES

1. Jerry Wilson, Anthony Buffa. "College Physics", 7th ed., Pearson Education,2009
2. Giambattista,Richardson,Richardson, "College Physics", McGraw Hill Internationatial Ed., 2007.
3. Stephen T.Thornton, Andrew Rex. "Modern Physics for Scientists & Engineers", 2nd ed, Brooks Cole, 1999.
4. W. Bolton. "Engineering Science". Fourth Edition. Newnes. 2001

PGT 103/3
COMPUTER TECHNOLOGY

COURSE SYNOPSIS

This course prepares the student to be familiar with computer hardware and software available in the market. The hardware includes CPU, memories and I/O such as monitor, keyboard and mouse. Computer software contains various Operating Systems (OS) such as Android, GNU/Linux, Microsoft and Apple based OS. Introduction to Free Open Source Software (FOSS) concept and philosophy, various applications such as Office Suite (word processor and spread sheet) will be explained.

COURSE OUTCOMES

1. Ability to illustrate concepts and principles of various hardware components in a computer system.
2. Ability to interpret Free/Open Source Software (FOSS) and proprietary software.
3. Ability to justify suitable software for the right application/ task.

REFERENCES

1. Randal E. Bryant and David R. O'Hallaron, "Introduction to Computer Systems: A Programmer's Perspective", Second edition Prentice Hall.
2. William Stallings " Computer Organization and Architecture", Eight edition Pearson
3. M. Morris Mano, "Computer System Architecture", Third Edition, Prentice-Hall.
4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", Fifth Edition, McGraw Hill

PGT 104/3
DIGITAL ELECTRONICS

COURSE SYNOPSIS

Introduction and discussion of fundamental of digital circuit design and analysis. The lecture and tutorial exercise covers the following topics: Boolean algebra, Numbering System, Basic Logic Gates, Combinational Circuit Design, Timing Diagram, Bi-Stable Memory Device and Sequential Circuit Design.

COURSE OUTCOMES

1. Ability to describe basic numbering system and basic theory of binary system.
2. Ability to analyze Boolean functions and logic circuit in digital applications.
3. Ability to design combinational and sequential logic circuit to solve mathematical equations in terms of Boolean Functions.

REFERENCES

1. Thomas L. Floyd, "Digital Fundamentals:,10th Ed., Pearson Prentice Hall, 2009
2. Floyd. TL, "Digital Fundamentals", 9th Ed., Prentice Hall, 2006.
3. Ronald J. Tocci, "Digital Systems – Principles and Applications", 7th Ed., Prentice Hall, 2003
4. Nigel, P.C. "A First Course in Digital Electronics", 1st Ed., Prentice Hall, 1999.

PGT 105/3
ELECTRICAL ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

This course focuses on the fundamental of electrical engineering and power electronics which consists of two parts; electrical machinery and instrumentation. This course will provide the basic knowledge in power transmission, machinery, power processing devices and metering. The topics covered in this course are transformers, AC and DC machines, AC and DC meters, AC and DC bridges, AC and DC converters, and sensors & transducers.

COURSE OUTCOMES

1. Ability to apply and solve the problems on transformers, dc machines and ac machines with respect to their efficiency, equivalent circuits and losses.
2. Ability to analyze the problems on the basic operations of dc and ac meters, dc and ac bridges.
3. Ability to design and develop on sensors & transducers to meet a specified requirement.

REFERENCES

1. Chapman S.J., "Electric Machinery Fundamentals", Fifth Edition, 2009, McGraw Hill, Singapore.
2. C.S Rangan, G.R. Sarma & V.S. Mani, "Instrumentation Devices & System" Tata, McGraw-Hill Publishing Company Limited, 2004.
3. Bhas S. Guru & Huseyin R. Hiziroglu, "Electric Machinery and Transformers", 2001, Oxford University Press.
4. A.K. Sawhney & P.Sawhney, "A Course in Electronic and Electrical Measurement and Instrumentation" Dhanpat Rai & Co. (P) Ltd., 2001.

5. Z.A. Yamayee & J.L. Bala, " Electromechanical Energy Devices & Power Systems", 1994, Wiley & Sons, USA.

PGT 106/3
C PROGRAMMING

COURSE SYNOPSIS

This course introduces basic programming using high-level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with programming tools such as flowcharts and pseudo code and then to implement them by developing C programmes.

COURSE OUTCOMES

1. Ability to define and describe programming concepts and principles.
2. Ability to apply GNU/Linux for coding, compiling, executing and debugging computer programs.
3. Ability to analyze and solve engineering-related problems using computer programming techniques.
4. Ability to evaluate programming techniques and tools to design computer programs.

REFERENCES

1. Deitel and Deitel, Sudin, S.,Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2012.
2. Cheng, H., "C for Engineers and Scientists", McGraw Hill, 2010.
3. Hanly, J.R. and Koffman, E.B., "Problem Solving and Program Design in C", 6th Ed., Pearson, 2007.
4. Sprankle and Maureen, "Problem Solving and Programming Concepts" 7th Ed., Prentice Hall, 2006.
5. Etter, D.M., "Engineering Problem Solving with C", 3rd Ed., Prentice Hall, 2004.

PGT 107/2
WRITING IN ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

To expose the students to the common requirements and expectations of writing as an engineering technologist; as well as to the format and techniques of writing various types of engineering technology documents.

COURSE OUTCOMES

1. Ability to produce engineering documents in consideration of ethics, spelling, grammar and avoidance of typing errors while at the same time considering the flow and continuity of ideas.
2. Ability to explain, solve and analyse group work involving presentations, reports and communication task.
3. Ability to compose and write common engineering documents and to discover sources of engineering information.

REFERENCES

1. Leo Finkelstein Jr (2008). Pocket Book of Technical Writing for Engineers and Scientist, 3rd Ed. (New York: McGraw Hill International Edition
2. Beer, D. (2009). A Guide to Writing as an Engineer, 3rd Ed. (John Wiley, USA)
3. Pfeiffer, W. S., Adkins, K. E. (2010). Technical Communication – A Practical Approach, 7th Ed. (Pearson, USA)
4. Lannon, J. M, Gurak, L. J. (2011) Technical Communication, 12th Ed. (Longman).

PGT 200/3
OPERATING SYSTEMS

COURSE SYNOPSIS

This course presents the fundamental concepts and design of operating systems. Students will be guided to explore basic operating system concepts like processes, memory management, scheduling, file systems and IO management. Basic design and implementation of some of these concepts will be covered during laboratory sessions.

COURSE OUTCOMES

1. The ability to discuss basic operating system concepts.
2. The ability to implement basic operating system concepts.
3. The ability to analyze implementations of basic operating system concepts.

REFERENCES

1. Modern Operating Systems 3/E (Andrew S. Tanenbaum), Prentice Hall, 2008.
2. Operating Systems Design and Implementation 3/E (Andrew S Tanenbaum, Albert S Woodhull), Prentice Hall, 2006.
3. Operating Systems: Internals and Design Principles 7/E (William Stallings), Prentice Hall, 2012.
4. Operating System Concepts 9/E (Avi Silberschatz, Peter Baer Galvin, Greg Gagne), Wiley, 2012.
5. Operating Systems 3/E (Deitel, Deitel & Choffnes), Prentice Hall, 2003.

PGT 201/3
MICROPROCESSOR

COURSE SYNOPSIS

The aim of this course is to study the Intel 8085 microprocessor architecture and relate that knowledge to the design of microprocessor based systems. This includes the design technique for designing memory, input and output for the systems. The study of 8085 instruction set and various software development tools are also emphasized as the knowledge are needed in the design of the microprocessor-based systems.

COURSE OUTCOMES

1. Ability to describe the theory and basic architecture of microprocessor system.
2. Ability to write an assembly language programming.
3. Ability to describe and capable of interfacing the microprocessor to the I/O devices.
4. Ability to design a simple application on a microprocessor-based system.

REFERENCES

1. R.S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5th Edition, Prentice Hall, 2002.
2. W. Kleitz, Microprocessor and Microcontroller Fundamentals: The 8085 and 8051 Hardware and Software, Prentice Hall, 1998.
3. B.B. Brey, The 8085A Microprocessor: Software, Programming and Architecture, 2nd Edition, Prentice Hall, 1996.

PGT 202/3
ANALOG ELECTRONICS I

COURSE SYNOPSIS

This course exposes the student the basic knowledge in analog electronic. The exposure encompasses amplifier design based on bipolar and field effect transistors, for single and multi stage, power amplifier, frequency response analysis of amplifiers. Emphasis is placed on basic design aspects and applications. The course has been designed to provide basic analog electronic skills covering theories and practices.

COURSE OUTCOMES

1. Ability to analyze DC and AC, small-signal analysis and frequency performance of basic configurations of amplifier (BJT and FET).
2. Ability to design basic configurations of BJT and FET amplifiers.
3. Ability to define, analyze and perform simple design of classes A, B and AB of BJT and FET power amplifiers in term of their equivalent circuit and gain.

REFERENCES

1. Donald A. Neamen, 'Electronic Circuit Analysis and Design,' 4th Ed., McGraw-Hill, 2010.
2. Boylestad, R.L., Nashelsky, L., 'Electronic Device and Circuit Theory', 10th Ed., Prentice Hall 2009.
3. Floyd, T., 'Electronic Devices', 8th Ed., Pearson Education, Inc, 2008.
4. Adel S. Sedra, Kenneth C. Smith, 'Microelectronic Circuits', 6th Ed., Oxford University Press, 2009.

PGT 203/3
DATABASE MANAGEMENT SYSTEMS

COURSE SYNOPSIS

The subject focuses on the concept of database system and architecture. This includes data models, schemas and instances and system environment. Students will be exposed to data modeling by using high level conceptual data models for relational database design that includes Entity Relationship Diagram(ERD), Structured Query Language (SQL) and normalization and also covers database storage and management.

COURSE OUTCOMES

1. Ability to explain the concepts of database system, database storage and management.
2. Ability to write and analyze SQL statements.
3. Ability to normalize and evaluate a relation database.
4. Ability to design a relational database with Entity Relationship Diagram(ERD).

REFERENCES

1. Silberschatz, Korth & Sudarshan. (2010) Database System Concepts. 6th Ed. Addison-Wesley
2. Elmasri & Narathe. (2007) Fundamentals of Database Systems. 5th Ed. Addison-Wesley
3. Thomas Connolly, Carolyn Begg and Anne Strachan.(2005).Database Systems, 4th Ed. Addison-Wesley
4. Jeffry A. Hoffer, V.Ramesh, Heikki Topi.(2010). Modern Database Management. Pearson Education



PGT 204/3
INTERNETWORKING TECHNOLOGY I

COURSE SYNOPSIS

This course will introduce students with the fundamental knowledge and tools for study internetworking. Principles of computer network cover so many aspects and it is expanding rigorously. Therefore this course focuses on the fundamental concept and theories, applications and advantages of internetworks. Related technologies such as Local Area Network, Wide Area Network and techniques use in data transmission as well as latest technologies. Practical exercises such as design, install and testing of a simple computer internetworking which improve understanding and develop skills on networking are integrated in laboratories exercises.

COURSE OUTCOMES

1. Ability to explain, discuss and apply the concept and principles of computer networking technologies.
2. Ability to use GNU/Linux for coding, compiling, executing and testing using internetworking tools.
3. Ability to design and evaluate the performance of computer networks.

PGT 205/3
SIGNALS AND SYSTEMS

COURSE SYNOPSIS

This course introduces student to mathematical foundation and computational tools for processing continuous-time and discrete-time signals in both time and frequency domains. Key concepts and tools introduced and discussed in this class include linear time-invariant systems, impulse response, frequency response, convolution, filtering, sampling, and Fourier transform, Laplace Transform and z-Transform. This course serves as entry and prerequisite for any higher level course in the fields of signal processing, communications, and control.

COURSE OUTCOMES

1. Ability to show the different types and basic operations of signals and systems.
2. Ability to identify and show the concept of Fourier representation of analog and discrete signals, the different forms and properties of Fourier transforms, concept of frequency response in analog and discrete systems.
3. Ability to evaluate and construct sampling and reconstruction of analog signals using Laplace transform and Z-transform.
4. Ability to evaluate and demonstrate using mathematical analysis tools into continuous and discrete signals systems.

PGT 206/3
COMPUTER ARCHITECTURE

COURSE SYNOPSIS

This course covers both the architectural and organizational aspects of computer systems. Architectural aspects of a system are defined as the features that are available to the operating system kernel such as the instruction set, data representations and peripheral interfaces. On the other hand, organizational aspects of a system are defined as the physical implementations that realize the features given for a system. These include the design of basic building blocks such as the ALU and the control unit, as well as the logic level interface of both internal and external units. This course expects the students to have a good fundamental on digital logic design (both combinatorial and sequential logic).

COURSE OUTCOMES

1. Ability to interpret the theoretical aspects of computer organization and architecture.
2. Ability to analyze existing design issues involving performance using theoretical knowledge and/or simulation tools.
3. Ability to design and justify basic Central Processing Unit (CPU) based on given specifications.

PGT 207/3
OBJECT-ORIENTED PROGRAMMING

COURSE SYNOPSIS

This course discusses the fundamental concepts of programming in the object-oriented paradigm which includes classes and objects, inheritance, polymorphism and exception handling. Students will also learn object-oriented problem solving with attention to general, as well as programming language-specific issues such as application design and development, packages, applets and Graphical User Interface (GUI).

COURSE OUTCOMES

1. Ability to explain and apply the basic concepts of class, object, instance, attributes and methods.
2. Ability to apply inheritance and polymorphism
3. Ability to analyse technology problems and design the solution to the problem using object-oriented paradigm.
4. Ability to develop an application and improve its robustness based on the problem solution design.

PGT 300/4
FINAL YEAR PROJECT I

COURSE SYNOPSIS

This is a development project that involves solving practical engineering technology problem under the supervision of a faculty member. The project undertaken may fall under one of the following areas: hardware and/ or software development and device fabrication. Each student prepares comprehensive engineering reports, presents and demonstrates findings and results of project work.

COURSE OUTCOMES

1. Ability to synthesize information including standards, code of practice, journals, policies, field data, etc relevant to the specific project to be undertaken and relate with societal and global issues.
2. Ability to analyse scenarios and construct problem statements and objectives of the project.
3. Ability to formulate research methodology incorporating clear fundamentals, theories and benchmarked against standard practices governing the research project.
4. Ability to prepare and defend project proposal with effective skills.

PGT 400/6
FINAL YEAR PROJECT II

COURSE SYNOPSIS

This is a research project in connection with engineering technology problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. For both FYP I and II, each student prepares a comprehensive engineering report, present and demonstrate findings and results of the project work.

COURSE OUTCOMES

1. Ability to plan activities related to the development project and execute them in a timely manner.
2. Ability to develop a product, whether hardware or software using appropriate methodology and tools.
3. Ability to produce a technical report that conforms to standard thesis format and defend project outcome with effective communication skills.

PGT 301/3
COMMUNICATION SYSTEMS

COURSE SYNOPSIS

This course will cover basic principles and concepts of communication engineering system such as introduction to the basic elements of communications, information theory and signal analysis. The students will be introduced to and familiar with Amplitude Modulation & Demodulation (AM) and their technique of modulation as well as Frequency Modulation (FM) and demodulation. Some digital modulation technique are also introduced such as Amplitude Shift Keying (ASK), Phase Shift Keying (PSK) and Frequency Shift Keying (FSK). In addition, some practical system which has been applied in real world such as fiber optics and satellite are also covered in this course.

COURSE OUTCOMES

1. Ability to explain the fundamentals of communication systems and information theory and the essentials of signal analysis in communication system.
2. Ability to describe amplitude modulation and calculate the signals in term of modulation index, power, noise and spectrum.
3. Ability to identify frequency modulation and calculate frequency deviation and modulation index. Also ability to compare FM with AM and Phase Modulation.
4. Ability to describe digital modulation and compare different types of digital modulation techniques and explain its application in communication system.

PGT 302/3
EMBEDDED SOFTWARE TECHNOLOGY

COURSE SYNOPSIS

This course introduces contemporary software technology for embedded systems. Students will be exposed to the requirements of embedded systems that frequently impose time and/or memory constraints. Among the topic that will be discussed are embedded systems, platform hardware, cross-compilations, bare bone systems, peripheral interfacing and embedded operating system. Knowledge in this subject is important for electronic engineers who are interested in system development and integration.

COURSE OUTCOMES

1. Ability to describe the concepts of embedded software.
2. Ability to evaluate embedded software implementations.
3. Ability to develop embedded software for specific applications.



PGT 303/3
DATA STRUCTURES

COURSE SYNOPSIS

This course introduces data types, algorithm and data structures. The topics of array, pointers, structure and union in C is revisited. Then, the linear data structure i.e. stack, queue linked list and non-linear data structure i.e. tree and graph is discussed in depth. In addition sorting and searching algorithm are also included.

COURSE OUTCOMES

1. Ability to determine the systematic way of solving problems.
2. Ability to analyse different methods of organizing large amounts of data.
3. Ability to develop and implement the different data structures in solving problems.

PGT 304/3
INTERNETWORKING TECHNOLOGY II

COURSE SYNOPSIS

Comprehensive overview of communications software and hardware involved in wide area networks and their relationship to local area networks are introduced. The course is designed for computer networking majors. The students are able to identify the major components of the WAN and the flow of data between the bridges and routers.

COURSE OUTCOMES

1. Ability to understand and distinguish between the principles of the OSI and TCP/IP Models, their layers and the open communication principles for LAN and WAN interconnections.
2. Ability to design and apply advanced networking protocols, mechanisms and technique such as IP addressing, subnetting, connection orientation, and network security.
3. Ability to construct and analyse the network and its beh aviour via network simulation tools in solving network problems.

PGT 305/3
NETWORK MANAGEMENT

COURSE SYNOPSIS

The course aims to give knowledge of operation, and maintenance of modern computer and global networks. Network Management basics, and standards is described with focus on Internet Management with the aid of Simple Network Management Protocol (SNMP), as well as the application of the same. It discusses the components of network management framework, i.e. fault management, performance management, configuration management, security management and accounting management. This course also gives practical knowledge and skill in system and network administration as well as network supervision.

COURSE OUTCOMES

1. Ability to explain the concept of network management, standards and protocols including Simple Network Management Protocol (SNMP) and Open Systems Interconnection (OSI).
2. Ability to differentiate functional areas of fault, configuration, accounting, performance and security management (FCAPS).
3. Ability to design and recommend network management standards to manage practical networks.
4. Ability to analyse and devise solutions to network management issues and challenges pertaining to management of emerging network technologies.

PGT 306/3
NETWORK MODELLING

COURSE SYNOPSIS

This course introduces the principle and technique in modeling and analyzing the computer network using software and discrete event simulator technique. The simulation technique is a powerful tool to analyze the network without the possibilities to destroy the real network. The students are able to understand the concept of network model, develop and analyze the computer network using this simulation technique.

COURSE OUTCOMES

1. Ability to define and explain elements and components used in setting up an Internet network.
2. Ability to apply the usefulness of Internet network applications practically.
3. Ability to analyse and apply the knowledge of computer network which can connect the client and server efficiently.
4. Ability to utilize network simulation tools which are able to analyse, develop and design the network protocols over the internet.

PGT 307/3
PROGRAMMING FOR NETWORKING

COURSE SYNOPSIS

The aims of this course are to introduce the students of the programming in computer network and students get familiar with the mechanism of protocols

that consists in the network. This course provides the skills to programme the network protocols to works properly to transfer data from the sender to the receiver are exposed. The students are able to analyze, test, develop and design the protocols that are setting up a network.

COURSE OUTCOMES

1. Ability to explain and apply the concepts of network programming and the related network protocols involved.
2. Ability to apply network programming in computer networking environments.
3. Ability to design the architecture of network application/web.
4. Ability to develop and improve Java languages as an application by using network programming techniques learned.

PGT 401/3
NETWORK SECURITY TECHNOLOGY

COURSE SYNOPSIS

The aims of this course are to introduce basic concept of network security technology. It includes concepts, security practice and encryption and decryption techniques. Discussion in network security will involved network defence concepts and network intruders. Firewall application software will be discussed together with computer security services and security management.

COURSE OUTCOMES

1. Ability to explain basic issues, issues, concepts, principles and mechanism in modern network security technology and differentiate types of security threats and attacks to different category of computer and network assets.
2. Ability to identify and recommend solutions to network security threats.
3. Ability to apply network security concepts in the global network and revise network security threats and related current issues.

PIT 304/12
INDUSTRIAL TRAINING

COURSE SYNOPSIS

This practical-based course exposes students to accompany technical functions and organizational structure and operation such as departmental function, work procedure, safety procedure, communication, technical skills and project management.

COURSE OUTCOMES

1. Ability to analyse and adapt the working environment during training period.
2. Ability to demonstrate good work performance, good communication skills, leadership and work ethics during training period.
3. Ability to operate assigned task given by host company.

PGT 308/3
CISCO CERTIFIED NETWORK ASSOCIATE (CCNA)

COURSE SYNOPSIS

CCNA is a certification in the field of computer networks managed by CISCO organisation and recognised by international. CCNA course will describe how the networks impact out our daily lives, the role of data networking in the human network and the characteristic of network architectures. This course covers basic principles and the fundamental concepts of networking such as configuring a network operating system, network protocols and communications. This course will expose the students to the real networking environment and they will perform tasks such as how to design, build, troubleshoot and to create the secure computer networks.

COURSE OUTCOMES

1. Ability to describe and explain the characteristics of network architectures such as fault tolerance, scalability, quality of service and security.
2. Ability to apply and use network analysis tools to examine and explain how common user applications work.
3. Ability to classify and design how the transport layer enable multiple applications to communicate over the network at the same time on a single device.
4. Ability to develop and decide the most common network layer protocol, internet protocol (IP) and its features for providing connectionless and best effort services.

PGT 309/3
CLOUD INFRASTRUCTURE AND SERVICES

COURSE SYNOPSIS

This course educates students about cloud deployment and service models, cloud infrastructure and the key considerations in migrating to cloud computing. It covers technologies required to build classic (traditional), virtualized and cloud data centre environments. These technologies include compute, storage, networking, desktop and application virtualization. Additional areas of focus are backup/ recovery, business continuity, security and management. Students will learn about the key considerations and



steps involves in transitioning from the current state of a data centre to a cloud computing environment. Upon completing this course, student will have the knowledge to make informed decision about migrating to cloud infrastructure and choosing the best deployment model for an organization.

COURSE OUTCOMES

1. Ability to explain the importance and benefits of cloud computing and the need for its rapid adoption and differentiate various infrastructure components of classic and virtualized data centre.
2. Ability to evaluate effective cloud computing deployment models for business/IT organizations and perform detailed exploration of cloud product and services.
3. Ability to design infrastructure framework and service management activities in cloud computing and formulate high level cloud migration strategy and best practices.

PGT 402/3
MOBILE COMPUTING

COURSE SYNOPSIS

This course will introduce students to the fundamentals of mobile computing and mobile application development. Mobile computing will be discussed from three perspectives: mobile technology, application development and user interaction. The course will first give an overview of various mobile computing applications, technologies and wireless communication. Next, students will learn about common paradigms in mobile computing such as low power computing, computing in an environment with limited resources, fault tolerance and persistence. Students will be introduced to and use mobile application frameworks and development environments. User interface and user experience will be discussed and application development guidelines from various vendors will be discussed and analysed. Lastly, the course will look at some current research in mobile computing. Students will be expected to learn at least one mobile application development framework and use it to implement their assignments and course project.

COURSE OUTCOMES

1. Ability to explain the basic concepts and features of mobile computing technologies and applications.
2. Ability to categorize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities.
3. Ability to relate the important issues of developing mobile computing systems and applications.
4. Ability to develop mobile computing applications by analysing their characteristics and requirements.

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (INTEGRATED ELECTRONIC) - RY44

PROGRAMME OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of electronic engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOME (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to define and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE FOR BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (INTEGRATED ELECTRONIC) - RY44

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (102)	PGT 103/3 Computer Technology	PGT 104/3 Digital Electronics	PGT 211/3 Electromagnetic Theory	PGT 213/3 Analog Electronics II	PGT 301/3 Communication Systems	PGT 300/4 Final Year Project I	PGT 400/6 Final Year Project II	PXX 4XX/12 Industrial Training
	PGT 102/3 Engineering Science	PGT 105/3 Electrical Engineering Technology	PGT 201/3 Microprocessor	PGT 205/3 Signals and Systems	PGT 320/3 Power Electronics	PGT 312/3 Modern Control System	PGT 420/3 Instrumentation	
	PGT 101/3 Electric Circuit Principles	PGT 106/3 C Programming	PGT 202/3 Analog Electronics I	PGT 206/3 Computer Architecture	PGT 321/3 VLSI System Design	PGT 323/3 Verification on Chip	PGT 4XX/3 Elective II	
	PGT 120/3 Engineering Material	PGT 107/2 Writing in Engineering Technology	PGT 207/3 Object Oriented Programming	PGT 220/3 VLSI Design	PGT 322/3 Microcontroller	PGT 310/3 Digital Signal Processing	PGT 4XX/3 Elective III	
						PGT 3XX/3 Elective I		
Common Core (21)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III	PQT 274/3 Statistics for Engineering Technology IV	PTT 333/3 Engineering Technology Management	PTT 444/3 Engineering Technologist in Society		
	PCT 111/3 Engineering Skills							
University Required (19)	UZW 1XX/1 Co-Curricular Activity	UVW 410/2 University Malay Language	UUW 224/2 Engineering Entrepreneurship	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies	UUW 322/2 Thinking Skills			
		UUT 122/2 Skills & Technology in Communication	UVW XXX/2 Option Subjects OR **UVW 211/2 English for General Purposes	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UVW 312/2 English For Technical Communications			
		UZW 1XX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity					
		*UVA111 Foundation English						
	19	19	20	19	19	19	15	12
Total Units for Graduation 142								

Electives:
Elective I: PGT 333/3 Reliability Analysis OR PGT 334/3 Nanosystem Design
Elective II: PGT 422/3 Analog Integrated Circuit Design OR PGT 431/3 Optoelectronic System
Elective III: PGT 430 /3 Micro-Electro-Mechanical-System OR PGT 421/3 Semiconductor Testing

*Uncredited: Compulsory to student with MUET Band 2 only. This course is a prerequisite to UVW211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW 312 English for Technical Communication.

LIST OF COURSES

BACHELOR OF ELECTRONIC ENGINEERING TECHNOLOGY (HONOURS) (INTEGRATED ELECTRONIC)

- PGT 101/3 ELECTRIC CIRCUIT PRINCIPLES
- PGT 102/3 ENGINEERING SCIENCE
- PGT 103/3 COMPUTER TECHNOLOGY
- PGT 120/3 MATERIAL ENGINEERING
- PGT 105/3 ELECTRICAL ENGINEERING TECHNOLOGY
- PGT 104/3 DIGITAL ELECTRONICS
- PGT 106/3 C PROGRAMMING
- PGT 107/2 WRITING IN ENGINEERING TECHNOLOGY
- PGT 211/3 ELECTROMAGNETIC THEORY
- PGT 201/3 MICROPROCESSOR
- PGT 202/3 ANALOGUE ELECTRONICS I
- PGT 207/3 OBJECT-ORIENTED PROGRAMMING
- PGT 213/3 ANALOGUE ELECTRONICS II
- PGT 206/3 COMPUTER ARCHITECTURE
- PGT 220/3 VLSI DESIGN
- PGT 205/3 SIGNALS AND SYSTEMS
- PGT 301/3 COMMUNICATION SYSTEMS
- PGT 320/3 POWER ELECTRONICS
- PGT 321/3 VLSI SYSTEM DESIGN
- PGT 322/3 MICROCONTROLLER
- PGT 312/3 MODERN CONTROL SYSTEM
- PGT 323/3 VERIFICATION ON CHIP
- PGT 310/3 DIGITAL SIGNAL PROCESSING
- PGT 334/3 NANOSYSTEM DESIGN
- PGT 333/3 RELIABILITY & FAILURE ANALYSIS
- PGT 420/3 INSTRUMENTATION
- PGT 430/3 MICRO-ELECTRO-MECHANICAL SYSTEM
- PGT 431/3 OPTOELECTRONIC SYSTEM
- PGT 421/3 SEMICONDUCTOR TESTING
- PGT 422/3 ANALOG INTEGRATED CIRCUIT DESIGN



COURSE SYLLABUS

DISCIPLINE CORE

PGT 101/3
ELECTRIC CIRCUIT PRINCIPLES

COURSE SYNOPSIS

This course covers introduction to the basic of electrical measurements, Ohm's Law, Series and Parallel Circuits, Circuit Theorems and Conversions and RLC circuits. This course will expose the students to the elements and principles of electrical circuit theory with appropriate to any RLC circuit applications. The laboratory sessions will complement the theories given in a class.

REFERENCES

1. Thomas L. Floyd. *Principles of Electric Circuits: Conventional Current Version*, Pearson India, 2016 (Floyd 9e)
2. Fish, Fred Alan, Fundamental Principles of Electric and Magnetic Circuits, Biblio Life, 2016
3. Alenxander and Sadiku. *Fundamentals Of Electric Circuits*, McGraw-Hill, 2012 (5th ed)
4. Thomas L. Floyd. *Principles of Electric Circuits*, Pearson Prentice Hall, 2009 (Floyd 9e)
5. Nilsson and Riedel, *Electric Circuits*, Pearson Prentice Hall, 2008

PGT 102/3
ENGINEERING SCIENCE

COURSE SYNOPSIS

This course covers introduction to physic and science which are force and motion, circular motion, work, power and energy, electrostatic, magnetism and electric current and resistance. Fundamental physics is combined with problem solving and engineering skills through suitable experiments. This course will expose the students to the elements and principles of basic concepts of physics and its application.

REFERENCES

1. Jerry Wilson, Anthony Buffa. "College Physics", 7th ed., Pearson Education, 2009.
2. Giambattista, Richardson, "College Physics", McGraw Hill International Ed., 2007.
3. Stephen T.Thornton, Andrew Rex. "Modern Physics for Scientists & Engineers", 2nd ed, Brooks Cole, 1999.
4. W. Bolton. "Engineering Science". Fourth Edition. Newnes. 2001.

PGT 103/3
COMPUTER TECHNOLOGY

COURSE SYNOPSIS

This course prepares the student to be familiar with computer hardware and software available in the market. The hardware includes CPU, memories and I/O such as monitor, keyboard and mouse. Computer software contains various Operating Systems (OS) such as Android, GNU/Linux, Microsoft and Apple based OS. Introduction to Free Open Source Software (FOSS) concept and philosophy, various applications such as Office Suite (word processor and spread sheet) will be explained.

REFERENCES

1. Michael Meyers, (2012) "CompTIA A+ Certification All-in-One Exam Guide, (Exams 220- 801 & 220-802)", 8th Edition, *McGraw-Hill*
2. Randal E. Bryant and David R. O'Hallaron, *(2010) "Computer Systems: A Programmer's Perspective", 2nd Edition* Prentice Hall.
3. William Stallings, (2012) "Computer Organization and Architecture", *9th Edition* Pearson.
4. J. Stanley Warford,(2009) "Computer Systems", 4th Edition, Jones and Bartlett Publisher.
5. M. Morris Mano,(1992) "*Computer System Architecture*", Third Edition, Prentice-Hall.

PGT 120/3
ENGINEERING MATERIAL

COURSE SYNOPSIS

The course is tailored to give students a broad introduction to material properties and limitations. The subject will cover class of material properties, measurement of the properties, and fundamental knowledge to make material selection with better properties. The common micro-structural features of different material classes will be outlined in order to relate material with its process as well as performance.

REFERENCES

1. Smith, W.F. and Hashemi, J. (2011). Foundations of Materials Science and Engineering, 5th Edition, Mc Grawhill.
2. Ashby, M. Shercliff, H. and Cebon, D., A., (2007). Materials: engineering, science, processing, and design, Elsevier.
3. Ashby, M. and Jones, D.R.H. (2006). Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann.
4. Sharma, C.P. (2004). Enginjeering material properties and applications of metal and alloys, Prentice Hall, New Delhi.

5. Rajput, R.K. (2000). Engineering Materials. S.Chand & Companu, New Delhi.

PGT 105/3
ELECTRICAL ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

This course focuses on the fundamental of electrical engineering and power electronics which consists of two parts; electrical machinery and instrumentation. This course will provide the basic knowledge in power transmission, machinery, power processing devices and metering. The topics covered in this course are transformers, AC and DC machines, AC and DC meters, AC and DC bridges, AC and DC converters, and sensors & transducers.

REFERENCES

1. Chapman S.J., "Electric Machinery Fundamentals", Fifth Edition, 2011, McGraw Hill, Singapore.
2. Nagsarkar T.K & Sukhija M.S, "Basic Electrical Engineering", Second Edition, 2011, Oxford University Press, India.
3. Theraja B.L "Fundamentals of Electrical Engineering and Electronics", 2006, S. Chand & Company, India.
4. A.K. Sawhney & P.Sawhney, "A Course in Electronic and Electrical Measurement and Instrumentation" 2000, Dhanpat Rai & Co. (P) Ltd.
5. Z.A. Yamayee & J.L. Bala, " Electromechanical Energy Devices & Power Systems",
6. 1994, Wiley & Sons,USA.

PGT 104/3
DIGITAL ELECTRONICS

COURSE SYNOPSIS

Introduction and discussion of fundamental of digital circuit design and analysis. The lecture and tutorial exercise covers the following topics: Boolean Algebra, Numbering System, Basic Logic Gates, Combinational Circuit Design, Timing Diagram, Bi-Stable Memory Device and Sequential Circuit Design.

REFERENCES

1. Thomas L.Floyd, "Digital Fundamentals" (11th Edition) 11th Edition, 2014
2. Thomas L. Floyd, "Digital Fundamentals:, 10th Ed., Pearson Prentice Hall, 2009.
3. Floyd. TL, "Digital Fundamentals", 9th Ed., Prentice Hall, 2006.
4. Ronald J. Tocci, "Digital Systems – Principles and Applications", 7th Ed., Prentice Hall, 2003.
5. Nigel, P.C. "A First Course in Digital Electronics", 1st Ed., Prentice Hall, 1999.

PGT 106/3
C PROGRAMMING

COURSE SYNOPSIS

This course introduces basic programming using high-level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with programming tools such as flowcharts and pseudo code and then to implement them by developing C programmes.

REFERENCES

1. Deitel and Deitel, Sudin, S.,Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2012.
2. Cheng, H., "C for Engineers and Scientists", McGraw Hill, 2010.
3. Hanly, J.R. and Koffman, E.B., "Problem Solving and Program Design in C", 6th Ed., Pearson, 2007.
4. Sprankle and Maureen, "Problem Solving and Programming Concepts" 7th Ed., Prentice Hall, 2006.
5. Etter, D.M., "Engineering Problem Solving with C", 3rd Ed., Prentice Hall, 2004.

PGT 107/2
WRITING IN ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

This subject will expose the students to the common requirements and expectations of writing as an engineering technologist; as well as to the format and techniques of writing various types of engineering technology documents.

REFERENCES

1. Leo Finkelstein Jr (2008). Pocket Book of Technical Writing for Engineers and Scientist, 3rd Ed. (New York: McGraw Hill International Edition
2. Lannon, J. M, Gurak, L. J. (2011) Technical Communication, 12th Ed. (Longman).
3. Pfeiffer, W. S., Adkins, K. E. (2010). Technical Communication – A Practical Approach, 7th Ed. (Pearson, USA).
4. Beer, D. (2009). A Guide to Writing as an Engineer, 3rd Ed. (John Wiley, USA)



PGT 211/3
ELECTROMAGNETIC THEORY

COURSE SYNOPSIS

This is the first course in Electromagnetic Field Theory at the undergraduate level. It provides basic concepts and understanding of fundamental laws of electrostatics and magnetostatics. Applications of these laws for different field configurations are also introduced. The course also introduces transmission line theory and the use of transmission lines as circuit elements. Calculation of transmission line parameters like VSWR, reflection coefficient and impedance matching using Smith's chart is also included in this course.

REFERENCES

1. Fawwaz T. Ulaby, Eric Micielssen, Umberto Ravaioli, "Fundamentals of Applied Electromagnetics", Pearson (Prentice Hall) 2010.
2. Stuart M. Wentworth, "Applied Electromagnetics", John Wiley, USA, 2007.
3. Stuart M. Wentworth, "Fundamental of Electromagnetics with Engineering Applications", Wiley edition, 2005.
4. Brainslav M. Notaros, Electromagnetics, Pearson 2011.

PGT 201/3
MICROPROCESSOR

COURSE SYNOPSIS

The aim of this course is to study the Intel 8085 microprocessor architecture and relate that knowledge to the design of microprocessor based systems. This includes the design technique for designing memory, input and output for the systems. The study of 8085 instruction set and various software development tools are also emphasized as the knowledge are needed in the design of the microprocessor-based systems.

REFERENCES

1. R.S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5th Edition, Prentice Hall, 2002.
2. W. Routt, Microprocessor Architecture, Programming, and Systems Featuring the 8085, Thomson Delmar Learning. 2007.
3. Soumitra Kumar Mandal, Microprocessor and Microcontrollers: Architecture, Programming and Interfacing using 8085,8086 and 8051, McGraw Hill, 2011.
4. W. Kleitz, Microprocessor and Microcontroller Fundamentals: The 8085 and 8051 Hardware and Software, Prentice Hall, 1998.
5. B.B. Brey, The 8085A Microprocessor: Software, Programming and Architecture, 2nd Edition, Prentice Hall, 1996.

PGT 202/3
ANALOGUE ELECTRONICS I

COURSE SYNOPSIS

This course exposes the student the basic knowledge in analog electronic. The exposure encompasses amplifier design based on bipolar and field effect transistors, for single and multi stage, power amplifier, frequency response analysis of amplifiers. Emphasis is placed on basic design aspects and applications. The course has been designed to provide basic analog electronic skills covering theories and practices.

REFERENCES

1. Donald A. Neamen, 'Electronic Circuit Analysis and Design,' 4th Ed., McGraw-Hill, 2010.
2. Boylestad, R.L., Nashelsky, L., 'Electronic Device and Circuit Theory', 10th Ed., Prentice Hall 2009.
3. Floyd, T., 'Electronic Devices', 8th Ed., Pearson Education, Inc, 2008.
4. Adel S. Sedra, Kenneth C. Smith, 'Microelectronic Circuits', 6th Ed., Oxford University Press, 2009.
5. Thomas L.Floyd, 'Electronic devices (Conventional Current Version)', 8th ed., Prentice Hall, 2007

PGT 207/3
OBJECT-ORIENTED PROGRAMMING

COURSE SYNOPSIS

This course discusses the fundamental concepts of programming in the object-oriented paradigm which includes classes and objects, inheritance, polymorphism and exception handling. Students will also learn object-oriented problem solving with attention to general, as well as programming language-specific issues such as application design and development, packages, applets and Graphical User Interface (GUI) using Java Swing.

REFERENCES

1. Wu, C., "A Comprehensive Introduction to Object-Oriented Programming with Java", McGraw Hill, 2008.
2. Liang, "Introduction to Java Programming, Comprehensive Version with MyProgrammingLab" , Pearson Higher Education, 2012.

3. Idris, S., Abu Bakar, M. & Jailani, N., "OO Java: Pengaturcaraan Berorientasikan Objek menggunakan Java", McGraw-Hill, Kuala Lumpur, 2002.
4. Wu, T.C, "An Introduction to Object Oriented Programming with Java ", McGraw Hill, Boston, 2001
5. Bronson, G.J. and Rosenthal, D. " Object-oriented Program Development using Java: a class-centered approach", Thomson/ Course Technology, 2006.

PGT 213/3
ANALOGUE ELECTRONICS II

COURSE SYNOPSIS

This course offers the students an exposure to the Operational Amplifier: Operation, differential amplifier, common-mode, parameters, basic op-amp, practical op-amp circuits, op-amp datasheet; Applications of op-amp and frequency response: Summing amplifier, Voltage follower, Comparator, Integrator, Differentiator, frequency response and compensation; Feedback Circuits: Concepts of feedback, types of feedback connection, practical feedback circuit, feedback amplifier; oscillator: Basic operating principles of an oscillator, phase shift, Wien Bridge, Crystal oscillator, uni-junction. Active Analog Filters: Basic filter, filter response characteristics, low-pass filter, high-pass filter, band-pass filter, band-stop filter, frequency response measurement, design of filter, Butterworth, Chebychev and Elliptic

REFERENCES

1. Floyd, T., '*Electronic Devices*', 8th Ed., Pearson Education, Inc., 2007.
2. Malvino, A, '*Electronic Principles*', 6th Ed., Mc Graw Hill, 1999.
3. Boylestead, R.L, and Nashelsky, L., '*Electronic Devices and Circuit Theory*', 7th Ed., Prentice-Hall, 1999
4. Devices and Circuit Theory, 10th Ed., PrenticeHall.
5. Neamen, D. A., Microelectronics Circuit Analysis & Design, 3rd Ed., McGraw Hill.
6. Casier, Herman, Steyaert, Michiel(Eds.), Analog Circuit Design, Springer, 2010

PGT 206/3
COMPUTER ARCHITECTURE

COURSE SYNOPSIS

This course covers both the architectural and organizational aspects of computer systems. Architectural aspects of a system are defined as the features that are available to the operating system kernel such as the instruction set, data representations and peripheral interfaces. On the other hand, organizational aspects of a system are defined as the physical implementations that realize the features given for a system. These include the design of basic building blocks such as the ALU and the control unit, as well as the logic level interface of both internal and external units. This course expects the students to have a good fundamental on digital logic design (both combinatorial and sequential logic).

REFERENCES

1. William Stallings, "Computer Organization and Architecture: Designing for Performance", 8th Edition, Prentice Hall, 2010.
2. John L. Hennessy and David A. Patterson, "Computer Architecture: A Quantitative Approach", 4th Edition, Morgan Kaufmann, 2006.
3. Linda Null, "The Essentials of Computer Organization and Architecture", Jones & Bartlett Pub., 2006.
4. Miles J. Murdocca and Vincent P. Heuring, "Computer Architecture and Organization: An Integrated Approach", Wiley, 2007.

PGT 220/3
VLSI DESIGN

COURSE SYNOPSIS

The aims of this course are to introduce the students with an exposure on basic logic circuits design. The circuit design then will be transfer to layout design. This course provides the skills for student to design the integrated circuit from scratch. Students are able to analyze, test, develop and design the integrated circuit using the computer simulation tool.

REFERENCES

1. Wolf, Rabeay, Jan M. Weste, Neil H.E. - CMOS VLSI; A Design Perspective, Compiled by Norina Idris, Norhawati Ahmad, Rizalafande Che Ismail, Muammar Mohamad Isa, Siti Zarina Md Naziri, Muhammad Imran Ahmad. Pearson, 2008.
2. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic (2003). Digital Integrated Circuits: A Design Perspective. 2nd Edition. Prentice Hall.
3. Keating and Pierre Bricaud (2002). Reuse Methodology Manual for System-on-a-Chip Designs. 3rd Edition. Springer.
4. Wayne Wolf. (2002). *Modern VLSI Design: System-on-Chip Design*. 3rd ed. Prentice Hall PTR.
5. Vai, M. M., VLSI Design, CRC Press, 2001.



PGT 205/3
SIGNALS AND SYSTEMS

COURSE SYNOPSIS

This course introduce student to mathematical foundation and computational tools for processing continuous-time and discrete-time signals in both time and frequency domains. Key concepts and tools introduced and discussed in this class include linear time-invariant systems, impulse response, frequency response, convolution, filtering, sampling, and Fourier transform, Laplace Transform and z-Transform. This course serves as entry and prerequisite for any higher level course in the fields of signal processing, communications, and control.

REFERENCES

1. Charles L. Philips, John M. Parr, Eve A. Riskin, 'Signals, Systems and Transforms', 5th Ed., Pearson, 2014.
2. Alan V. Oppenheim, Alan S. Willsky, and Syed Hamid Nawab, 'Signals and Systems", 2nd Edition, Pearson, 2013.
3. Hwei P. Hsu, "Schaum's Outline of Signals and Systems", Second Edition, McGraw-Hill Companies, Inc, 2011.
4. Hwei P. Hsu, "Schaum's Outline of Signals and Systems", Second Edition, McGraw-Hill Companies, Inc, 2011.
5. Michael J. Roberts, "Fundamental of Signals and Systems", Mc Graw Hill International Ed., 2008.
6. B.P. Lathi, "Linear System & Signals", Oxford University Press, 2005.

PGT 301/3
COMMUNICATION SYSTEMS

COURSE SYNOPSIS

This course will cover basic principles and concepts of communication engineering system such as introduction to the basic elements of communications, information theory and signal analysis. Then student will introduce to and familiar with Amplitude Modulation & Demodulation (AM) and their technique of modulation as well as Frequency Modulation(FM) and demodulation. Some digital modulation technique are also introduce such as Amplitude Shift Keying(FSK), Phase Shift Keying(PSK) and Frequency Shift Keying(FSK) . In addition, some practical system which has been applied in real world such fiber optics and satellite also covered in this course.

REFERENCES

1. Rodge E.Ziemer, Wiliam H. Tranton, Principle of Communication System, 6th Edition, Wiley, 2008.
2. U.A Bakshi, A.P Godse, Analog Communication, 2nd Edition, Technology Publication Pune,2009.
3. Simon Haykin, Mocheal Mohen, An Introduction to Analog and Digital Communication, 2nd Edition, 2006.
4. Wayne Tomasi," Electronic Communication System, Fundamental Through Advanced",5th Ed. Pearson Prentice Hall,2004.
5. Paul Young, Electronics Communications Techniques, 5th Edition, Prentice Hall, 2004
6. Mullet,"Basic Telecommunications:The Physical Layer", Thomson Learning, 2003.

PGT 320/3
POWER ELECTRONICS

COURSE SYNOPSIS

This course introduces Power Electronics as a Multidisciplinary & Interdisciplinary Applications Orientated Technology emphasising the main criterion of energy efficiency. Topics for this course also cover Fundamental Concepts of Power Electronics, Power Semiconductor Devices, Power Electronic Circuits, AC-DC Conversion, AC-AC Conversion, DC-DC Conversion and DC-AC Conversion, including waveform analysis, is developed from the blended skills of theory – simulation - laboratory.

REFERENCES

1. *(Textbook)* Muhammad H. Rashid, Power Electronics: Circuits, Devices & Applications, 4th Ed. Pearson, Prentice Hall, 2013.
2. Muhammad H. Rashid (ed.), Power Electronics Handbook: Circuits, Devices & Applications, 3rd Ed. Amsterdam: Elsevier/Butterworth-Heinemann, 2011.
3. Daniel W. Hart, Power Electronics, New York : McGraw-Hill, 2011.
4. Nihal Kularatna, DC Power Supplies: Power Management And Surge Protection For Power Electronic Systems, Boca Raton: Taylor & Francis, 2012.
5. Ali Emadi, Integrated Power Electronic Converters and Digital Control, Boca Raton: CRC Press/Taylor & Francis, 2009.
6. Ahmad Radzi Mat Isa, Yaacob Mat Daud, Roslinda Zainal, Elektronik Asas: Peranti Semikonduktor, Skudai: Penerbit Universiti Teknologi Malaysia (UTM), 2007.

PGT 321/3
VLSI SYSTEM DESIGN

COURSE SYNOPSIS

The aim of this course is to study the techniques for rapid implementation of very large scale integration (VLSI) circuits for various important elements such as sequential circuit, clock tree, wire interconnect, power dissipation and low power design.

REFERENCES

1. Williams, John Michael (2014). Digital VLSI Design With Verilog, 2nd Edition, Springer Netherland.
2. Neil H.E. Waste, David Harris (2011). Integrated Circuit Design, 4thEdition, Addison Wesley.
3. Chandrasetty, Vikram Arkalgud (2011). VLSI Design, 1st Edition, Springer- Verlag New York .
4. Ramachandran Seetharaman (2007). Digital VLSI System Design, 1st Edition, Springer Netherland.
5. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic (2003). Digital Integrated Circuits: A Design Perspective. 2ndEdition. Prentice Hall.

PGT 322/3
MICROCONTROLLER

COURSE SYNOPSIS

The aim or this course is to study the concept and requirement of embedded system. This includes the characteristic of embedded system, hardware and software development, single chip microcontroller and programming technique in assembly language and C, basic multitasking concept, developing and embedded system application.

REFERENCES

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. Mckinlay " The 8051 Microcontroller and Embedded Systems Using Assembly and C", Pearson Edition, 2006
2. I. Scott Mackenzie and Raphael Chung-Wei Phan, " 8051 Microcontroller", 4th Edition, ,PrenticeHall, 2006.
3. Kenneth J. Ayala, "The 8051 Microcontroller – Architecture, Programming & Applications ", 2nd Edition, WEST, 1997.
4. W. Kleitz, "Microprocessor and Microcontroller Fundamentals: The 8085 and 8051 hardware and software", Prentice Hall 1998
5. James W. Stewart & Kai X. Miao, "The 8051 Microcontroller: Hardware, software & Interfacing, Prentice Hall 2nd Edition 1999.

PGT 312/3
MODERN CONTROL SYSTEMS

COURSE SYNOPSIS

This course aims to expose student a thorough concept of control systems theory, complements with practical understanding through simulation software and hardware. Topics in this course covers from the concept of control systems, and learn how to derive physical system into mathematical model of systems. Then, next topic will discuss further on the system characteristics, including performance, and the stability. There are several methods to observe the system performance, such as Routh-Hurwitz Criterion, root locus and frequency response. This course involves laboratory and projects (using Quanser and NI LabVIEW) to enhance your understanding and hands-on experience through hardware and simulation.

REFERENCES

1. Richard C. Dorf, Robert H. Bishop, Modern Control Systems, 13th edition, Pearson, 2017.
2. Norman S. Nise, Control System Engineering, 7th edition, Wiley, 2014
3. K. Ogata, Modern Control Engineering, 5th edition, Prentice Hall, 2009.
4. G. Franklin, J.D. Powell and A. Emani-Naeini, Feedback Control and Dynamic Systems, 6th edition, Prentice Hall, 2009.
5. Constantine H. Houpis, Stuart N. Sheldon, Linear Control System Analysis and Design with MATLAB, 6th edition, CRC Press, 2014.

PGT 323/3
VERIFICATION ON CHIP

COURSE SYNOPSIS

The aim of this course is to provide the introduction of system verilog language that will be used for verification to describe a basic coverage driven, constrained random layered testbench using Object Oriented Programming (OOP).

REFERENCES

1. Cris spear, 'System verilog for verification', 2nd edition, Springer, 2008
2. Bergeron, J, Cerny, E., Hunter, A. Nightingale, A., 'Verification methodology manual for system verilog' Springer, 2006.
3. Farzad Nekoogar and Faranak Nekoogar, "From ASICs to SOCs: A Practical Approach," Prentice Hall, 2003



PGT 310/3
DIGITAL SIGNAL PROCESSING

COURSE SYNOPSIS

Digital Signal Processing (DSP) has continued to have a major and increasing impact in many key areas of technology including telecommunication, digital television and media, biomedicine, VLSI design etc. DSP is now at the core of many new and emerging digital products and applications in the information society and is a core subject in most electronic/ computer/communication engineering curricula. This course is designed to give the students the necessary mathematical tools to analyze discrete time signals and systems. The course also includes various techniques for the design of digital filters and their implementations using DSP processors.

REFERENCES

1. S. Salivahanan, A. Vallavaraj, C.Gnanapriya, Digital Signal processing, Second Edition, Tata McGraw Hill Education 2010.
2. Sanjit K. Mitra, Digital Signal Processing, McGraw Hill, 2006.
3. Emmanuel C. Ifeachor, Digital Signal Processing, Prentice Hall.
4. Vinay K Ingle, John G. Proakis, Digital Signal Processing using MATLAB

PGT 334/3
NANOSYSTEM DESIGN

COURSE SYNOPSIS

Nanosystem design is an advanced nanosystem course and divided into three parts which are nanosystems design, parallel architecture and complex integrated nanosystems and nanoelectronics and nanowire. Nanosystem design part will cover the topics on basis of nanomaterials, nano electronic and nano-architectures and application of nanodevices in integrated system. In parallel architecture and complex integrated nanosystems the topics that covered are architecture principles and nanosystems as information-processing machines. Otherwise, in nanoelectronics and nanowire the topics that covered are nanoelectronics with tunneling devices, nanoelectronics with superconducting devices and basic of nanowire development and characterization.

REFERENCES

1. Karl Goser, "Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum Devices", Springer, 2004.
2. Giovanni De Micheli, Yusuf Leblebici, Martin Gijs and Janos Voros, "Nanosystems Design and Technology", Springer US, 2009.
3. K.Goser, P.Glosekotter and J.Dienstuhl, "Nanoelectronics and Nanosystems", Springer Germany, 2004.
4. Alina Voda, "Micro, Nanosystems and Systems on Chips: Modeling, Control, and Estimation", Wiley-ISTE, 2010.
5. Rainer Waser, "Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices", Wiley-VCH, 2003.

PGT 333/3
RELIABILITY & FAILURE ANALYSIS

COURSE SYNOPSIS

This course is basically divided into two areas: Reliability & Failure Analysis. In the first section of reliability, students will learn the concept of reliability, its terms & definitions, the different types of reliability distributions and also the different types of reliability prediction techniques such as FMEA & FTA. In the second section of failure analysis, students will be exposed to the different types of FA techniques commonly conducted on a failed semiconductor device and the test instrumentation associated with each technique.

REFERENCES

1. Patrick O'Connor (2002). Practical Reliability Engineering, Wiley.
2. Ebeling, C. E. (1997). Reliability and Maintainability Engineering, McGraw Hill.
3. Lawrence C. Wagner, (1999). Failure Analysis of Integrated Circuits: Tools and Techniques.: Kluwer Academic Publishers.
4. Perry L. Martin (1999). Electronic Failure Analysis Handbook.: McGraw Hill.
5. E. Ajith Amerasekera and Farid N. Najm (1997). Failure Mechanisms in Semiconductor Devices. 2nd Ed.: John Wiley & Sons.

PGT 420/3
INSTRUMENTATION

COURSE SYNOPSIS

This course covers the fundamental of electronic instrumentation. This includes the working principle and transduction properties of sensors and transducers. Importance and techniques of signal conditioning is emphasized. Element and principle of data acquisition and their applications are discussed. Modern stand-alone and computer-based measurement instruments are covered.

REFERENCES

1. Kalsi, H.S. "Electronic Instrumentation", Tata McGraw-Hill Publishing Co. Ltd., 2005

2. C.S. Rangan, G.R. Sarmaand V.S. Mani. "Instrumentation Devices & Systems", Tata McrGraw-Hill Publishing Co. Ltd., 2004
3. A.K. Sawhneyand P. Sawhney. "A Course in Electronic and Electrical Measurement and Instrumentation", Dhanpat Rai & Co. (P) Ltd., 2001.

PGT 430/3
MICRO-ELECTRO-MECHANICAL SYSTEM

COURSE SYNOPSIS

This course will focus on design and simulation of N/MEMSdevices. The design will include several of analysis types suchas structural, electrical and mechanical while the fabricationtechnology will focus on bulk and surface micromachining. Thiscourse will also discuss the application and technology of N/MEMS packaging in various fields.

REFERENCES

1. Nano and Micro-Electromechanical Systems: Fundamentals of Nano and Microengineering by Sergey E. Lyshevski and Sergey Edward Lyshevski.
2. MEMS and NEMS: Systems, Devices, and Structures by Sergey Edward Lyshevski.
3. Foundations of MEMS by Chang Liu

PGT 421/3
SEMICONDUCTOR TESTING

COURSE SYNOPSIS

Most semiconductor manufacturing Test/ Product engineers have weak foundations in device testing concepts, techniques and implementations and that causes them to have difficulties troubleshooting test problems. This course is designed to provide a strong foundation in conceptual understanding of semiconductor device testing. This conceptual knowledge of ATE instrumentation, basic semiconductor devices and test methods will provide the knowledge foundation. This course includes case studies and labs, that will help to build critical thinking abilities which is a very important skill for troubleshooting. The course contents start from an understanding of basic electronic devices that are found in any test, application circuits or part of a multi-functional system like diodes, transistors, linear and switching regulators and, converters (DAC/ADCs). Understanding of device data-sheets' electrical parameters and how these parameters affect the end applications and are conceptually measured, are taught. The functions and behaviours of these devices will be critically examined and discussed using a simulation tool. The Automatic Testers' (ATE) conceptual software and hardware architecture portion of the course introduces the participants to this machine that is found in every semiconductor manufacturers' test floor. DC, analog, digital test resources' architectures and theory of operations which all test engineers or aspiring test engineers should know, are provided.

REFERENCES

1. Renesas Electronics, 'Semicoductor Reliability Handbook', Renesas Electronics Corporation, 2017.
2. Guy Perry, 'The Fundamental of Digital Semiconductor Testing', Soft Test, 1996.
3. N.K. Jha, S. Gupta,'Testing of Digital Systems', Cambridge University Press, 2003.

PGT 422/3
ANALOG INTEGRATED CIRCUIT DESIGN

COURSE SYNOPSIS

The course covers MOS characteristics, Second order effects, Basic Cells, Single stage Amplifier, Differential amplifier, MOS Op amp and Op-amp Application.

REFERENCES

1. Tony Chan Caruson, David Johns, Kenneth Martin, Analog Integrated Circuit Design, International Student Version, Wiley, 2013.
2. R. Jacob Baker, CMOS Circuit Design, Layout, and Simulation, 3rd edition, Wiley, 2011
3. Behzad Razavi, Design of Analog CMOS Integrated Circuit, McGraw-Hill, 2000.
4. Phillip E. Allen, Douglas R. Holberg, CMOS Analog Circuit Design, Oxford University Press, 2002.
5. Paul R. Gray, Analysis and Design of Analog Integrated Circuit, 4th Ed, Wiley,2001.

PGT 423/3

MEMS DESIGN AND FABRICATION

COURSE SYNOPSIS

The aim of this course is to provide the introduction and overview of MEMS market, scaling laws, MEMS devices and applications, MEMS materials and fabrication methods, and basic MEMS concepts including pressure and acceleration.

REFERENCES

1. Nadim Maluf & Kirt Williams, 'An Introduction to Micro-electromechanical Systems Engineering",2nd edition, Artech House Inc, 2004
2. Tai-Ran Hsu, MEMS and Microsystems; Design and Manufacture, Boston, McGraw Hill 2000
3. Hong Xiao, Introduction to Semiconductor Manufacturing Technology, Prentice Hall, 2001
4. Tai-Ran Hsu. MEMS Packaging (2004). EMIS Processing Series 3. INSPEC.
5. James J. Allen. Micro Electro Mechanical System Design (2005). CRC Press. Taylor & Francis Group.

PGT 431/3
OPTOELECTRONIC SYSTEM

COURSE SYNOPSIS

The students studying this course will develop a basic understanding of the principles and practices of modern optoelectronic device includes fiber optic, semiconductor laser, photodiode and LED. The important functions for applications for these optoelectronic devices will acquire in optoelectronic system such as optical communication and display technology. Practical skills by using software in optical fiber systems and measurement will also be acquired.

REFERENCES

1. S.O.Kasap. Optoelectronics & Photonics: Principles & Practices: International Edition, Pearson Education Limited, 2013.
2. Gerasimos Konstantatos, Edward H. Sargent, Colloidal Quantum Dot Optoelectronics and Photovoltaics, Cambridge University Press, 2013.
3. Shun Lien Chuang, Physics of Photonic Devices, John Wiley & Sons, 2012.
4. Paul Scherz, Simon Monk, Practical Electronics for Inventors, 4th Ed., McGraw Hill Professional, 2016.

PGT 300/4
FINAL YEAR PROJECT I

COURSE SYNOPSIS

This is a development project that involves solving practical engineering technology problem under the supervision of a faculty member. The project undertaken may fall under one of the following areas: hardware and/ or software development and device fabrication. Each student prepares comprehensive engineering reports, presents and demonstrates findings and results of project work.

PGT 400/4
FINAL YEAR PROJECT II

COURSE SYNOPSIS

This is the second part of a development project that involves solving practical engineering technology problem under the supervision of a faculty member. The project undertaken may fall under one of the following areas: hardware and/or software development or device fabrication. Each student prepares comprehensive engineering reports, presents and demonstrates findings and results of project work.

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (MACHINING) - RY55

PROGRAMME OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of electronic engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOME (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to define and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE FOR BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (MACHINING) - RY55

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
DISCIPLINE CORE (108)	PDT 101/3 Statics and Dynamics	PDT 122/3 Material Science	PDT 201/3 Strength of Materials	PDT 203/3 Noise & Vibration	PDT 309/3 Manufacturing Economics	PDT 313/4 Final Year Project I	PDT 413/6 Final Year Project II	PDT 400/12 Industrial Training
	PDT 106/3 Engineering Graphics	PDT 102/3 Thermofluids	PDT 209/3 Industrial Safety	PDT 206/3 Jigs & Fixtures Design	PDT 318/4 Advanced Machining Technology	PDT 314/4 Machining Project	Elective II/3	
	PDT 109/2 Workshop Practice	PDT 107/2 Computer Aided Design	PDT 210/4 Conventional Machining	PDT 213/4 CNC Technology	PDT 312/3 Computer Aided Manufacturing	PDT 319/3 Maintenance Management	Elective III/3	
	PDT 111/3 Manufacturing Process	PDT 120/3 Basic Electrical and Electronic	PDT 202/3 Heat Transfer	PDT 222/3 Metallurgy	PDT 310/3 Quality System	PDT 316/3 Sustainable Machining		
		PDT 112/3 Theory in Machining		PDT 212/3 Geometric, Dimensioning & Tolerance		Elective I/3		
COMMON CORE (15)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III				PTT 444/3 Engineering Technologist in Society	
							PTT 333/3 Engineering Technology Management	
UNIVERSITY REQUIRED (19)	UUW 233/2 Islamic & Asian Civilisations or UUW 237/2 Malaysian Cultures	UZW XXX/1 Co-Curriculum	UVW 211/2 English for General Purpose	UUW 224/2 Engineering Entrepreneurship	UUW 322/2 Thinking Skills	UUT 122/2 Skill and Technology in Communication		
	UVW 410/2 University Malay Language		UZW XXX/1 Co-Curriculum	UVW 312/2 English for Technical Communication	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies			
	UZW XXX/1 Co-Curriculum				UVW XXX/2 Option Subject			
TOTAL CREDIT	19	18	19	20	19	19	18	12
Total units for Graduation = 142								

LIST OF COURSES

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (MACHINING)

- PDT 101/3 STATICS AND DYNAMICS
- PDT 106/3 ENGINEERING GRAPHICS
- PDT 109/2 WORKSHOP PRACTICE
- PDT 102/3 THERMOFLUIDS
- PDT 122/3 MATERIAL SCIENCE
- PDT 111/3 MANUFACTURING PROCESS
- PDT 107/2 COMPUTER AIDED DESIGN
- PDT 120/3 BASIC ELECTRICAL AND ELECTRONIC
- PDT 112/3 THEORY IN MACHINING
- PDT 209/3 INDUSTRIAL SAFETY
- PDT 210/4 CONVENTIONAL MACHINING
- PDT 202/3 HEAT TRANSFER
- PDT 203/3 NOISE AND VIBRATION
- PDT 206/3 JIGS AND FIXTURES DESIGN
- PDT 213/4 CNC TECHNOLOGY
- PDT 212/3 GEOMETRIC, DIMENSIONING AND TOLERANCING
- PDT 309/3 MANUFACTURING ECONOMICS
- PDT 318/4 ADVANCED MACHINING TECHNOLOGY
- PDT 312/3 COMPUTER AIDED MANUFACTURING
- PDT 310/3 QUALITY CONTROL
- PDT 313/4 FINAL YEAR PROJECT
- PDT 319/3 MAINTENANCE MANAGEMENT
- PDT 316/3 SUSTAINABLE MACHINING
- PDT 314/4 MACHINING PROJECT
- PDT 417/3 MODERN GRINDING TECHNOLOGY
- PDT 418/3 CUTTING TOOL TECHNOLOGY



COURSES SYLLABUS

PDT 101/3
STATICS AND DYNAMICS

COURSE SYNOPSIS

This course comprises two parts, namely; statics and dynamics. In statics, the basic principles of engineering mechanics such as forces, moments and friction are introduced. Students are required to apply this basic knowledge in analysing the equilibrium of rigid bodies, as well as the stability of a structure. The subjects of dynamics cover the concept of kinematics and kinetics. Kinematics treats the geometric aspects of the motion, whereas kinetics analyses the forces that cause the motion. Analyses in relation to kinetic problems are solved using acceleration method, principle of work and energy, and principle of impulse and momentum.

REFERENCES

1. Hibbeler, R. C., Engineering Mechanics Statics. 11th ed., Prentice Hall (2007)
2. Hibbeler, R. C., Engineering Mechanics Dynamics. 11th ed., Prentice Hall (2007)
3. Beer, F. B. and Johnston, E. R. Jr., Vector Mechanics for Engineers: Statics and Dynamics. 8th ed., Canada, McGraw_Hill (2004)
4. Beer and E.R. Johnson Jr., 'Vector Mechanics tor Engineer: Statics 8th ed. In SI Units', McGraw Hill (2004).
5. Beer and E.R. Johnson Jr., 'Vector Mechanics tor Engineer: Dynamics 8th ed. In SI Units', McGraw Hill (2004)
6. Meriam, J. L. and Kraige, L. G., Engineering Mechanics: Statics. 5th ed., USA, SI ver. Wiley (2003).
7. Meriam, J. L. and Kraige, L. G., Engineering Mechanics: Dynamics. 5th ed., USA, SI ver. Wiley (2003).

PDT 106/3
ENGINEERING GRAPHICS

COURSE SYNOPSIS

This course provides the skills to students the basics of Engineering Drawing, Computer Aided Drafting (CAD) and their engineering applications. The course covers the detail of Engineering Drawing for beginners followed with projection systems, oblique and isometric sketches. The course also introduced the Computer Aided Drafting using dedicated software, AUTOCAD, which focuses on product design in 2D and 3D environment. Fundamental knowledge in dimensioning and geometrical tolerance (GDT) enhances student's ability in interpreting and assessing information from basic raw data of an engineering drawing.

REFERENCES

1. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.
2. James H. Earle, "Engineering Design Graphics", IIth ed.,Pearson Prentice-Hall, 2004.
3. James D. B., "Engineering graphics with AutoCAD 2007", Pearson, 2007.
4. G. R. Cogorno, "Geometric Dimensioning and Tolerancing for Mechanical Design", McGraw-Hill, 2006.
5. R.K Dhawan, "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.

PDT 109/2
WORKSHOP PRACTICE

COURSE SYNOPSIS

This course is a practice of manufacturing process that is used in the industry to transform from raw material to finished products such as sand casting, vacuum casting, rapid prototyping, powder metallurgy, injection molding and heat treatment processes which covers introduction, processes and application. Practical work will help students to gain effective understanding.

REFERENCES

1. Mikell P. Groover (2007). Fundamentals of Modern Manufacturing, 3rd ed. John Wiley & Sons, Inc.
2. S. Kalpakjian, S.R. Schmid (2001). Manufacturing Engineering and Technology. 4th Ed. Prentice Hall International.
3. John A. Schey. (2000). Introduction to Manufacturing Processes. McGraw Hill.
4. Philip F. Ostwald, Jairo Munoz (1997). Manufacturing Processes and Systems. 9th ed., John Wiley & Sons.
5. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). Materials and Processes in Manufacturing. 8th ed., John Wiley & Sons, Inc.
6. Steve F. Krar, Arthur R.Gill, Peter Smid. Technology of Machine Tools. 6th ed. Mc Graw Hill.

PDT 102/3
THERMOFLUIDS

COURSE SYNOPSIS

This course will cover the basic knowledge, comprehension and application of law of thermodynamic to understand the relationship between

the properties that matter exhibits as it changes its condition. The first part includes review of thermodynamic concept, heat and energy. The second part covers the hydrostatic pressure, various manometers, and hydrostatic force on a plane surface and curved surface, Newton's Second Law of fluid motion, static, stagnation, dynamic, total pressure and the Bernoulli equation.

REFERENCES

1. M. Ishii and T. Hibiki, Thermo-Fluid Dynamics of Two-Phase Flow, Second ed, Springer, 2011.
2. C.P. Kothandaraman and R. Rudramoorthy, Fluid Mechanics and Machinery, Second ed, New Age International, 2007.
3. Y. A. Çengel, Fluid Mechanics: Fundamentals and Application, McGraw Hill Education Private, 2010.
4. Anthony R. Goodwin, et al., Applied Thermodynamics of Fluids, Royal Society of Chemistry, 2010.

PDT 122/3
MATERIAL SCIENCE

COURSE SYNOPSIS

This course introduces students to historical perspective of materials science and engineering fundamentals characteristics begin from understanding the atomic structures, atomic bonding in solids, crystal structures, mechanical and physical properties of materials. Students will then apply the understanding on properties of materials through phase diagram, transformations and heat treatment processing on ferrous and non-ferrous alloys, polymer and advanced materials.

REFERENCES

1. William D. Callister, Introduction to Materials, John-Wiley & Sons. Serope Kalpakjian, Steven R. Schmid (2010)."Manufacturing Engineering and Technology."6th ed Prentice Hall.
2. William F. Smith, Javad Hashemi, 2006, Foundation of Materials Science and Engineering, Fourth edition, McGraw Hill.
3. Budinski, K.G, 2006, Engineering Materials Properties and Selection, 8th edition, Prentice Hall.
4. Shackeford, J.F, 2005, Introduction to Materials Science for Engineers, 6th edition, Prentice Hall.

PDT 111/3
MANUFACTURING PROCESS

COURSE SYNOPSIS

This course explores the manufacturing process which used in industry to convert raw material into finished product. This course is devided into five sections. First, the introduction to manufacturing technology will be given, followed by material selection in manufacturing and heat treatment process. Secondly, the casting technology and various metal casting processes will be introduced including sand casting, investment casting, vacuum casting and other casting processes. Thirdly, overview of forming and shaping process will be given on rolling, forging, extrusion, drawing, sheet-metal forming, powder metallurgy, processing of ceramics, injection molding, and rapid prototyping process. Fourthly is about various joining process such as brazing, soldering, adhesive bonding, and mechanical fastening processes.

REFERENCES

1. Groover, M.P. Fundamentals of Modern Manufacturing; Materials, Processes, and Systems, 4th Ed., John Wiley & Sons, Inc., 2010.
2. Kalpakjian S, Schmid S.R. Manufacturing Engineering and Technology, 4th ed., Prentice Hall Inc. 2001
3. Schey, J.A. Introduction to Manufacturing Processes, 3rd Ed., Mc Graw Hill, 2000.
4. Philip F. Ostwald, Jairo Munoz (1997). Manufacturing Processes and Systems. 9th ed., John Wiley & Sons.
5. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). Materials and Processes in Manufacturing. 8th ed., John Wiley & Sons, Inc.

PDT 107/2
COMPUTER AIDED DESIGN

COURSE SYNOPSIS

This course focuses on giving exposure and skill to students about the basics of 3D modeling and its application in engineering field by using 3D Modeling software. This course includes details on 3D modeling followed by producing 2D drawing, assembly drawing, exploded drawing, surface modeling, rendering and animation. All this skill will help student to produce technical drawing and virtual prototype or model. This skill is very demanding in industry.

REFERENCES

1. James H. Earle, "Engineering Design Graphics", IIth ed.,Pearson Prentice-Hall, 2004.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.



3. R.K Dhawan, "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.
4. N. Zulkifli, M. H. Omar & F. F. Mohamed, "Computer Aided Drafting", UUM.
5. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak, "Engineering Graphics", 8th edition, Pearson, 2004.

PDT 120/3
BASIC ELECTRICAL AND ELECTRONIC

COURSE SYNOPSIS

This course provides basic knowledge of solving DC and AC electrical circuits. It also covers the fundamentals of electrical machines. The electronics section includes basic semi conductor diodes and transistors as well as the fundamentals of digital systems. At the end of the semester students will be able to understand, analyze and apply basic electrical and electronics concept and principles.

REFERENCES

1. Hambley, A. R., Electrical Engineering: Principles and Applications, 5th ed., Pearson (2011)
2. Hughes, E., Electrical and Electronic Technology, 11th ed. Pearson (2012).
3. Zekayat, S. A., Electrical Engineering Concepts and Applications , Pearson(2012)
4. Floyd, T.L., Electronic Devices. 9th ed. Prentice Hall, Inc, 2012.
5. Floyd, T.L., Digital Fundamentals, 10th ed. Prentice Hall, Inc, 2009.

PDT 112/3
THEORY IN MACHINING

COURSE SYNOPSIS

In this course, the students learn the fundamentals and principles of metal cutting/machining processes common to current industrial practises. This includes single point orthogonal and turning operations, multi-point cutting operations, i.e. milling, drilling; and abrasive processes/grinding operations. Key technological principles and mechanisms of chip formations are initially explained. This is followed by discussions and evaluations of various conventional machining operations for different part shape requirements. Basic toolings for machining operations are introduced along with the machine tool structures to perform the cutting operations. Material removal rate, machining time and machining economics are analyzed as part of machinability analyses.

REFERENCES

1. Krar, S.F., Gill, A.R. and Smid, P. Technology of Machine Tools. 7th Edition, United States, McGraw Hill, 2011.
2. Groover, M.P. Principles of Modern Manufacturing. 4th Edition, United States, John Wiley & Sons, 2010.
3. Kalpakjian, S., Schmid, S.R., Manufacturing Engineering & Technology. 6th Edition, United States, Pearson, 2010.
4. Stephenson, D.A., Agapiou, J.S., Metal Cutting Theory & Practise. United States, CRC Press Taylor & Francis Group, 2005.
5. Childs, T., Maekawa, K., Obikawa, T., Yamane, Y. Metal Machining: Theory and Applications, London, United Kingdom, John Wiley & Sons (accessed from Elsevier Science Direct), 2000.

PDT 209/3
INDUSTRIAL SAFETY

COURSE SYNOPSIS

This course gives an exposure to students to understand industrial safety standards and guidelines, quality management concept and various quality tools that allow students to understand the general picture of both areas which are being practiced by industries. At the end of this course, students are expected to be able to identify suitable quality techniques and tools to be implemented in production management and can apply Industrial Safety standards in real industrial environment.

REFERENCES

1. David L. Goetsch, Quality Management – Introduction to Total Quality Management for Production, Processing, and Services. 5th Ed., Pearson Prantice Hall, 2006.
2. C. Ray Asfahl, Industrial Safety and Health Management, 5th Ed., Pearson Prantice Hall, 2003.
3. David L. Goetsch, Occupational Safety and Health, for Technologists, 4. Engineering, and Managers., 4th ed., Prentice Hall. 2002.
4. Willie Hammer, Dennis Price, Occupational Safety Management and Engineering, 5th ed., Prentice Hall. 2001.
5. Howard S. Gitlow et. al,Quality Management, 3rd ed., McGraw-Hill. 2005

PDT 210/4
CONVENTIONAL MACHINING

COURSE SYNOPSIS

This course introduce about safety aspects in workshop and fundamental of measurement technique followed by

milling, lathe and grinding operation which consists of introduction to basic knowledge of various cutting tools, parts of machine and its functions, machine operations, and numerous calculations involving the operations. Students will practices the conventional machining process that is used in the industry to transform from raw material to finished products. Practical work will help students to gain effective understanding.

REFERENCES

1. Steve F. Krar, Arthur R. Gill, Peter Smid, Technology of Machine Tools. 6th ed. Mc Graw Hill
2. S. Kalpakjian, S.R. Schmid (2001). Manufacturing Engineering and Technology. 4th ed. Prentice Hall International.
3. Mikell P. Groover (2007), Fundamentals of Modern Manufacturing. 3rd ed. John Wiley & Sons, Inc.
4. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). Materials and Processes in Manufacturing. 8th ed., John Wiley & Sons, Inc.
5. Zainal Abidin Ahmad. Proses Pembuatan. Jilid I. UTM: Cetak Ratu Sdn. Bhd, 1999.
6. Zainal Abidin Ahmad. Proses Pembuatan Jilid II. UTM: Cetak Ratu Sdn. Bhd, 1999.

PDT 202/3
HEAT TRANSFER

COURSE SYNOPSIS

The main objective of this course is to enable student to understand the concepts of conduction, convection and radiation which form the basics of heat transfer. Student will also perform theoretical calculations such as thermal conductivity, heat loss, and other important theories.

REFERENCES

1. Yunus A. Cengel., 2003, Heat transfer: A practical approach. Mc-Graw Hill.
2. Tariq Muneer., Jorge Kubie., Thomal Grassie., 2003, Heat transfer: A problem solving approach, volume 1.
3. Jack Philip Holman., 2009, Heat transfer. Mc-Graw Hill Higher Education.
4. Adrian Bejan., 1993, Heat transfer. John Wiley & Sons, Inc.
5. Anthony F. Mills., 1999, Heat transfer. Prentice Hall.

PDT 203/3
NOISE AND VIBRATION

COURSE SYNOPSIS

The objective of the course is to introduce the students with the skills and knowledge in vibrations disciplines. The syllabus covers the fundamental of vibration and oscillation motion, free vibration, force vibration, transient vibration, two degree of freedom systems and multiple degree of freedom systems. The students will be well prepared towards industrial application elements such as vibration control, vibration measurement and signal analysis methods.

REFERENCES

1. J.P. Den Hartog, Mechanical Vibrations, Third Edition, Mc Graw Hill (2008)
2. Singiresu S. Rao, Mechanical Vibration, Fourth Edition, Prentice Hall (2000)
3. W. Thomson, Theory of Vibration With Application, Prentice Hall (2004)
4. W. J. Palm III. Mechanical Vibration, John Wiley & Sons (2005).
5. G Genta, Vibration of Structures and Machines (Practical Aspects), Third Edition, Springer (1998)

PDT 206/3
JIGS AND FIXTURES DESIGN

COURSE SYNOPSIS

This course provides concept and understanding to allow students to find suitable designs for components in designing machine system, jig and fixtures. It focuses on basics of power transmission system, motors, fasteners and fundamental principles of jig and fixtures. Students will be exposed with simple design problems before being assigned to compute design parameters. At the end of this course, students will be analyzed simple designs of machine components by using CAD Aided Engineering (CAE) software.

REFERENCES

1. Robert L. Mortt. Machine Elements in Mechanical Design. 4th Edition. Pearson Prantice Hall, 2004.
2. Edward G. Hoffman. Jig and Fixture Design. 4th Edition. Delmar Publishers, 1996.
3. Norton, Robert L. Design of Machinery. 3rd Edition. McGraw-Hill, 2004.
4. Robert C. Juvinall and Kurt M. Marshek. Fundamental of Machine Components Design. 4th Edition. John Wiley & Sons, 2005.
5. Richard Budynass, Joseph E. Shigley and Charles R. Mischke. Mechanical Engineering Design. 7th Edition. McGraw-Hill, 2004.
6. Erik K.Henriksen. Jig and Fixture Design manual. Industrial Press INC, 1973.



PDT 213/4
CNC TECHNOLOGY

COURSE SYNOPSIS

This course enables students to understand the use of conventional and modern machining processes. The course begins with an introduction to machining processes, followed by analyses of machine tools. Then, students are taught about CNC programming, CNC processes, tools and control systems. Students will perform machining processes and learn how to develop programming and solve problems related with it.

REFERENCES

1. Jon Stenerson, Kelly Curran, Computer Numerical Control Operation and Programming. 3rd ed., Prentice Hall, 2007.
2. By Stephen F. Krar, Arthur Gill, Exploring Advanced Manufacturing Technologies, Industrial Press Inc. New York, 2003.
3. P.N. Rao, CAD/CAM Principles and Applications, 2nd ed., Mc Graw Hill, 2002.
4. Smid, CNC Programming Handbook, 2nd ed., Industrial Press, 2002.
5. Mikell P. Groover, Fundamentals of Modern Manufacturing, 3rd ed., John Wiley & Sons, Inc., 2007.
6. S.Kalpakjian, S.R.Schmid, Manufacturing Engineering and Technology. 4th ed., Prentice Hall International, 2001.

PDT 212/3
GEOMETRIC, DIMENSIONING AND TOLERANCING

COURSE SYNOPSIS

This course introduces the basic knowledge of Geometric Dimensioning and Tolerancing (GD&T) and applies to the drawing. Students will be exposed to GD&T fundamentals, symbols, terms, rules, profile, technique, and strategy for tolerancing parts.

REFERENCES

1. Gene R. Cogorno, Geometric Dimensioning and Tolerancing for Mechanical Design, McGraw-Hill, 2006.
2. Dotson, C.L. Fundamentals of Dimensional Metrology. 5th Edition, Unites States, Thomson Delmar Learning, 2006.

PDT 309/3
MANUFACTURING ECONOMICS

COURSE SYNOPSIS

This course addresses a systematic evaluation of proposed solution to engineering problems. It evaluates the monetory consequences of products, projects and processes that engineers design. The course introduces students to fundamental economics consideration and costs involve in decision making for a production or a project which will be economically acceptable and demonstrate a positive balance of long term benefits over long term costs. The students learn about fundamental cost concepts and costs involve in a production process. Then, money-time relationship (also called time value of money) and concept of equivalence expose students to the value of investment by estimating future costs or revenues. The application of money-time relationship in comparing different alternatives help to choose best solution before investing.

REFERENCES

1. Sullivan, W. G., Wicks, E. M. & Luxhoj, J. T. "Engineering Economy", 13/E, Prentice Hall, 2006.
2. Park, C.S. "Fundamental of Engineering Economics", Prentice Hall, 2004.
3. Park, C. S. "Contemporary Engineering Economics", 4/E, Prentice Hall, 2007.
4. Newnan, D. G., Eschenbach, T. G. and Lavelle, J. P. "Engineering Economics Analysis", Oxford, 2004.
5. Blank, L. and Tarquin, A. "Engineering Economy", 6/E, McGraw Hill, 2005.

PDT 318/4
ADVANCED MACHINING TECHNOLOGY

COURSE SYNOPSIS

This course is the introduction for EDM technology (Electrical Discharge Machining) which is used in industries nowadays. It includes topics about introduction to EDM technology, wire-cut and Ram (die-sinker) machining. Students are involved with system and process for both type of machining. Besides that, students are also exposed to other types of EDM process.

REFERENCES

1. Carl Sommer, Steve Sommer, Complete EDM Handbook, Advance Pub., 2005
2. Elman C. Jameson. Electrical Discharge Machining, Society of Manufacturing Engineers and Machining Technology Association, 2001

3. E. Bud Guitrau. The EDM Handbook, Hanser Gardner Publications, 1997.
4. Carl Sommer, Steve Sommer. Wire EDM Handbook, Advance Publ., 2000
5. P N Rao. Manufacturing Technology: Metal Cutting & Machine Tools, Mc Graw Hill, 2000.
6. Carl Sommer. Non-Traditional Machining Handbook, Advance Pub, 2001.

PDT 312/3
COMPUTER AIDED MANUFACTURING

COURSE SYNOPSIS

This course introduces principles and application of CAD/CAM system. This course enables student to understand the theory, concept, and application of CAD/CAM in an industry. Students will be exposed to CAD software to illustrate parts and then using CAM software to convert CAD file into numerical control (NC) codes.

REFERENCES

1. P.N. Rao. (2004). CAD/CAM Principles and Applications. 2nd Edition. McGraw Hill.
2. Ibrahim Zeid (2004). Mastering CAD/CAM. 1st Edition. McGraw Hill International Edition.
3. Farid M. Amirouche. (2003). Principles of Computer Aided Design and Manufacturing. 2nd Edition. Prentice Hall.
4. Kunwoo Lee (1999). Principles of CAD/CAM/CAE. 1st Edition. Prentice Hall.
5. Chris McMahon and Jimmy Brown (1999). CAD/CAM: Principles, Practice and Manufacturing Management. 2nd Edition. Prentice Hall.

PDT 310/3
QUALITY CONTROL

COURSE SYNOPSIS

This course is offered to introduce quality assurance which refers to all systematic and planned activities in quality systems that are proved to be sufficient enough to build up proper confidence in meeting quality requirements whether for products or services which meet or exceed customer expectations. In this course student will learn the quality management as the key for quality assurance achievement. This course comprise of the quality management's philosophy and concepts and application of quality tools and techniques in order to achieve quality assurance. By understanding the entire contents of this course, students will be able to interpret the standard for quality assurance and quality management systems, and able to develop, formulate, and organize their works or organization effectively.

REFERENCES

1. David L. Goetsch, Stanley B. Davis, Quality Management: Introduction to Total Quality Management for Production, Processing, and Services, 5th ed., Pearson Prentice Hall, 2006.
2. Melissa G. Hartman, Fundamental Concepts of Quality Improvement, 1st ed., ASQ Quality Press, Milwaukee, Wisconsin, 2002.
3. Stephen B. Vardeman, J. Marcus Jobe, Statistical Quality Assurance Methods For Engineers, 1st Ed., John Wiley & Sons, Inc., 1999.
4. Fred Owen, Derek Maidment, Quality assurance: A guide to the application of ISO 9001 to process plant projects, 2nd ed,. IChemE, 1996.

PDT 313/4
FINAL YEAR PROJECT

COURSE SYNOPSIS

A projects based course that exposes students to solve, analyze, design and research engineering problems in the field of manufacturing engineering, machining or product design.



BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (AGRICULTURAL SYSTEMS) - RY56

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of mechanical engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning** or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to define and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.

CURRICULUM STRUCTURE FOR BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (AGRICULTURAL SYSTEMS) - RY56

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (110)	PDT 176/2 Computer Aided Drafting	PDT 181/3 Engineering Mechanics	PDT 276/3 Mechanics of Materials	PDT 107/2 Computer Aided Design	PDT 376/3 Farm Power and Machinery	PDT 313/4 Final Year Project 1	PDT 413/6 Final Year Project 2	PDT400/12 Industrial Training
	PDT 177/2 Applied Chemistry	PDT 182/3 Electronic Appliction in Agriculture	PDT 277/3 Applied Thermodynamics	PDT 278/2 Geodetics Engineering	PDT 377/3 Applied Heat and Mass Transfer	PDT 382/3 Controlled Enviroment Agriculture	PDT 477/3 Post-Harvest Technology	
	PDT 178/2 Applied Biology	PDT 183/2 Agricultural Mechanics and Workshop Technology	PDT 279/4 Principle of Agronomy	PDT 281/3 Instrumentatios and Control	PDT 378/2 Precision Agriculture Technology	PDT 383/3 Renewable Energy	PDT 478/3 Agricultural Waste Management and Utilization Eng.	
	PDT 179/3 Agricultural Economics	PDT 184/4 Agricultural Production Systems	PDT 280/2 Fundamentals of Agribusiness Accounting And Finance	PDT 282/3 Applied Fluid Mechanics	PDT 379/3 Water Resource Management	PDT 384/3 Food Technology	Elective II/3	
	PDT 180/3 Engineering Science			PDT 283/2 Agribusiness Management	PDT 380/3 Automations in Agricultural Systems	Elective 1/3	Elective III/3	
				PDT 284/2 Agro-ecosystem and Sustainability				
Common Core (15)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III		PTT 333/3 Engineering Technology Management	PTT 444/3 Engineering Technologist in Society		
University Required (19)	UVW 410/2 University Malay Language	UVW 211/2 English for General Purposes	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	UUW 322/2 Thinking Skills	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies			
	UZW XXX/1 Co-Curriculum	UVW XXX/2 Option Subject or UUT122/2 Skill and Technology in Comunication	UZW XXX/1 Co-Curriculum	UUW 224/2 Engineering Entrepreneurship				
		UZW XXX/1 Co-Curriculum	UVW 311/2 English for Technical Education					
Total Credit	18	20	20	18	19	19	18	12
Total units for Graduation = 144								



LIST OF COURSES

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS)
(AGRICULTURAL SYSTEMS)

- **PDT 176/2 COMPUTER AIDED DRAFTING**
- **PDT 177/2 APPLIED CHEMISTRY**
- **PDT 178/2 APPLIED BIOLOGY**
- **PDT 179/3 AGRICULTURAL ECONOMICS**
- **PDT 107/2 COMPUTER AIDED DESIGN**
- **PDT 180/3 ENGINEERING SCIENCE**
- **PDT 181/3 ENGINEERING MECHANICS**
- **PDT 182/3 ELECTRONICS APPLICATION IN AGRICULTURE**
- **PDT 183/2 AGRICULTURAL MECHANICS AND WORKSHOP TECHNOLOGY**
- **PDT 184/4 AGRICULTURAL PRODUCTION SYSTEMS**
- **PDT 276/3 MECHANICS OF MATERIAL**
- **PDT 277/3 APPLIED THERMODYNAMICS**
- **PDT 278/2 GEODETICS ENGINEERING**
- **PDT 279/4 PRINCIPLES OF AGRONOMY**
- **PDT 280/2 FUNDAMENTALS OF AGRIBUSINESS ACCOUNTING AND FINANCE**
- **PDT 281/3 INSTRUMENTATIONS AND CONTROL**
- **PDT 282/3 APPLIED FLUID MECHANICS**
- **PDT 283/2 AGRIBUSINESS MANAGEMENT**
- **PDT 284/2 AGRO-ECOSYSTEMS AND SUSTAINABILITY**
- **PDT 376/3 FARM POWER AND MACHINERY**
- **PDT 377/3 APPLIED HEAT AND MASS TRANSFER**
- **PDT 378/2 PRECISION AGRICULTURE TECHNOLOGY**
- **PDT 379/3 WATER RESOURCES MANAGEMENT**
- **PDT 380/3 AUTOMATIONS IN AGRICULTURAL SYSTEMS**
- **PDT 313/4 Final Year Project**
- **PDT 382/3 CONTROLLED ENVIRONMENT AGRICULTURE**
- **PDT 383/3 RENEWABLE ENERGY**
- **PDT 384/3 FOOD TECHNOLOGY**
- **PDT 385/3 BIOMATERIAL ENGINEERING (ELECTIVE)**
- **PDT 386/3 INTEGRATED AGROSYSTEMS (ELECTIVE)**
- **PDT 413/6 FINAL YEAR PROJECT 2**
- **PDT 477/3 POST-HARVEST TECHNOLOGY**
- **PDT 478/3 AGRICULTURAL WASTE MANAGEMENT AND UTILIZATION ENGINEERING**
- **PDT 479/3 BIO-RENEWABLE SYSTEMS (ELECTIVE)**
- **PDT 480/3 FOOD PROCESSING ENGINEERING (ELECTIVE)**
- **PDT 481/3 ADVANCES IN AGROTECHNOLOGY (ELECTIVE)**
- **PDT 482/3 FOOD AND HERBAL CROP PRODUCTION TECHNOLOGY (ELECTIVE)**

COURSE SYLLABUS

PDT 176/2
COMPUTER AIDED DRAFTING

COURSE SYNOPSIS

This course introduces the application of drafting and modelling techniques commonly used in mechanical and civil designs computer graphics, 2-D and 3-D geometry related to drafting and design of mechanical and structural components and/or systems. The primary software used in this course is AUTODESK AutoCAD.

COURSE OUTCOMES

1. Ability to apply basic drafting skills using computer aided drafting software.
2. Ability to construct and interpret drawings in orthographic projection.
3. Ability to construct a working drawing for an engineering product or device using a CAD system.
4. Ability to accurately interpret and construct standard engineering drawings and schematic diagram.

REFERENCES

1. Ibrahim Zeid. 2002. CAD/CAM Theory and Practice, McGraw Hill International, NY.
2. David G. Ullman. 2003. The Mechanical Design Process. 3rd Edition. McGraw-Hill.
3. Simon D. 2004. The Complete Guide to Digital 3D Design. Cambridge: ILEX.
4. Julien M. C. 2005. Best of 3D Virtual Product Design. Singapore: Page One Publishing Private Ltd.
5. Bruce H. 2004. Becoming a Product Designer. John Wiley and Sons. New York.

PDT 177/2
APPLIED CHEMISTRY

COURSE SYNOPSIS

The course covers pure chemistry (chemical elements, atoms and molecules), water and the fitness of environment, carbon and functional groups, structure and function of macromolecules and analytical chemistry (stoichiometric calculations and chemical equilibrium which comprises of acid base equilibrium, acid base titrations and reactions, and precipitation titrations).

COURSE OUTCOMES

1. Ability to apply the concepts and principles of general chemistry and analytical chemistry.
2. Ability to solve the problems in chemical reactions and calculations.
3. Ability to recognise and analyze the data from various types of chemistry of life and problem solving in analytical chemistry.

REFERENCES

1. Steven, S. Z. and Susan A. Z. (2008) Chemistry 8th Edition.Cengage. USA.
2. Skoog, D. A. 2004. Fundamentals of Analytical Chemistry 8th Edition. Thomson-Brooks/Cole, Miami.
3. Gesser, H. D. (2002). Applied Chemistry : A Textbook for Engineers and Technologists Kluwer Academic, New York.
4. Wan Saime Wan Ngah and Che Sofiah Saidin (2007). Basic Analytical Chemistry 2nd Ed. Pearson Prentice Hall.
5. Campbell, N.A, Reece, J.B. 2008. Biology, 9th ed. Pearson Cummings, San Francisco

PDT 178/2
APPLIED BIOLOGY

COURSE SYNOPSIS

This course introduces the general concepts of biology as related to agricultural technology, the molecular and cellular aspects of living things, structure and function of plants and animals, plant and animal diversity, principles of classification and ecological relationships in organisms, and the role of genetics in organism variation and adaptation.

COURSE OUTCOMES

1. Ability to illustrate important traits in living organisms with reference to: evolution, classification and ecology
2. Ability to interpret growth in living organisms with reference to: physiology and genetics.

REFERENCES

1. Campbell, N.A, Reece, J.B. 2008. Biology, 9th ed. Pearson Cummings, San Francisco
2. Alters, S. and Alters, B., .2006. Biology: Understanding Life. Wiley, New York.
3. Campbell, N.A., Williamson, B., and Heyden, R.J. 2004. Biology Exploring Life. Prentice Hall, London.
4. Collen,B., and Virginia. 2007. Biology Science for Life. 2nd Ed. Prentice Hall,
5. Sylvia, S.M. 2007. Biology. 9th Ed. McGraw Hill, London.



PDT 179/3
AGRICULTURAL ECONOMICS

COURSE SYNOPSIS

The course introduces to the study of economic principles with respect to supply-demand, finance and marketing of agricultural products related to food and fiber production with special references to Malaysian conditions and policies.

COURSE OUTCOMES

1. Ability to apply economic development and agriculture, with specific context of Malaysia's economy and the agriculture sector.
2. Ability to analyze consumer behavior, market supply-demand equilibrium, and elasticity.
3. Ability to analyze business behavior and market supply-demand equilibrium.
4. Ability to apply macroeconomics of agriculture with respect to international agricultural trades and exchange rates and policies.

REFERENCES

1. John B. Penson, Jr. Oral T. Capps, Jr. (2010), Introduction to Agricultural Economics, 5th Ed., Prentice Hall, New York, NY.
2. Nellis, J.G. and Parker, D. (2008), Principles of Business Economics, 2nd Ed., Prentice Hall, New York, NY.
3. Richard, L.K. and Joseph, N.U. (2001),Marketing of Agricultural Products, 9th Ed. McGraw Hill, New York, NY.
4. Won, W.K. and Kennedy, P.L. (2003), International Trades and Agriculture: Theory and Practices, Wiley-Blackwell, New York, NY.
5. Gail, L.C. , Jensen, C.W. and Dauglas, D.S. (2001), Agricultural Economics, John Wiley, New York, NY.

PDT 107/2
COMPUTER AIDED DESIGN

COURSE SYNOPSIS

This course focuses on giving exposure and skill to students about the basics of 3D modeling and its application in engineering field by using 3D Modeling software. This course includes details on 3D modeling followed by producing 2D drawing, assembly drawing, exploded drawing, surface modeling, rendering and animation. All this skill will help student to produce technical drawing and virtual prototype or model. This skill is very demanding in industry.

REFERENCES

1. James H. Earle, "Engineering Design Graphics", IIth ed.,Pearson Prentice-Hall, 2004.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.
3. R.K Dhawan, "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.
4. N. Zulkifli, M. H. Omar & F. F. Mohamed, "Computer Aided Drafting", UUM.
5. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak, "Engineering Graphics", 8th edition, Pearson, 2004.

PDT 180/3
ENGINEERING SCIENCE

COURSE SYNOPSIS

The course covers foundations of quantity and units of measurement, vectors, particle dynamics, work, power and momentum. Additional coverage includes forces on objects and introduction to electrical circuit.

COURSE OUTCOMES

1. Ability to analyze problems related to units of measurements, and scalar and vector quantities.
2. Ability to analyze particles in motion, energy, work, power, and momentum.
3. Ability to analyze forces acting on objects.
4. Ability to analyze basic electrical circuitry.

REFERENCES

1. Raymond, A. S. and John, W. J. (2010), Physics For Scientists and Engineers, 8th Ed., Thompson Higher Education, Belmont, CA.
2. Dauglas, C.G.(2010), Physics: Principles with Applications, 6th Ed., Pearson, New York, NY.
3. Hibbler, R.C. (2010), Engineering Mechanics: Statics and Dynamics, 12th Edition, Peason Prentice Hall, Singapore.
4. Richard, J.F. (2008), Electricity Principles and Applications, 7th Ed., McGraw Hill, New York, NY.
5. Huges, E. (2005), Electrical and Electronics Technology, 9th Ed., Prentice Hall, New York, NY.

PDT 181/3
ENGINEERING MECHANICS

COURSE SYNOPSIS

This course covers vector representation of forces, moments and static equilibrium of particles, rigid bodies, and engineering structures, analysis of external and internal forces in structures via the methods of free-body diagrams and properties of cross-sectional areas, kinematics and kinetics of system of particles and of rigid bodies in two and three-dimensional spaces covering force and acceleration, linear and angular momentum, and energy conservation.

COURSE OUTCOMES

1. Ability to interpret the basic principles of statics and dynamics on mechanism and bodies.
2. Ability to apply the basic principles of statics and dynamics on mechanism and bodies.
3. Ability to solve problem related forces, loads, displacement, velocity and acceleration of a body or mechanism.

REFERENCES

1. Hibbler R.C. 2010.Engineering Mechanics: Statics, 12th Edition, Peason Prentice Hall, Singapore
2. Bedford, A. and Fowler, W. 2007. Engineering Mechanics: Statics and Dynamics, 5th Edition, Pearson-Prentice Hall,
3. Sheppard S.D. and Tongue B.H. 2005.Statics. Analysis and design of systems in equilibrium, Wiley, N.Y
4. Tongue B.H. and Sheppard S.D. 2005. Dynamics. Analysis and design of systems in motion, Wiley, N.Y
5. Beer, F.P. and Johnston, E.R. 2006. Vector mechanics for engineers: Statics and Dynamics, 8th edition, McGraw Hill, N.Y

PDT 182/3
ELECTRONICS APPLICATION IN AGRICULTURE

COURSE SYNOPSIS

This course introduces basic electrical circuit theory and analogue electronics, basic DC and AC circuits and fundamental of electronic components such as operational amplifiers and semiconductor diodes.

COURSE OUTCOMES

1. Ability to demonstrate application of the key principles of DC circuit theory including Kirchhoff's laws of current and voltage, and rules for current and voltage division.
2. Ability to apply ideal and non-ideal operational amplifier circuits.
3. Ability to analyze simple AC series and parallel circuits using phasors and complex numbers.

REFERENCES

1. Bird, J. 2010. Electrical Circuit Theory and Technology. 4th Edition. Elsevier
2. Boylestad, R. 2010 Introductory Circuit Analysis. 12th Edition. Pearson
3. Harry,F.L and John, B. S. 2007. Introduction to Agricultural Engineering Technology, 3rd Edition.
4. Bishop, O. 2010 Electronics Circuits and Systems. 3rd Edition Elsevier
5. Donald,C. 2004.Standard Handbook Electronic Engineering, McGraw-Hill Professional

PDT 183/2
AGRICULTURAL MECHANICS AND WORKSHOP TECHNOLOGY

COURSE SYNOPSIS

This laboratory course is designed to provide students with introductory level experiences in selected major areas of agricultural mechanics technology which may include small engine maintenance and repair, metal fabrication, concrete construction, building construction, plumbing, electrical wiring, maintenance of agricultural machinery, equipment and tractors.

COURSE OUTCOMES

1. Ability to follow safety procedures in the agricultural mechanics shop.
2. Ability to sketch drawings of simple projects, layout projects from drawings, creates a bill of materials for organizing agricultural mechanics shop projects.
3. Ability to identify tools and materials common to agricultural mechanics shop.
4. Ability to demonstrate basic shop skills common to agricultural mechanics shop through the construction of an agricultural mechanics project.

REFERENCES

1. Herren, R. V.2006. Agricultural Mechanics: Fundamentals & Applications. 5th Edition. Thomson/ Delmar Learning.Clifton Park, NY
2. John, K. C. 2010. Mechanical Workshop Practice", PHI Learning Private Limited
3. Bawa, H. S. 2007. Workshop Practice. 3rd Edition, Tata McGraw-Hill
4. Garg, S.K. 2006. Workshop Technology: Manufacturing Processes. 2nd Edition, Laxmi Publication

5. Carl, B. and Stanley, R. B. 2006. Modern Agricultural Mechanics. 3rd Edition. Pearson/Prentice Hall Interstate.

PDT 184/4
AGRICULTURAL PRODUCTION SYSTEMS

COURSE SYNOPSIS

The course covers the various facets of agricultural production systems and practices, dynamism within the soil-plant-atmosphere continuum involving living organisms related to crops and fauna, components in agricultural production systems and good agricultural practices and sustainability approaches.

COURSE OUTCOMES

1. Ability to define and interpret the basic principles and processes involved in agricultural production systems.
2. Ability to solve systems/problems related to aspects in agricultural production systems.
3. Ability to choose systems related to good agricultural practices and sustainable farming

REFERENCES

1. Benckiser, G. and Schnell, S. 2007. Biodiversity in Agricultural Production Systems. CRC Press /Taylor and Francis, Florida, USA.
2. Akinyemi, O. M. 2007. Agricultural Production; Organic and Conventional. Science Publishers,Inc.,USA.
3. Martins, J.H., Leonard, W.H., Stamp, D.L. and Waldren, R.P. 2005. Principles of Field Crop Production. Prentice Hall, NewYork.
4. Fageria, N.K. Baligar, V.C. and Ralph B.C. 2006. Physiology of Crop Production. Haworth Press, New York, USA.
5. Hans J. M. 2005. Globalization and Agricultural Trade Policy. Lynne Rienner Publishers, USA.

PDT 276/3
MECHANICS OF MATERIAL

COURSE SYNOPSIS

This course covers analysis of stresses due to various loading conditions, stresses and strains at a point, stress-strain relationships, theories of failure, energy methods, shear center, unsymmetrical bending, curved beams, torsion, and buckling problems.

COURSE OUTCOMES

1. Ability to analyze the basic concepts of mechanics of materials in design consideration.
2. Ability to analyze stress and strain by using Mohr's Circle and Hooke's Law plane stress in pressure vessels and beams.
3. Ability to use the superposition method or moments-area method to analyze the deflections of beams.
4. Ability to analyze buckling and stability for Columns and in designing columns.

REFERENCES

1. Hibbeler,R.C. 2010. Mechanics of Materials. Pearson Prentice Hall, NY
2. Ugural, A. C. 2008.Mechanics of Materials 3rd Edition, Wiley, USA
3. James, M. G., Barry, J. G. 2009 Mechanics of Materials, 7th Edition, Cengage Learning Inc.
4. Ferdinand, B. P.,John, T. D. 2008. Mechanics of Materials, 8th Edition, McGraw Hill, NY
5. Cristopher, R. J., Sanjeev V. K. 2010. Mechanics of Mateials 10th Edition, Elsevier Inc, NY

PDT 277/3
APPLIED THERMODYNAMICS

COURSE SYNOPSIS

Thermodynamics is the study of heat related to matter in motion. The First Law of Thermodynamics involves the conversion of energy from one form to another while the Second Law determines the direction of heat flow, and the availability of energy to do work. This course, covers the terminology, principles, theory, and practical application of the First and Second Law of engineering thermodynamics.

COURSE OUTCOMES

1. Ability to discuss basic concept of thermodynamic and energy transformation in the system.
2. Ability to apply the concepts of thermodynamics systems such as processes, cycles and working fluid in engineering field.
3. Ability to solve thermodynamics system performance problem analytically.
4. Ability to analyze thermodynamics system such as steam power cycles and refrigeration cycles.

REFERENCES

1. Cengel, Y.A and Boles, M.A. 2008. Thermodynamics: An Engineering Approach", 6th Edition, McGraw-Hill, NY
2. Nag, P.K, 2010. Basic and Applied Thermodynamics 2nd Edition, McGraw Hill, NY
3. Robert, T. B. 2010.Modern Engineering Thermodynamics. Elsevier Inc, NY

4. Rajput, R.K, 2010. Engineering Thermodynamics, 3rd Edition, Jones and Bartlett
5. Srivastava, R. C 2007. Thermodynamics, 3rd Edition, Prentice Hall, London

PDT 278/2
GEODETICS ENGINEERING

COURSE SYNOPSIS

This course emphasizes on knowledge and skills using surveying equipments such as leveling, theodolite and GPS. Topics discussed include are traversing, tacheometry, mapping, setting out, triangulation, geometric design, vertical and horizontal alignment, and volume of earthwork.

COURSE OUTCOMES

1. Ability to apply concepts and principles of geodetic surveying.
2. Ability to perform surveying tasks and procedures.
3. Ability to analyze data from various types of geodetics surveying.

REFERENCES

1. Uren, J and Price, W.F., (2006). Surveying for engineers 4th Edition, Palgrave Macmillan, McMillan, London.
2. Kavanagh, B.F. (2009), Surveying: Principles and applications, 8th Ed. Prentice Hall, New York, NY.
3. McCormack, J. (2004), Surveying, 5th Ed., John Wiley and Sons, New York, NY.
4. Nathanson, J., Lanzafama, M. T. dan Kissam, P. 2006. Surveying Fundamentals and Practices, 5th Edition, Person Prentice Hall, New Jersey.
5. Irvine, W. and Maclennan, F. 2006, Surveying For Construction, 5th Ed., McGraw-Hill, London.

PDT 279/4
PRINCIPLES OF AGRONOMY

COURSE SYNOPSIS

A foundation course in agronomy applying crop, soil, and environmental sciences in understanding agricultural systems. Topics include crop morphology and classification, soils and soil water management, mineral nutrition of crops, pest management, plant breeding, seed and grain quality and sustainable aspects of crop production.

COURSE OUTCOMES

1. Ability to relate the science and principles of agricultural crop production systems and the importance of crops to our society.
2. Ability to apply crop production principles to crop production practices.
3. Ability to demonstrate sustainable practices for agricultural crops.

REFERENCES

1. Mullen R.E. 2008. Plant Production Systems, 5th edition, Kendall-Hunt Publishing, Dubuque, Iowa.
2. Gardiner, D.T. and Miller, R.W. 2008. Soils in Our Environment. 11th edition. Upper Saddle River: Pearson Prentice Hall.
3. Jones Jr., J.B. 2002. Agronomic Handbook. Boca Raton: CRC Press.
4. Anderson, W.P. 2007. Weed Science: Principles and Application. Long Grove: Waveland Inc.
5. Mauseth, J.D. 2008. Botany: An Introduction to Plant Biology, 4th edition. Ontario: Jones & Bartlett Publications.

PDT 280/2
FUNDAMENTALS OF AGRIBUSINESS ACCOUNTING AND FINANCE

COURSE SYNOPSIS

This course covers fundamentals of the double-entry accounting cycle as it relates to partnerships and sole proprietorships operating in the agricultural sector including the use of automated accounting software the application of an agribusiness firm.

COURSE OUTCOMES

1. Ability to apply transactions into debit and credit parts.
2. Ability to apply accounts as assets, liabilities, or owner's equity.
3. Ability to prepare and analyze a balance sheet, an income statement, and statement of owner's equity.

REFERENCES

1. Silva, U.H. and Judy, U.H.(2009): Fundamentals of Agribusiness Accounting, Rex Bookstore Inc, Philippines.
2. Albrect, W.S. and Stice, J.D. (2007): Accounting: Concepts and Applications. Thompson, Mason, OH.
3. McLaney, E. and Atrill, P. (2007): Accounting: An Introduction, Prentice Hall, New York, NY.
4. Ralph, W.B. and Robert, C.T. (2008): Fundamentals of Agribusiness Finance, Iowa State University Press, Ames, IA.
5. Bamber, L.S. and Harrison, W.T. (2009): Managerial Accounting, Prentice Hall, New York, NY.

PDT 281/3
INSTRUMENTATIONS AND CONTROL

COURSE SYNOPSIS

The course covers the general concept of instrumentation, various measuring devices, manipulation, transmission, and recording of data, measurement standards, data analysis, calibration methods and software simulation to design and solve problems in measurement and automation systems.

COURSE OUTCOMES

1. Ability to differentiate main components in instrumentation, measurement, their integration and working principle of various measurement devices.
2. Ability to differentiate roles and features of appropriate instruments for various agricultural technology and applications.
3. Ability to solve connectivity and interfacing of different instrumentation.

REFERENCES

1. David Alciatore and Michael B. Hisband. 2011. Introduction to Mechatronics & Measurement Systems 4th edition. McGraw-Hill Publishing.
2. John G. W. 1998. Measurement, Instrumentation & Sensors Handbook.
3. Douglas V.H. 1992.Microprocessors and Interfacing. McGraw-Hill Publishing.
4. John P. and Steve M. 2003.Practical Data Acquisition for Instrumentation and Control Systems. Newnes.
5. Campbell, M. 1996. Sensor Systems for Environmental Monitoring, Thomson Science and Professional. Glaslow.

PDT 282/3
APPLIED FLUID MECHANICS

COURSE SYNOPSIS

This course emphasizes fundamental concepts and problem-solving techniques in fluid properties, static and kinematics, control volume analysis, momentum analysis of flow system, dimensional analysis, internal flows (pipe flows), differential analysis, and external flows (lift and drag).

COURSE OUTCOMES

1. Ability to analyze the essential parameters describing a fluid system and common devices used in measuring pressure and flow rates and turbo machineries.
2. Ability to analyze pressures, forces, and energy in fluid systems.
3. Ability to calculate pressure, forces and flow rates in dynamic fluid system.

REFERENCES

1. Cengel, Y. A. Cimbala, J. M. 2010. Fluid Mechanics: Fundamental and Applications, 2nd edition in SI units. McGraw-Hill, New York.
2. Mott, R.L. 2006. Applied Fluid Mechanics, 6th Edition, Prentice Hall, London.
3. Crowe, C.T., Elger, D.F., and Robertson, J.A.2005. Engineering Fluid Mechanics, 8th Edition. John Wiley, New York.
4. Pijush K. K., Ira M. C., David R. D. 2011. Fluid Mechanics with Multimedia DVD 5th ed.
5. Bruce R. M. 2009. Fundamental of Fluid Mechanics. 6th ed. John Wiley, NY

PDT 283/2
AGRIBUSINESS MANAGEMENT

COURSE SYNOPSIS

As farming becomes more complex and global, and that the economic pressure on farming increases, future farm managers need to be equipped with knowledge in management and business strategies. This course covers strategy, marketing, financial, operations quality, risks, human resources, and organizational management.

COURSE OUTCOMES

1. Ability to apply various management functions to agribusiness entity.
2. Ability to analyze business process improvement using quality tools.
3. Ability to analyze time-value of money.

REFERENCES

1. Kent, D.O. (2008). Farm Management: Principles and Strategies, Iowa State Press, Ames, IA.
2. Rickettes, C. (2008). Agribusiness: Fundamentals and Applications, Delmar Cengage Learning.
3. Rawlins, N.O. (2004) Introduction to Agribusiness, Thompson Learning, OH
4. Ralph, W.B. and Robert, C.T. (2008) Fundamentals of Agribusiness Finance, Iowa State University Press, Ames, IA.
5. Bamber, L.S. and Harrison, W.T. (2009) Managerial Accounting, Prentice Hall, New York, NY

PDT 284/2
AGRO-ECOSYSTEMS AND SUSTAINABILITY

COURSE SYNOPSIS

This course discusses important components of sustainability for agrosystems which can be optimized through suitable application of engineering principles to reinforce the conventional wisdom of agrosystems production. Important engineering approaches invoking current practices and design are covered.

COURSE OUTCOMES

1. Ability to distinguish agrosystems practices and sustainability indicators which include soil, water, biomass and waste.
2. Ability to apply and formulate mathematical model for sustainable agrosystems.
3. Ability to design components and processes of sustainable agrosystems.

REFERENCES

1. Lynch, D. R.2009. Sustainable natural resource management for scientists and engineers, Cambridge University Press, New York
2. Michel D.L. and Luc D. 2008. Sustainable management of natural resources : Mathematical models and method, Springer-Verlag Berlin Heidelberg
3. Mason.J. 2003Sustainable Agriculture. 2nd Edition. Landlinks Press, Collingwood Vic. Australia.
4. Gliessman, S. R. 2001. Agroecosystem sustainability: developing practical strategies, CRC Press, Washington.
5. Anil S. and David C.2004. New Dimension in Agroecology. CRC Press. USA.

PDT 376/3
FARM POWER AND MACHINERY

COURSE SYNOPSIS

The course covers the basic of machines and the importance of mechanization for various farm operations, selection of appropriate machines and its maintenance and the management of farm machineries.

COURSE OUTCOMES

1. Ability to apply the basic principles, construction and working of farm machinery for different crops and livestocks.
2. Ability to select and assemble appropriate machinery, use, repair and maintenance.
3. Ability to manage agro machinery service centre.

REFERENCES

1. Brian,B. 2005. Farm Machinery, Fifth Edition, Old Pond Publishing Ltd,
2. Hunt, D. 2001. Farm Power and Machinery,Management. Tenth Edition. Blackwell Publishing Professional. United State of America.
3. Bello, S. R. Adegbulugbe, T. A. and Odey, S.O. 2010. *Farm* Power and Machinery Practical workbook.
4. Goering, C. E. and Handerson, A. C. 2004. Engine and Tractor Power. ASME.
5. Culpin, C. 2008. Farm Machinery, Fourth Edition. Hesperides Press.

PDT 377/3
APPLIED HEAT AND MASS TRANSFER

COURSE SYNOPSIS

The course covers the application of various energy resources to generate power useful for processing biological materials and focuses on the technology, production process and engineering of renewable sources of energy which includes solar, wind, wave, and energy from biomass.

COURSE OUTCOMES

1. Ability to discuss mechanisms and characteristics of heat and mass transfer.
2. Ability to apply mathematical models of various heat transfer mechanisms.
3. Ability to analyze different types of heat exchangers, heat transfer coefficient for heat exchanger and energy analysis on heat exchanger.
4. Ability to analyze and calculate physical mechanism of mass transfer, the rate of mass diffusion, and simultaneous heat and mass transfer.

REFERENCES

1. Yunus A. Cengel (2006). Heat and Mass Transfer: A Practical Approach, 3rd Ed., McGraw Hill, New York, . Pearson, Prentice-Hall.
2. Incropera, F. P. DeWitt, D. P. (2007). Fundamentals of Heat and Mass Transfer. John Wiley Inc.. London.
3. Holman, J.P. (2002) Heat Transfer, 8th SI Metric Edition. McGraw-Hill. New York.
4. Baehr, H. D. Stephan, K. (2006). Heat and Mass Transfer. 2nd Edition. Springer. New York.
5. Welty, J. R. Wicks, C.E. Wilson,R.E. Rorrer, G. (2008). Fundamentals of Momentum, Heat and Mass Transfer . John Wiley & Sons, New York.



PDT 378/2
PRECISION AGRICULTURE TECHNOLOGY

COURSE SYNOPSIS

This course covers the essential aspects of Precision Agriculture (PA) concepts including soil/landscape and crop spatial variability, GIS, DEM, GPS, sensors, variable rate machinery, PA software, remote sensing; geostatistics, sampling, experimental designs, precision integrated crop management, data acquisition, processing, and management and socio-economical and e-marketing aspects.

COURSE OUTCOMES

1. Ability to illustrate the concept, component and application of precision farming in agriculture.
2. Ability to apply spatial information and precision agriculture technologies to improve soil and crop management, environmental and socio-economical aspects.
3. Ability to analyze geo-referenced data using spatial information technologies.

REFERENCES

1. Morgan M. and D. Ess. (2003). The precision-farming guide for agriculturists. 2nd Ed. John Deere Publishing. Moline, Illinois, USA.
2. Heywood, I. Cornelius S. and Carver, S. (2006). An Introduction to Geographical Information Systems 3rd Ed., Pearson Education Limited. England.
3. Lilesand, T.M. and Keifer, R.W. (2007). Remote Sensing and Image Interpretation, John Wiley & Sons, University of California.
4. Thurston, J., Poiker, T. dan Moore, J. (2003). Integrated Geospatial Technologies – A Guide to GPS, GIS and Data Logging, Canada: John Wiley & Sons, Inc.
5. Kavanagh, B.F. (2009), Surveying: Principles and applications, 8th Ed. Prentice Hall, New York, NY.

PDT 379/3
WATER RESOURCES MANAGEMENT

COURSE SYNOPSIS

This course introduces principles of surface and ground water hydrology and their applications in water resources engineering, descriptive and quantitative applications of the hydrologic cycle, weather system, precipitation, evaporation, transpiration, surface and subsurface waters, stream flow hydrographs and flood routing. The course also covers water resources management principles, regulatory issues, management of water resources for sustainable development, tools for water resources management; economic analysis, water supply, water demand, climate change and water resources management, extremes (floods and droughts), water management in the Malaysia practices and use of computer-based tools in solving water resources management problems.

COURSE OUTCOMES

1. Ability to analyze principle of water resources, planning and management.
2. Ability to infer the components of hydrologic cycle and the affect to human daily lives.
3. Ability to analyze hydrologic data for engineering design and management.

REFERENCES

1. Chin, D.A., (2006) Water-resources Engineering, Prentice Hall, Upper Saddle River, NJ,
2. Thomas V.C. (2009) Principles of Water Resources: History, Development, Management, and Policy 3rd Edition, John Wiley. United State of America.
3. Simonovic, S.P. (2009) Managing water resources: Methods and tools for a systems approach, Earthscan, London.
4. Mays, L.W. (2005) Water Resources Engineering, John Wiley. United State of America.
5. Cech, T. V., (2002) Principles of Water Resources, John Wiley & Sons, Inc. Durbin.

PDT 380/3
AUTOMATIONS IN AGRICULTURAL SYSTEMS

COURSE SYNOPSIS

This course covers advanced study on instrumentation with emphasis on selection of measurement techniques and transducers to sense physical properties of biological materials with application to agricultural, food processing industries and biological system. Application of biosensors in agriculture, design of automation system and machine/gentry for agricultural systems.

COURSE OUTCOMES

1. Ability to identify and apply the concepts of automated machines and equipment and to agricultural related problems.
2. Ability to operate with existing biosensor systems and transducers, as well as to design new sensors.

3. Ability to identify and assemble industrial sensors in farming system

REFERENCES

1. Mikell, P. G. (2008). Automation, Production Systems and Computer-Integrated Manufacturing . Pearson, Prentice-Hall. United State of America
2. Considine, D.M. editor in chief. (1986). Standard Handbook of Industrial Automation. Chapman and Hall. New York.
3. Lansky, Z.J. Schrader, L.F. (1986). Industrial Pnuematic Control. Marcel-Dekker. New York.
4. Rehg, J. A. (2002). Introduction to Robotics in CIM Systems.5th Edition. Prentice Hall. University of Michigan
5. Dunn, I. J. Heinzle, E. Ingham, J. Prenosil, J. E. (2003). Biological Reaction Engineering Dynamic Modelling Fundamentals with Simulation Examples. 2nd Edition, John Wiley. Federal Republic of Germany.

PDT 313/4
FINAL YEAR PROJECT

COURSE SYNOPSIS

A projects based course that exposes students to solve, analyze, design and research engineering problems in the field of manufacturing engineering, machining or product design.

COURSE OUTCOMES

1. Ability to apply and integrate theories and lab, known how that has been learnt to solve engineering problems.
2. Ability to produce either a new design or toimprove on an existing design.
3. Ability to choose a suitable research methodology for the research project being undertaken.
4. Ability to write. Present and defend the technical report (desertation) for the projects undertaken.

PDT 382/3
CONTROLLED ENVIRONMENT AGRICULTURE

COURSE SYNOPSIS

The course covers design of controlled environment agricultural structures which include thermal and environmental engineering analyses appropriate for controlled environment agricultural production facilities for plants and animals. Major topics include psychrometrics, heat transfer, ventilation and heating, air distribution within buildings, and control systems.

COURSE OUTCOMES

1. Ability to analyze heat and mass transfer of plants and animals structures.
2. Ability to analyze natural and forced cooling and heating for plants and animals structures.
3. Ability to analyze mechanical and natural ventilation for plants and animal structures.

REFERENCES

1. Albright, L.D. (2005). Environmental Control for Plants and Animals, American Society of Agricultural and Biological Engineers, St. Joseph, MI.
2. Incropera, F.P. (2002). Introduction to Heat and Mass Transfer, 4th Ed., John Wiley and Sons, New York.
3. Bartok, J. W. (2001). Energy Conservation for Commercial Greenhouses, NRAES, New York.
4. Ibrahim, D. (2002), Microcontroller Based Temperature Monitoring & Control, Newnes, Oxford.
5. Tiwari, G.N. (2003). Greenhouse Technology for Controlled Environment, Alpha Science, New York.

PDT 383/3
RENEWABLE ENERGY

COURSE SYNOPSIS

The course covers the application of various energy resources to generate power useful for processing biological materials and focuses on the technology, production process and engineering of renewable sources of energy which includes solar, wind, wave, and energy from biomass.

COURSE OUTCOMES

1. Ability to explain technologies used in generating mechanical and electrical power for biosystems
2. Ability to demonstrate the concepts of renewable energy conversion suitable for production and processing of biological materials.
3. Ability to evaluate the efficiency and performance of different renewable energy generating systems.

REFERENCES

1. Aldo, V. D. R. (2009). Fundamentals of Renewable Energy Processes. Elsevier Academic Press. Amsterdam.
2. Freris, L.L. and Infield, D.G. (2008). Renewable Energy in Power Systems. John Wiley. D G Infield Publisher: Chichester, U.K
3. Sorensen, B. (2011). Renewable Energy. Academic Press. Britain.
4. Thumann, A. and Mehta, D.P. (200). Handbook of Energy Engineering, Sixth Edition. The Fairmont Press Inc. United State of America.

5. Nelson, C.V. (2009). Wind Energy: Renewable Energy and The Environment. CRC Press. United State of America.

PDT 384/3
FOOD TECHNOLOGY

COURSE SYNOPSIS

This course covers multidisciplinary field of food technology and related industries. Topics covered include food science, food ingredients, nutrition, nutritional information, food spoilage, food production systems, preservation processes, freezing, drying, direct-heating, radiation, extrusion and packaging, freezing, texturization, mechanical separation and food biotechnology.

COURSE OUTCOMES

1. Ability to differentiate the principles of food technology.
2. Ability to interpret ingredients and nutrition in food.
3. Ability to solve problems involved in food production.

REFERENCES

1. Meireles, A. 2009. Extracting bioactive compounds for food products, CRC Press, NY
2. Campbell-Platt, G. 2009. Food Science and Technology. John Wiley, New York.
3. Martinez, J.L. 2008. Supercritical fluid extraction of nutraceuticals and bioactive compounds, CRC Press, NY.
4. Heldman, D.R. and Singh, R.P. Food Process Engineering.
5. Toledo, R.T. Fundamental of Food Process Engineering.

PDT 385/3
BIOMATERIAL ENGINEERING
(ELECTIVE)

COURSE SYNOPSIS

This course covers structure and properties of biomaterial and related solids, physical and chemical bases for properties exhibited by materials, polymeric biomaterials, metallic biomaterials, ceramic biomaterials and composite materials. Material properties including mechanical, electrical, magnetic and thermal behaviour, applications of biomaterials in agricultural systems, relationship between physical and chemical structure of materials and biological system response, selection, fabrication and modification of materials for specific applications, biomaterials processing and degradation, implant requirements, host-implants reactions including wound healing response and inflammatory response, physiological and biomechanical basis for soft-tissue implants, design of modified biomaterials, bulk and surface characterization of materials and regulatory and ethical concerns dealing with the implementation and commercialisation of biomaterials.

COURSE OUTCOMES

1. Ability to analyze the biomaterial physical, chemical and biological properties.
2. Ability to design the processing system for a biomaterial.
3. Ability to recommend the commercialization potential of biomaterial

REFERENCES

1. Chu P K and Liu X . 2008. Biomaterials Fabrication and Processing Handbook. CRC Press
2. J. A. Schey. 2000. Introduction to Manufacturing Processes, Third Edition. McGraw-Hill Higher Education: Boston.
3. Stroshine,R. 2007. Physical Properties of Agricultural Materials and Food Products, Purdue University.
4. Nuri, N. 2007. Physical Properties of plant and animal materials, Taylor and Francis.
5. Rao,M.A. and Rizvi, S. S. H. 2005. Engineering Properties of Foods. Taylor and Francis.

PDT 386/3
INTEGRATED AGROSYSTEMS
(ELECTIVE)

COURSE SYNOPSIS

An advanced course integrating principles of crop production, animal husbandry, aquaculture, soils and environmental sciences in agricultural systems. Topics include concept and principles of biologically integrated farms, components, interactions, techniques and energy flows of integrated farms.

COURSE OUTCOMES

1. Ability to compare and contrast between integrated farming and conventional farming.
2. Ability to categorize the components, interactions and energy flows in an integrated farming system.
3. Ability to demonstrate sustainable practices of integrated farming systems.

REFERENCES

1. Panda, S.C. 2006. Crop Management and Integrated Farming.Agrobios.
2. Gardiner, D.T. and Miller, R.W. 2008. Soils in Our Environment. 11th edition. Upper Saddle River: Pearson Prentice Hall.
3. Taylor, R.E. and Field, T.G. 2007. Scientific Farm Animal Production, 9th edition. Upper Saddle River: Prentice Hall
4. Anderson, W.P. 2007. Weed Science: Principles and Application. Long Grove: Waveland Inc.
5. Southgate, P. And Lucas, J.S. 2003. Aquaculture: Farming Aquatic Animals. Ames, Iowa: Iowa State University Press.

PDT 413/6
FINAL YEAR PROJECT 2

COURSE SYNOPSIS

A short-term research project in engineering operations for producing agricultural systems and technologies, including research writing and presentation of the research outcome in the form of thesis and seminar.

COURSE OUTCOMES

1. Ability to apply and integrate theory and practical to solve the engineering problem.
2. Ability to develop suitable research methodology for the project.
3. Ability to present and defend effectively project proposal to selected audience.
4. Ability to evaluate the commercialization potential for proposed project

REFERENCES

1. Buku Panduan Projek Tahun Akhir UniMAP

PDT 477/3
POST-HARVEST TECHNOLOGY

COURSE SYNOPSIS

This course introduces the overview of post-harvest handling technology of selected commodities that emphasizes on the basic of pre-harvest, harvest factors and post harvest handling technology fresh production, post-harvest treatment and processing, packaging operation and appropriate equipment, post harvest pest management, quality assurance and preparation of fresh cuts, and socio-economics of post harvest.

COURSE OUTCOMES

1. Ability to analyze the physical properties of agricultural products in order to apply the appropriate post-harvest handling technology.
2. Ability to distinguish the packaging operation and propose the appropriate equipment for handling this operation.
3. Ability to differentiate the preharvest and harvest factors that affects on postharvest quality.

REFERENCES

1. Ofelia,K.B and Elda,B.E. (2010). Postharvest Technology for Southeast Asian Perishable Crop, Second Edition, Philippines.
2. Chakraverty,A. (2006). Handbook of post-harvest technology: Cereals, Fruits, Vegetables, Tea and Spice, Marcel Dekker
3. Wills, R.B.H, Mc Glasson and Graham, (2007). Post Harvest and Introduction to the Physiology and Handling of Fruit, Vegetable and Ornamentals, University of New Jersey Word Press
4. Kays, S.J. (1998). Postharvest Physiology of Perishable Plant Products, CBC pub. New Delhi.
5. Knee,M. 2002. Fruit quality and Its Biological Basis. Sheffield Academic Press. UK.

PDT 478/3
AGRICULTURAL WASTE MANAGEMENT AND UTILIZATION ENGINEERING

COURSE SYNOPSIS

This course covers the agricultural sources of pollution (pesticides, commercial fertilizer, on-farm food processing wastes and animal manure) and their effect on the environment. Physical, chemical and biological properties of agricultural waste materials, treatment processes of agricultural wastes, methods of land application of agricultural wastes, and technologies for utilization of agricultural wastes for biogas production and animal feed.

COURSE OUTCOMES

1. Ability to recommend suitable physical, chemical and/or biological treatment of industrial and agricultural organic wastes.
2. Ability to design systems for the collection, handling, treatment and utilization of wastes.
3. Ability to propose suitable utilization technique for agricultural waste and wastewater to sustain an environmental

REFERENCES

1. Liu, S. 2007. Food and Agricultural Wastewater Utilization and Treatment, Wiley-Blackwell.
2. Inc, M. E., Tchibanoglous, G. Burton, F.L. Stensel, H.D. 2003. Wastewater Engineering: Treatment, Disposal and Reuse 4th Edition. McGraw Hill,New Delhi.
3. Unger, P.W., 1994. Managing Agricultural Residues. Lewis Pub., USA.
4. William, T.P., 2005. Waste Treatment and Disposal. 2nd Edition, John Wiley, England.
5. Hammer, M.J and Hammer M.J Jr, 2008. Water and Wastewater Technology 6th Edition in SI Unit, Prentice Hall, Upper Saddle River, NJ.

PDT 479/3
BIO-RENEWABLE SYSTEMS
(ELECTIVE)

COURSE SYNOPSIS

An in-depth introduction to bio-renewable concepts in relation to converting bio-renewable resources into bio-energy, bio-based products, feedstock production, economics, logistics and marketing of products and co-products.

COURSE OUTCOMES

1. Ability to differentiate biorenewable resources.
2. Ability to compare and contrast the products, co-products, production processes, economics and marketing of bio-renewable resources.
3. Ability to analyze conversion of bio-renewable resources into bio-energy and bio-based products.

REFERENCES

1. Brown, R.C. and Stevens, C. (eds). 2011. Thermochemical Processing of Biomass: Conversion into Fuels, Chemicals and Power. Willey. New York.
2. Blaschek, H.P., Ezeji, T. and Scheffran, J. 2010. Biofuels from Agricultural Wastes and Byproducts. Wiley-Blackwell. New York.
3. Clark, J.H., E. Fabien and Deswarte, I. 2008. Introduction to Chemicals from Biomass. Wiley. New York.
4. Dewulf, J. and Langenhove, H.V. (eds). 2006. Renewables-Based Technology: Sustainability Assessment. Wiley. New York.
5. Zatzman, G. 2011. Sustainable Energy Pricing. Wiley. New York.

PDT 480/3
FOOD PROCESSING ENGINEERING
(ELECTIVE)

COURSE SYNOPSIS

This course covers multidisciplinary field of applied physical sciences that combines science and engineering education for food and related industries. Topics covered include introduction to food engineering, fluid flow theory, heating and cooling processes for foods, thermal processes, food freezing and freeze concentration, evaporation and freeze concentration, food dehydration, filtration, sedimentation and centrifugation, membrane process, extrusion and cleaning and sanitation.

COURSE OUTCOMES

1. Ability to categorize the appropriate physical characteristic according to food processing.
2. Ability to differentiate the principles of food engineering operations.
3. Ability to analyze the problem that involved in food engineering operations and propose the solutions.

REFERENCES

1. Singh, R. P. Heldman, D.R. (2009). Introduction to Food Engineering. 4th ed. Academic Press. Elsevier.
2. Heldman, D. R. and Singh, R. P. (1981). Food Process Engineering. AVI Publishing Co. Westport, CT.
3. Toledo, R.T. (2007). Fundamental of Food Process Engineering. 3rd ed. Aspen Publisher. New York.
4. P.G. Smith.(2011). Introduction to Food Process Engineering, 2nd Ed. Springer. New York.
5. Shafiur Rahman (2009). Food Properties Handbook, 2nd Ed., CRC Press. Boca Raton, FL.

PDT 481/3
ADVANCES IN AGROTECHNOLOGY
(ELECTIVE)

COURSE SYNOPSIS

This course covers inventions, achievements, acceptance and challenges in the use of modern agricultural technologies to increase yield and quality of agricultural produce with emphasis on the application, transfer and management of technologies that regulate crop and soil quality in relation to social, technical and environmental conditions.

COURSE OUTCOMES

1. Ability to apply modern technologies in the production, handling and processing of agricultural products.
2. Ability to distinguish modern agricultural technologies that would improve quantity and quality of agricultural products.

3. Ability to experiment with new technologies and alternative solutions in agricultural production.

REFERENCES

1. Burton, L.D. 1998. Agriscience and Technology. Thompson & Delmar Learning, NY.
2. Burton, L.D. 2002. Agriscience: Fundamentals and Application, Thompson & Delmar Learning, NY
3. Yeoshua, S. B. 2005. Environmentally Friendly Technologies for Agricultural Produce Quality. Boca Raton, FL: Taylor & Francis.
4. Field, H. L. and Solie, J. 2007. Introduction to Agricultural Engineering Technology: A Problem Solving Approach. New York, NY: Springer.
5. Prevost, P. 1997. Fundamentals of modern agriculture. Science Publisher Inc., New Hampshire.

PDT 482/3
FOOD AND HERBAL CROP PRODUCTION TECHNOLOGY
(ELECTIVE)

COURSE SYNOPSIS

This course covers crop production practices of important food crops (paddy, maize/corn, sweet potato and cassava) in meeting the energy requirements and ensuring food security and food safety as well as selected herbal crops with pharmaceutical/nutraceutical/medicinal properties

COURSE OUTCOMES

1. Ability to distinguish appropriate crop production technology.
2. Ability to apply good agricultural practices in food and herbal crop production.
3. Ability to select new technology to increase yield.

REFERENCES

1. Hillocks, R.J.,Thresh, J.M. and Belloti, A. 2002. Cassava: Biology, production and utilization. CABI Publication, Oxford.
2. Oztekin, S. and Martinov, M. 2007. Medicinal and aromatic crops: harvesting, drying and processing. CRC Press, NY
3. Manrique, L.A. 1998. Sweet potato: Production principles and practices. Manrique International Agrotech, Honolulu.
4. Smith, C.W., Betran, J. and Runge, E.C.A. 2004. Corn: Origin, history, technology and production. Wiley, New Jersey.
5. Smith, C.W. and Dilday, R.H. 2002. Rice: origin, history, technology and production. Wiley, New Jersey.



BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (PRODUCT DEVELOPMENT) - RY57

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of **mechanical** engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
To produce creative and innovative Engineering Technologist in research and development in fulfilling the nation's requirements.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognize the need for professional development and to engage in independent and lifelong learning.

CURRICULUM STRUCTURE FOR BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (PRODUCT DEVELOPMENT) - RY57

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (108)	PDT 101/3 Statics and Dynamics	PDT 122/3 Material Science	PDT 201/3 Strength of Materials	PDT 240/3 Applied Ergonomics and Safety	PDT 341/3 Industrial Dialogue		Elective II/3	INDUSTRIAL TRAINING PIT 304/12
	PDT 126/3 Design Fundamental	PDT 128/2 Design Visualization	PDT 229/3 Design Integration	PDT 230/3 Design Studio I	PDT 330/3 Design Studio II	PDT 313/4 Final Year Project I (FYP I)	PDT 413/6 Final Year Project II (FYP II)	
	PDT 127/2 Design Appreciation	PDT 111/3 Manufacturing Process	PDT 251 /3 Thermofluid	PDT 202/3 Heat Transfer	PDT 343/3 Economic Principles			
	PDT 106/3 Engineering Graphics	PDT 131/3 Computer Aided Industrial Design I (CAID I)	PDT 231/3 Computer Aided Industrial Design II (CAID II)	PDT 232/3 Product Data Management (PDM)	PDT 344/3 Innovation Management & Product Development	Elective I/3		
	PDT 133/2 Workshop Technology	PDT 134/3 Design Practice	PDT 234/3 Rapid Prototyping I (RP I)	PDT 235/3 Rapid Prototyping II (RP II)	PDT 236 /2 Computer Programming			
		PDT 120/3 Basic Electrical and Electronic				PDT 348/3 Finite Element Analysis	PDT 443/3 Design for Manufacturing and Assembly	
Common Core (15)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology				PTT 333/3 Engineering Technology Management	
							PTT 444/3 Engineering Technologist in Society	
University Required (19)	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures		UVW 312/2 English for Technical Education	UUW 224/2 Engineering Entrepreneurship		UUT122/2 Skill and Technology in Communication		
	UZW XXX/1 Co-Curriculum	UZW XXX/1 Co-Curriculum	UZW XXX/1 Co-Curriculum	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies	UVW 410/2 University Malay Language	UVW XXX/2 Options Subjects		
				UUW 322/2 Thinking Skills				
Total	19	21	21	21	16	14	18	12

Total Unit for Graduation = 142

Elective I	Elective II
A1: PDT 346/3 Production Management for Designers A2: PDT 345/3 Consumer Behaviour	B1: PDT 347/3 Product Study and Professional Practice B2: PDT 442/3 Commercialization Culture



LIST OF COURSES

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (PRODUCT DEVELOPMENT)

- **PDT 101/3 STATICS AND DYNAMICS**
- **PDT 106/3 ENGINEERING GRAPHICS**
- **PDT 133/2 WORKSHOP TECHNOLOGY**
- **PDT 126/3 DESIGN FUNDAMENTAL**
- **PDT 127/3 DESIGN APPRECIATION**
- **PDT 122/3 MATERIAL SCIENCE**
- **PDT 128/3 DESIGN VISUALIZATION**
- **PDT 111/3 MANUFACTURING PROCESS**
- **PDT 131/2 COMPUTER AIDED INDUSTRIAL DESIGN I (CAID I)**
- **PDT 120/3 BASIC ELECTRICAL AND ELECTRONIC**
- **PDT 134/3 DESIGN PRACTICE (PRE-REQUISITE: WORKSHOP TECHNOLOGY PDT133/3)**
- **PDT 201/3 STRENGTH OF MATERIALS (PRE-REQUISITE: STATICS AND DYNAMICS PDT101)**
- **PDT 251/3 THERMOFLUID**
- **PDT 229/3 DESIGN INTEGRATION (PRE-REQUISITE: DESIGN VISUALIZATION PDT128)**
- **PDT 231/3 COMPUTER AIDED INDUSTRIAL DESIGN II (CAID II) (PRE-REQUISITE: CAID I PDT131)**
- **PDT 236/2 COMPUTER PROGRAMMING**
- **PDT 234/3 RAPID PROTOTYPING I (RP I) (PRE-REQUISITE: DESIGN PRACTICE PDT134/3)**
- **PDT 240/3 APPLIED ERGONOMICS AND SAFETY**
- **PDT 202/3 HEAT TRANSFER**
- **PDT 230/3 DESIGN STUDIO I**
- **PDT 232/3 PRODUCT DATA MANAGEMENT (PDM) (PRE-REQUISITE: CAID II PDT231)**
- **PDT 235/3 RAPID PROTOTYPING II (RP II) (PRE-REQUISITE: RAPID PROTOTYPING I PDT234/3)**
- **PDT 341/3 INDUSTRIAL DIALOGUE**
- **PDT 330/3 DESIGN STUDIO II**
- **PDT 343/3 ECONOMIC PRINCIPLES**
- **PDT 344/3 INNOVATION MANAGEMENT & PRODUCT DEVELOPMENT**
- **PDT 348/3 FINITE ELEMENT ANALYSIS**
- **PDT 443/3 DESIGN FOR MANUFACTURING AND ASSEMBLY**
- **PDT 313/4 FINAL YEAR PROJECT I**
- **PDT 413/4 FINAL YEAR PROJECT II**

COURSES SYNOPSIS

PDT 101/3
STATICS AND DYNAMICS

COURSE SYNOPSIS

This course comprises two parts, namely; statics and dynamics. In statics, the basic principles of engineering mechanics such as forces, moments and friction are introduced. Students are required to apply this basic knowledge in analysing the equilibrium of rigid bodies, as well as the stability of a structure. The subjects of dynamics cover the concept of kinematics and kinetics. Kinematics treats the geometric aspects of the motion, whereas kinetics analyses the forces that cause the motion. Analyses in relation to kinetic problems are solved using acceleration method, principle of work and energy, and principle of impulse and momentum.

COURSE OUTCOMES

1. Ability to apply and analyse the basic principles of physics related to static such as force, moment, Newton's First, second and Third Law, trusses, frame and machine.
2. Ability to apply and analyse the structures and frameworks problems by constructing, sketching and/ or drawing free body diagram in ensuring static equilibrium.
3. Ability to apply and analyse the kinematics and kinetics for particles and systems of particles.
4. Ability to apply and analyse the planar kinematics and kinetics of a rigid body.

REFERENCES

1. Hibbeler, R. C., Engineering Mechanics Statics. 11th ed., Prentice Hall (2007)
2. Hibbeler, R. C., Engineering Mechanics Dynamics. 11th ed., Prentice Hall (2007)
3. Beer, F. B. and Johnston, E. R. Jr., Vector Mechanics for Engineers: Statics and Dynamics. 8th ed., Canada, McGraw_Hill (2004)
4. Beer and E.R. Johnson Jr., 'Vector Mechanics tor Engineer: Statics 8th ed. In SI Units', McGraw Hill (2004).
5. Beer and E.R. Johnson Jr., 'Vector Mechanics tor Engineer: Dynamics 8th ed. In SI Units', McGraw Hill (2004)
6. Meriam, J. L. and Kraige, L. G., Engineering Mechanics: Statics. 5th ed., USA, SI ver. Wiley (2003).
7. Meriam, J. L. and Kraige, L. G., Engineering Mechanics: Dynamics. 5th ed., USA, SI ver. Wiley (2003).

PDT 106/3
ENGINEERING GRAPHICS

COURSE SYNOPSIS

This course provides the skills to students the basics of Engineering Drawing, Computer Aided Drafting (CAD) and their engineering applications. The course covers the detail of Engineering Drawing for beginners followed with projection systems, oblique and isometric sketches. The course also introduced the Computer Aided Drafting using dedicated software, AUTOCAD, which focuses on product design in 2D and 3D environment. Fundamental knowledge in dimensioning and geometrical tolerance (GDT) enhances student's ability in interpreting and assessing information from basic raw data of an engineering drawing.

COURSE OUTCOMES

1. To apply the basic drafting, sketching engineering components, and common term used in engineering drawing.
2. To apply orthographic, auxiliary view, cross section and isometric in engineering drawing.
3. To apply geometric, dimensioning, and tolerancing (GDT) in engineering drawing.
4. To apply detail and assembly drawing in engineering drawing.

REFERENCES

1. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.
2. James H. Earle, "Engineering Design Graphics", 11th ed.,Pearson Prentice-Hall, 2004.
3. James D. B., "Engineering graphics with AutoCAD 2007", Pearson, 2007.
4. G. R. Cogorno, "Geometric Dimensioning and Tolerancing for Mechanical Design", McGraw-Hill, 2006.
5. R.K Dhawan, "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.

PDT 133/2
WORKSHOP TECHNOLOGY

COURSE SYNOPSIS

In this course, explanation about safety aspects in workshop will be covered,followed by fundamental measurement techniques , and use of measurement equipment such as Vernier Caliper , Chiseling , Sawing , etc. Students will be introduced to fabrication, sheet metal forming, and welding processes which consists of introduction to basic knowledge of various cutting methods and hand tools, such as file, hacksaw, chisel, and etc.
The second part of the course introduces the fundamentals of measurement



techniques' followed by milling, lathe and grinding operations which consist of introduction to basic knowledge of various cutting tools, parts of machines and their functions, machine operations, and numerous calculations involving the operations. Students will practice conventional machining process that it used in the industry to transform raw material to finished products. Practical work will help students gain effective understanding.

COURSE OUTCOMES

1. Work in a group, communicate effectively; apply basic industrial safety regulation as well as emergency first aid techniques.
2. Ability to apply and understand engineering drawing and able to transfer for model/prototype fabrication.
3. Define and operate the conventional machining.

REFERENCES

1. Steve F. Krar, Arthur R.Gill, peter Smid. Technology of Machine Tools. 6th ed. McGraw Hill, 2007.
2. S.Kalpakjian, S.R. Schimd (2001), Manufacturing Engineering and Technology. 5th ed. Prentice Hall International.
3. Mikell P. Groover (2007), Fundamentals of Modern Manufacturing. 3rd ed. John Wiley & Sons, Inc.
4. E.Paul DeGarmo, JT. Black, Ronald A. Kosher (1997). Materials and Processes in Manufacturing. 8th ed., John wiley & Sons, Inc.
5. John A.Schey. Introduction to Manufacturing Processes . Mc Graw Hill,2000.

PDT 126/3
DESIGN FUNDAMENTAL

COURSE SYNOPSIS

The subject introduces students to the theory and practice of art. In this course, the elements of art (line, color, shape/ form, space, value, and texture) and the principles of art (balance, harmony, unity, emphasis, repetition, rhythm, contrast, and composition) are discussed and practiced through student individual or group projects. Students will be exposed to the topics about Nature of Design; Design Process and Communication; Design Techniques and Critiques. The most important topic in this course is visual language, which comprises of exploration towards visual elements and design principles. In addition, students will be exposed and experienced the aesthetics value of an art work, through creating graphical images or 3 dimensional objects including presentations and critique sessions.

COURSE OUTCOMES

1. Ability to describe and apply design elements and principles in design projects and assignments.
2. Ability to analyze aesthetic value of 2 dimensional artwork and 3 dimensional objects of the design output.
3. Ability to recognize/realize the important of leadership and teamwork in producing projects or assignments for better output.

REFERENCES

1. Mark and Mary Willenbrink, (2006) Drawing For the Absolute Beginners, Cincinnati, Ohio: North Light Books.
2. David Dabner,(2004) Graphic Design School: The Principles and Practices of Graphic Design, London: Thames & Hudson.\
3. Duane Preble and Sarah Preble, (2002) Art Forms: An Introduction To the Visual Arts, Upper Saddle River, N.J: Prentice Hall.
4. Jeanne Kopacz, Colour In Three-Dimensional Design, New York: McGraw-Hill.\
5. Linda Holtzschue. (2004) Understanding Color: An Introduction for Designers, 2nd ed., New York: John Wiley & Sons, 2002.
6. Otto G.Ocvirk, (2006) Art Fundamentals: Theory and Practice (10th edition), Boston: McGraw-Hill.
7. Thomas J.Barry, (2002) Creativity in the Classroom and Life: A Nurturing Approach, Tanjung Malim: Penerbiit Universiti Pendidikan Sultan Idris,.
8. Rudolf Arnheim, (1997) Art and Visual Perception: A Psychology of the Creative Eye. Berkeley: University of California Press.

PDT 127/3
DESIGN APPRECIATION

COURSE SYNOPSIS

This course is designed to incorporate an understanding of the vast range of works of art. It is a chronological survey of major artwork, movements and monuments since the earliest cave drawings. The first part of this course introduces students to the history and appreciation of art, including exploration of the elements and principles of the visual arts. Students will be introduced to the study and history of the visual arts with focus on the unique characteristics, representative artists and works; and common art forms and genres of various art historical periods. The second part of this course is the historical study to the progression of industrial design/product design professions and the important aspects of their involvement and contributions in product design. Finally, students will be introduced to the

art of product styling and the important of product semantics in the process of creating a product.

COURSE OUTCOMES

1. Ability to understand, identify and evaluate the issues and challenges of industrial technologies ethics.
2. Ability to translate and explain the factor of design history and revolution and the effects to the industrialization sector.
3. Ability to discuss in group and evaluate the aspects of industrial revolution technology and the effects to the social and cultural.

REFERENCES

1. Bernhard, E.B. (2005). Design: The History, Theory and Practice of Product Design. New York: Princeton Architectural Press.
2. D' Alleva, A. (2006). Look! Art History Fundamentals. Jersey City: Prentice Hall.
3. Nasser, D.K. (2006). Islamic Art in Detail, Boston: Harvard University Press.\
4. Sheila, R. C. (2006). Islamic Art in Detail, Boston: Harvard University Press.
5. Stokstad, M. (2004). Art history. Jersey City: Prentice Hall Inc.

PDT 122/3
MATERIAL SCIENCE

COURSE SYNOPSIS

This course introduces students to historical perspective of materials science and engineering fundamentals characteristics begin from understanding the atomic structures, atomic bonding in solids, crystal structures, mechanical and physical properties of materials. Students will then apply the understanding on properties of materials through phase diagram, transformations and heat treatment processing on ferrous and non-ferrous alloys, polymer and advanced materials.

COURSE OUTCOMES

1. Ability to describe and explain the materials' atomic structures, bonding, crystal structure and imperfections.
2. Ability to explain and analyse the mechanical, physical properties of materials.
3. Ability to explain and analyse the metal alloys microstructure, phase diagram and heat treatment processes.
4. Ability to describe and explain machinability of ferrous and non-ferrous metal alloys, polymer materials and advanced materials..

REFERENCES

1. William D. Callister, Introduction to Materials, John-Wiley & Sons.
2. Serope Kalpakjian, Steven R. Schmid (2010)."Manufacturing Engineering and Technology."6th ed Prentice Hall.
3. William F. Smith, Javad Hashemi, 2006, Foundation of Materials Science and Engineering, Fourth edition, McGraw Hill.
4. Budinski, K.G, 2006, Engineering Materials Properties and Selection, 8th edition, Prentice Hall.
5. Shackeford, J.F, 2005, Introduction to Materials Science for Engineers, 6th edition, Prentice Hall.

PDT 128/3
DESIGN VISUALIZATION

COURSE SYNOPSIS

This course aims at addressing important issues in the visual design. The course will cover fundamental design concepts in a logical sequence which will provide students with good visual design. The most important topic in this course is visual language, which comprises of exploration towards visual elements and design principles. In addition, the student will learn about aesthetics value of an art work, such as graphical images and 3 dimensional objects. The student will undergo lecture series on related topics and experience some design projects included presentations and critique sessions.

COURSE OUTCOMES

1. Ability to describe and apply design elements and principles in design projects and assignments.
2. Ability to analyze aesthetic value of 2 dimensional artwork and 3 dimensional objects of the design output.
3. Ability to recognize/realize the important of leadership and teamwork in producing projects or assignments for better output.
4. Ability to construct and produce 2 dimensional and 3 dimensional objects using various drawing and modeling techniques with appropriate tools and instruments.

REFERENCES

1. Cerver, Francisco Asencio [ed.]. (2007) School of Drawing. New York: Artrium International.
2. David Dabner, (2007) Graphic Design School: The Principles and Practices of Graphic Design, London: Thames & Hudson.
3. Julien Martinez Calmettes, (2006) Best of 3D Virtual Product Design, Singapore:Page One Publishing Private Ltd.
4. Linda Holtzschue, (2006) Understanding Color: An Introduction for Designers, 2nd ed., New York: John Wiley & Sons.

5. Mark Oldach, (2008) Creativity for Graphic Designers, Cincinnati: F&W Publications, Inc.
6. Simon, Danaher, (2008) The Complete Guide To Digital 3D Design, Cambridge: ILEX,.

PDT 111/3
MANUFACTURING PROCESS

COURSE SYNOPSIS

This course explores the manufacturing process which used in industry to convert raw material into finished product. This course is divided into five sections. First, the introduction to manufacturing technology will be given, followed by material selection in manufacturing and heat treatment process. Secondly, the casting technology and various metal casting processes will be introduced including sand casting, investment casting, vacuum casting and other casting processes. Thirdly, overview of forming and shaping process will be given on rolling, forging, extrusion, drawing, sheet-metal forming, powder metallurgy, processing of ceramics, injection molding, and rapid prototyping process. Fourthly is about various joining process such as brazing, soldering, adhesive bonding, and mechanical fastening processes.

COURSE OUTCOMES

1. Ability to describe the concept & methodologies of manufacturing technology and fundamental of materials in manufacturing.
2. Ability to describe and analyze the concept & methodologies of solidification processes.
3. Ability to analyze and evaluate the concept of forming and shaping processes.
4. Ability to analyze and evaluate the concept & methodologies of joining and assembly technology.

REFERENCES

1. Groover, M.P. Fundamentals of Modern Manufacturing; Materials, Processes, and Systems, 4th Ed., John Wiley & Sons, Inc., 2010.
2. Kalpakjian S, Schmid S.R. Manufacturing Engineering and Technology, 4th ed., Prentice Hall Inc. 2001
3. Schey, J.A. Introduction to Manufacturing Processes, 3rd Ed., Mc Graw Hill, 2000.
4. Philip F. Ostwald, Jairo Munoz (1997). *Manufacturing Processes and Systems.* 9th ed., John Wiley & Sons.
5. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). *Materials and Processes in Manufacturing*. 8th ed., John Wiley & Sons, Inc.

PDT 131/2
COMPUTER AIDED INDUSTRIAL DESIGN I (CAID I)

COURSE SYNOPSIS

This course focuses on giving exposure and skill to students about the basics of 3D modeling and its application in engineering field by using 3D Modeling software. This course includes details on 3D modeling followed by producing 2D drawing, assembly drawing, exploded drawing, surface modeling, rendering and animation. All this skill will help student to produce technical drawing and virtual prototype or model. This skill is very demanding in industry.

COURSE OUTCOMES

1. Design 3d model of components by using Catia software.
2. Apply and construct technical/2d drawing using Catia software.
3. Apply and construct assembly drawing and exploded drawing using Catia software.
4. Apply and construct 3d animation and rendering for the components using Catia software.

REFERENCES

1. James H. Earle, "Engineering Design Graphics", 11th ed.,Pearson Prentice-Hall, 2004.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.
3. R.K Dhawan, "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.
4. N. Zulkifli, M. H. Omar & F. F. Mohamed, "Computer Aided Drafting", UUM.
5. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak, "Engineering Graphics", 8th edition, Pearson, 2004.

PDT 120/3
BASIC ELECTRICAL AND ELECTRONIC

COURSE SYNOPSIS

This course provides basic knowledge of solving DC and AC electrical circuits. It also covers the fundamentals of electrical machines. The electronics section includes basic semiconductor diodes and transistors as well as the fundamentals of digital systems. At the end of the semester

students will be able to understand, analyze and apply basic electrical and electronics concept and principles.

COURSE OUTCOMES

1. Ability to implement and analyze basic electrical circuits.
2. Ability to analyze single phase and three phase a.c circuits.
3. Ability to analyze the three phase induction motors.
4. Ability to implement and analyze basic electronics circuits.

REFERENCES

1. Hambley, A. R., Electrical Engineering: Principles and Applications, 5th ed., Pearson (2011)
2. Hughes, E., Electrical and Electronic Technology, 11th ed. Pearson (2012).
3. Zekayat, S. A., Electrical Engineering Concepts and Applications , Pearson(2012)
4. Floyd, T.L., *Electronic Devices*. 9th ed. Prentice Hall, Inc, 2012.
5. Floyd, T.L., *Digital Fundamentals*, 10th ed. Prentice Hall, Inc, 2009.

PDT 134/3
DESIGN PRACTICE (PRE-REQUISITE: WORKSHOP TECHNOLOGY PDT133/3)

COURSE SYNOPSIS

This course will expose the student in practicality and developing skills regarding design processes and model/ prototype fabrication. Hence, topics will be focusing to product sketching techniques and model/prototype fabrication. Through the assignment given, the knowledge and skills that need by a product designer will be developing.

Furthermore, this course will expose the student by studio/workshop sessions through product design assignments which emphasis on creative thinking and the production of visual in the context of design. The student will be expose trough design assignment about the concepts and methods in designing; elements of good quality product; included concepts sketching and presentation drawing; model making; understanding of engineering drawing and design documentation

COURSE OUTCOMES

1. Ability to define and apply design philosophy and process flow in product development
2. Ability to construct and produce 2 Dimensional or 3 Dimensional objects using various medium and modelling techniques with appropriate tools and instruments.
3. Ability to identify and define different techniques in concept generation and design method in model making process.

REFERENCES

1. Mark and Mary Willenbrink, Drawing For the Absolute Beginners, Cincinnati, Ohio: North Light Books, 2006.
2. Otto G.Ocvirk, Art Fundamentals: Theory and Practice (10th edition), Boston: McGraw-Hill, 2006.
3. Duane Preble and Sarah Preble, Art Forms: An Introduction To the Visual Arts, Upper Saddle River, N.J: Prentice Hall, 2002.
4. Linda Holtzschue. Understanding Color: An Introduction for Designers, 2nd ed., New York: John Wiley & Sons, 2002.
5. Rudolf Arnheim, Art and Visual Perception: A Psychology of the Creative Eye. Berkeley: University of California Press, 1997.

PDT 201/3
STRENGTH OF MATERIALS (PRE-REQUISITE: STATICS AND DYNAMICS PDT101)

COURSE SYNOPSIS

This course covers deformation and internal forces that exist in a solid body when subjected to external loads. The concepts of stress, strain, and constitutive behaviors are discussed. Students are taught to solve problems of loading on solid bodies under axial, torsion and bending loading conditions. The concepts of principal stresses and strains are used to solve problems involving multi-directional loadings.

COURSE OUTCOMES

1. Ability to apply the simple stress and strain problems in load-bearing structures, in structural members subjected to axial loads.
2. Ability to analyze the circular shafts problems which are subjected to twisting couples or torques.
3. Ability to evaluate case of bending in beam or shaft and to analyze the shear and bending diagrams and its elastic curve.
4. Ability to analyze the buckling structure supporting axial compressive load and the structure stability.

REFERENCES

1. Hibbeler, R.C.,"Mechanics of Materials." 8th ed Prentice Hall, 2011.
2. Ferdinand P. Beer.,"Mechanics of Materials." 6th ed. McGraw-Hill (Global Edition), 2012.
3. Roy R. Craig, Jr., "Mechanics of Materials" 3rd ed. John Wiley & Sons, 2011.
4. Madhuhar Vable, "Mechanics of Materials" Oxford 2002.



5. Raymond Parnes, "Solid Mechanics in Engineering" John Wiley and Sons, 2001.

PDT 251/3
THERMO-FLUIDS

COURSE SYNOPSIS

This course will cover the basic knowledge, comprehension and application of law of thermodynamic to understand the relationship between the properties that matter exhibits as it changes its condition. The first part includes review of thermodynamic concept, statistic thermodynamic and solution. The second part covers the phase equilibrium, thermodynamic of phase diagram, crystal defect, phase transformation unary and heterogeneous system, solution, phase equilibrium, surface and interface, defects in crystal, phase transformation and energy of interfaces.

COURSE OUTCOMES

1. Ability to apply basic concept and process that relate to the material thermodynamics.
2. Ability to employ a basic concept and process of thermodynamic for further understanding in phase transformation, solid state reaction and thermodynamic application to materials.
3. Ability to relate and apply the knowledge on thermodynamics of interfaces, the thermodynamics of electrolysis and defect in crystals to the materials process.

REFERENCES

1. R. T. DeHoff, Thermodynamics in Materials Science, Taylor & Francis, 2006.
2. H.G. Lee, Chemical Thermodynamics for Metals and Materials, Imperial College Press, 1999
3. R. T. DeHoff, Thermodynamics in Materials Science, McGraw-Hill, 1993.
4. J. Susanto, Termodinamik Gunaan: Masalah dan Contoh Penyelesaian, Dewan Bahasa dan Pustaka, 1988

PDT 229/3
DESIGN INTEGRATION (PRE-REQUISITE: DESIGN VISUALIZATION PDT128)

COURSE SYNOPSIS

This subject introduce the role of industrial designer profession consist of explanation on the job scope and knowledge and required skills. Furthermore, the subject exposes the students to the development of visual and creative thinking within the context of industrial design field, with special emphasis on the development of product form. Through lecture sessions and design assignments, students will be focused and exposed to the aesthetic, styling and classification of products; concepts and design development method; producing product visualization/ presentation techniques including concept sketching and rendering techniques; model making and basic documentation skills inclusive of design presentation skills. The student will exposed and familiarized with the workshop environment and regulation and utilize and use those facilities for model making.

COURSE OUTCOMES

1. Ability to plan, perform and reflect on different phase in a design process.
2. Ability to plan and embark on design research to support the design process.
3. Ability to produce a product model and adapt with the workshop facilities and modeling materials.
4. Ability to communicate an opinion, design idea, concept, and other information clearly and convinced the audience using language, gestures, and presentation materials.
5. Ability to demonstrate and apply relevant basic engineering principles and material properties and manufacturing processes.

REFERENCES

1. P. Trott (2007). Innovation Management & Product Development, Prentice Hall.
2. B. Laurel, P. Lunenfeld (2007). Design Research: Methods and Perspectives. The MIT Press.
3. M. Crawford (2006) New Products Management. McGraw-Hill.
4. K.T. Ulrich, S.D. Eppinger (2006). Product Design and Development. McGraw-Hill.
5. W. Lidwell, K. Holden, J. Butler (2007). Universal Principles of Design: 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design. Rockport Publishers.

PDT 231/3
COMPUTER AIDED INDUSTRIAL DESIGN II (CAID II) (PRE-REQUISITE: CAID I PDT131)

COURSE SYNOPSIS

Once an Industrial Designer has completed the conceptual design stage of a project the details required for manufacture need to be resolved and prototypes made. It is at this stage that Computer Aided Design (CAD) is used. 3D CAD allows the details of the design to be resolved. Rapid prototypes can be made

directly from the CAD data for design testing and verification. Modifications to the CAD data can be made quickly. Once the design is satisfactory, the 3D CAD models can then be used to generate photo-realistic images and engineering drawings so that the new product can be manufactured.

COURSE OUTCOMES

1. Apply three-dimensional transformations and viewing operations in computer-aided product design.
2. Apply curve, surface, and solid modelling in computer-aided product design.
3. Understand product data management (PDM) technologies and the acquisition of PDM systems.
4. Understand and appreciate virtual engineering technologies and how they can be applied to product life-cycle design.

REFERENCES

1. Jensen C., Helsel J D., Short D R., 2007, Engineering Drawing & Design. 7th ed. Mc-Graw Hill.
2. Jensen C., Helsel J D., 1996. Fundamentals of Engineering Drawing. 4th ed. Mc-Graw Hill.
3. Kirkpatrick J M., 2003. Basic Drafting Using Pencil Sketches and AutoCAD. Prentice Hall.
4. Luzzader W. J., Duff J. M., 1993. Fundamentals of Engineering Drawing With an Introduction to Interactive Computer Graphics for Design and Production. 11th ed. Prentice Hall International.
5. Goetsch D L., Chalk W.S., Nelson J.A. Rickman R.L., 2005. Technical Drawing. 5th ed. Thomson Delmar Learning.

PDT 236/2
COMPUTER PROGRAMMING

COURSE SYNOPSIS

This course introduces basic programming using high level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming tools such as organization chart, IPO chart, flowchart and pseudo code and then to implement them by developing C program.

COURSE OUTCOMES

1. Ability to describe and apply design elements and principles in design projects and assignments.
2. Ability to analyze aesthetic value of 2 dimensional artwork and 3 dimensional objects of the design output.
3. Ability to recognize/realize the important of leadership and teamwork in producing projects or assignments for better output.

REFERENCES

1. Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2006.
2. Cheng, H., "C for Engineers and Scientifics", McGraw Hill, 2010.
3. Hanly, J.R. and Koffman, E.B.,"C Program Design for Engineers", 2nd Ed., Addison-Wesley, 2001.
4. Tan, H.H. and D'Orazio, T.B., "C Programming for Engineering & Computer Science", McGraw Hill, 1999.
5. Sprankle and Maureen, "Problem Solving and Programming Concepts", 7th Ed., Prentice Hall, 2006.

PDT 234/3
RAPID PROTOTYPING I (RP I)
(PRE-REQUISITE: DESIGN PRACTICE PDT134/3)

COURSE SYNOPSIS

Once an Industrial Designer has completed the conceptual design stage of a project the details required for manufacture need to be resolved and prototypes made. It is at this stage that Rapid Prototyping process is used. 3D geometry CAD data allows the details of the design to be resolved before actual manufacturing. Rapid prototypes can be made directly from the CAD data for design testing and verification. Modification to the CAD data can be made quickly. Once the design is satisfactory, the 3D CAD models can then be used to generate physical model made of plastic by using layer type rapid prototyping and engineering drawings so that the new product can be manufactured.

COURSE OUTCOMES

1. Ability to Describe theory in Rapid Prototyping and Apply appropriate Rapid Prototyping technique to parts.
2. Ability to Describe and Apply the principles technology of CUBE and layer based built in Rapid Prototyping.
3. Ability to Evaluate proper design planning and costing in Rapid Prototyping.

REFERENCES

1. Chua, C.K., Leong, K.F., Kai, C.C. (2010), Rapid Prototyping Principles and Applications in Manufacturing, John Wiley and Sons (New York).
2. Ali K. Kamrani, Emad Abouel Nasr, Rapid Prototyping: Theory and Practice Springer 2006.

3. Todd Grimm, User's Guide to Rapid Prototyping, Society of Manufacturing Engineers 2004.
4. Kenneth Cooper, Rapid Prototyping Technology, Marcel Dekker 2001.
5. Bralla, J.G. (ed.) (1986), Handbook of Product Design for Manufacturing, McGraw-Hill (New York).

PDT 240/3
APPLIED ERGONOMICS AND SAFETY

COURSE SYNOPSIS

This course addresses ergonomics knowledge in product design. It explains the application of anthropometrics data in the design of products, equipment and tools. Students will learn about fundamental knowledge of ergonomics, its applications in design and basic assessment tools to analyze design problems. The course also exposes students to specific considerations, needs or requirement for special populations such as the elderly and the disabled in the design. It also looks into ergonomic hazards, safety analysis & prevention, and the product safety.

COURSE OUTCOMES

1. Ability to define and explain the application and importance of ergonomics in design, and human capability and limitations.
2. Ability to apply anthropometric data in product or workplace design, and perform analysis and evaluation.
3. Ability to explain interaction design and usability issues, and apply usability principles and framework in product design
4. Ability to address human needs through the use of ergonomics principles in product or workplace design.
5. Ability to identify, analyze and evaluate design problems by using suitable ergonomics methods.
6. Ability to apply ergonomics knowledge in equipment and tools design.

REFERENCES

1. Helander, M. (2006) A Guide to Human Factors & Ergonomics. Boca Raton: CRC Press.
2. Standon, N. (2005) Handbook of Human Factors and Ergonomics Methods. London: CRC Press
3. Sanders, M. and McCormick, E. (1993) Human Factors in Engineering and Design. McGraw-Hill.
4. Green, W. S. and Jordan, P. W. (1999) Human Factors in Product Design. Taylor & Francis, Florida.

PDT 202/3
HEAT TRANSFER

COURSE SYNOPSIS

The main objective of this course is to enable student to understand the concepts of conduction, convection and radiation which form the basics of heat transfer. Student will also perform theoretical calculations such as thermal conductivity, heat loss, and other important theories.

REFERENCES

1. Yunus A. Cengel., 2003, Heat transfer: A practical approach. Mc-Graw Hill.
2. Tariq Muneer., Jorge Kubie., Thomal Grassie., 2003, Heat transfer: A problem solving approach, volume 1.
3. Jack Philip Holman., 2009, Heat transfer. Mc-Graw Hill Higher Education.
4. Adrian Bejan., 1993, Heat transfer. John Wiley & Sons, Inc.
5. Anthony F. Mills., 1999, Heat transfer. Prentice Hall.

PDT 230/3
DESIGN STUDIO I

COURSE SYNOPSIS

This course aims to develop an understanding of customers and product marketability trough the subject theme of "Customers/User Centered Design". Student will use appropriate engineering approaches and methods to analyze user needs and formulate solution to the design problems. Students are required to use and manipulate 3D CAD based software to construct product detailing and specifications and analyzing basic product reliability and performance. Additionally, student must use the software output to produce product illustrations and digital rendering techniques for product presentation.

COURSE OUTCOMES

1. Ability to establish market segment and user requirements trough proper market study and ability to formulate that study into appropriate design solution.
2. Ability to analyze the customer's requirement and formulate those requirements into product solution based on engineering principles for better marketability.
3. Ability to use and manipulate 3D software to construct and analyze product solution.
4. Ability to create digital product illustrations and technical GDT (Geometric Dimensioning and Tolerance) drawing which support student's verbal presentation.

REFERENCES

1. P. Trott (2007). Innovation Management & Product Development, Prentice Hall.
2. B. Laurel, P. Lunenfeld (2007). Design Research: Methods and Perspectives. The MIT Press.
3. M. Crawford (2006) New Products Management. McGraw-Hill.
4. K.T. Ulrich, S.D. Eppinger (2006). Product Design and Development. McGraw-Hill.
5. W. Lidwell, K. Holden, J. Butler (2007). Universal Principles of Design: 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design. Rockport Publishers.

PDT 232/3
PRODUCT DATA MANAGEMENT (PDM)
(PRE-REQUISITE: CAID II PDT231)

COURSE SYNOPSIS

This lesson provides an engaging context to introduce students to the advance processes of computer aided design and manufacture (CAD/CAM). Students analyze the reasons behind using CAD/CAM to develop selected products concept before identifying the advantages and disadvantages of its use. Students are given an opportunity to practice their advance CAD skills by responding to a design concept. The lesson is supported by instructional worksheets, and demonstrates the importance of the use of advance CAD/CAM tools and equipment in the process of realizations of a design or product concepts.

Once an Industrial Designer has completed the conceptual design stage of a project the details required for manufacture need to be resolved and prototypes made. It is at this stage that Rapid Prototyping process is used. 3D geometry CAD data allows the details of the design to be resolved before actual manufacturing. Rapid prototypes can be made directly from the CAD data for design testing and verification.

Modification to the CAD data can be made quickly. Once the design is satisfactory, the 3D CAD models can then be used to generate physical model made of plastic by using layer type rapid prototyping and engineering drawings so that the new product can be manufactured.

COURSE OUTCOMES

1. Be able to evaluate the success of a product concept against a design brief and identify areas for improvement.
2. Ability to analyse the different characteristics of products designed and manufactured using computers and those manufactured by hand.
3. Have a good understanding of how to accomplish a design brief using advance CAD/CAM and able to analyse the limitations.
4. Ability to perform diverse roles as designers and consequently their responsibility in order to fulfil product or design requirements.
5. Ability to evaluate the main design considerations and the advantages of using CAD/CAM in translating and producing the finest products or equipment with the highest quality.

REFERENCES

1. Chua Chee Kai, Leong Kah Fai and Lim Chu-Sing Rapid Prototyping(Mar 2003): Principles and Applications (2nd Edition)
2. Ian Gibson, David W. Rosen, and Brent Stucker (Dec 14, 2009).Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing by
3. Rodger Burden (May 19, 2003) Rapid Prototyping: Principles and Applications PDM: Product Data Management.
4. Fontaine J.P. La, M.G.R. Hoogeboom, and J.S. Konst (Aug 24, 2009)Product Data Management: A Strategic Perspective
5. Mikel Sorli and Dragan Stokic (Jul 24, 2009)Innovating in Product/Process Development: Gaining Pace in New Product Development.

PDT 235/3
RAPID PROTOTYPING II (RP II)
(PRE-REQUISITE: RAPID PROTOTYPING I PDT234/3)

COURSE SYNOPSIS

Once an Industrial Designer has completed the conceptual design stage of a project the details required for manufacture need to be resolved and prototypes made. It is at this stage that Computer Aided Design (CAD) is used. 3D CAD allows the details of the design to be resolved. Rapid prototypes can be made directly from the CAD data for design testing and verification. Modifications to the CAD data can be made quickly. Once the design is satisfactory, the 3D CAD models can then be used to generate photo-realistic images and engineering drawings so that the new product can be manufactured.

COURSE OUTCOMES

1. Ability to DESCRIBE theory in Rapid Prototyping and APPLY appropriate testing and evaluation technique in RP.



2. Ability to DESCRIBE and APPLY the principles costing and charging of RP.
3. Ability to EVALUATE the quality and control of RP parts and managing the project.

REFERENCES

1. Douglas Bryden , CAD and Rapid Prototyping for Product Design, Laurence King 2014
2. Chua, C.K., Leong, K.F., Kai, C.C. (2010), Rapid Prototyping Principles and Applications in Manufacturing, John Wiley and Sons (New York).
3. Ali K. Kamrani, Emad Abouel Nasr, Rapid Prototyping: Theory and Practice Springer 2006.
4. Todd Grimm, User's Guide to Rapid Prototyping, Society of Manufacturing Engineers 2004.
5. Kenneth Cooper, Rapid Prototyping Technology, Marcel Dekker 2001.
6. Bralla, J.G. (ed.) (1986), Handbook of Product Design for Manufacturing, McGraw-Hill (New York).

PDT 341/3
INDUSTRIAL DIALOGUE

COURSE SYNOPSIS

This lesson provides up to date knowledge and facts in current design issues from seminars type sessions and lecture by invited experts in design related discipline. Students have to produce a report referring each discussed issue throughout seminars session. Students have to produce a comprehensive report with a verbal presentation at the end of the semester on selected topics given by course coordinator.

COURSE OUTCOMES

1. Ability to analyse and recognize design issues through direct interaction between experts in different disciplines related to design field.
2. Ability to construct opinions and able to criticize issues discussed in seminar sessions presented by experts.
3. Ability to formulate and present extensive and comprehensive report in identified design issue and able to present it professionally in in-house seminar session.

REFERENCES

1. Dialogue Mapping: Building Shared Understanding of Wicked Problems by E. Jeffrey Conklin (Paperback - Nov 18, 2005)
2. Deconstructing Product Design: Exploring the Form, Function, Usability, Sustainability, and Commercial Success of 100 Amazing Products by William Lidwell and Gerry Manacsa (Hardcover - Nov 1, 2009)
3. Emotional Design: Why We Love (or Hate) Everyday Things by Donald A. Norman (Paperback - May 10, 2005)
4. Unstoppable Confidence by Kent Sayre (Kindle Edition - Jun 20, 2008) - Kindle eBook

PDT 330/3
DESIGN STUDIO II

COURSE SYNOPSIS

The student will expose and gain knowledge on the subject of design affordance and semantic throughout the course. Study and analysis about user interaction in relation to the design concept is the most important subject to appreciate by the student. Furthermore, sustainable design and manufacturing is the second topic to be discussed in this course. The course will enhance student designing skill by focusing the engineering study on materials and manufacturing aspects which implements into design projects. The design should be electrical or electronic products which involve the use of instrumentation and control. Student will develop an understanding of Failure Mode and Effects Analysis (FMEA), a risk assessment technique for systematically identifying potential failures in a system or a process throughout the product life cycle

COURSE OUTCOMES

1. Ability to apply and formulate design affordance and semantic aspects on a product concept for better user interaction
2. Ability to respond regarding sustainable design issues and use the "Quality Function Deployment" (QFD) method in the design process.
3. Ability to analyze and decide material properties and the manufacturing processes to produce/manufacture the design concept.
4. Ability to design and formulate a product based on product performance analysis using "Failure Modes Effect Analysis" (FMEA) factors.

REFERENCES

1. P. Trott (2007). Innovation Management & Product Development, Prentice Hall.
2. B. Laurel, P. Lunenfeld (2007). Design Research: Methods and Perspectives. The MIT Press.
3. M. Crawford (2006) New Products Management. McGraw-Hill.
4. K.T. Ulrich, S.D. Eppinger (2006). Product Design and Development. McGraw-Hill.

5. W. Lidwell, K. Holden, J. Butler (2007). Universal Principles of Design: 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design. Rockport Publishers.

PDT 343/3
ECONOMIC PRINCIPLES

COURSE SYNOPSIS

This is an introduction to cost and management accounting. The course is designed to provide an understanding of the main elements which determine the cost of a product. The course also focuses on the application of fundamental costing methods and techniques and covers some aspects of managerial accounting which are mainly used for decision making purposes.

COURSE OUTCOMES

1. To explain costing techniques such as marginal and absorption costing which are relevant for decision making.
2. To apply cost-volume-profit analysis and interpret the results.
3. To prepare, interpret and understand the role of budgets.
4. To explain standard costing and variance analysis.

REFERENCES

1. Drury, C (2007)"Cost Accounting" 4th Edition International Thomson Business Press.
2. Rujukan: 1. Hongren, Datar & Foster (2008), Accounting, A Managerial Emphasis, 11th Edition, Prentice Hall.
3. Hansen (2008), Cost Management, Accounting and Control, 4th Edition, Thomson, South Western.
4. Hilton (2008), "Managerial Accounting' 4th Edition, Irwin McGraw-Hill.
5. Barfied, Raibon & Kinney (2008), Cost Accounting, Traditions & Innovations Thomson, 5th Edition, South Western.
6. Ruzita Jusoh (2006), "Perakaunan Pengurusan Matrikulasi", Penerbit Fajar Bakti Sdn.Bhd

PDT 344/3
INNOVATION MANAGEMENT & PRODUCT DEVELOPMENT

COURSE SYNOPSIS

In this course addresses to the integration problems in innovative product design, comprehensive management development and industrial finance structure. Students will learn the appropriate engineering approaches and methods to analyze with engineering science principle. This course focuses on manipulation of 3D CAID based software to construct the product conceptual solutions.
Students are hoped to be able to understanding various engineering design environments and produce the technical report to support conceptual.

COURSE OUTCOMES

1. Ability to UNDERSTAND, DESCRIBE and DIFFERENTIATE the basic concepts and principles of innovation management and product development
2. Ability to COMPARE and EVALUATE the fundamental principles of technology and product cycle used in innovation.
3. Ability to ARRANGE and WRITE the followings in terms of aesthetic intentions in product invention (i) the inventive techniques to produce novel design concepts (ii) reverse engineering process to improve the current design

REFERENCES

1. Dussage P, Harts S, Ramantosa B, John Wiley & Sons,2008 Strategic technology management.
2. Rosseger, Gerhard (ed.)(2008) Management Of Technological Change,Elsevier Science Pub.
3. Trott P(2005),Innovation and New Product Development, Prentice Hall.
4. K.T. Ulrich, S.D. Eppinger (2011). Product Design and Development. 5th Edition, McGraw-Hill.
5. P. Trott (2011). Innovation Management & Product Development, 5th Edition, Prentice Hall.

PDT 345/3
CONSUMER BEHAVIOUR

COURSE SYNOPSIS

This course addresses major concepts, research and applications based on natural science study of human behaviour, perception and price tag study and also a personality theory.
The course also exposes students to understand about the application of advertisement, consciousness and memory, consumer involvement and decision making, behavioural methods and consumer analysis based on product satisfaction.



COURSE OUTCOMES

1. EXPLAIN the basic concept of human behaviour and consumer behaviour and ANALYZE the related behaviour.
2. Ability to EVALUATE the consumer behavior interpretation processes as directed towards product benefits.
3. Ability to ARRANGE consistency as input to attitude and satisfaction base on price and psychological strategies.

REFERENCES

1. Michael R. Solomon. Consumer Behaviour. Ninth Edition. January 17. 2010.
2. Hyden Noel. Basics Marketing: Consumer Behaviour. September 10. 2009.
3. Leon Schifman and Leslie Kanuk. Consumer Behaviour. August 7. 2009.
4. Elizabeth Parson and Pauline Maclaran. Contemporary Issues in Marketing and Consumer Behaviour. April 29. 2009.
5. Martin M. Evans, Ahmad Jamal, and Gordon Foxall. Consumer Behaviour. April 21.2006.

PDT 346/3
PRODUCTION MANAGEMENT FOR DESIGNERS (PRE-REQUISITE: CONSUMER BEHAVIOUR PDT345)

COURSE SYNOPSIS

This course addresses the Product management is an organizational lifecycle function dealing with the planning, forecasting, and production, or marketing of a product or products at all stages of the product lifecycle. Similarly, Product Lifecycle Management (PLM) integrates people, data, processes and business systems. It provides product information for companies and their extended supply chain enterprise. Product management also involves elimination decisions. Product management often serves an inter-disciplinary role, bridging gaps within the company between teams of different expertise, most notably between engineering-oriented teams and commercially oriented teams.

COURSE OUTCOMES

1. Ability to Discuss and Analyze the relation between management and stakeholders in Product Lifecycle Management area.
2. Ability to Discuss and Analyze user experience concept and market strategy in product management.
3. Apply and Analyze product roadmap concept – strategy and Business Model with Financial.

REFERENCES

1. James, M. Morgan, Jefry, K. Liker. "The Toyota Product Development System: Integrating People, Process And Technology", Productivity Press, 2006. Krajewski, L.j. & Ritzman, L.P. "Operations Management: Strategy and Analysis", 8/E, Prentice Hall 2006.
2. Steven Eppinger, Karl Ulrich, "Product Design and development", Mc Graw Hill, 2011.Nahmias,S. "Production and Operation Analysis", 5/E, McGraw Hill, 2005.
3. Roman Pichler, "Agile Product Management with Scrum", Addison-Wesley Profesional, 2010.
4. Krajewski, L.J. & Ritzman, L.P "Operations Management. Strategy and analysis", 8/E, Prentice Hall 2006.
5. Reid, R.D. & Sanders, N.R. "Operations Management, Wiley 2006.

PDT 347/3
PRODUCT STUDY & PROFESSIONAL PRACTICE

COURSE SYNOPSIS

Students will learn this course through some case studies where the product and its system development are analyzed in the aspect of design, function and usability based on design guidelines. Students also will be exposed to professional approaches practiced in industry and consulting including project organization and management. Student will learn the professional and ethical responsibilities, corporate identity, branding, and design portfolio concept.

COURSE OUTCOMES

1. To DEMONSTRATE the corporate identity in the product design.
2. Ability to ANALYZE in the aspect of design, usability and function.
3. Ability to EVALUATE the product based on design guidelines.

REFERENCES

1. Steve L.Wintner,Michael TardifFinancial Management for Design Professionals : The Path to Profitability , Kaplan AEC Education. 2006
2. Raymond Kogan,Cara.Strategic Planning for Design Firms. Kaplan AEC Education.2007
3. Nathan M. Crystal. Professional Responsibility: Problem of Practice and the Profesion.Aspen Publishers. 2011
4. Tim Parsons. Thinking Objects: Contemporary Approches to Product Design. AVA Publishing. 2009
5. Alina Wheeler. Designing Brand Identity: An Essential Guide for the Whole Branding Team. John Willey and Sons. 2011

6. Trevor van Gorp, Edie Adams., Design for Emotion. Elsevier. 2012

PDT 348/3
FINITE ELEMENT ANALYSIS

COURSE SYNOPSIS

This course gives students an exposure to the theoretical basis of the finite element method and its implementation principles, and to introduce the use of available finite element applications for solving real-life engineering problems.

COURSE OUTCOMES

1. **FORMULATE** the basic equations of finite element method for simple one- and two-dimensional element
2. **APPLY** the finite element method to model and **ANALYSE** simple real engineering problems, by hand calculation, and then **INTERPRET** the results
3. **APPLY** the use of available finite element software to solve real-life engineering problems, especially those of the structural mechanics type, and correctly **EVALUATE** the results

REFERENCES

1. Chandrupatla, T.R. and Belegundu, A.D., Introduction to Finite Elements in Engineering, 4th Edition, Prentice Hall, New Jersey, 2011.
2. Hutton, David V., Fundamentals of Finite Element Analysis, International Edition, McGraw-Hill, New York, 2004.
3. Logan, D.L., A First Course in the Finite Element Method, 5th Edition, Brooks/Cole, 2011.
4. Cook, R.D., Concepts and Applications of Finite Element Analysis, 4th Edition, John Wiley & Sons Inc., New York, 2002.
5. Huebner, K.H., Dewhirst, D.L., Smith, D.E. and Bryon, T.G., The Finite Element Methods for Engineers, 4th Edition, John Wiley & Sons Inc., New York, 2001. Reddy, J.N., An Introduction to the Finite Element Method, 3rd Edition (International), McGraw-Hill Inc., New York, 2006.

PDT 442/3
COMMERCIALIZATION CULTURE

COURSE SYNOPSIS

This course aims at developing student capability, professionalism and working culture in planning, preparation and managing of product design promotion and exhibition event. The student will be exposed by visiting local trade exhibitions and practices negotiation techniques. The students have to complete the product package with their own branding and corporate identity included promotion of their Final Year project. At the end of the course the student will prepare and launch an exhibition event which manages by them.

COURSE OUTCOMES

1. Ability to perform and work in a group, communicate effectively and able to work independently.
2. Ability to analyze the concept of the commercialization relations to its culture.
3. Ability to analyze the product lifecycle and it relationship with commercialization aspects.

REFERENCES

1. Uwe Cantner,Elias Dinopoulus and Robert F.Lanzillotti. The New Economy Public Policy: Schumpeterian Perspetives.Nov 9th,2010.
2. C.Joseph Touhill,Gregory Touhill,and Thomas o'Riordan .Commercialization of Innovative Technologies: Bringing Good Ideas to the Marketplace.Apr 7,2008.
3. Darius Rafinejad.Innovation ,Product Development and Commercialization: Case Studies and Key Practice for Market Leadership.2007.
4. Tony Davila,Marc J.Epstein and Robert Shelton.Aug 1st ,2005.
5. Sten A.Thore . DEA and Related Analytical Methods for Evaluationg the Use and Implementing of Technical Innovation.Apr 30th ,2002.

PDT 443/3
DESIGN FOR MANUFACTURING AND ASSEMBLY

COURSE SYNOPSIS

This course introduces method that is used to determine the suitable manufacturing process according to design and development of a product. It also introduces the assembly methodology that helps producing correctly and efficiently in term of costing and manufacturing process requirement. It applies for manual assembly and automatic assembly processes. Design guidelines and rules in DFMA will be used to develop suitable component design according to the manufacturing process required. Student will have a group project to analyze existing product then propose better design in manufacturing and assembly aspect



COURSE OUTCOMES

1. Ability to demonstrate knowledge and comprehension of concepts & methodologies of suitable materials and manufacturing process selection.
2. Ability to analyze and evaluate parts reduction and process selection using reduction methodology.
3. Ability to develop suitable component design according to the manufacturing process

PDT 313/4
FINAL YEAR PROJECT

COURSE SYNOPSIS

A projects based course that exposes students to solve, analyze, design and research engineering problems in the field of manufacturing engineering, machining or product design.

COURSE OUTCOMES

1. Ability to apply and integrate theories and lab, known how that has been learnt to solve engineering problems.
2. Ability to produce either a new design or toimprove on an existing design.
3. Ability to choose a suitable research methodology for the research project being undertaken.
4. Ability to write. Present and defend the technical report (desertation) for the projects undertaken.

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (MATERIAL PROCESSING) - RY58

PROGRAMME OBJECTIVES (PEO)

PEO1
Engineering technology graduates engaged in the field of mechanical engineering technology as demonstrated through career advancement.

PEO2
Engineering technology graduates who are members and contribute to professional society.

PEO3
Engineering technology graduates embracing in life-long learning or pursuing continuing education opportunities.

PEO4
Engineering technology graduates who are technopreneurs.

PROGRAMME OUTCOMES (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialisation.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO5
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

PO11
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO12
Recognise the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE FOR BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (MATERIAL PROCESSING) - RY58

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Discipline Core (108)	PDT 151/2 Introduction to Materials Processing Technology	PDT 155/3 Quality Control	PDT 251/3 Thermo-fluids	PDT 255/3 Process Control	PDT 282/3 Applied Fuid Mechanics	PDT 451/3 Materials Selection & Design	PDT 413/6 FYP 2	PIT 304/12 Industrial Training
	PDT 101/3 Statics and Dynamics	PDT 152/3 Materials Chemistry	PDT 201/3 Strength of Materials	PDT 256/3 Materials Characterization	PDT 362/4 Metal Fabrication Technology	PDT 463/3 Material for Energy and Environmental Sustainability	Elective 1/4	
	PDT 180/3 Engineering Science	PDT 153/3 Materials Structure & Properties	PDT 253/2 Materials Processing Lab	PDT 261/3 Whiteware Ceramic Processing	PDT 352/2 Design of Die & Moulds	PDT 313/4 FYP 1		
	PDT 106/3 Engineering Graphics	PDT 154/3 Materials Testing	PDT 264/3 Electronic Materials	PDT 262/3 Metal Extraction Technology	PDT 364/3 Composite Materials Processing	Elective 1/4		
	PDT 133/2 Workshop Technology	PDT 120/3 Basic Electrical and Electronic	PDT 236 /2 Computer Programming	PDT 263/4 Plastic Processing	PDT 351/3 Materials Failure Analysis			
Common Core (15)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Mathematics for Engineering Technology III				PTT 333/3 Engineering Technologist Management	
							PTT 444/3 Engineering Technologist in Society	
University Required (19)	UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures	*UVA 111/2 Foundation English	UUW XXX/2 Option or **UVW 211/2 English for General Purpose	UUW 224/2 Engineering Entrepreneurship	UVW 312/2 English for Technical Communication	UUT 122/2 Skills and Technology in Communication		
	UZW XXX/1 Co-Curriculum	UZW XXX/1 Co-Curriculum	UZW XXX/1 Co-Curriculum	UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies	UUW 322/2 Thinking Skills	UVW 410/2 University Malay Language		
Total Credit	19	21	19	20	19	18	16	12
Total Unit for Graduation = 142								

*Uncredited. Compulsory to students with MUET Band 2 only. This course is a prerequisite to UVW 211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is prerequisite to UVW 312 English for Technical Communication.

LIST OF COURSES

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS)
(MATERIAL PROCESSING)

- PDT 101/3 STATICS AND DYNAMICS
- PDT 180/3 ENGINEERING SCIENCE
- PDT 155/3 QUALITY CONTROL
- PDT 106/3 ENGINEERING GRAPHICS
- PDT 133/2 WORKSHOP TECHNOLOGY
- PDT 151/2 INTRODUCTION TO MATERIALS PROCESSING TECHNOLOGY
- PDT 120/3 BASIC ELECTRICAL AND ELECTRONIC
- PDT 152/3 MATERIALS CHEMISTRY
- PDT 153/3 MATERIALS STRUCTURE AND PROPERTIES
- PDT 154/3 MATERIALS TESTING
- PDT 236/2 COMPUTER PROGRAMMING
- PDT 251/3 THERMO-FLUIDS
- PDT 201/3 STRENGTH OF MATERIALS
- PDT 253/3 MATERIALS PROCESSING LAB
- PDT 264/3 ELECTRONIC MATERIALS
- PDT 255/3 PROCESS CONTROL
- PDT 256/3 MATERIALS CHARACTERIZATION
- PDT 261/3 WHITEWARE CERAMIC PROCESSING
- PDT 262/3 METAL EXTRACTION TECHNOLOGY
- PDT 263/3 PLASTIC PROCESSING
- PDT 364/3 COMPOSITE MATERIALS PROCESSING
- PDT 362/3 METAL FABRICATION TECHNOLOGY
- PDT 351/3 MATERIALS FAILURE ANALYSIS
- PDT 352/3 DESIGN OF DIE & MOULDS
- PDT 451/3 MATERIALS SELECTION & DESIGN
- PDT 282/3 APPLIED FLUID MECHANICS
- PDT 463/3 MATERIAL FOR ENERGY AND ENVIRONMENTAL SUSTAINABILITY
- PDT 313/4 FYP 1 (FINAL YEAR PROJECT)
- PDT 413/6 FYP 2 (FINAL YEAR PROJECT)
- PDT 333/3 ENGINEERING TECHNOLOGIST MANAGEMENT
- PDT 444/3 ENGINEERING TECHNOLOGIST IN SOCIETY



COURSE SYLLABUS

PDT 101/3
STATICS AND DYNAMICS

COURSE SYNOPSIS

This course comprises two parts, namely; statics and dynamics. In statics, the basic principles of engineering mechanics such as forces, moments and friction are introduced. Students are required to apply this basic knowledge in analyzing the equilibrium of rigid bodies, as well as the stability of a structure. The subjects of dynamics cover the concept of kinematics and kinetics. Kinematics treats the geometric aspects of the motion, whereas kinetics analyses the forces that cause the motion. Analyses in relation to kinetic problems are solved using acceleration method, principle of work and energy, and principle of impulse and momentum.

COURSE OUTCOMES

1. Ability to apply and analyse the basic principles of physics related to static such as force, moment, Newton's First, second and Third Law, trusses, frame and machine.
2. Ability to apply and analyse the structures and frameworks problems by constructing, sketching and/ or drawing free body diagram in ensuring static equilibrium.
3. Ability to apply and analyse the kinematics and kinetics for particles and systems of particles.
4. Ability to apply and analyse the planar kinematics and kinetics of a rigid body.

REFERENCES

1. Hibbeler, R. C., Engineering Mechanics Statics. 11th ed., Prentice Hall (2007)
2. Hibbeler, R. C., Engineering Mechanics Dynamics. 11th ed., Prentice Hall (2007)
3. Beer, F. B. and Johnston, E. R. Jr., Vector Mechanics for Engineers: Statics and Dynamics. 8th ed., Canada, McGraw_Hill (2004)
4. Beer and E.R. Johnson Jr., 'Vector Mechanics tor Engineer: Statics 8th ed. In SI Units', McGraw Hill (2004).
5. Beer and E.R. Johnson Jr., 'Vector Mechanics tor Engineer: Dynamics 8th ed. In SI Units', McGraw Hill (2004)

PDT 180/3
ENGINEERING SCIENCE

COURSE SYNOPSIS

The course covers foundations of quantity and units of measurement, vectors, particle dynamics, work, power and momentum. Additional coverage includes forces on objects and introduction to electrical circuit.

COURSE OUTCOMES

1. Ability to analyze problems related to units of measurements, and scalar and vector quantities.
2. Ability to analyze particles in motion, energy, work, power, and momentum.
3. Ability to analyze forces acting on objects.
4. Ability to analyze basic electrical circuitry.

REFERENCES

1. Raymond, A. S. and John, W. J. (2010), Physics For Scientists and Engineers, 8th Ed., Thompson Higher Education, Belmont, CA.
2. Dauglas, C.G.(2010), Physics: Principles with Applications, 6th Ed., Pearson, New York, NY.
3. Hibbler, R.C. (2010), Engineering Mechanics: Statics and Dynamics, 12th Edition, Peason Prentice Hall, Singapore.
4. Richard, J.F. (2008), Electricity Principles and Applications, 7th Ed., McGraw Hill, New York, NY.
5. Huges, E. (2005), Electrical and Electronics Technology, 9th Ed., Prentice Hall, New York, NY.

PDT 155/3
QUALITY CONTROL

COURSE SYNOPSIS

This course is an overview of quality studies that take into account the philosophical, managerial and technical issues of Quality. The managerial aspects include TQM, ISO 9000. The technical aspects include statistical tools and techniques used in many industrial applications.Topics covered include: Introduction to Quality, TQM, ISO standard, Design of experiment, six sigma, basic statistics, fundamentals of probability, control charts for variable and attribute, process capability, acceptance sampling plan, acceptance sampling system and reliability.

COURSE OUTCOMES

1. Ability to differentiate the essentials of the quality management philosophy and theories of experts including Deming and Juran.
2. Ability to develop and implement TQM in work place as well as can contribute in developing ISO 9000 System
3. Ability to apply statistical process control techniques to monitor industrial process variation as well as interpret the chart to identify potential corrective actions.

REFERENCES

1. Dale H. Besterfield, (2004) Quality Control. 7th Edition, Prentice Hall.
2. Doughlas C. Montgomery, (2004) Intoduction to Statistical Quality Control, Wiley.
3. Chandrupatla, Tirupathi R, (2009) Quality and Reliability in Engineering, Cambridge University Press.
4. John L. W. Beckford, (2010) Quality: A Critical Introduction, Routledge/ Taylor & Francis Group.
5. B. S. Dhillon, (2005) Reliability, Quality and Safety for Engineers, CRC Press.

PDT 106/3
ENGINEERING GRAPHICS

COURSE SYNOPSIS

This course provides the skills to students the basics of Engineering Drawing, Computer Aided Drafting (CAD) and their engineering applications. The course covers the detail of Engineering Drawing for beginners followed with projection systems, oblique and isometric sketches. The course also introduced the Computer Aided Drafting using dedicated software, AUTOCAD, which focuses on product design in 2D and 3D environment. Fundamental knowledge in dimensioning and geometrical tolerance (GDT) enhances student's ability in interpreting and assessing information from basic raw data of an engineering drawing.

COURSE OUTCOMES

1. Ability to apply the basic drafting, sketching engineering components, and common term used in engineering drawing.
2. Ability to apply orthographic, auxiliary view, cross section and isometric in engineering drawing.
3. Ability to apply and analyse geometric, dimensioning, and tolerancing (GDT) in engineering drawing.
4. Ability to apply detail and assembly drawing in engineering drawing.

REFERENCES

1. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.
2. James H. Earle, "Engineering Design Graphics", 11th ed.,Pearson Prentice-Hall, 2004.
3. James D. B., "Engineering graphics with AutoCAD 2007", Pearson, 2007.
4. G. R. Cogorno, "Geometric Dimensioning and Tolerancing for Mechanical Design", McGraw-Hill, 2006.
5. R.K Dhawan, "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.

PDT 133/2
WORKSHOP TECHNOLOGY

COURSE SYNOPSIS

In this course, explanation about safety aspects in workshop will be covered,followed by fundamental measurement techniques , and use of measurement equipment such as Vernier Caliper , Chiseling , Sawing , etc. Students will be introduced to fabrication, sheet metal forming, and welding processes which consists of introduction to basic knowledge of various cutting methods and hand tools, such as file, hacksaw, chisel, and etc.

The second part of the course introduces the fundamentals of measurement techniques' followed by milling, lathe and grinding operations which consist of introduction to basic knowledge of various cutting tools, parts of machines and their functions, machine operations, and numerous calculations involving the operations. Students will practice conventional machining process that it used in the industry to transform raw material to finished products. Practical work will help students gain effective understanding.

COURSE OUTCOMES

1. Work in a group, communicate effectively; apply basic industrial safety regulation as well as emergency first aid techniques.
2. Ability to apply and understand engineering drawing and able to transfer for model/prototype fabrication.
3. Define and operate the conventional machining.

REFERENCES

1. Steve F. Krar, Arthur R.Gill, peter Smid. Technology of Machine Tools. 6th ed. McGraw Hill, 2007.
2. S.Kalpakjian, S.R. Schimd (2001), Manufacturing Engineering and Technology. 5th ed. Prentice Hall International.
3. Mikell P. Groover (2007), Fundamentals of Modern Manufacturing. 3rd ed. John Wiley & Sons, Inc.
4. E.Paul DeGarmo, JT. Black, Ronald A. Kosher (1997). Materials and Processes in Manufacturing. 8th ed., John wiley & Sons, Inc.
5. John A.Schey. Introduction to Manufacturing Processes . Mc Graw Hill, 2000.

PDT 151/2
INTRODUCTION TO MATERIALS PROCESSING TECHNOLOGY

COURSE SYNOPSIS

This is a course for undergraduate students majored in materials engineering technology. It is designed to teach the basic knowledge to processing methods used to manufacture materials such as metal, ceramic, polymeric and composites components. The topics covered will include casting, joining, deformation processing, machining, powder processing of metals and ceramics, polymer processing, coating processes, microelectronics manufacturing, materials selection, and manufacturing process selection.

COURSE OUTCOMES

1. Able to learn about understand on materials and available manufacturing processes for metals, ceramics, polymers, composites and coatings.
2. Able to relate material processing to structure and performance pertaining to several different types of material;
3. Able to develop an understanding of how material processes affect the material microstructure, properties, cost, energy, and power requirements, shape limitations and dimensional tolerances and time to manufacture components
4. Able to use fundamentals of materials science and engineering to perform basic materials selection and determine processing conditions needed to achieve desired shapes and properties

REFERENCES

1. Engineering Material Technology Structures, Processing, Properties and Selection, 5th Edition , James A. Jacobs and Thomas F. Kilduff, Pearson Prentice Hall, 2005
2. Fundamentals of Manufacturing, 2nd Edition, Philip D. Rufe, Society of Manufacturing Engineers, 2002.
3. New Materials Processes and Methods Technology, Mel Schwartz, CRC Taylor & Francis, 2006
4. Introduction to Manufacturing Processes, 3rd Edition, John A. Schey (2000)

PDT 120/3
BASIC ELECTRICAL AND ELECTRONIC

COURSE SYNOPSIS

This course provides basic knowledge of solving DC and AC electrical circuits. It also covers the fundamentals of electrical machines. The electronics section includes basic semi conductor diodes and transistors as well as the fundamentals of digital systems. At the end of the semester students will be able to understand, analyze and apply basic electrical and electronics concept and principles.

COURSE OUTCOMES

1. Ability to implement and analyze basic electrical circuits.
2. Ability to analyze single phase and three phase a.c circuits.
3. Ability to analyze the three phase induction motors.
4. Ability to implement and analyze basic electronics circuits.

REFERENCES

1. Hambley, A. R., Electrical Engineering: Principles and Applications, 5th ed., Pearson (2011)
2. Hughes, E., Electrical and Electronic Technology, 11th ed. Pearson (2012).
3. Zekayat, S. A., Electrical Engineering Concepts and Applications , Pearson (2012)
4. Floyd, T.L., *Electronic Devices*. 9th ed. Prentice Hall, Inc, 2012.
5. Floyd, T.L., *Digital Fundamentals*, 10th ed. Prentice Hall, Inc, 2009.

PDT 152/3
MATERIALS CHEMISTRY

COURSE SYNOPSIS

This course is designed to introduce the students aspect of thermodynamics including first law and second law of thermodynamics, Reaction kinetics such as effect of reactants and products concentration, effect of temperature, determination of order and velocity constant of reaction, electrochemistry and interface phenomenon.

COURSE OUTCOMES

1. Able to recognize the first law of thermodynamics in materials.
2. Able to classify the importance of entropy function in the second and third law of of thermodynamics.
3. Able to demonstrate the effect reactant and products concentration, effect of temperature, and diffusion in solid state.
4. Able to calculate and identify the electrochemistry, surface energy, interfacial energy expect gas /liquid interfacial, absorption and colloid.

REFERENCES

1. Azizan Aziz dan Kamarudin Hussin, Pengenalan Kimia Metalurgi, Penerbit USM, 2000
2. Raymond Chang, Chemistry, 9th Edition, International Edition, McGraw Hill, 2005.
3. Levine, I.N., Physical Chemistry, 5th Edition, New York, McGraw Hill, 2002.
4. Moore, J.J., Chemical Metallurgy, 2nd Edition, London, Butterwoths, 1998.

5. Brian Smith, E., Basic Chemical Thermodynamics, 5th Edition, USA, Imperial College Press, 2004.
6. Aleksishvili, M and Sidamonidze, S., Problems in Chemical Thermodynamics and Solutions,USA, World Scientific, 2002

PDT 153/3
MATERIALS STRUCTURE AND PROPERTIES

COURSE SYNOPSIS

This course is designed to introduce some fundamentals of materials engineering; materials structure, solid defects and basic theory of diffusion. Introduction to mechanical and physical properties for various types of engineering materials, how these properties are measured and what these properties represent.

COURSE OUTCOMES

1. Able to identify the type of atomic bonding and materials structure.
2. Able to classify various types of defect and basic concept of diffusion in materials.
3. Able to examine physical and mechanical properties of various types of engineering materials.
4. Able to analyze the factor that affected the physical and mechanical properties of materials

REFERENCES

1. Callister, W.D. Jr. Materials Science and Engineering: An Introduction. 5th Ed. New York: John Wiley, 2000
2. Smith, W.F. Principles of Materials Science and Engineerings. 2nd Ed. Singapore: McGraw Hill, 1990
3. Donald R. Askeland & Pradeep P. Phule, The Science and ngineering of Materials. 4th Ed. Thomson Brooks/ Cole, 2003.

PDT 154/3
MATERIALS TESTING

COURSE SYNOPSIS

This course is designed to expose students the theory and practical aspects of materials testing using destructive and non-destructive tests such as compression test, charpy impact testing, hardness test, magnetic particle test and liquid penetration test.

COURSE OUTCOMES

1. Able to identify the importance of materials testing, the types of materials testing, the basic of materials imperfection and impurities in solids.
2. Able to demonstrate the destructive and non-destructive materials tests using testing machines.
3. Able to analyze the result and defects that exist on inspection materials through destructive and non-destructive testings.
4. Able to analyze physical and mechanical properties of materials through various testing techniques such as compression test, charpy impact testing, hardness test, magnetic particletest and liquid penetration test.

REFERENCES

1. W.D. Callister, Jr. & D.G. Rethwisch, 3rd Ed. Fundamentals of Materials Science and Engineering. John Wiley & Son, 2008
2. erope Kalpakjian. (1995). Manufacturing Engineering and Technology, Third Edition. Addison-Wesley Publishing Company.
3. John Witey; (1993).Failure of Materials in Mechanical Design: Analysis, Prediction,Preventation. New York.
4. Charles Hellier, (2001), Handbook of nondestructive evaluation, McGraw-Hill.

PDT 236/2
COMPUTER PROGRAMMING

COURSE SYNOPSIS

This course introduces basic programming using high level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming tools such as organization chart, IPO chart, flowchart and pseudo code and then to implement them by developing C program.

COURSE OUTCOMES

1. Ability to describe and apply design elements and principles in design projects and assignments.
2. Ability to analyze aesthetic value of 2 dimensional artwork and 3 dimensional objects of the design output.
3. Ability to recognize/realize the important of leadership and teamwork in producing projects or assignments for better output.

REFERENCES

1. Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2006.
2. Cheng, H., "C for Engineers and Scientifics", McGraw Hill, 2010.
3. Hanly, J.R. and Koffman, E.B.,"C Program Design for Engineers", 2nd Ed., Addison-Wesley, 2001.
4. Tan, H.H. and D'Orazio, T.B., "C Programming for Engineering & Computer Science", McGraw Hill, 1999.
5. Sprankle and Maureen, "Problem Solving and Programming Concepts", 7th Ed., Prentice Hall, 2006.

PDT 251/3
THERMO-FLUIDS

COURSE SYNOPSIS

This course will cover the basic knowledge, comprehension and application of law of thermodynamic to understand the relationship between the properties that matter exhibits as it changes its condition. The first part includes review of thermodynamic concept, statistic thermodynamic and solution. The second part covers the phase equilibrium, thermodynamic of phase diagram, crystal defect, phase transformation unary and heterogeneous system, solution, phase equilibrium, surface and interface, defects in crystal, phase transformation and energy of interfaces.

COURSE OUTCOMES

1. Ability to apply basic concept and process that relate to the material thermodynamics.
2. Ability to employ a basic concept and process of thermodynamic for further understanding in phase transformation, solid state reaction and thermodynamic application to materials.
3. Ability to relate and apply the knowledge on thermodynamics of interfaces, the thermodynamics of electrolysis and defect in crystals to the materials process.

REFERENCES

1. R. T. DeHoff, Thermodynamics in Materials Science, Taylor & Francis, 2006.
2. H.G. Lee, Chemical Thermodynamics for Metals and Materials, Imperial College Press, 1999
3. R. T. DeHoff, Thermodynamics in Materials Science, McGraw-Hill, 1993.
4. J. Susanto, Termodinamik Gunaan: Masalah dan Contoh Penyelesaian, Dewan Bahasa dan Pustaka, 1988

PDT 201/3
STRENGTH OF MATERIALS

COURSE SYNOPSIS

Stress analysis, stress theory, strain analysis, relationship of stress-strain and stress-strain temperature. Axial load, torsional loading, bend loading, bending stress and strain deflection. Elastic deflection failure, excessive yeilding failure, fracture failure, excessive deflection failure and progressive failure. Methods of integration, moment area methods, methods of superpotion, enegy methods and plastic analysis. Combined axial and bending load, combined axial, bending and torsion load. Buckling of column, end support condition and empirical formula. Rivet and bolt analysis (average shear strength and tensile strength), connection analysis.

COURSE OUTCOMES

1. Ability to analyze general basic concept strength of materials
2. Ability to measure, examine and analyze the materials behaviours when different mode of load applied.

REFERENCES

1. Hibbler, R.C (2003), Mechanic of Materials, 5th edition, Prentice Hall
2. Megson, T.H.G.(2002), Structural and stress analysis, Butterworth-Heinemann
3. Hamzah, M.O.(1988), Pengantar analisis struktur, USM

PDT 253/3
MATERIALS PROCESSING LAB

COURSE SYNOPSIS

The purpose of this laboratory is to familiarize students with experimental set-up and use of metallurgical apparatus. In addition, the students will learn hands on experience in examination of different materials through metallographic examination, tensile property characterization, different hardness testing methods, and effect of different thermal processing on the mechanical properties and microstructure. Safety aspects and regulations on conducting scientific experiments are also briefed and taught.

COURSE OUTCOMES

1. Able to identify different types of materials processing.
2. Able to determine the parameters involve in each of the processing technique
3. Able to propose a suitable processing technique of the materials.

REFERENCES

1. W.D. Callister., Materials Science and Engineering - An Introduction, 7th Edition, NJ: John Wiley and Sons Inc., 2007.
2. Kenneth G. Budinski & Michael K. Budinski, Engineering Materials-Properties & Selection, 9th Edition, Pearson, 2010.
3. Serope Kalpakjian & Steven Schemid, Manufacturing Engineering and Technology, 5th Edition, NJ : Pearson Education, 2006.
4. Donald R. Askeland, Pradeep P. Phulé, The Science and Engineering of Materials, 5th Edition, Canada : Thomson, 2006.

5. William F. Smith & William Smith, Foundations of Materials Science and Engineering, 3rd Edition, William F. Smith, William Smith, New York: McGraw Hill, 2004.

PDT 264/3
ELECTRONIC MATERIALS

COURSE SYNOPSIS

Materials and the interfaces between them are the key elements in determining the functioning of electronic devices and systems. This course develops the fundamental parameters of the basic solid material types and their relationships to electrical, thermal, mechanical, and optical properties. The application of these materials to the design and fabrication of electronic components is described, including integrated circuits, passive components, and electronic boards, modules, and systems.

COURSE OUTCOMES

1. Able to-identify fundamental knowledge of material properties important to electronic systems including electrical conductivity, coefficient of thermal expansion, thermal conductivity, and strength.
2. Able to perform simple trade offs between basic material properties to recommend candidate materials for specific applications
3. Able to relate knowledge of material structure to various material properties and phase diagrams
4. Able to identify and state reasons for the selection of the common electronic materials used in integrated circuits, printed wiring board assemblies, etc

REFERENCES

1. S.O. Kasap , Principles of Electronic Materials and Devices, Second Edition, McGraw Hill Higher education, 2002.
2. Rao R. Tummale, Fundamentals of Microsystems Packaging, McGrawhill, 2001.
3. Electronic Materials, Harry L Kwok, PWS Pub. Co. 1997
4. Introduction to Semiconductor Materials and Devices, M.S.Tyagi, Wiley 1991.
5. Principles of Plasma Discharges and Materials Processing, Michael A Lieberman, Alan J. Lictenberg, Wiley 2005

PDT 255/3
PROCESS CONTROL

COURSE SYNOPSIS

Basic concept for process control system, continuous and batch control. Implemention control algorithm for selected processes. Instrumentation selection for process control. Project management and implementation. Process control design and implementation.

COURSE OUTCOMES

1. Able to identify objective for control, process and able to estimate the essential of process control.
2. Able to write balance equation, solve differentiation equation and able to analyze dynamic process.
3. Able to design transfer function close loop for analysis of stabilization loop.
4. Able to remote the control equipment by close loop and open loop method.
5. Able to analyze and remote the control equipment to physical equipment.

REFERENCES

1. Donald R.C, (1991) Process System analysis and Control, 2nd ed., MaGraw Hill International Editions
2. D.E Seborg, T.F Edgar, D.A Mellichamp (2003), Process Dynamic and Control, Wiley and Sons
3. Thomas E. Marlin (2000) Process Control: Designing Processes and Control System for Dynamic Performance, Mc GrawHill.

PDT 256/3
MATERIALS CHARACTERIZATION

COURSE SYNOPSIS

This course is designed to expose students the basic principles of materials characterization using LM, SEM, TEM as well as the principles of crystallography, metal texture, x- ray diffraction method and followed by spectroscopic technique and analytical.

COURSE OUTCOMES

1. Able to identify suitable characterization technique such as XRD, XRF, SEM, DTA, TGA and others to characterize ceramic, metal, polymer and composite materials.
2. Able to apply a materials characterization concept and method.
3. Able to examine a material via various characterization techniques (modern engineering tools) such as XRD, XRF, SEM, DTA, TGA and others.
4. Able to analyze physical and chemical properties of materials through various characterization technique such as XRD, XRF, SEM, DTA, TGA and others for selection materials purpose.

REFERENCES

1. Hammond, C (1998).The Basic of Crystallography and Diffraction, Oxford University Press,.
2. Douglas A. Skoog & James J. Leary. (1992). Principles of Instrumental Analysis, 4th Ed. Sounders College Publishing.
3. Larry, G., Harges (1988). Analytical Chemistry: Principles and Techniques, Prentice Hall.
4. Gary, D., Cristian (1986). Analytical Chemistry, 4th Edition, John Wiley & sons.
5. John Edward Gentle (1982).Atomic Absorption Spectrometry, Elsevier.
6. Eugene, Z., Bertin, P (1975). Principles and Practice of X-ray Spectrometric Analysis, Plenum PressThomas E Marlin (2000) Process Control: Designing Processes and Control System for Dynamic Performance, McGraw Hill.

PDT 261/3
WHITEWARE CERAMIC PROCESSING

COURSE SYNOPSIS

Introduction to the traditional whiteware ceramics materials including types, properties and applications. Student will be exposed to the traditional ceramics processing including different shaping techniques, drying, firing and glazing.

COURSE OUTCOMES

1. Able to discuss traditional ceramic raw materials including properties and production technique.
2. Able to compare different types of shaping technique in traditional ceramic processing.
3. Able to explain mechanism in drying stages.
4. Able to demonstrate firing and glazing process.

PDT 262/3
METAL EXTRACTION TECHNOLOGY

COURSE SYNOPSIS

This course will introduce student to mineral processing and general principle in extracting metal from ore: hydrometallurgy, elecrometallurgy and pyrometallurgy. This course will exposed student to the advantages mineral processing, crushing, grinding, sizing, classification, gravity concentration, magnetic and electrostatic separation and flotation. Hydrometallurgy: Leaching: process and mode of leaching. Leaching technique: in-situ leaching, dump leaching, heap leaching, vat leaching, bacterial leaching, electrochemical leaching, Counter current leaching system. Electrometallurgy: Electrorecovery and electropurification: principles, electrochemical, electrod potential, overpotential, limited potential, electrochemical/elecrolysis cell. Pyrometallurgy: Ore treatment by roasting, calcination, and sintering. Melting and smelting, matte smelting. Reduction of iron ore from blast furnace. Direct smelting/melting.

COURSE OUTCOMES

1. Ability to discuss and practice the principle and process involved in mineral processing.
2. Ability to discuss and differentiate the theory in hydrometallurgy, electrometallurgy and pyrometallurgy.
3. Ability to demonstrate mineral or metal extraction process from its ore using hydrometallurgy, electrometallurgy and pyrometallurgy.
4. Able to explain extraction process of some metals that have been established worldwide.

REFERENCES

1. A.R. Burkin, "Chemical Hydrometallurgy: Theory and principle", London Imperial College Press, 2001.
2. G.K. Errol, "Introduction To Mineral Processing", Mineral Engineering Services, Australia, 1989.
3. Samsul Bahar Sadli, "Asas proses Metalurgi", Dewan Bahasa dan Pustaka, Kuala Lumpur, 1998.
4. Fathi Habashi,"Handbook of Extractive Metallurgy, Volume II", Wiley-VCH, 1997.
5. Chiranjib Kumar Gupta, "Chemical Metallurgy", Wiley-VCH, 2003.

PDT 263/3
PLASTIC PROCESSING

COURSE SYNOPSIS

This course will provide students with a broad knowledge on the aspect of thermoplastic and thermoset processing methods, parameters, and also knowledge on the thermoplastic and thermoset compounding and additives. This course also will expose student to environmental of plastic product.

COURSE OUTCOMES

1. Able to discuss the concept of plastic materials and illustrate the physical basis of plastic processing
2. Able to prepare plastic product from different techniques parameter for thermoplastic and thermoset processing
3. Able to asses the finishing and assembly of plastic processing end product
4. Able to practice the environmental aspect of plastic product

REFERENCES

1. A.Brent Strong, Plastics Materials and Processing, 1st edition, Prentice Hall, 2000.
2. Manas Chanda, Salil K.Roy, Plastic Technology Handbook, 3rd edition, Marcel Dekker Inc,2003.
3. D.H Morton-Jones, Polymer Processing, Chapman and Hall Ltd, 1989
4. Suresh G.advani, E.Murat Sozer, Process modelling in Composites Manufacturing, Marcel Dekker Inc,2003

PDT 364/3
COMPOSITE MATERIALS PROCESSING

COURSE SYNOPSIS

This course is focusing on three major types of composite materials which are Ceramic Matrix Composite (CMC), Polymer Matrix Composite (PMC), and Metal Matrix Composite (MMC). Lectures cover on several important aspects of composite materials. This includes the introductions, classifications, properties, applications and characterizations of composite materials, matrix and reinforcement phase, manufacturing and processing methods, types and influence of different reinforcement, inter-phase properties, current and future potential applications of composite products. At the end of this course, students will have a comprehensive knowledge and well understanding regarding composite materials processing.

COURSE OUTCOMES

1. Able to define, classify and describe on each composite material.
2. Able to distinguish different phases in composite system and differentiate the effects of each phase's parameters to the final composite properties.
3. Able to understand the failure behaviour and strengthening mechanism of composite materials and also evaluate and predict the properties of different composite materials.
4. Able to analyse problems and come out with new idea and relevant opinion in order to develop better composite system.
5. Able to demonstrate and well understanding the fabrication of each composite materials using conventional and advanced processing.

REFERENCES

1. Mathew, F.L., Rawlings, R.D., Composite Materials: Engineering and Science, Chapman & Hall, 1998.
2. D. Hull, T. W. Clyne, An Introduction to Composite Materials, 2nd Edition, 1996.
3. Ronal F.G. , Principles of Composite Material Mechanic, McGraw-Hill, 1994.
4. Schwartz, M.M, Composite Materials Handbook, McGraw-Hill, 1992.

PDT 362/3
METAL FABRICATION TECHNOLOGY

COURSE SYNOPSIS

Metal fabrication technology program focused towards sheet metal, plates and structure fabrication in the engineering and construction field. Metal fabrication technology will exposed student to the heavy metal plating used in building structure and wall panels, oil and gas, power station, pipeline building in the transportation of liquid and gas, large storage boilers and vessels, platform for oil and rigs and heavy industrial plant. Student will be provided with strengthening of theoretical knowledge with high degree of design and practical work usage of modern CNC metal fabrication machinery, equipment and state-of-the-art CAD/CAM solutions. The main objective of the course is to prepare students to the needs and demands of the current and future industry with regards to fabrication, welding, inspection and testing.

COURSE OUTCOMES

1. Ability to discuss and practice the principle and process involved in metal fabrication process.
2. Ability to discuss and differentiate the theory in metal fabrication.
3. Ability to demonstrate metal fabrication process using shearing, punching, forming and welding.
4. Able to explain and design metal fabrication process using CAD/CAM and CNC.

PDT 351/3
MATERIALS FAILURE ANALYSIS

COURSE SYNOPSIS

A comprehensive overview of the field, this course covers three principal areas of interest such as procedures for failure analysis, root-caused of failure, failure mechanisms and recommendation to prevent future failure.The forensic analysis of product/component failures is also studied from beginning to end for certain case studies that normally happen in industries. The module also provides hands-on experience on material failure analysis during laboratory work and on site visit. Student also exposed with technical report writing technique through mini project.



COURSE OUTCOMES

1. Be able to implement general procedures, techniques and precautions of in failure analysis.
2. Be able to analyse the exposed and extract the hidden information presented by failed product/ component that may resulted from wide variation of failure factors.
3. Be able to develop corrective and preventive actions based on failure analysis findings.
4. Ability to evaluate what material failure analysis is, in terms of profitability and liability.

REFERENCES

1. Brooks, C.R., Choudhury, A., Brooks, C.R. 2001 Failure Analysis of Engineering Materials. McGraw-Hill. . New York
2. Becker, William T.; Shipley, Roch J. 2002 ASM Handbook, Volume 11 - Failure Analysis and Prevention.
3. Moalli, J. 2001. Plastics Failure - Analysis and Prevention. William Andrew Publishing/Plastics Design Library.
4. McEvily, A.J. 2002. Metal Failures: Mechanisms, Analysis, Prevention. John Wiley & Sons. New York

PDT 352/3
DESIGN OF DIE & MOULDS

COURSE SYNOPSIS

The aim of this course is to derive knowledge on mould design for plastic injection moulding purposes and general die design. The generate knowledge will provide an effective skill to counter and solve the common problem approach in mould and die basis.

COURSE OUTCOMES

1. Able to describe and discuss the concept of mould and die design.
2. Able to analyze the detail of mould and die design and its purpose to get an optimum processing conditions.
3. Able to compose the optimize mould design and die design condition for different type of molding requirement.
4. Able to simulate the development of mould and die design and evaluate the obtain data.

REFERENCES

1. Micheali, W (1992) Extrusion Dies for plastics and rubber: Design and Engineering. Munich: Hanser Publishers.
2. Michaeli, W.; Greif, H.; Kretzschmar, G.; Ehrig, F. (2001) Training in Injection Molding. Munich: Hanser Publishers.
3. Paquin, J.R. (1986), Die Design Fundamentals, New York: Industrial Press.
4. Smith, D.A. (1990), Die Design Handbook, New York: Society of Manufacturing Engineers.

PDT 451/3
MATERIALS SELECTION & DESIGN

COURSE SYNOPSIS

This course builds an understanding of the inter-relationship between selection, materials processing, product design (material, design and processing) and product performance to develop a holistic approach to optimum selection of materials for engineering and industrial applications. The focuses of this course are fundamentals of the design process, specifications, decision-making, materials selection, materials process, experimental design, statistic process control and preliminary design. The course integrates vertically and horizontally concepts from all areas of engineering technology and material processing and into a practical design project designed to train the students in the design practice.

COURSE OUTCOMES

1. Able to define and describe fundamental materials design and selection.
2. Able to relate materials knowledge, processing, microstructure and performance and their implication with materials design.
3. Able to design and make a selection material using a method: performance index and efficiency of materials, weibull modulus, base on mechanical factors, semi quantitative and others.

REFERENCES

1. Engineering Design, A Materials and Processing Approach, George E. Dieter, McGraw-Hill Company, Third Edition, 2000.
2. Pat. L. Mangonon. 1999. The principles of Materials Selection for Engineering Design. Prentice Hall.
3. Schaffer, Saxena, Antolovich, Sanders, Warner. 1999. The Science and Design of Engineering Materials. McGraw Hill.
4. Mahmud M. Farag. 1989. Selection of Materials and Manufacturing Process for Engineering Design. Prentice Hall.
5. The Engineering Design Process, Atila Ertas and Jesse C. Jones, John Wiley & Sons, Inc., 1993.

SCHOOL OF BUSINESS INNOVATION AND TECHNOPRENEURSHIP (PPIPT)

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INTRODUCTION

The School of Business Innovation and Technopreneurship (PPIPT), Universiti Malaysia Perlis was officially established on June 4th, 2010. The main objective of its establishment is to invigorate the knowledge acquiring process in the fields of business, economics and entrepreneurship across all departments in UniMAP. The establishment of PPIPT also aims to catalyse the development of entrepreneurship in Perlis.

Since July 2009, PPIPT has been offering two bachelor degree programs, namely the Bachelor of Business with Honours specialising in Engineering Entrepreneurship, and the Bachelor of Business with Honours specialising in International Business. The Engineering Entrepreneurship program enables students to be directly involved in business organisations through its business incubator program. This incubator program runs for ten weeks during the semester break weighing 6 credit hours, through the placement of students in selected business incubators throughout the country. Students are exposed to new product development stage up to the commercialisation stage. They have the opportunity to develop valuable networking with entrepreneurs and business leaders through activities organised from time to time. In addition, the basic knowledge of engineering that encompasses various disciplines of engineering are also exposed in the program. Students are trained to become entrepreneurs and become a catalyst for economic growth through business and entrepreneurial activities that will be a key driver towards achieving a developed nation status by 2020.

Meanwhile, the Bachelor of Business program specialising in International Business provides opportunities for students to enrol in at least one of the seven foreign language courses offered in UniMAP which includes Mandarin, Thai, Arabic, Japanese, Korean, Russian and German. The foreign language courses are to be taken in four consecutive stages. Through the International Business program, students have the opportunity to undergo a 16-week Industrial Training which is divided into two parts. In Part 1, students are required to attend 8 weeks of Industrial Training after one year of study. Whereas in Part 2, students will be attending another 8 weeks of Industrial Training after their second year of study. Students are permitted to do their Industrial Training either in local or overseas settings. The School of Business Innovation and Technopreneurship, Universiti Malaysia Perlis (UniMAP) believes that Industrial Training is an important part of students' career preparation. It should be used to help students to identify their career path in any businesses related fields; to gain experience and expertise in students' area of interest; to determine the level of skills needed by the students to develop in order to become successful after their graduation. In addition, students have the opportunity to both observe and participate in a range of real world business experiences related to their studies.

In 2011, PPIPT introduced the Master of Business Administration (MBA) specialising in Engineering Management. This is a unique program as it is designed to meet the engineers' needs and requirements to become future managers in any organisations or companies. In 2012, PPIPT offers more graduate programs namely the Master of Science (MSc) and the Doctorate degrees in various fields related to business, which includes finance, accounting, marketing, economics, management and entrepreneurship.

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BACHELOR OF BUSINESS (HONOURS) (ENGINEERING ENTREPRENEURSHIP)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Graduates who are entrepreneurs

PEO2
Graduates who are entrepreneurial leaders in the chosen field as demonstrated through career advancement.

PEO3
Graduates who pursue continuous educational opportunities.

PEO4
Graduates who contribute to society.

PEO5
Graduates who contribute through research and development.

PROGRAMME OUTCOMES (PO)

PO1
Ability to apply knowledge of entrepreneurship, business management and basic engineering.

PO2
Ability to identify problems, create solutions and innovate to improve decision making and problem solving.

PO3
Ability to apply business operation practices and principles used in the current business environment.

PO4
Ability to communicate effectively.

PO5
Ability to demonstrate an in-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO6
Ability to understand professional and ethical responsibilities.

PO7
Ability to operate with multi-disciplinary teams.

PO8
Ability to recognize the need for, and engage in life-long learning.

PO9
Ability to understand social, cultural and environmental responsibilities of an entrepreneur/manager.

PO10
Ability to recognize potential utilities of engineering applications as business opportunities.

CURRICULUM STRUCTURE FOR BACHELOR OF BUSINESS (HONOURS) (ENGINEERING ENTREPRENEURSHIP)

YEAR	FIRST			SECOND		SEMESTER BREAK	THIRD	
SEMESTER	FIRST	SECOND		FIRST	SECOND		FIRST	SECOND
Business Program Core / Elective Courses	BFT 101/3 Business Economics	BFT 107/3 Principles of Finance	SEMESTER BREAK	BFT 103/3 Business Law & Ethics	BFT 219/3 Product Design & Development	BIT 291/6 INCUBATOR PROGRAM (12 weeks)	BFT 223/3 Human Resource Management	BFT 338/3 Strategic Management
	BFT 105/3 Introduction to Business	BFT 108/3 Principles of Marketing		BFT 211/3 Business Innovation	BFT 220/3 Technology Entrepreneurship		BFT 318/3 Research Methodology	BFT 362/3 Business Plan for Engineering Project
	BFT 106/3 Principles of Accounting	BFT 110/3 Organisational Behaviour		BFT 213/3 Business Venture Management	BFT 221/3 Operation Management		BFT 326/3 Project Management	BFT xxx/3 Elective (**Elective 8**)
	BFT 109/3 Principles of Management	BQT 173/3 Business Statistics		BFT 218/3 Introduction to Manufacturing Technology	BFT 222/3 Managerial Accounting		BFT xxx/3 Elective (**Elective 5**)	BFT xxx/3 Elective (**Elective 9**)
	BQT 133/3 Business Mathematics			BFT xxx/3 Elective (**Elective 1**)	BFT xxx/3 Elective (**Elective 2**)		BFT xxx/3 Elective (**Elective 6**)	BFT xxx/3 Elective (**Elective 10**)
					BFT xxx/3 Elective (**Elective 3**)		BFT xxx/3 Elective (**Elective 7**)	
					BFT xxx/3 Elective (**Elective 4**)			
University Required Courses	UUW 410/2 Malay Language	BUW 123/3 Business Communication		UZW xxx/1 Co-Curriculum			UUW 235/2 Ethnic Relations or UUW 239/2 Malaysian Studies	UUW 322/2 Thinking Skills
	UZW 1xx/1 Co-Curriculum (Uniformed Body)	UUW 224/2 Engineering Entrepreneurship		UVW 211/2 English for General Purposes (MUET BANDS 1, 2, 3)			UVW 313/2 English for Academic Purposes (MUET ALL BANDS)	
		UZW 2xx/1 Co-Curriculum (Uniformed Body)		UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures				
122 units	18	18		20	21	6	22	17

Note:
1. Students who obtained MUET Band 2 have to take and pass UVA 112 Foundation English course in the First Year, Second Semester before taking UVW 211 English for General Purposes.
2. Elective Courses: Students need to take ELECTIVE courses that are offered by PPIPT.

BACHELOR OF BUSINESS (HONOURS) (INTERNATIONAL BUSINESS)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
Graduates who are managers

PEO2
Graduates who are business leaders experienced in global/ international business environment

PEO3
Graduates who pursue continuous educational opportunities

PEO4
Graduates who contribute to society

PEO5
Graduates who contribute through research and development

PROGRAMME OUTCOMES (PO)

PO1
Ability to apply knowledge of business management in the work environment

PO2
Ability to identify problems, create solutions and innovate to improve decision making and problem solving

PO3
Ability to apply business operation practices and principles used in the current business environment

PO4
Ability to communicate effectively

PO5
Ability to demonstrate an in-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development

PO6
Ability to understand professional and ethical responsibility

PO7
Ability to operate with multi-disciplinary teams

PO8
Ability to recognize the need for, and engage in life-long learning

PO9
Ability to understand the social, cultural and environmental responsibilities from a global perspective

PO10
Ability to adapt to international business environments

PO11
Ability to communicate proficiently in foreign languages

CURRICULUM STRUCTURE FOR BACHELOR OF BUSINESS (HONOURS) (INTERNATIONAL BUSINESS)

YEAR	FIRST		SEMESTER BREAK	SECOND		SEMESTER BREAK	THIRD	
SEMESTER	FIRST	SECOND		FIRST	SECOND		FIRST	SECOND
Business Program Core / Elective Courses	BFT 101/3 Business Economics	BFT 103/3 Business Law & Ethics	BIT190/3 INDUSTRIAL TRAINING 1 (8 weeks)	BFT 107/3 Principles of Finance	BFT 221/3 Operation Management	BIT 290/3 INDUSTRIAL TRAINING 2 (8 weeks)	BFT 351/6 Final Year Project	
	BFT 105/3 Introduction to Business	BFT 108/3 Principles of Marketing		BFT 202/3 International Business Management	BFT 222/3 Managerial Accounting		BFT 337/3 International Marketing	BFT 335/3 International Business Environment
	BFT 106/3 Principles of Accounting	BFT 110/3 Organizational Behavior		BFT 223/3 Human Resource Management	BFT 314/3 Cross-Cultural Management		BFT xxx/3 Elective (**Elective 4**)	BFT 338/3 Strategic Management
	BFT 109/3 Principles of Management	BQT 173/3 Business Statistics		BFT xxx/3 Elective (**Elective 1**)	BFT 318/3 Research Methodology		BFT xxx/3 Elective (**Elective 5**)	BFT xxx/3 Elective (**Elective 8**)
	BQT 133/3 Business Mathematics			BFT xxx/3 Elective (**Elective 2**)	BFT xxx/3 Elective (**Elective 3**)		BFT xxx/3 Elective (**Elective 6**)	BFT xxx/3 Elective (**Elective 9**)
							BFT xxx/3 Elective (**Elective 7**)	
University Required Courses	UVW 1x1/2 Foreign Language (Part 1)	UVW 1x2/2 Foreign Language (Part 2)		UVW 2x3/2 Foreign Language (Part 3)	UVW 2x4/2 Foreign Language (Part 4)		UVW 313/2 English for Academic Purposes (MUET ALL BANDS)	UUW 322/2 Thinking Skills
	UUW 235/2 Ethnic Relations or UUW239/2 Malaysian Studies	UVW 211/2 English for General Purposes (MUET Bands 1, 2, 3)		BUW 123/3 Business Communication	UUW 224/2 Engineering Entrepreneurship			
	UZW 1xx/1 Co-Curriculum (Uniformed Body)	UZW 2xx/1 Co-Curriculum (Uniformed Body)		UZW xxx/1 Co-Curriculum				
		UUW 410/2 Malay Language						
		UUW 233/2 Islamic & Asian Civilizations or UUW 237/2 Malaysian Cultures						
124 units	20	21	3	21	19	3	20	17

Note:
1. Students who obtained MUET Band 2 have to take and pass UVA 112 Foundation English course in the First Year, First Semester before taking UVW 211 English for General Purposes.
2. Elective Courses: Students need to take ELECTIVE courses that are offered by PPIPT.



LIST OF COURSES

BUSINESS CORE COURSES

- BFT 101/3 BUSINESS ECONOMICS
- BFT 103/3 BUSINESS LAW & ETHICS
- BFT 105/3 INTRODUCTION TO BUSINESS
- BFT 106/3 PRINCIPLES OF ACCOUNTING
- BFT 107/3 PRINCIPLES OF FINANCE
- BFT 108/3 PRINCIPLES OF MARKETING
- BFT 109/3 PRINCIPLES OF MANAGEMENT
- BFT 110/3 ORGANIZATIONAL BEHAVIOUR
- BFT 221/3 OPERATION MANAGEMENT
- BFT 222/3 MANAGERIAL ACCOUNTING
- BFT 223/3 HUMAN RESOURCE MANAGEMENT
- BFT 318/3 RESEARCH METHODOLOGY
- BFT 338/3 STRATEGIC MANAGEMENT
- BQT 133/3 BUSINESS MATHEMATICS
- BQT 173/3 BUSINESS STATISTICS

CORE COURSES FOR ENGINEERING ENTREPRENEURSHIP (RP52)

- BFT 211/3 BUSINESS INNOVATION
- BFT 213/3 BUSINESS VENTURE MANAGEMENT
- BFT 218/3 INTRODUCTION TO MANUFACTURING TECHNOLOGY
- BFT 219/3 PRODUCT DESIGN & DEVELOPMENT
- BFT 220/3 TECHNOLOGY ENTREPRENEURSHIP
- BFT 326/3 PROJECT MANAGEMENT
- BFT 362/3 BUSINESS PLAN FOR ENGINEERING PROJECTS
- BIT 291/6 INCUBATOR PROGRAM

CORE COURSES FOR INTERNATIONAL BUSINESS (RE09)

- BFT 202/3 INTERNATIONAL BUSINESS MANAGEMENT
- BFT 314/3 CROSS CULTURAL MANAGEMENT
- BFT 335/3 INTERNATIONAL BUSINESS ENVIRONMENT
- BFT 337/3 INTERNATIONAL MARKETING
- BFT 351/6 FINAL YEAR PROJECT
- BIT 190/3 INDUSTRIAL TRAINING 1
- BIT 290/3 INDUSTRIAL TRAINING 2
- UVW XXX/2 FOREIGN LANGUAGE (LEVELS 1 TO 4)

ELECTIVE COURSES FOR ENGINEERING ENTREPRENEURSHIP (RP52)

- BFT 104/3 E-BUSINESS
- BFT 112/3 INTRODUCTION TO ENGINEERING
- BFT 113/3 ENGINEERING DRAWING
- BFT 212/3 BUSINESS FRANCHISING AND LICENSING
- BFT 214/3 ENGINEERING ECONOMICS
- BFT 215/3 ENTREPRENEURIAL FINANCE
- BFT 216/3 ENTREPRENEURIAL MARKETING
- BFT 316/3 LEADERSHIP IN ORGANIZATION
- BFT 319/3 RISK MANAGEMENT
- BFT 321/3 SERVICES MARKETING
- BFT 322/3 SUPPLY CHAIN MANAGEMENT
- BFT 325/3 LOGISTICS MANAGEMENT
- BFT 328/3 MANAGING ENGINEERING AND TECHNOLOGY

ELECTIVE COURSES FOR INTERNATIONAL BUSINESS (RE09)

- BFT 104/3 E-BUSINESS
- BFT 201/3 INTERNATIONAL ACCOUNTING
- BFT 203/3 INTERNATIONAL ECONOMICS
- BFT 204/3 INTERNATIONAL FINANCE
- BFT 205/3 INTERNATIONAL HUMAN RESOURCE MANAGEMENT
- BFT 316/3 LEADERSHIP IN ORGANIZATION
- BFT 321/3 SERVICES MARKETING
- BFT 322/3 SUPPLY CHAIN MANAGEMENT
- BFT 325/3 LOGISTICS MANAGEMENT
- BFT 330/3 NEGOTIATION AND CONFLICT RESOLUTION
- BFT 344/3 IMPORT EXPORT MANAGEMENT
- BFT 346/3 CHANGE MANAGEMENT

COURSE SYNOPSIS

BUSINESS CORE COURSES

BFT 101/3
BUSINESS ECONOMICS

COURSE SYNOPSIS

This course applies the tools of economic analysis to issue in business management, developing the student's abilities to problem solving using microeconomic and macroeconomic approaches. The module will focus on the operation of markets for goods and services demand and supply analysis, entrepreneurship, emergence and growth of firms, costs of production, different forms of competition and game theory, the macroeconomic environment and government policy.

REFERENCES

1. Nellis, J.G. and Parker, D. (2008). Principles of Business Economics, (2nd ed.), Prentice Hall, Pearson
2. Tucker, I.B (2011). Survey of Economics, (7th ed.), South-Western, Cengage Learning.
3. Mastrianna, F.V. (2010). Principles of Economics, (15th ed.), South-Western, Cengage Learning.

BFT 103/3
BUSINESS LAW & ETHICS

COURSE SYNOPSIS

Law governs our daily activities. Similarly, there are certain rules that we have to follow in business transactions. The purpose of having these laws is to provide remedies for the aggrieved parties to take action in the occurrence of any breach of the laws. Business ethics deals with what is right and wrong in organizational decisions, behaviour and policies. Ethics provides the principles and guidelines to assist people in making choices to balance up economic interests and social responsibilities. The main objective of this course is to nurture students' abilities to discuss various laws and ethical issues which affect business operation. Ethical issues exposed include business operations and how business effectively operates.

REFERENCES

1. Lee Mei Pheng & Ivan Jeron Detta, (2009), Business Law, Oxford University Press.
2. Nuraisyah Chua Abdullah, (2003), Business Law In Malaysia, Pusat penerbitan Universiti Teknologi MARA.
3. Abdullah Haji Abdul Ghani & Mohammad Zainol Abidin Adam, (2010), Business Ethics, Oxford University Hall.

BFT 105/3
INTRODUCTION TO BUSINESS

COURSE SYNOPSIS

This course presents business theories and practice in comprehensive manner. It focuses on an integrated view of business such as developing a business mindset, business in the global economic environment, business organization and management, business operations and technology and financial management.

REFERENCES

1. Dlabay,L., Burron, J.L. and Eggland, S.A. (2010). 'Intro to Business', Asia Edition . Singapore: Cengage Learning Asia Pte. Ltd.
2. Pride,William M., Hughes R.J, and Kapoor J.R. (2010). Introduction to Business, 10th Edition, South-Western-Cengage Learning Pub
3. Ebert R.J., Griffin, Ricky W. (2011). Business Essentials, (8th edition), New Jersey: Pearson Education Inc.
4. Bovee, Courtland L., Thill, John V. (2011), Business in Action 5th Ed., New Jersey: Pearson Education Inc.
5. McDaniel, Carl., Gitman, Lawrence J. (2008), The Future Business 6th Ed., Thomson South Western.

BFT 106/3
PRINCIPLES OF ACCOUNTING

COURSE SYNOPSIS

This introductory course to business accounting, introduces students to the environment of accounting. The course covers nature of accounting and accounting concepts that are relevant to the preparation and presentation of financial statements. This course also exposes students to the skills of analyzing and interpreting the financial statements.

REFERENCES

1. Frank A, (2008). 'Business Accounting 1', Pearson Prentice Hall Pub.
2. A. Wong (2007).' Business Accounting', Pearson Prentice Hall Pub.
3. Reeve, J., Warren,C.S and Duchac, J.E. (2007), 'Principles of Accounting',Thomson South-Western.
4. Roshayani, Laily and Maznah (2007), Financial Accounting: An Introduction, McGrew Hill.
5. Weygandt, J.J. Kieso, D.E and Kimmel, P.D. (2007), Accounting Principles, John Wiley & Sons.

6. Wild, J.J., Larson, K.D and Chiappetta, B. (2006), Fundamental Accounting Principles, McGrew Hills.

BFT 107/3
PRINCIPLES OF FINANCE

COURSE SYNOPSIS

This course provides an introduction to financial decision making rooted in current financial theories and in current state of world economic conditions with emphasis on capital markets and their influences on corporate financial decisions. The aim of this course is to provide tools that enable students to summarize new and unforeseen financial related problems.

REFERENCES

1. Keown, Martin, Perry (2011). Foundations of Finance: The Logics and Practice of Financial Management,, Pearson International Edition 7th Ed.,Pearson Prentice Hall Publication.
2. Titman, Keown and Martin (2011), Financial Management: Principles and Application, Pearson International Edition, 11th Ed., Pearson Prentice Hall Publication.
3. Fabozzi, Modigliani, Jones, (2010), Foundations of Financial Markets and Institutions, Pearson International Edition 4th Ed., Pearson Prentice Hall Publication.
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5. Brigham, Houstan, Chian, Lee and Ariffin (2010), Essentials of Financial Mangement 2nd Ed., Cengage Learning.
6. Brigham, Houstan, Chian, Lee and Ariffin (2011), Core Conceppts of Financial Management, Cengage Learning.

BFT 108/3
PRINCIPLES OF MARKETING

COURSE SYNOPSIS

Marketing is one of the three foundations in any business besides operations management and finance. Every business entity small, medium or multinational organizations need to have this component. This course aims to familiarize student with the important concerns of marketing and the importance of how, when, why and where to promote the business.

REFERENCES

1. P.Kotler, G. Armstrong, (2014), Principles of Marketing An Asian Perspective, Pearson Education South Asia Pte. Ltd.
2. Kurtz, D.L., Young, V. (20018), Principles of Contemporary Marketing, Thomson South-Western, USA.
3. P.Kotler, G. Amstrong (2009), Marketing An Introduction, Pearson Education Inc.
4. P. Kotler, G. Mastrong (2009), Principles of Marketing A Global Perspective, Pearson Education South Asia Pte. Ltd.
5. Hartley, R. H (2006), Marketing Mistakes and Success, John Wiley and Sons.

BFT 109/3
PRINCIPLES OF MANAGEMENT

COURSE SYNOPSIS

This course is about management and managers. Manager is very important in all organizations – regardless of business size, kind, or location-need. And there's no doubt that the world that managers face has changed, is changing, and will continue to change. The dynamic nature of today's organizations means both rewards and challenges for the individuals who will be managing those organizations.

REFERENCES

1. Robbins, S.P., DeCenzo, D.A., Coulter, M. (2011), Fundamentals of Management, (7th Edition), Pearson.
2. Richard, L.D. (2010), New Era of Management, (9th Edition), South-Western Cengage Learning.
3. Schermerhorn, J. Jr. (2008), Management, (9th Edition), John Wiley & Sons, Inc.
4. Drucker, P. F. (2007), Management Challenges for the 21st Century, Collins Business.

BFT 110/3
ORGANIZATIONAL BEHAVIOUR

COURSE SYNOPSIS

The main reason for studying organizational behaviour is that most of us work in organizations, so we need to understand, predict, and influence the behaviours of others in organizational settings. All of us need organizational behaviour knowledge to address the people issues.

REFERENCES

1. Quick, J.C & Nelson, D. L (2011), Principles of Orgazational Behavior: Realities and Challenges 7th Ed., Australia: South Western Cengage Learning.
2. George, J. M & Jones, G. R (2012), Understanding and Managing Organizational Behavot 6th Ed., Boston, Pearson.
3. Moorhead, G. & Griffin, R. W (2012), Managing Organizational Behavior 10th Ed., Australia: South Western Cengage Learning.
4. Slocum, J. W& Hellriegel, D. (2011), Principles of Organizational Behavior 13th Ed., Australia: South Western Cengage Learning.
5. Nelson, D. L. & Quick, J.C. (2008), Understanding Organizational Behavior,3rd Ed., Australia: South Western Cengage Learning.
6. Colqiutt, J.S., Le Pine, J.A. & Wesson, M.J. (2010), Organizational Behavior: Essentials for Improving Performing and Commitment, Boston: McGraw-Hill Irwin.
7. Griffin, R. W. & Moorhead, G., (2010), Organizational Behavior: Managing People and Organizations 9th Ed., Australia: South Western Cengage Learning.
8. Newstrom, J.W (2007), Organizational Behavior: Human Behavior At Work 12th Ed., Boston: McGraw-Hill Irwin.

BFT 221/3
OPERATION MANAGEMENT

COURSE SYNOPSIS

This course will be of interest to business programs students because Operation Management is one of the three major foundations in any business organization beside Marketing and Finance/Accounting. Every Business, whether small, medium or Multinational Organization have operations component. This course will familiarize students with the important concerns of operation management decisions.

REFERENCES

1. Render and Heizer,(2010) Operations Management (10th Edition), Prentice Hall.
2. William J. Stevenson (2007), Operations Management (9th Edition), McGraw-Hill.
3. Krajewski and Ritzman, (2010) Operations Management, Ninth Edition, Prentice Hall.
4. Slack N, Chambers S, Johnston R, (2003), Operation Management 4th ed., Prentice Hall.

BFT 222/3
MANAGERIAL ACCOUNTING

COURSE SYNOPSIS

This course aims to provide students with a pedagogy that helps them to build their decision-making skills and to equip them with manipulative skills in dealing with accounting information to make decisions. Focuses on contemporary issues which include interpreting financial information as a basic function for top management to plan, control and making decision in the internal organization operations. Students also learn how to manage business units effectively.

REFERENCES

1. Mowen, Hansen and Heitger (2012), Managerial Accounting: The Cornerstone of Business Decisions (4th Edition), South Western Cengage Learning.
2. Brewer, Garrison and Noreen (2010), Introduction to Managerial Accounting (5th Edition), McGraw-Hill.
3. Horngren, Sundem, Stratton, Burgstahler and Schatzberg (2011), Introduction to Management Accounting (15th Edition), Prentice Hall
4. Oliver and Hengren (2010), Managerial Accounting, Prentice Hall.

BFT 223/3
HUMAN RESOURCE MANAGEMENT

COURSE SYNOPSIS

To develop skills in making rationale decisions in managing human resource. A good human resource manager needs to guide their employees, influence their behaviours and motivate them and to become a catalyst to achieve maximum impact of organizational goals.

REFERENCES

1. Maimunah Aminuddin (2011). Human Resource Management: Principles and Practices (2nd Edition). Shah Alam: Oxford Fajar.
2. Maimunah Aminuddin, (2009), Human Resources Management (Revision Series), Selangor: Oxford Fajar.
3. Mondy, R. W. & Mondy, JB. (2012), Human Reosurce Management (12th Edition), Pearson, Boston.
4. Noe, R. A., hollenbeck, J. R. Gerhart, B. & Wrighta, P.M. (2010), Human Resource Management: Gaining a Competitive Advantage 7th Ed., Boston: McGraw Hill.
5. Dessler, G. (2012), Fundamental of Human Resouce Management 2nd Ed., Pearson Education, New Jersey.
6. Dessler, G. (2011), Human Resource Management 12th Ed., Pearson Education, New Jersey.
7. Dessler. G. & Chwee huat, T. (2009), Human Resource management: An Asian Perspective 2nd Ed., Prentice Hall, Singapore.



BFT 318/3
RESEARCH METHODOLOGY

COURSE SYNOPSIS

To provide students with the tools and skills required to understand research terminology and types of methods best suited for investigating different types of problems and questions especially in business.

1. Mark Saunders, Philip Lewis and Andrian Thornhill, Research Methods for Business Students 5th Edition, (2009), Prentice Hall.
2. Cooper D. R and Schindler P.S. (2010), Business Research Methods 8th Edition, Prentice hall Publications Fourth Edition.
3. Pervez Ghauri and Kjell Gronhaug (2010), Research Methods in Business Studies, Prentice Hall Publications 4th Ed.
4. Sekaran U. (2010) Research Methods for Business: A Skill-Building Approach (5th Ed). John Wiley & Sons.
5. Zikmund, Babin, Carr and Griffin, Business Research Methods 8th Ed. (2009), south Western.

BFT 338/3
STRATEGIC MANAGEMENT

COURSE SYNOPSIS

This is a capstone program that inter-relates the business courses that students have previously taken and is one of the compulsory core courses for all business students.

PREREQUISITE

- Final Year Student only

REFERENCES

1. Wheelen, T. L. & Hunger, J. D. (2012). Strategic Management and Business Policy: Toward Global Sustainability (13th edition). United States: Pearson Educ. Inc.
2. Haim, H. A. (2010). Pengurusan Strategik: Konsep dan Kes (3rd. edition). Kuala Lumpur: Pearson-Prentice Hall.
3. Ireland, R.d., Hoskisson, R. E & Hitt, M. A (2011), The Management of Strategy: Concepts and Cases 9th Ed., South Western.
4. David, F. R. (2011). Strategic Management: Concepts and Cases (13th edition). New Jersey: Prentice Hall.
5. Barney, H., & Hesterley, W.S. (2008), Strategic Management and Competitive Advantage: Concepts and Cases 2nd Ed., New Jersey, Pearson International.
6. Dess, G. Lumkin, G.T., & Eistner, B. A (2008), Startegic Management: Text and Cases 4th Ed., United States of America, Mc Graw Hill.
7. Hill, W.L.C & Jones, G. R (2009), Theiry of Strategic Management with Cases 8th Ed., United States of America, south Western.
8. Jennings, D. (2002), Startegic Management: AN Evaluation of the Use of Three Learning Methods, Journal of Management Development, Vol. 21 No. 9 pp. 655-665.

BQT 133/3
BUSINESS MATHEMATICS

COURSE SYNOPSIS

The purpose of the course is to provide the students with some mathematical techniques which could help them to make better decisions in dealing with business challenges. Topics learnt include: Matrix Algebra, Financial Mathematics, Differential Calculus and Integral Calculus.

REFERENCES

1. Brechner R, (2008). Contemporary Mathematics for Business and Consumers, South-Western College Pub.
2. Slavin S., Stouffer T.(2007). Business Math, John Wiley.
3. Shannon J. (1995). Mathematics for Business, Economics and Finance, John Wiley and Son

BQT 173/3
BUSINESS STATISTICS

COURSE SYNOPSIS

This course covers topics on data and statistics, descriptive statistics (tabular, graphical presentation and numerical measures), introduction to random the variable, discrete and continuous probability distributions, sampling and sampling distributions, estimation, hypothesis tests, regression and correlation, and introduction to multiple regression.

REFERENCES

1. Mark, L. B., Levine, D. M. & Krehbiel, T.C. (2008). Basic Business Statistics. (11th edition), Prentice Hall.
2. Bowerman, O. & Orris, P. (2008). Essentials of Business Statistics. (2nd edition), McGraw Hill/Irwin.
3. Weiers, R. M. (2007). Introduction to Business Statistics. Duxbury Press, An International Thomson Publishing Company.

CORE COURSES FOR ENGINEERING ENTREPRENEURSHIP (RP52)

BFT 211/3
BUSINESS INNOVATION

COURSE SYNOPSIS

The course explains business opportunities emerging in both business and society's contemporary needs. Main focus of this course is to manipulate student's thinking skills especially in creative and innovative aspects. As a result they shall produce new products, services or processes for customers who would address issues of market segmentation and saturation and changing customer values and user requirements. Creativity and innovation are vital elements for all level of business in order to grow and expand.

REFERENCES

1. Pervaiz Ahmed and Charlie Shepherd (2010). Innovation Management: Context, strategies, systems and processes (10th ed). Financial Times Press.
2. Mahmood, R., et. all. (2009). Prinsip-prinsip Keusahawanan: Pendekatan Gunaan (2nd ed). Sintok: CENGAGE-Learning.
3. Aman Shah, S.H & Mohd Ali, Abd. R. (2008). Entrepreneurship. Selangor: Oxford Fajar Sdn Bhd.

BFT 213/3
BUSINESS VENTURE MANAGEMENT

COURSE SYNOPSIS

This course is indeed an extension subject of Introduction to Business (BFT 105). Students need to apply the knowledge that has been gained earlier for the implementation of the business venture and management process and strategies. The main objective of this course is to equip students with communication skills to make good business venture management decisions, and to formulate cost effective business strategies and programs, if we want to attain business organizational objectives. It requires students to integrate, in an optimal manner, the appropriate strategies associated with each element of the marketing mix (4Ps) to produce a comprehensive business venture management plan.

REFERENCES

1. Barringer, B.R. and Ireland, R.D (2012), Entrepreneurship Succesfully Launching New Ventures. (3rd Edition), Pearson Education, Singapore.
2. Timmons, J.A. (2009), New Venture Creation, Entrepreneurship for the 21st Century, 8th Ed., Mc Graw Hill Intenational Edition, Singapore.
3. Kathleen, R.A. (2012), New Venture Creation, (5th Edition), South Western Cengage Learning, Singapore.
4. Scarborough N.M (2011). Essentials of Entrepreneurship and Small Business Management, (Sixth Edition). Pearson, Singapore.

BFT 218/3
INTRODUCTION TO MANUFACTURING TECHNOLOGY

COURSE SYNOPSIS

This course introduces students to some fundamentals of manufacturing technology and its function in product development, production and business. Topics taught include introduction to manufacturing technology and its role in concurrent engineering, metallic and non-metallic material behaviours, casting, forming and shaping processes. Aspects of material removal, joining and surface technology are expose later. Finally, the engineering metrology and quality assurance, manufacturing system and automation, human factors and manufacturing costing.

REFERENCES

1. Kalpakjian S. and Schmid S. R. (2014), Manufacturing Engineering and Technology, (7th Ed.), Pearson.
2. Grover M. P,(2010) Fundamentals of Modern Manufacturing, (4th Ed.), John Willey & Sons, Inc.
3. P N Rao, (2013), Manufacturing Technology (4th Ed.), Mc Graw Hill Edu. (India).

BFT 219/3
PRODUCT DESIGN & DEVELOPMENT

COURSE SYNOPSIS

This course introduces students to various design aspects in the application of product development. Design plays an importance role in transforming product ideas into physical form which is vital to product development. The design function includes engineering design and industrial design. It is complemented by marketing and manufacturing.

REFERENCES

1. Karl T. Ulrich and Steven D. Eppinger (2012), Product Design and Development, 5th Intenatinal edition Ed., Mc Graw Hill International Edition.
2. Baxter, M. (1995), Product Design: Practical Methods for Systematic Development of New Product, CRC Press.
3. Priest, J. W. and Sanchez, J. M. (2001), Product Development and Design for Manufacturing: A Collaborative Approach to Producibility and Reliability (2nd Edition), Marcel Dekker, Inc.

4. Dieter, G.E. and Schmidt, L.C (2009), Engineering Design 4th Ed., Mc Graw Hill.
5. Cross, N. (2008), Engineering Design Methods: Strategies for Product Design, John Wiley & Sons.
6. Dym, C.L. and Little, P. (2008), Engineering Design: A Project-Based Introduction, John wiley and Sons.

BFT 220/3
TECHNOLOGY ENTREPRENEURSHIP

COURSE SYNOPSIS

This course concentrates on the innovative transformation of knowledge into commercial products and services. Students shall access real technologies for commercial potential in terms of licensing and for venture development. The course begins by examining concepts associated with technology commercialization. Concepts are introduced to improve and accelerate the commercialization process, from decisions made by scientist at the research bench, through the development, patenting, and licensing of new technologies, to the formation of entrepreneurial enterprises. Intellectual property studies are to be included in this course too.

REFERENCES

1. Byers, T.H., R.C & Nelson, A.J. (2011). Technology Venture: From Idea to Enterprise, Third Edition. McGraw-Hill.
2. Merges, Menell & Lemley (2007). Intellectual Property in the New Technological Age, Statutory Supplement.
3. Swanson, J.A. and Baird, M.L. (2003). Engineering Your Start-Up (2nd ed). Belmont, CA: Professional Publications.
4. Kamariah Ismailet al (2009), Technology Entreprenuership, Pearson Education.
5. Izaidin Abdul Majid & Kamariah Ismail (2009), Entrepreneurial Management and Technology-based Firms, Lambert Academic Publisher, Koln. Germany.
6. Fang Zhou (2008), Information Technology Entrepreneurship and Innovation, IGI Global Snippet.

BFT 326/3
PROJECT MANAGEMENT

COURSE SYNOPSIS

In this course, students shall learn basic management concepts and models that could enhance successful management of projects in engineering and technology. Topics include, structured approach to project management, project life cycle, project selection and evaluation, organizational concepts in project management, project planning, conflict and negotiation, budgeting and cost estimation, scheduling, resource allocation, monitoring, information systems and project evaluation and control, project reviewing and project termination.

REFERENCES

1. Pinto, J.K., (2010). Project Management – Achieving Competitive Advantage, (2th Edition). Pearson.
2. Clements & Gido (2012). Effective Project Management, (2th Edition). South-Western Cengage Learning.
3. Meredith & Mantel, Jr. (2006). Project Management - A Managerial Approach. (6th edition). John Wiley & Sons, Inc.
4. Kerzner, H. (2005), Project Management: A Systems Approach to Planning, Scheduling and Controlling, Wiley.
5. Wysocki, R.K., (2006), Effective Project Management: Traditional, Adaptive, Extreme, Wiley.

BFT 362/3
BUSINESS PLAN FOR ENGINEERING PROJECTS

COURSE SYNOPSIS

This course provides an exposure to the students to write a business plan proposal which combine business and basic engineering aspect. Students shall have an opportunity to put their learning into practice in a specific business plan format with specific product project. The product or project to be included in the proposal shall reflect from various sources such as the faculty, industry or student's project.

PREREQUISITE

- BFT213 Business Venture Management
- Result must be D+ and above

REFERENCES

1. Barringer, B.R. (2009). Preparing Effective Business Plans. Ph.D. Pearson Education Inc.

BIT 291/6
INCUBATOR PROGRAM

COURSE SYNOPSIS

This course exposes students to the actual entrepreneurship and business world. Students will be stationed in business incubators, and have been assigned to one of the newly startup

companies or enterprise. Students shall experience challenges which include start up a company / business the company procedures, banking activities, development of new product, business networking, management of the company and others. Exposure to business world shall trigger students into fostering an entrepreneurial network.

REFERENCES

1. UniMAP Business Incubator Guideline (September 2010)
2. UniMAP Business Incubator Log Book

CORE COURSES FOR INTERNATIONAL BUSINESS (RE09)

BFT 202/3
INTERNATIONAL BUSINESS MANAGEMENT

COURSE SYNOPSIS

This course covers broad survey of the field of international business and provides the foundations for further specialisation in this field. It begins with a brief overview of international business and focus on the concept of globalisation. The main objective of this course is to provide students with an understanding and knowledge of international business management concepts. This course also views thinking aspects of international business linked to management, organizations and contemporary culture. It encourages students to apply theories and ideas to practice and to relate them to their own experiences via various examples and many study cases from the business world and a range of practical activities.

REFERENCES

1. Cavusgil S. Tamer, Kinght Gary & Riesenberger John R. (2012), International Business: Environment & Operations 13th Ed., Pearson.
2. Daniels J. D., Radebaugh L. H., & Sullivan D. P. (2011), International Business: Environments and Operations, (13th Edition), Pearson.
3. Griffin R. W., & Pustay M. W. (2010), International Business, (6th Edition), Pearson.
4. Wild. John. J.& Wild Kenneth L. (2012), International Business: The Challenges of Globalization 6th Edition, Pearson.
5. Peng Mike W. (2011), Global Business 2nd Ed., South western Cengage Learning.

BFT 314/3
CROSS CULTURAL MANAGEMENT

COURSE SYNOPSIS

The increase of diversity and globalization in business require employees, especially managers, to develop cross-cultural competence, to work effectively in international assignments, on cross-cultural teams. This due to diversification customers and clients needs, and to effectively compete or collaborate with competitors, suppliers, partners, and relevant stakeholders, such as governments and other public bodies. Effective training and exposure to cultural differences around the world can help employees learn to be more successful in a variety of business settings. This course seeks to provide students with an understanding of effective cross-cultural management and the challenges occurred internationally. It focuses on culture and management, culture and communication and culture and communication.

REFERENCES

1. Joelle M. and Roger P. (2011), Understanding Cross-cultural Management, (Second Edition), Prentice Hall.
2. Ember C. R and Ember M. (2011), Cultural Anthropology, (13th Edition), Pearson.
3. Schneider, S.C and Barsoux, J.L (2003), Managing Across Culture, (Second Edition), Prentice Hall.
4. Holden, N. J. (2002), Cross Culture Management, Prentice Hall.
5. David. C. Thomas (2008), Cross Culture Management Essential Concept, 2nd ed., SAGE Publications, Inc.

BFT 335/3
INTERNATIONAL BUSINESS ENVIRONMENT

COURSE SYNOPSIS

This course introduces students to the world of international business environment and devises global strategies in response to changes in the internal and external influences of the business environment. Students also learn various methods of collecting, analysing and organising information and communicating ideas and information, which are core processes of business research and case studies.

REFERENCES

1. Daniels J.D., Radebaugh L. H., Sullivan D. P. (2013), International Business: Environment Operations, 13/E, Pearson.
2. Cavusgil S.T., Knight G., Riesenberger J. R. (2012), International Business: The New Realities, 2/E, Pearson.

3. Inkpen A., & Ramaswamy, K. (2005), Global Strategy: Creating and Sustaining Advantage across Borders, Oxford University Press, USA.
4. Pankaj Ghemawat (2007) Redefining Global Strategy: Crossing Border in a World Where Differences Still Matter, Harvard Business School Press.
5. Peng M. W. (2011), Global Business 2nd Edition, South-Western: Cengage Learning.

BFT 337/3
INTERNATIONAL MARKETING

COURSE SYNOPSIS

This course familiarize student with the importance of international marketing and the economic, political, and cultural trend differences among countries as they influence marketing.

REFERENCES

1. Keegan, W., Green, M. (2011). Global Marketing, (6th edition), Pearson Prentice-Hall.
2. C. Samuel Craig and Susan P. Douglas (2005). International Marketing Research .Wiley.
3. P. Kotler, H. Kartajaya, H. D Huan, S. Liu (2008), Rethinking Marketing 2nd Ed., Pearson Prentice Hall.
4. Alexander Chernev (2007), Strategic Marketing Analysis, 2nd Ed., Brightstar Media, Inc.

BFT 351/6
FINAL YEAR PROJECT

COURSE SYNOPSIS

The course reflects student's abilities to select appropriate research area and then present a substantial piece of work that prove his/her intellectual abilities to the fullest. A well-written project paper is a useful document to employer. The course also provides skills to students who wish to pursue their studies to post graduate level. Student shall learn 'project management' of a substantial piece of work and techniques associated with writing and assembling a large document. These skills shall assist students when it comes to similar ventures in the future.

PREREQUISITE

- Final year student only

REFERENCES

1. Fisher C. (2007), Researching and writing a dissertation: A guidebook for business students. Prentice hall.
2. Johnson R.A and Wichen D.W (2007), Applied Multivariate Statistical Analysis, (6th Ed), Pearson International Edition.
3. Ghauri P. and Gronhaug K. (2010), Research Methods in Business Studies, (4th Ed), Prentice Hall.
4. Barry J. babin, Jon C. Carr and Mitch Griffin (2010), Business Research Methods, 8th Ed., International Edition.
5. Julie Pallant (2007), SPSS Survival Manual: A Step By Step Guide To data analysis Using SPSS 3rd Ed.

BIT 190/3 INDUSTRIAL TRAINING 1
BIT 290/3 INDUSTRIAL TRAINING 2

Industrial training is viewed as an important strategy for students as exposure to the real work situation. These two series of course shall equip them with the necessary skills needed as graduate. It is hoped that students will benefit from the series as well as to provide experience of real working world. In addition, students may use this opportunity to and make the best preparation to enter real working world.

REFERENCES

1. UniMAP Industrial Training Guideline Rev A (July 2008)
2. UniMAP Industrial Training Log Book

ELECTIVE COURSES FOR ENGINEERING ENTREPRENEURSHIP (RP52)

BFT 104/3
E-BUSINESS

COURSE SYNOPSIS

This course is a comprehensive guide to all aspects of deploying e-business and e-commerce within organization. The course is divided into 3 parts: An introduction to e-business and e-commerce; reviewing alternative strategic approaches and applications of e-business; and how strategy can be implemented.

REFERENCES

1. Chaffey, D. (2009). E-Business and E-Commerce Management: Strategy, Implementation and Practice (4th Edition). Harlow: Financial Times Prentice Hall.
2. Laudon, K.C. & Traver, C.G. (2009). E-Commerce: Business, Technology, Society (5th Edition). New Jersey: Pearson Prentice Hall.
3. Turban, E. et al. (2009). Introduction to Electronic Commerce (2nd Edition). New Jersey: Pearson Prentice Hall.
4. Canzer, B. (2003), E-Business: Strategic Thinking and Practice, Boston: Houghton Mifflin Company.
5. Cassidy, A. (2002), A Practical Guide to Planning for E-Business Success: How to E-Enable Your Enterprise, Florida: St. Lucie Press.

BFT 113/3
ENGINEERING DRAWING

COURSE SYNOPSIS

This course provides exposure and skills to student in basic Engineering Drawing, Computer Aided Drafting (CAD) and its applications in product design. The course will cover the details of Engineering Drawing for beginners followed by projection systems, oblique and isometric sketches, before going on to Computer Aided Drafting software, which focuses on product design in 2D. Knowledge in dimensioning and geometrical tolerance (GDT) will enhance student's ability in interpreting and assessing information from basic raw data of an engineering drawing which can be used for business applications.

REFERENCES

1. Madsen, D.A. and Madsen, D.P. (2011), Engineering Drawing & Design, 5th ed. Cengage Learning.
2. Bertoline, G.R., Wiebe, E.N., Hartman, N.R., and Ross, W.A. (2011), Fundamentals of Graphics Communication, 6th ed., McGraw-Hill.
3. French, T.E. (2012), A Manual Of Engineering Drawing: For Students And Draftsmen, Nabu Press.
4. Jensen C., Helsel J.D., and Short D.R (2007), Engineering Drawing & Design, 7th Ed. mc Graw Hill.
5. Jensen, C. H and Helsel J. D (2007), Interpreting Engineering Drawings 7th Ed., Thomsons/Delmar Learning.
6. Yarwood, A. (2010), Introduction to AutoCAD 2011 @D and 3D Design, Elsevier.

BFT 112/3
INTRODUCTION TO ENGINEERING

COURSE SYNOPSIS

This course introduces students to the basic engineering concepts/fields and how they can be applicable in manufacturing systems across industries. It also covers issues from engineering disciplines. These key engineering issues shall be translated into entrepreneurial opportunities. For example, how bioprocess engineering can be used in agriculture, food, perfume and pharmaceuticals. Or cause and effect of climate change to the environment. Or the usage of electrical and electronics engineering in power generation and broadcast transmission systems.

REFERENCES

1. Jensen J.N. (2005). A user's guide to engineering. Pearson Prentice Hall.
2. Moaveni S. (2010). Engineering Fundamentals: An Introduction to Engineering. Cengage Learning.
3. Jensen J.N. (2005). A user's guide to engineering. Pearson Prentice Hall.
4. Wright, Paul H. (2002). Introduction to Engineering. (3rd ed). John Wiley & Sons. New York.
5. McCarty, N. (2009), Engineering: A Beginner Guide, OneWorld.

BFT 212/3
BUSINESS FRANCHISING AND LICENSING
COURSE SYNOPSIS

This course intends to assist students in developing a clear picture of franchisees and franchisors and to provide them with some insights that will help them to make own decisions when entering the field. Students will learn the concept of franchising and licensing comprehensively .

There are 3 focus area in the course: First, a franchisor and franchisee are independent business people who must manage their separate business affairs; second, the franchisor and franchisee are dependent upon each other in order to be successful in business; and third, the franchisor-franchisee relationship bring with it an interdependent contractual obligation that is legally binding upon both parties.

REFERENCES

1. Judd, R.J. & Justis, R.T. (2008). Franchising: An Entrepreneur's Guide (4th Edition). Australia: Thomson.
2. Gartner, W.B. & Bellamy, M.G. (2008). Enterprise. Australia: South-Western Cengage Learning.
3. Lambing, P.A. & Kuehl, C.R. (2007). Entrepreneurship (4th Edition). New Jersey: Pearson Prentice Hall.
4. Norita Deraman et.al (2007), Keusahawanan, Kuala Lumpur: Mc Graw Hill Education.
5. Shane, S.A (2005), From Ice-cream to the Internet: Using Franchising to Drive the Growth and Profits of Your Company, New Jersey: Pearson Prentice Hall.

BFT 214/3
ENGINEERING ECONOMICS

COURSE SYNOPSIS

The main purpose this course is to introduce students to methods and modern techniques of engineering economic analysis for decision making, evaluations of economic alternatives, cost control, capital budgeting, managerial cost accounting, deterministic inventory theory and decision-making under uncertainty. It provides a background of economic principles that engineers encounter in working on development projects. Students are also analyse the



financial and economic concepts that are required in engineering project financial performance, from the conceptual stage to the engineering and design stages.

REFERENCES

1. Chan, S. P. (2008). Fundamentals Engineering Economics, (2nd. Ed), Prentice-Hall. (2008)
2. Chan, S.P. (2006). Contemporary Engineering Economics, (4th ed.), Prentice-Hall.
3. Newnan, D., Eschenbach, T. and Lavelle, J. (2004). Engineering Economic Analysis. (9th ed.) Oxford University Press, USA
4. O'Sullivan/Sheffin (2001), economics: Principles and Tools, prentice Hall.
5. Sullivan, William G., E. and Luxhoj, T. J. (2006), Engineering Economy: Fundamnetal of Engineering Economics 13th Ed., Upper Sadder River, NJ: Pearson Prentice Hall.

BFT 215/3
ENTREPRENEURIAL FINANCE

COURSE SYNOPSIS

The subject covers a broad range of core financial aspects that are pertinent for entrepreneurs in starting a business and understanding the financial aspects of running a business may be an overwhelming experience. The course discusses sole proprietorships, partnerships, limited liability companies, and private corporations. Key financial topics, such as financial statements, break-even analysis, working capital management, and time value of money are also explained and examined. The class will also study important topics in finance and describes how mastering these topics can positively impact business success. Students are also expected to master the financial tools of Time-Value-of-Money and financial statement analysis - Discusses horizontal, vertical, and ratio analysis of financial statements in detail. Other topics of discussion include financial distress and mergers and acquisition, and also personal financial planning which is relevant for entrepreneurs.

PREREQUISITE

- BFT107 Principles of Finance
- Result must be D+ and above

REFERENCES

1. Leach and Melicher (2012), Entrepreneurial Finace 4th Ed., South Western Publications, USA.
2. Smith, R.L. and Smith Kiholm, J. (2004). Entrepreneurial Finance (2nd Edition), Wiley Publishing.
3. Mohd Noor Mohd Shariff, Rosli Mohd Saad, Siti Hajar Mohd Ali (2006). Financial Analysis for Entrepreneur, Pearson Prentice Hill.
4. J. Chris Leach and Ronald W. Melicher (2009), Finance for Entrepreneurs 3rd Ed., South western CENGAGE Learning.
5. Adelman, J.P. and Marks, M.A. (2010). Entrepreneurial Finance (5th Edition), Pearson International Edition.

BFT 216/3
ENTREPRENEURIAL MARKETING

COURSE SYNOPSIS

Entrepreneurial Marketing is an art and science in choosing target markets and getting, keeping, and growing customers through creating, delivering, and communicating superior customer value. Eentrepreneurial marketing seeks to meet organizational objectives by effectively satisfying customers in a dynamic environment. This course provides an overview of marketing processes, marketing principles, entrepreneurial environment and provides students with the opportunity to apply the key concepts to practical business situations.

PREREQUISITE

- BFT108 Principles of Marketing
- Result must be D+ and above

REFERENCES

1. Bjerke, B. and Hultman, C., (2004), 'Entrepreneurial Marketing: The Growth of Small Firms in the New Economic Era ', Edward Elgar Pub.
2. Buskirk, B. and Lavik, M. ,(2003), 'Entrepreneurial Marketing: Real Stories and Survival Strategies', South-Western College Pub; 1st Edition.
3. Lodish, Morgan and Killianpur, Entrepreneurial Marketing (2006), Wiley Publishing.
4. Lodish, M.L., Morgan, H.L and Archambeau, S. , Marketing That Works: How Entrepreneurrial Marketing Can Add Sustanable Value to Any Sized Company (2007), Wharton School Publishing.
5. Schindehutte, M., Morris, M. and Pitt, L., (2009),'Rethinking Marketing: The Entrepreneurial Imperative', Prentice Hall.

BFT 316/3
LEADERSHIP IN ORGANIZATION

COURSE SYNOPSIS

This course is a comprehensive guide to all aspects of leadership in organizations. The course is divided into 11 topics: (i) nature of leadership, (ii) leadership thoeries, (iii) perspective of effective leadersip behavior, (iv) participative leadership, (v) power and influence, (vi) charismatic and transformational leadership, (vii) leading change, (viii) leadership in teams, (ix) cross-cultural

leadership, (x) developing leadership skills and (xi) strategic leadership by executives.

REFERENCES

1. Yulk, G. D. (2009). Leadership in Organizations, (7th Edition), Pearson Prentice-Hall.
2. Daft, R. L. (2011). Leadership, (5th Edition), South-Western, Cengage Learning.
3. Achua, L. (2010). Effective Leadership, (4th Edition), South-Western, Cengage Learning.
4. DuBrin, Andrew J., Principles of Leadership (2010), 4th Ed., South western, Cengage Learning.
5. Afsaneh nahavandi, (2012), The Art and Science of Leadership 6th ed., Paeson Prentice Hall.

BFT 319/3
RISK MANAGEMENT

COURSE SYNOPSIS

The subject covers a broad range of core aspects that are pertinent for entrepreneurs as starting a business and understanding the risk management of running a business. The course discusses fundamentals of risk management, risk management techniques and strategies. Key topics include, risk and its treatment, legal principles of insurance, financial risk management, enterprise risk management, and also personal insurance which is relevant for entrepreneurs.

REFERENCES

1. Hull, John C. (2007), Risk Management and Financial Institutions, 2nd Ed., Pearson.
2. Hull, John. C. (2011), Fundamentals of Futures and options Market, Global edition, Pearson.
3. Chance, Don M. and Robert Brooks (2010), An Introduction to Derivatives and Risk, South Western, Cengage Learning.
4. Hull, J. C. (2009), Options, Futures, and Other Derivatives, (7th Edition), Pearson International Edition.
5. Mishkin, John. C (2009), Financial Markets and Institutions, 6th Ed., Pearson International Edition.
6. Dorfman Mark S., (2008), Introduction to Risk Management Insurance, 9th Ed., Pearson International Edition.

BFT 321/3
SERVICES MARKETING

COURSE SYNOPSIS

This course focused on a comprehensive reference of managing services in marketing elements in an organization. It is divided into 4 parts: Understanding Service Products,Consumers,and Markets; Applying the 4 P's of Marketing to Services; Managing the Customer Interface and Implementing Profitable Service Strategies.

REFERENCES

1. Lovelock, C.H. and Wirtz, J. (2011). Services Marketing (7th Edition), Pearson Global Edition
2. Lovelock, C. H. and Wirtz, J. and Chew, P. (2008), Essential of Service Marketing 5th Ed., Mc Graw Hill.
3. Zeithaml, V., Bitner, M.J. and Gremler, D.D. (2008), Services Marketing (5th Edition), McGraw-Hill/Irwin
4. Schultz, M. and Doerr, J. (2009). Professional Services Marketing, Wiley
5. Bateson, J. E. G and Hoffman, K. D (2008), Service Marketing 4th Ed., South Western Cengage Learning.
6. Fitzsimmons, J. A and Fitzsimmons, M. J. (2011), Service Management 7th Ed., McGraw Hill.

BFT 322/3
SUPPLY CHAIN MANAGEMENT

COURSE SYNOPSIS

This course explored key issues associated with the design and management of industrial supply chains (SC). SC is concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. One of the primary objectives of SC management is to minimize the total SC cost subject to various service requirements.

REFERENCES

1. Wisner, J. D., Tan,K.C. & Leong,G.K., (2012). Supply Chain Management: A balanced approached (3rd Edition). South-Western Cengage Learning.
2. N. Chandrasekaran, (2010). Supply Chain Management, First Edition, Oxford
3. Chopra S. and Meindl P. (2007). Supply Chain Management, Fourth Edition, Prentice Hall.
4. Bozarth and Handfield, (2008), Operations and Supply Chain Management, @nd Ed., Prentice Hall.
5. Handfield, R. B., Monczka, R. B., Giunipero, L.C., and Patterson, J.L (2011), Sourcing and Supply Chain Management 5th Ed., South Wester Cengage Learning.

BFT 325/3
LOGISTICS MANAGEMENT

COURSE SYNOPSIS

The course focuses on the fundamental principles of contemporary logistics management. It involves the roles and contributions of logistics management in ensuring successful supply chain management process (plan, implementation, control); the efficient, effective forward and reverse flow; storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. It then focuses on the additional competitive pressures and reengineering possibilities generated by the rapid advances in Information Technology (IT) and Intelligent Transportation Systems (ITS) technologies. The final part of the course covers transportation management which highlights the multi-modal transportation.

REFERENCES

1. Paul R., Murphy Jr, Donald F. Wood, (2011), Comtemporary Logistics, Pearson Education Inc.
2. Bowersox, Donal J., Closs, David J., Cooper, M. Bixby., (2006), Supply Chain Logistic Management, McGraw Hill Higher Education.
3. Grant, D., lambart, Doughlas M., Stock, James R., Ellram, Lisa M., (2005), Fundamntal of Logistics Management, McGraw Hill Higher Education.
4. Rushton, A., Croucher, P., Baker P., (2006), The Handbook of Logistics and Distribution Management, Kogan Page Ltd.
5. Ronald H. Ballou (2004), Business Logistics/Supply Chain Mangement, 5th Ed., Prentice Hall.

BFT 328/3
MANAGING ENGINEERING AND TECHNOLOGY

COURSE SYNOPSIS

This course introduces students to the management functions of planning, organizing, leading and controlling; analyzes the application of these functions in research, design, production, technical marketing and project management; and studies evolution of the engineering career and the transition to engineering management.

REFERENCES

1. Babcock , D. L. and Morse , L. C. (2010). Managing Engineering and Technology: International Version (5th Edition), Pearson Higher Education.
2. Friedman, R. S., Roberts, D. M. and Linton, J. D. (2008). Principle Concepts of Technology and Innovation Management: Critical Research Models. Information Science REFERENCES.
3. Parnell, G. S., Driscoll, Patrick J. and Henderson, D. L. (2008). Decision Making in Systems Engineering and Management. Wiley-Interscience.
4. Chang Ching Ming, (2005), Engineering Management: Challenges In The New Millenium, Paerson/Prentice Hall.
5. Meredith Jack R. and Mantel, Samuel J., Jr. (2010), project Management: A Managerial Approach 7th Ed., Wiley.
6. Senese, Brian P. (2002), Managing Successful High-Tech Product Introduction, Artech House.

ELECTIVE COURSES FOR INTERNATIONAL BUSINESS (RE09)

BFT 104/3
E-BUSINESS

COURSE SYNOPSIS

This course is a comprehensive guide to all aspects of deploying e-business and e-commerce within organization. The course is divided into 3 parts: An introduction e-business and e-commerce; reviewing alternative strategic approaches and applications of e-business; and how strategy can be implemented.

REFERENCES

1. Chaffey, D. (2009). E-Business and E-Commerce Management: Strategy, Implementation and Practice (4th Edition). Harlow: Financial Times Prentice Hall.
2. Laudon, K.C. & Traver, C.G. (2009). E-Commerce: Business, Technology, Society (5th Edition). New Jersey: Pearson Prentice Hall.
3. Turban, E. et al. (2009). Introduction to Electronic Commerce (2nd Edition). New Jersey: Pearson Prentice Hall.
4. Canzer, B. (2003), E-Business: Strategic Thinking and Practice, Boston: Houghton Mifflin Company.
5. Cassady, A. (2002), A Practical Guide to Planning for E-Business Success: How To E-Enanble your Enterprise, Florida: St. Lucie Press.

BFT 201/3
INTERNATIONAL ACCOUNTING

COURSE SYNOPSIS

This course is an extension of Principles of Accounting (BFT 106) course and students need to apply the knowledge that has been gained for

the implementation of the accounting regulation and practices. The main objective of this course is to explore more on accounting knowledge of the students and to enhance it by putting the accounting issues uniquely confronted by companies involve in international businesses. The course familiarizes them with international accounting regulations, financial reporting, taxation and other accounting practices that exist across the globe.

PREREQUISITE

- BFT106 Principles of Accounting
- Result must be D+ and above

REFERENCES

1. Doupnik and Perera (2011). International Accounting (3rd Edition). McGraw Hill.
2. Choi and Meek. (2010). International Accounting (7th Edition). Pearson-Prentice Hall.
3. Radebaugh, Gray and Black (2006). International Accounting and Multinational Enterprises (6th Edition). Wiley.
4. Shahrokh M. Saudagaran (2004), International Accountingh: A User Perspective 2nd Ed., Thomson South Western.
5. Christopher Nobes and Robert Parker (2010), Comparative International Accounting 11th Ed., Prentice Hall.

BFT 203/3
INTERNATIONAL ECONOMICS

COURSE SYNOPSIS

Student learns the ideas and perspectives of economic theories and thought that build the notion of International Economics. He/she will also learn three major components in International Economic which is International Trade, International Finance, and International Monetary Systems. Later in the chapter student shall use the knowledge to understand the issues and critics in global economy.

PREREQUISITE

- BFT101 Business Economics
- Result must be D+ and above

REFERENCES

1. Robert J. Carbaugh (2011), Global Economics, International Edition, 13th Ed., Cengage Learning Asia Pte Ltd Dlabay.
2. Paul R. Krugman, Maurice Obstfeld & Marc J. Melitz (2012), international Economics, Global Edition, Pearson International Inc.
3. Arnold, Roger A. (2003), Economics, 5th Ed., Singapore Thomsons Learning.
4. Baylis, John and Smith, Steve (2005), The Globalization of World Politic, 3rd Ed., Oxford: Oxford University Press.
5. Pugel, Thomas (2006), Intenational Economics, McGrawHill/Irwin.

BFT 204/3
INTERNATIONAL FINANCE

COURSE SYNOPSIS

The subject matter of international finance course consists of issues raised by the special problems of economic interactions between states. This course introduces the main concepts and theories of international finance and illustrates them with applications drawn from the real world. It will address a wide range of issues, including exchange rate risks and management, international capital budgeting, and the asset and liability management for multinational corporations.

REFERENCES

1. Madura, J. (2010). International Corporate Finance. (10th Edition) South-Western Cengage Learning
2. Eiteman D.K., Stonehill, A.I., and Moffett, M.H. (2010). Multinational Business Finance. (12th Edition) Pearson Prentice Hall
3. Robin, J.A. (2010). International Corporate Finance. (International Edition).McGraw Hill
4. Eun, C. S., Resnick, B. G (2009), Intenational Financial Management 5th Ed., McGraw Hill International Edition.
5. Keown, Martin, Perry, Scott (2010), financial Management: Principles and Applications 10th Ed., pearson Prentice Hall.
6. Greenaway, David (2009), The Wolrld Economy: Global Trade Policy 208, John Wiley & Sons Inc.

BFT 205/3
INTERNATIONAL HUMAN RESOURCE MANAGEMENT

COURSE SYNOPSIS

This course provides an introduction to the critical issues in organizations in locally and internationally managing their human resources. It focuses on the interrelatedness of corporate strategies and the effective management of human resources, which require different policies. The course is based on the notion that competitive firms and economies which require an appropriate structure, policies and strategies to managing their employees at every level of the enterprise. This is true particularly in multinational enterprises (MNEs) and transnational corporations (TCs).

REFERENCES

1. Dowling, P. J., Festing, M. Engle, A.D. Sr. (2013), International Human Resources Management, 6th Ed., UK: Cengage Learning EMEA.
2. Dowling, Peter J. Denice E. Welch, and Randall S. Schuler (1999), Introduction and Overview: International Human Resources Management, Cincinnati: ITP, Southwestern College Publishing.

BFT 316/3
LEADERSHIP IN ORGANIZATION

COURSE SYNOPSIS

This course is a comprehensive guide to all aspects of leadership in organizations. The course is divided into 11 topics: (i) nature of leadership, (ii) leadership thoeries, (iii) perspective of effective leadersip behavior, (iv) participative leadership, (v) power and influence, (vi) charismatic and transformational leadership, (vii) leading change, (viii) leadership in teams, (ix) cross-cultural leadership, (x) developing leadership skills and (xi) strategic leadership by executives.

REFERENCES

1. Yulk, G. D. (2009). Leadership in Organizations, (7th Edition), Pearson Prentice-Hall.
2. Daft, R. L. (2011). Leadership, (5th Edition), South-Western, Cengage Learning.
3. Achua, L. (2010). Effective Leadership, (4th Edition), South-Western, Cengage Learning.
4. DuBrin, Andrew J.,(2010), Principles of Leadership, 4th Ed., South Western, Cengage Learning.
5. Afsaneh Nahavandi, (2012), The Art and Science of Leadership 6th Ed., Pearson Prentice Hall.

BFT 321/3
SERVICES MARKETING

COURSE SYNOPSIS

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BFT 322/3
SUPPLY CHAIN MANAGEMENT

COURSE SYNOPSIS

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5. Handfield, R. B., Monczka, R. B., Giunipero, L.C., and Patterson, J.L (2011), Sourcing and Supply Chain Management 5th Ed., South Wester Cengage Learning.

BFT 325/3
LOGISTICS MANAGEMENT

COURSE SYNOPSIS

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covers transportation management which highlights the multi-modal transportation.

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1. Paul R., Murphy Jr, Donald F. Wood, (2011), Comtemporary Logistics, Pearson Education Inc.
2. Bowersox, Donal J., Closs, David J., Cooper, M. Bixby., (2006), Supply Chain Logistic Management, McGraw Hill Higher Education.
3. Grant, D., lambart, Doughlas M., Stock, James R., Ellram, Lisa M., (2005), Fundamntal of Logistics Management, McGraw Hill Higher Education.
4. Rushton, A., Croucher, P., Baker P., (2006), The Handbook of Logistics and Distribution Management, Kogan Page Ltd.
5. Ronald H. Ballou (2004), Business Logistics/Supply Chain Mangement, 5th Ed., Prentice Hall.

BFT 344/3
IMPORT EXPORT MANAGEMENT

COURSE SYNOPSIS

This course gives attention to the knowledge, skills and insight needed to manage imports and exports either in a comprehensive trading company or in a department of a company that depends on sourcing or exporting to achieve its strategic objectives. It places responsibility of time management on the student and in some ways, this course will be more demanding in the future especially in international business field. Apart from that, student who are knowledgeable and qualified in this area of business are essential to companies who intend to or are already trading in the world market.

REFERENCES

1. Justin Paul and Rajiv Aserkar (2008), Export Import Management, Oxford University Press.

   Additional references supporting the course.

2. Thomas A. Cook with Annie Alston and Kelly Raia (2004), Mastering Import Export Management, 1st Edition, AMACOM.

BFT 346/3
CHANGE MANAGEMENT

COURSE SYNOPSIS

Contemporary business environments constantly face the challenge of change. Whether the change is simple or complex, whether they are entrepreneurial start-ups or long-established firms, find that they must change or die. This course is geared toward deepening students' understanding of the challenges, the techniques, and the problems associated with initiating and implementing major change in an organization. Throughout the course, the objective will be to educate students as future managers, or consultants and advisers, to meet the challenges of organizational change successfully. While we will cover the macro (organizational) level of change, we will also focus on the micro (individual) level of change and how students, as a manager/consultant, can lead change through their actions and through others. This kind of learning emphasizes application and not only understanding through analysis. Both are important.

The perspective on change adopted in this course is that competitive advantage today is less a matter of determining the right strategy than of implementing it faster and more smoothly than your competitors. As a result, this course concentrates on process, or how change can be most effectively implemented through people within the organizational context. In keeping with the emphasis on change process, the course focuses on the exploration and classroom discussion of cases illustrating different change efforts in a variety of organizations across a diverse range of business contexts. The exploration of these cases and the understanding of the complex and intricate process of initiating and implementing change is the central focus of the course. This course stresses the development of clear and specific managerial implications, both in class and in all assignments.

REFERENCES

1. Jones, G.R. (2013), Organizational Theory, Design, and Change, 7/E, Prentice Hall
2. Spector, B. (2013), Implementing Organizational Change, 3/E, Prentice Hall
3. Newton, R. (2010), Change Management: Financial Times Briefing, FT Press
4. Greenberg, J. (2013), Managing Behavior in Organizations, 6/E, Prentice Hall
5. Judge, T.A. & Robbins, S.P. (2012), Essentials of Organizational Behavior Plus MyManagementLab with Pearson eText, 11/E, Prentice Hall

BFT 330/3
NEGOTIATION AND CONFLICT RESOLUTION

COURSE SYNOPSIS

This course is designed to help you better understand the theory, processes, and practices of negotiation, conflict resolution and relationship management



so that you can be a more effective negotiator in a wide variety of situations. If you take advantage of the opportunities this course offers, you will be comfortable and more productive managing negotiations as well as professional and personal relationships. You will develop an understanding of the principles, strategies, and tactics of effective negotiation, conflict resolution, and relationship management, and enhance your ability to assess the variables in negotiations, the impact of interpersonal styles, personality, and culture. The course treats negotiation, conflict resolution and relationship management as complex processes that require the successful practitioner to develop and use a unique blend of perceptual, persuasive, analytical, and interpersonal skills. After each exercise, we will discuss what

REFERENCES

1. The Mind and Heart of the Negotiator, Leigh L., Thompson, Pearson/ Prentice Hall, Fourth Edition (2009)
2. The Art and Science of Negotiation, Raiffa. Howard. Cambridge. Belknap. Press of Harvard University Press (1982).
3. Negotiating Agreement without giving in., Roger Fisher, William Ury and Bruce Patton, New York, NY: Penguin, Books, Second Edition (1991).

JOB OPPORTUNITIES

Bachelor of Business (Honours) (Engineering Entrepreneurship)

Upon successful completion of their degree program, the Engineering Entrepreneurship graduates have bright opportunities in pursuing their career in business as they are trained and well-equipped to be entrepreneurs. The off-campus incubator experience shall strenghten their confidence level. For those who are looking for business opportunities in the engineering field, this program provides entrepreneurial skills and basic technical skills. In terms of career opportunities, this program provides career and professional opportunities in the fields of finance, investment, production and marketing.

Bachelor of Business (Honours) (International Business)

Meanwhile, the International Business graduates have sufficient knowledge and skills in international business practices. The industrial training program provides opportunities for establishing and developing a strong network with well-known companies and multinational corporations. Graduates of this program are able to link theory to practice and have a global perspective on issues such as international marketing, cross cultural negotiation and human resources. The International Business graduates have gone to careers in multinationals, international organisations and governments.



SCHOOL OF HUMAN DEVELOPMENT AND TECHNOCOMMUNICATION (iKOM)

PROGRAMMES OFFERED

- Bachelor of New Media Communication (Hons.)

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INTRODUCTION

School of Human Development and Technocommunication (iKOM) is a new faculty which has been upgraded from a Centre for Communication Technology and Human Development (PTKPI). In the year 2014, IKOM advanced forward as a faculty upon the approval of the Ministry of Education to offer a new program, the Bachelor of New Media Communications. It will also continue to serve as a Service Center that manages the university courses for UniMAP.

VISION

Committed to be the center of the development of social science, communication, information technology, and soft skills in competitive international arena.

MISSION

iKOM will form intellectual humanity, personality, superiority, creativity and innovativeness. It will also create competitiveness and competency through the observation of knowledge and soft skills with quality education, rooted in the aspirations of the University.

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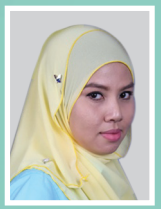
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BACHELOR OF NEW MEDIA COMMUNICATION (HONOURS) (RA72)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1
To educate and produce the graduates who have the knowledge and skills of professionals in the field of communication and social interaction.

PEO2
To educate and produce the graduates who have the knowledge and skills of professionals in the field of new media.

PEO3
To educate and produce the graduates who have the knowledge and skills of professionals in the field of entrepreneurial management.

PEO4
To train and produce skilled graduates in implementing and managing projects / research by integrating the latest information related to new media communication.

PROGRAMME OUTCOMES (PO)

PO1
To demonstrate professional and research skills in communication and social interaction, new media, entrepreneurship and management.

PO2
To apply the model and the theory of communication and social interaction, new media, and entrepreneurial management through an understanding of the impact of such changes on society.

PO3
To interpret social issues, cultural, global, and environmental responsibility, and law and ethics to the practice fields of communication and social interaction, new media, and entrepreneurial management in their professional activities.

PO4
To identify the link between professionalism and human values in the areas of communication and social interaction, new media, and entrepreneurial management through a variety of practical applications and theoretical framework, methods and research techniques.

PO5
To communicate effectively, both individually and in group.

PO6
To demonstrate the ability to use hardware and software related to digital media, journalism, advertising, broadcasting, public relations, graphic design, multimedia and photography.

PO7
To analyze and interpret research data of communication and social interaction, new media, and entrepreneurial management, and propose a solution and justify the measures to be taken.

PO8
To develop analytical and critical thinking skills that are appropriate in preparation for continuous learning.

PO 09
To demonstrate an understanding of the impact of changing media and communications technologies, policies and structures on the social, cultural, economic and political environments.

PO 10
To apply widely business activities in real-world perspective.

PO 11
To demonstrate social and entrepreneurship skills and inculcate a spirit of innovation.



CURRICULUM STRUCTURE FOR BACHELOR OF NEW MEDIA COMMUNICATION (HONOURS) (RA72)

YEAR	FIRST		SECOND		THIRD		
SEMESTER	I	II	III	IV	V	VI	
Discipline Core	KUT 101/3 Introduction to Communication Theory	KUT 102/3 Interpersonal Communication in New Media	KUT 201/3 Small Group Communication	KUT 301/3 New Media and Cross Cultural Communication	KUT 401/3 Public Relations and New Media	KUT 404/3 Event Management	KIT432/6 Industrial Training
	KUT 103/3 Public Speaking	KUT 114/3 New Media and Society	KUT 211/3 Digital Photography	KUT 302/3 Integrated Marketing Communication	KUT 403/3 Ethics and Law in New Media Communication	KUT 405/3 Seminar on New Media Communication	
	KUT 111/3 Writing for New Media	KUT 115/3 Visual Communication	KUT 212/3 Graphic Design for New Media	KUT 311/3 Digital Video Production	KUT 411/3 Digital Media Production	KUT 421/3 Skills in Organizational Strategy and Performance Management	
	KUT 112/3 Principles of Communication Network	KUT 121/3 Innovative and Creative Skills	KUT 331/3 Research Method	KUT 312/3 Web Design and Development	KUT 412/3 Animation for Integrated Media	KUT 433/4 Final Year Project 2	
	KUT 113/3 Introduction to New Media		KUT 333/3 Social Psychology	KUT 332/3 Data Reasoning	KUT 322/3 Electronic Entrepreneurship		
			KUT 221/3 New Era Management		KUT 432/2 Final Year Project 1		
Elective		KUT 116/3 Principles of Human Computer Interaction / KUT 117/3 Sociology in New Media		KUT 321/3 Invention Skills / KUT 334/3 Industrial Psychology	KUT 402/3 Managerial Communication / KUT 406/3 Crisis Communication in New Media		
University Required	*UVA 111/2 Foundation English	**UVW 211/2 English for General Purposes	UVW 313/2 English for Academic Purposes	UUW 3XX/2 Foreign Language	UUW 3XX/2 Foreign Language		
	UUW 410/2 Bahasa Melayu Universiti	UUW 235/2 Ethnic Relations		UUW 322/2 Thinking Skills			
	UUW 233/2 Tamadun Islam dan Tamadun Asia						
	UZW 1XX/1 KO-K	UZW 1XX/1 KO-K	UZW 1XX/1 KO-K				
122/124	20	18/20	21	22	22	13	6

TOTAL UNITS FOR GRADUATION 122/124

*Uncredited. Compulsory to students with MUET Band 2 Only. This course is a prerequisite to UVW 211 English for General Purposes.
**Compulsory to students with MUET Band 3 or less. This course is a prerequisite to UVW 313 English for Academic Purposes.

LIST OF COURSES

BACHELOR OF NEW MEDIA COMMUNICATION (HONS.) RA72

- KUT 101/3 INTRODUCTION TO COMMUNICATION THEORY
- KUT 103/3 PUBLIC SPEAKING
- KUT 111/3 WRITING FOR NEW MEDIA
- KUT 112/3 PRINCIPLES OF COMMUNICATION NETWORKS
- KUT 113/3 INTRODUCTION TO NEW MEDIA
- KUT 102/3 INTERPERSONAL COMMUNICATION IN NEW MEDIA
- KUT 114/3 NEW MEDIA AND SOCIETY
- KUT 115/3 VISUAL COMMUNICATION
- KUT 116/3 PRINCIPLES OF HUMAN COMPUTER INTERACTION
- KUT 117/3 SOCIOLOGY IN NEW MEDIA
- KUT 121/3 INNOVATIVE AND CREATIVE SKILLS
- KUT 201/3 SMALL GROUP COMMUNICATION
- KUT 211/3 DIGITAL PHOTOGRAPHY
- KUT 212/3 GRAPHIC DESIGN FOR NEW MEDIA
- KUT 221/3 NEW ERA MANAGEMENT
- KUT 331/3 RESEARCH METHODOLOGY
- KUT 333/3 SOCIAL PSYCHOLOGY
- KUT 301/3 NEW MEDIA AND CROSS CULTURAL COMMUNICATION
- KUT 302/3 INTEGRATED MARKETING COMMUNICATION
- KUT 311/3 DIGITAL VIDEO PRODUCTION
- KUT 312/3 WEB DESIGN AND DEVELOPMENT
- KUT 321/3 INVENTION SKILLS
- KUT 322/3 ELECTRONIC ENTREPRENEURSHIP
- KUT 334/3 INDUSTRIAL PSYCHOLOGY
- KUT 332/3 DATA REASONING
- KUT 401/3 PUBLIC RELATIONS AND NEW MEDIA
- KUT 402/3 MANAGERIAL COMMUNICATION
- KUT 406/3 CRISIS COMMUNICATION IN NEW MEDIA
- KUT 421/3 SKILLS IN ORGANIZATIONAL STRATEGY AND PERFORMANCE MANAGEMENT
- KUT 404/3 EVENT MANAGEMENT
- KUT 403/3 ETHICS AND LAW IN NEW MEDIA COMMUNICATION
- KUT 405/3 SEMINAR ON NEW MEDIA COMMUNICATION
- KUT 411/3 DIGITAL MEDIA PRODUCTION
- KUT 412/3 ANIMATION FOR INTEGRATED MEDIA
- KUT 432/2 FINAL YEAR PROJECT 1
- KUT 433/4 FINAL YEAR PROJECT 2
- KIT 432/4 INDUSTRIAL TRAINING

UNIVERSITY COURSES

- UUW 224/2 ENGINEERING ENTREPRENEURSHIP
- UUW 233/2 ISLAMIC & ASIAN CIVILIZATIONS (FOR LOCAL STUDENTS ONLY)
- UUW 235/2 ETHNIC RELATIONS
- UUW 322/2 THINKING SKILLS
- BUW 122/2 SKILLS AND TECHNOLOGY IN COMMUNICATION (FOR BUSINESS STUDENTS ONLY)
- UUT 122/2 SKILLS AND TECHNOLOGY IN COMMUNICATION (FOR ENGINEERING STUDENTS ONLY)
- BUW 123/3 BUSINESS COMMUNICATION (FOR BUSINESS STUDENTS ONLY)
- UUW 237/2 MALAYSIAN CULTURES (FOR INTERNATIONAL STUDENTS ONLY)
- UUW 239/2 MALAYSIAN STUDIES (FOR INTERNATIONAL STUDENTS ONLY)
- EUT 442/2 PROFESSIONAL ENGINEERS (FOR ENGINEERING STUDENTS ONLY)
- EUT 444/3 MANAGEMENT FOR ENGINEERS (FOR ENGINEERING STUDENTS ONLY)



COURSE SYLLABUS

BACHELOR OF NEW MEDIA COMMUNICATION (HONS) RA72

KUT 101/3
INTRODUCTION TO COMMUNICATION THEORY

COURSE SYNOPSIS

This course aims to give students the theories of communication. Focus is given to the establishment and development of theories and concepts of communication. Apart from discussing the various types of basic theories in communication, the focus will also be given to the theories of communication: interpersonal, group, organization, society, and technology. Overall, this course introduces students about the establishment, change and development theories have communication theory.

COURSE OUTCOMES

1. Describe concepts, models, elements, functions and context of human communication.
2. Explain concepts, attributes, basic elements, and functions of communication theory.
3. Determine communication theories based on communication context.

REFERENCES

1. Baran, J.B. & Davis, D.K. (2010) Mass Communication Theory: Foundations, Ferment and Future. 6th ed. Singapore: Wardsworth Cencage Learning
2. Bryant, J. & Zillman, D. () Media Effects: Advances in Theory and Research. Mahwah, New Jersey: Lawrence Erlbaum Associates
3. Holmes, D. (2005) Communication Theory: Media, Technology and Society. Thousand Oaks: SAGE
4. Woods, J.T. (2011) Communication Mosaics: An Introduction to the Field of Communication. Singapore: Wardsworth Cencage Learning
5. Biagi, S. (2009). Media Impact: An Introduction to Mass Media. London: Wadsworth.
6. Dominick, J. R. (2010). The Dynamics of Mass Communication Media in Transition. NewYork: McGraw-Hill.
7. Rosenberry, J & Vicker, L. A. (2009). Applied Mass Communication Theory A Guide For Media Practitioners. Boston: Pearson/ Allyn and Bacon
8. Stanley, J.B. & Dennis, K.D. (2009). Mass Communication Theory: Foundations, Ferment and Future (2nd Ed.). Belmont: Wadsworth.

KUT 103/3
PUBLIC SPEAKING

COURSE SYNOPSIS

This course provides both theoretical basis and practical instruction to speaking effectively in public. Areas covered include; topic selection, audience analysis, speech preparation and organization, support of speeches with credible research, strategic and creative language use, effective listening and delivery skills, and common types of public speeches. At the end of this course, students should be able to demonstrate the speaking and to be effective communicators in academic settings, workplace and community.

COURSE OUTCOMES

1. Identify the key concepts related to the public speaking.
2. Apply knowledge in the process of preparing a speech.
3. Present a public speech in front of the audience, according to the situation and event.
4. Evaluate and verbally critique speeches and presentations.

REFERENCES

1. Cheryl Hamilton (2012). Essentials of Public Speaking (Fifth Edition). Boston, MA, USA: Wadsworth, Cengage Learning.
2. Jo Sprague, Douglas Stuart dan David Bodary (2010). The Speaker's Handbook (Ninth Edition). Boston, MA, USA: Wadsworth, Cengage Learning.
3. Abdul Mua'ti @ Zamri Ahmad (2008). *Panduan Pengucapan Awam* (Edisi Kedua). Dewan Bahasa & Pustaka, Kuala Lumpur.
4. Clella Iles Jaffe (2013). Public Speaking: Concepts & Skills for a Diverse Society (Seventh Edition). Boston, MA, USA: Wadsworth, Cengage Learning.
5. Steven A. Beebe dan Susan J. Beebe (2012). Public Speaking: An Audience-Centered Approach (8th Edition). Boston, MA: Pearson Education, Inc..
6. Boston, MA: Pearson Education, Inc.
7. Sprague,J., Douglas, S. & David B. (2010). *The Speaker's Handbook* (Ninth Edition). Boston, MA, USA: Wadsworth, Cengage Learning.

KUT 111/3
WRITING FOR NEW MEDIA

COURSE SYNOPSIS

This course aims to expose students to the skills and application method of writing in new media. Students will be able to know the difference in writing, interactive on-line with the traditional method of writing. This course will help

improve students' ability to comprehend concepts related to new media writing methods that can be used in the context of the organization.

COURSE OUTCOMES

1. Identify concepts related writing in new media.
2. Explain the writing skills in new media.
3. Apply the concepts of creative, multimedia and online methods in the writing of new media.

REFERENCES

1. Anne Wysocki (2004) Writing New Media: Theory and Applications for Expanding the Teaching of Composition; Utah State University Press; 1 edition
2. Robert L. Hilliard (2011) Writing for Television, Radio, and New Media (Broadcast and Production) Wadsworth Publishing; 10 edition
3. Martin Lister, Jon Dovey, Seth Giddings and Iain Grant (2009) New Media: A Critical Introduction; Routledge; 2 edition
4. Nicholas Gane (2008) New Media: The Key Concepts; Berg Publishers; English Ed edition
5. Lev Manovich (2002) The Language of New Media (Leonardo Books); The MIT Press

KUT 112/3
PRINCIPLES OF COMMUNICATION NETWORKS

COURSE SYNOPSIS

This course provides an introduction to / and overview of the field of principles of communication networks (PCN). PCN is all about the network architecture, link and access technologies. It also a combination of several network layers, services. This course also will explain about the traffic and switch architecture as well as the network security. It integrates theories and methodologies from computer and network communications with many other areas, course readings will span current theory and practice in the communication networks. Students will work on both individual and team projects to design, implement and evaluate the principles of communication networks.

COURSE OUTCOMES

1. Ability to explain the concept and elements of communication network, and analyze its relevant to new media communication usage.
2. Ability to combine the principles of communication network and relate its application into today's media activity.
3. Ability to design communication network infrastructure and associate them to any geographic limitation and service applications.

REFERENCES

1. Principles of Data Communications and Network Security: Practice Orientation, Brian Shin PhD, Montezuma Publishing, 2013 (ISBN-10: 0-7442-2427-6; ISBN-13: 978-0-7442-2427-6)
2. Larry L. Peterson and Bruce S. Davie "Computer Networks: A Systems Approach (5th ed)", Morgan Kaufmann, 2011
3. Andrew S. Tanenbaum, Computer Networks (5th ed), Pearson, 2011.
4. Data and Computer Communications (10th Edition), William Stallings, Prentice Hall, 2013

KUT 113/3
INTRODUCTION TO NEW MEDIA

COURSE SYNOPSIS

This course provides a survey of modern cyber culture, including various forms of human communication mediated by the creative application of computer technology, and the developments that have enabled this exploding phenomenon. This course studies the history, theory, and practice of new media in today's networked society; the implications of the convergence of technology and convergence of disciplines; and the societal implications of the new connectedness. Second generation web-based media such as social communities, blogs, wikis, personal web pages will be examined.

COURSE OUTCOMES

1. Explain the concepts of new media and computer technology.
2. Distinguish computer hardware, software, communication media, its functions and characteristics.
3. Compare the differences between new media technology to identify the appropriateness of use for certain functions.

REFERENCES

1. Levinson, Paul. (2012). New New Media. 2nd edition. US: Allyn & Bacon, Inc.
2. Nayar, Pramod K. (2010). An introduction to new media and cybercultures. Chichester : Wiley-Blackwell.
3. Hui, Wendy Kyong Chun & Keenan, Thomas. (2006). New media, old media : a history and theory reader. New York ; London: Routledge.
4. Lister, Martin et. al. (2003). New Media: A Critical Introduction. London: Routledge.



KUT 102/3
INTERPERSONAL COMMUNICATION IN NEW MEDIA

COURSE SYNOPSIS

This course aims to expose the students to the skills of interpersonal communication in the context of new media. This course will help to improve the students' ability to comprehend the concepts related to interpersonal communication that can be used in the context of organizations, small groups as well as individual level. Students will also be exposed to conflict management skills and interpersonal relationship skills.

COURSE OUTCOMES

1. Explain the concepts related to interpersonal communication.
2. Analyze the interpersonal communication skills in a variety of contexts.
3. Conclude the issues related to interpersonal relationships and problem solving.

REFERENCES

1. Steven. A. Beebe, Susan J. Beebe, & Mark V. Redmond. (2014). Interpersonal Communication: Relating to others (7th edition). Pearson, Education Inc.
2. Joseph A. DeVito. (2014). The Interpersonal Communication Book (13th edition). Pearson, Education Inc.
3. Owen Hargie and David Dickson. (2011). Skilled Interpersonal Communication: Research, Theory, And Practice(5th edition); Routledge.
4. Julia T. Wood.(2009). Communication in Our Lives (5th edition) Wadsworth Cengage Learning
5. Michael Tomasello. (2008). Origins of human communication; Massachusetts Institute of Technology, London England
6. Richard Ellis. (2009). Communication Skills Stepladders to Success for the Professional (2nd ed); Gutenberg Press, Malta

KUT 114/3
NEW MEDIA AND SOCIETY

COURSE SYNOPSIS

This course aims to enhance students' knowledge, understanding of the philosophy of communication and new media development in the community. The discussion led to the function and roles of new media in influencing people's lives. Students are also exposed how new media is able to disseminate information to the public. In addition, this course also reviews the rapid development of new media such as radio, television, online news, social media, blogs and technology gadgets nowadays. It also analyzes the impact of new media in the media industry, especially to local communities and abroad.

COURSE OUTCOMES

1. Explain and understand the philosophy of technology in communication and new media in society.
2. Apply the function and role of new media in influencing people's lives .
3. Analyze how new media is able to disseminate information to the public.
4. Evaluating the understanding of digital culture and create a roadmap that can connect the new media technology with today's modern society.

REFERENCES

1. Vivian, J (2012). The Media of Mass Communication (Eleventh Edition). Amazon.com: Barnes & Noble.
2. Barrie, G & Machin, D (2009). Media audiences. London: SAGE Publishing Ltd.
3. Carroll, Craig E (2011). Corporate reputation and the news media: agenda-setting within business news coverage in developed, emerging, and frontier markets. New York: Routledge.
4. Dominick, J.R (2010). The Dynamics of Mass Communication Media in Transition. New York: McGraw Hill.
5. Gali, E (2010). *Transitioned media (electronic resource; a turning into the digital realm*. New York: Springer.
6. Jones, Paul (2011). Key concepts in media and communications. Los Angeles: SAGE Publishing Ltd.
7. Juliana Abdul Wahab. (2012). Media, Komunikasi dan Wacana Globalisasi di Malaysia. Pulau Pinang: USM

KUT 115/3
VISUAL COMMUNICATION

COURSE SYNOPSIS

This course will guide the students understand the basic principles of visual communication and relationship with publishing products either in print or on the move. This course also explains the importance of visual communication in human life. This course will guide students to produce projects that are visually more meaningful. Students will be guided in understanding various concepts of visual perspective view, the history of visual communication and its development, its importance from the perspective of different cultures and their application in a publication. This course will help students to become more critical and sensitive in the use of color, layout, design and selection of tones in attracting attention and leave a meaning to the audience.

COURSE OUTCOMES

1. Explain the concepts and principles of visual communication with suitable approach and process of issuing all forms of visual media.
2. Understanding the elements of visual communication and analyze the appreciation meaning in the context of the creation of product.
3. Produce communication products that give emphasis on aspects of visual communication.
4. Relate knowledge learned with the analysis of activity related to production and assessment of visual communication.

REFERENCES

1. Burrough, Xtine & Martin, Paul. (2013). Visual communication on the web. New York: Routledge.
2. Manghani, Sunil. (2013). Image studies : Theory and practice. London; New York: Routledge.
3. Williams, Rick & Newton, Julianne. (2007). Visual communication : integrating media, art and science / Rick Williams and Julianne Newton. New York : Lawrence Erlbaum Associates.
4. Smith, K.L., Moriarty, K., Barbatsis, G., & Kenny, K. (Penyt.) (2010). Handbook of Visual Communication: Theory, Methods, and Media. Routledge: Mahwah New Jersey.
5. Jamieson, H. (2007). Visual Communication. More than Meets the Eyes.Bristol, United Kingdom.
6. Martin, P., Ross, S.D. (2003) Images that Injure. Pictorial Stereotypes in the Media. Praeger: Westport Connecticut.

KUT 116/3
PRINCIPLES OF HUMAN COMPUTER INTERACTION

COURSE SYNOPSIS

This course provides an introduction to and overview of the field of human-computer interaction (HCI). HCI is an interdisciplinary field that integrates theories and methodologies from computer science, cognitive psychology, design and many other areas. The course readings will span current theory and practice in interface specification, design and evaluation, as well as current and classic research papers in HCI. Students will work on the individual assignment and team projects to design, implement and evaluate computer interfaces. They should be able to explore the HCI in their projects and present their works.

COURSE OUTCOMES

1. To explain the concept of human computer interaction and analyze its relevant to managerial usage and decision making.
2. To combine the principles of human computer interaction and relate its usage in today's activity.
3. To modify various features and arrange them to retrieve the information through the use of human computer interaction.

REFERENCES

1. Alan Dix, Janet Finlay, Gregory D. Abowd and Russell Beale (2004), Human Computer Interaction, 3rd Edition, Prentice Hall
2. Yvonne Rogers, Helen Sharp, and Jenny Preece (2011), Interaction Design: Beyond Human-Computer Interaction (3rd edition), Publisher: Wiley
3. Wilbert O. Galitz (2007), The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques (3rd Edition), Publisher: Wiley
4. David Benyon, Phil Turner, and Susan Turner (2005), Designing Interactive Systems: People, Activities, Contexts, Technologies, Publisher: Addison Wesley
5. Ben Shneiderman (1998), Designing the User Interface: Strategies for Effective Human-Computer Interaction (3rd Edition), Publisher: Addison Wesley Longman
6. Jenny Preece, Yvonne Rogers, Helen Sharp, David Benyon, Simon Holland and Tom Carey (1994), Human-Computer Interaction, Publisher: Addison Wesley

KUT 117/3
SOCIOLOGY IN NEW MEDIA

COURSE SYNOPSIS

This course provides an overview of the study of the relationship between humans and society. This paper will allow students to examine how economics, politics, religion, race, gender, family and the environment interact to shape people's lives. Students will learn to analyze social problems to discover their causes and possible solutions. This paper also prepares the students for employment in social service, recreation, teaching, and preparation for pre-professional studies.

COURSE OUTCOMES

1. Explain how social change factors, such as population, urbanization, or technology affect social structure and individuals.
2. Discuss how the self develops sociologically and compare this to psychological, economic and other approaches.



3. Justify how social structure varies across time and place and the effects of such variations.

REFERENCES

1. Newman, D. M. (2017). Sociology: Exploring the Architecture of Everyday Life, Brief Edition. Fifth Edition. US: Sage.
2. Chambliss, W. J. & Eglitis, D, S. (2017). Discover Sociology. Third Edition. US: Sage.
3. Healey, J. F. & O'Brien, E. (2015). Race, Ethnicity, Gender, and Class: The Sociology of Group Conflict and Change. Seventh Edition. US: Sage.
4. Gail Dines and Jean Humez (2015). Gender, Race, and Class in Media: A Critical Reader. 4th Edition. US: Sage.
5. Waisbord, S.(2014). Media Sociology: A Reappraisal. 1st Ed. US: Polity.
6. Fadul, J. A. & Estoque, R. S. (2011). A Textbook for an Introductory Course in Sociology 2nd Edition. US: Lulu. com

KUT 121/3
INNOVATIVE AND CREATIVE SKILLS

COURSE SYNOPSIS

This course aims to improve students understanding and knowledge of the theory and processes related to creative and innovative thinking. Foundation of the course is to processes relevant to problem solving that encourages the use of problem solving tools.

COURSE OUTCOMES

1. Explain theories and concepts that are relevant to the creative and innovative thinking.
2. Demonstrate effective approach to identify problems and solve the problem.
3. Identify obstacles in order to enhance capabilities of looking opportunities and thinking skills in team.
4. Explore the processes associated with creativity and innovation.

REFERENCES

1. Mark A. Runco. Creativity Theories and Themes: Research, Development and Practice (2014)
2. A Coskum Samli. From Imagination to Innovation (2011)
3. Gordon Cameron. Trizics: Teach yourself TRIZ, how to invent, innovate and solve "impossible" technical problems systematically. (2010)
4. W. Chan Kim and Renee Mauborgne. Blue Ocean Strategy, Expanded Edition: How to Create Uncontested Market Space and Make the Competition Irrelevant. (2014)

KUT 201/3
SMALL GROUP COMMUNICATION

COURSE SYNOPSIS

The course aims to provide students with the concepts and theories of small group communication. Focus is given to the core skills in order to communicate in small groups, build groups for problem solving, interpersonal relationships in small group, led small and conflict handling in small groups. Overall, this course introduces students to the knowledge and skills related to the establishment, control and problem solving in small groups, using appropriate skills in communication.

1. Illustrate the key concepts associated with a small group communication.
2. Apply the theory and small group communication model.
3. Demonstrate in various ways the skills needed to communicate, build and operate small groups.

REFERENCES

1. John F. Cragan, Chris R. Kasch dan David W. Wright (2009). Communication in Small Groups: Theory, Process, Skills (7th. Edition). Boston, MA, USA: Wadsworth Cengage Learning.
2. J. Dan Rothwell (2013). In Mixed Company: Communicating in Small Groups and Teams (8th. Edition). Boston, MA, USA: Wadsworth Cengage Learning.
3. Scott A. Myers dan Carolyn M. Anderson (2008). The Fundamentals of Small Group Communication. Thousand Oaks, California: Sage Publication, Inc..
4. John O. Burtis dan Paul D. Turman (2006). Group Communication Pitfalls. Thousand Oaks, California: Sage Publication, Inc..
5. Stephen E. Kohn dan Vincent D. O'Connell (2007). 6 Habits of Highly Effective Teams. Franklin Lakes, NJ: Career Press.
6. Thomas E. Harris dan John C. Sherblom (2008). Small Group and Team Communication (4th. Edition). Boston, MA: Pearson Education, Inc..
7. R. Scott Tindale et. Al. (Editors) (2002). Theory and Research on Small Groups. New York: Kluwer Academic Publishers

KUT 211/3
DIGITAL PHOTOGRAPHY

COURSE SYNOPSIS

In this course students learn the basic principles of the photographic media, basic camera functions, become familiar with various settings and presets on camera, explore the photographic process from pre-visualization, taking images, digital storage media and transfer of images, to adjusting and manipulation

of digital images, output to print and creating digital portfolio. Emphasis is placed on learning design principles, composition, and fundamental history and theory of photographic media. Through number of projects students approach various subjects to create images that are personal and expressive.

COURSE OUTCOMES

1. Discuss the concept of digital photography as an art form.
2. Apply camera techniques necessary for using digital photography as a creative tool.
3. Illustrate professional images editing software and proper digital workflow.
4. Appraise the practice in the creation of images using their camera that they can visualize in their own mind.

REFERENCES

1. Kelby, S (2012). *The digital photography book. Part 1 : the step-by-step secrets for how to make your photos look like the pros'*. San Francisco, Calif. Peachpit Press
2. Long, B. (2013). *Complete Digital Photography*. Boston. MA , Course Technology.
3. Busch. D (2015). *David Busch's mastering digital SLR photography*. Boston, MA. Cengage Learning
4. Kelby, S & Klowskowski, M . (2012). *The Photoshop Elements 10 book for digital photographers*.
5. Berkely, Calif. New Riders.
6. Evening, M. (2012). *Adobe Photoshop CS6 for photographers : a professional image editor's guide to the creative use of Photoshop for the Macintosh and PC*. Burlington, Mass. Focal Press
7. Kelby, S (2013). *The Adobe Photoshop CS6 book for digital photographers*. Berkeley, CA. New Riders.
8. Hasnuddin Abu Samah, (2012). *Asas Fotografi Digital*. PTS NetMedia

KUT 212/3
GRAPHIC DESIGN FOR NEW MEDIA

COURSE SYNOPSIS

This course is designed to build upon a basic level of skills in using Adobe Illustrator, Adobe Photoshop, Adobe InDesign, and Adobe Flash for those wishing to design a variety of graphics. This course also provides theoretical basis on graphic design such as Design Principle, Elements of arts, Stages of Design and types of graphic design. At the end of this course, students should be able to demonstrate the basic skill of Adobe software and basic knowledge about graphic design for both academic settings and industrial workplaces.

COURSE OUTCOMES

1. Identify the key concepts related to the Graphic Design.
2. Applying technical skills by using graphic software to produce the creative project.
3. Applying the creative process in solving design problem.
4. Design strategies for effectively engaging audiences and enhancing communication in all forms of media.

REFERENCES

1. Adobe Photoshop CS6 Classroom in a Book, Adobe Press, 2012, ISBN: 9780321827333
2. Adobe Illustrator CS6 Classroom in a Book, Adobe Press, 2012, ISBN: 9780321822482
3. Adobe InDesign CS6 Classroom in a Book, Adobe Press, 2012, ISBN: 9780321822499
4. Adobe Flash Professional CS6 Classroom in a Book, Adobe Press, 2012, ISBN: 9780321822512
5. Asas Seni Visual, Mohd. Johari Ab. Hamid, Universiti Pendidikan Sultan Idris, 2006, ISBN: 9832620864
6. Graphic Design Essentials: Skills, Software and Creative Strategies, Joyce Walsh Macario, 2009.
7. Graphic Design: A User's Manual, Adrain Shaughnessey, 2009.

KUT 221/3
NEW ERA MANAGEMENT

COURSE SYNOPSIS

This course aims to give students the basic concepts and skills to manage organizations in the new era. In general, the course focuses on the identification of environmental management, planning, managing, directing, and controlling and monitoring the organizations of the local and global environmental multifaceted.

COURSE OUTCOMES

1. Identify the concepts related to new era management.
2. Apply the knowledge of new era management in organization.
3. Analyze new era management concepts with the real situation in the organization.
4. Demonstrate the contemporary challenges facing management ethic and corporate social responsibility and international management.

REFERENCES

1. Chuck Williams (2011). Management. Mason, OH, USA: South-Western, Cengage Learning.
2. Ricky W. Griffin (2012). Fundamentals of Management (6th Edition). Mason, OH, USA: South-Western, Cengage Learning.
3. John R. Schermerhorn (2011). Management (11th Edition). Hoboken, New Jersey: John Wiley & Sons, Inc.

4. Thomas S.Bateman dan Scott A. Snell (2004). Management: The New Competitive Landscape (6th Edition). New York: McGraw-Hill Companies, Inc.
5. Jeffrey A Miles (2012). Management and Organization. San Francisco, CA: Jossey-Bass.

KUT 331/3
RESEARCH METHODOLOGY

COURSE SYNOPSIS

The course focuses on the processes involved in conducting research in the field of social sciences particularly in new media and communication. It aims at providing the experience for students to apply selected research designs to conduct research in focuses in the field of new media and communication. In addition it develops research exposure in collecting, analyzing and interpreting research data. The course will enable students to apply research format to prepare a research proposal.

COURSE OUTCOMES

1. Integrate the five basic research processes conducting research in the field of new media and communication (social sciences).
2. Identify research designs to conduct research in the field of new media and communication (social sciences).
3. Demonstrate skills and understanding in collecting, analyzing and interpreting research data.
4. Prepare a research proposal.

REFERENCES

1. Ranjit Kumar .(2010). Research Methodology: A Step-by-Step Guide for Beginners; Sage Publications Ltd; CA.
2. Berger, AA (2000). Media and Communication Research Methods: An Introduction to Qualitative and Quantitative Approaches. Sage Pub, CA
3. Federick, W., Ronald, ER., Everett, MR. (1988). Research Methods and the New Media. Free Press, Macmillan, NY.
4. Uwe Flick (2011). Introducing Research Methodology: A Beginner's Guide to Doing a Research Project; Sage Publications Ltd.
5. John W. Creswell .(2008). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches; Sage Publications Ltd; Third Edition.
6. Steve Jones. (1988). Doing Internet Research. Sage Pub, CA.

KUT 333/3
SOCIAL PSYCHOLOGY

COURSE SYNOPSIS

Social psychology is the scientific study about the way people think about, feel, and behave in social situations. It involves understanding how people influence, and are influenced by others and situations around them. This course will discuss concepts of social psychology and how student can use it in helping the community. The main concern in this course is the use of social psychology in the development of society.

COURSE OUTCOMES

1. Describe the concepts related to social psychology.
2. Apply knowledge of social psychology to situations in everyday life.
3. Explain potentials and weaknesses of social psychology in solving society problems.

REFERENCES

1. Aronson, E, Wilson, T.D. and Akert, R.M. (2013) Social Psychology 8th Edition. Pearson.
2. Hogg, M.A. and Vaughn, G.M. (2013) Social Psychology. Pearson.
3. Delamater,J.D, and Myers,D.J (2010) Social Psychology 7th Edition. Cengage Learning.
4. Myers,D.J (2012) Social Psychology 11th Edition. McGraw-Hill Humanities.
5. Lesko, W. A. (2011) Readings in Social Psychology 8th Edition. Pearson.
6. Abdul Rahman Embong (2006) Peranan dan Orientasi Sains Sosial Malaysia. Universiti Kebangsaan Malaysia.

KUT 301/3
NEW MEDIA AND CROSS CULTURAL COMMUNICATION

COURSE SYNOPSIS

With the rapid expansion of globalization, intercultural contact is now part of daily life for most of us. The course aims to examine communication in multicultural relationships and provides practitioners with the tools for effective communication amid cultural, ethnic, and religious differences. Overall, students are introduced to the primary approaches for studying intercultural communication along with a theoretical and practical framework for applying these approaches themselves.

COURSE OUTCOMES

1. Analyze the key concepts associated with a cross-cultural communication.
2. Hypothesize the theory in cross-cultural communication model.
3. Conclude in various ways the skills needed to communicate, build and operate in intercultural setting.

REFERENCES

1. Judith Martin, Thomas Nakayama (2013). *Intercultural Communication in Contexts*. McGraw-Hill Humanities/ Social Sciences/Languages; 6th edition
2. Fred Edmund Jandt and Fred E. Jandt (2009). *An Introduction to Intercultural Communication: Identities in a Global Community*. Sage Publications, Inc; Sixth Edition edition.
3. James William Neuliep (2011). *Intercultural Communication: A Contextual Approach*. Sage Publications, Inc; Fifth Edition edition
4. Myron W. Lustig (2009).*Intercultural Competence: Interpersonal Communication Across Cultures*. Allyn & Bacon; 6 edition
5. Judith N. Martin (2010). *Experiencing Intercultural Communication: An Introduction*. McGraw-Hill Humanities/Social Sciences/ Languages; 4 edition

KUT 302/3
INTEGRATED MARKETING COMMUNICATION

COURSE SYNOPSIS

The course provides an understanding of the concepts and methods in Integrated Marketing Communications (IMC), in both traditional and digital media. Primary emphasis on consumer insight, branding, market segmentation and positioning, message strategy, promotion and the execution of marketing communications through appropriate media technologies. The course develops students' ability to think analytically and strategically by assessing examples and case studies of marketing communications problems and opportunities. At the end of this course, students should be able to demonstrate and apply concepts and methods in order to analyze IMC plays a role in improving business decisions.

COURSE OUTCOMES

1. Comprehend the concepts used in integrated marketing communications (IMC).
2. Distinguish the different kinds of marketing as part of an IMC.
3. Analyze a number of pragmatic examples and case studies of real-world experiences in IMC.
4. Apply IMC concepts and methods in the development of a comprehensive plan an integrated marketing campaign.
5. Critically evaluate the communications effects and results of an integrated marketing campaign to determine its success.

REFERENCES

1. Tuckwell, K.J. (2011). *Integrated Marketing Communication: Strategic Planning Perspectives*. Canada: Pearson.
2. Belch, G., & Belch, M. (2014). *Advertising and promotion: An integrated marketing communications perspective* (10th ed.). New York: McGraw-Hill
3. Dominick, J. R. (2010). *The Dynamics of Mass Communication Media in Transition*. NewYork: McGraw-Hill.
4. Biagi, S. (2009). *Media Impact: An Introduction to Mass Media*. London: Wadsworth.

KUT 311/3
DIGITAL VIDEO PRODUCTION

COURSE SYNOPSIS

This course introduces students to the fundamentals of digital video production. Through a series of audio and video productions, students will explore and practice the aesthetic, technical, and communicative elements of digital video and sound production. Particular attention is paid to the skills required to successfully bring a mediated story or message to an audience. Students will learn how to produce short videos, including story-boarding, directing, lighting and shooting, sound recording and will finish productions using current video- and sound-editing software. Students will learn to analyze and respond critically to a variety of audio/ visual productions.

COURSE OUTCOMES

1. Discuss various concept and direction styles ranging from scripted narrative and short film, live documentary and commercial movie-making traditions.
2. Demonstrate proficiency in the operation of digital video cameras, lighting equipment, audio for digital video production, and digital video editing hardware and software.
3. Analyze audio/visual productions and respond critically, in oral and/or written form.
4. Verbally critique technical and aesthetic qualities of digital video productions in the context of historical and contemporary video making trends.

REFERENCES

1. Owen, J, Millerson, G (2012). Video Production Handbook. Amsterdam: London: Focal Press
2. Schreer, O, Jean-François Niamut, Omar Aziz (2013) Media Production, Delivery and Interaction for Platform Independent Systems : Format-Agnostic Media. John Wiley & Sons, Incorporated
3. Ekert, P (2013) Mastering Adobe Premiere CS6 Hotshot : take your video editing skills to a new and exciting levels with eight fantastic projects. Birmingham: Packt Pub
4. Heldt, Guido (2014). Music and Levels of Narration in Film. Intellect Ltd.

5. Hodgson, Jay (2010) Understanding Records : A Field Guide to Recording Practice. Continuum International Publishing
6. Paul White. (2010) Basic MIDI. SMT; Min edition
7. Owen, J, Millerson, G (2013) Television Production. Waltham, MA: Focal Press

KUT 312/3
WEB DESIGN AND DEVELOPMENT

COURSE SYNOPSIS

This course provides the knowledge and basic skills in creating, coding and posting basic HTML and CSS files to the Internet. Equipped with standard design guidelines to ensure strong online presentation, the students will have a foundational knowledge of website creation and apply it to the planning, design and development of their own web page over the course of the semester. Critical thinking will be encouraged through class interactions, projects, and online postings.

COURSE OUTCOMES

1. Read and write basic HTML and CSS code
2. Create a full functioning website
3. Present skills by uploading websites to a web server.
4. Evaluate and critique online web presentations.

REFERENCES

1. Castro, Elizabeth and Hyslop . HTML5, and CSS, Eight Edition: (Visual QuickStart Guide), Peachpit Press, 2013.
2. Cederholm, Dan. CSS3 For Web Designers, A Book Apart, 2015.
3. Horton, Sarah and Quesenbery, Whitney. Universal Design for Web Accessibility, Rosenfeld Media, 2014.
4. Chisholm, and May. Universal Design for Web Applications: Web Applications That Reach Everyone, O'Reilly Media, 2008.
5. Debolt, Virginia. Mastering Integrated HTML and CSS, Sybex Inc, 2007.

KUT 321/3
INVENTION SKILLS

COURSE SYNOPSIS

This course emphasizes on building creativity and innovation to produce competitive designs to meet current needs. Students will be exposed to the concept, the type, process and strategy to develop creativity and innovation. At the end of this course, students will be exposed to the opportunities and challenges in generating ideas, products and services in a creative and innovation in line with the current challenges in new media communication.

COURSE OUTCOMES

1. Comprehend the concepts related to invention skills.
2. Demonstrate the strategies and instruments of innovation and invention skill.
3. Apply methods and tools of invention skills in organization.
4. Appraise the skill of invention facing challenges of internal and external environment.

REFERENCES

1. Tom Kelleys. *The Ten Faces of Innovation*. Doubleday (2005)
2. Mauborgne, René, *Blue Ocean Strategy.* Boston, Harvard Business School Press.
3. Peter Drucker (1985). *Innovation And Entrepreneurship*. Harper Collinns Publisher. New York.
4. Ceserani, J. and Greatwood, P. (1995). *Innovation and creativity*. London: Kogan Page.
5. Frederick, H.H., Kuratko, D.F, & Hodgetts, R.M. (2007). *Entrepreneurship: Theory, process & practice.* Australia: Thomson Publication.
6. Hisrich, R.D., Peters, M.P, & Shepherd, D.A. (2008). *Entrepreneurship, 7th edition*. Singapore: Mc Graw Hill Companies.

KUT 334/3
INDUSTRIAL PSYCHOLOGY

COURSE SYNOPSIS

This course focuses both on understanding the psychological bases of work behavior and on the organizational practices used to create a good fit between people's characteristics and work's demands. During this course, we will cover a number of topics including personnel selection, placement, training, work motivation, job satisfaction, leadership, teamwork, and work-family balance.

COURSE OUTCOMES

1. Elaborate how the science of human behavior is used to select, develop, and manage employees
2. Conclude the major content areas and vital foundational components of Industrial Psychology
3. Critically evaluate and apply solutions to the problems relevant to Industrial Psychology.

REFERENCES

1. Spector, P. E. (2016). Industrial and Organizational Psychology: Research and Practice, 7th Edition. US: Wiley.
2. Arnold, J. et. al. (2016). Work Psychology: Understanding Human Behaviour in the Workplace. 6th Ed. New Jersey: Pearson.
3. Muchinsky, P. M. and Culbertson, S. S. (2015). Psychology applied to work (11th Edition). Hypergraphic Press.
4. Steptoe-Warren, G. (2013). Occupational Psychology: An Applied Approach. New Jersey: Pearson.
5. Landy, F. J., & Conte, J. M. (2010). Work in the 21st century: An introduction to industrial and organizational psychology (3rd ed.). Malden, MA: Blackwell Publishing.

KUT 332/3
DATA REASONING

COURSE SYNOPSIS

The process of evaluating data using analytical and logical reasoning to examine each component of the data provided. Data from various sources is gathered, reviewed, and then analyzed using a variety of specific data analysis methods with the goal of discovering useful information, or supporting decision-making and learn to use data to make reasonable, useful conclusions and to write the results and reports in effective and convincing ways.

COURSE OUTCOMES

1. Identify the concepts related to the basics of statistical thinking with an interesting question and some data.
2. Apply the correct statistical tool to answer question of interest about own data, using available statistical software/transcribing manually.
3. Write clearly and concisely about own research topic so that the reader can easily understand the purpose and results of own research.
4. Interpret findings and develop a meaningful conclusion.

REFERENCES

1. Donald JT (2009). Quantitative Data Analysis. Wiley, SF
2. Harry FW. (2009). Writing Up Quantitative Research (3rd Ed.). Sage Pub., LA
3. John WC. (2013). Qualitative Inquiry and Research Design. Sage Pub., LA
4. Pat Bazaley & Kristi, J. (2013). Analysis with Nvivo. Sage Pub., LA
5. R. Lymen Ott & Micheal L. (2010). Statistical Methods and Data Analysis. Cengage Learning, Boston.
6. Robert, N., John E., & Gary M. (2009). Handbook of Statistical Analysis. Elservier, Amsterdam.

KUT 401/3
PUBLIC RELATIONS AND NEW MEDIA

COURSE SYNOPSIS

This course focuses on the assessment of the tactical and strategic implications of digital technology for organizations. Course content includes an examination of the potential of digital technologies for public relations campaigns, the particular challenges of online communication and the planning, management and evaluation of interactive communication campaigns. There is an analysis of the PR challenges and implications of the growing online news media industry as well as an assessment of the potential impact and possible responses to such issues as online activism, citizen journalism and the blogging explosion.

COURSE OUTCOMES

1. Express the impact of digital and interactive media on professional communication and public relations industry.
2. Assess the growth, impact and implications of the new media revolution in the context of the contemporary mass media industry, its audiences and various outputs.
3. Evaluate the tools and techniques of online public relations and their assimilation into programme planning and design.

REFERENCES

1. Seitel, Frasier (2011). The Practice of Public Relations (11th ed.). Upper Saddle, New Jersey: Pearson.
2. Newsom, D., Turk, J.V. and Kruckerberg, D. (2010). This is PR: The Realities of Public Relations (9th ed.). Belmont, CA: Wadsworth.
3. Cutlip, M.S., Center, H.A. and Broom, M.G. (2009). Effective Public Relations (10th ed). New Jersey: Prentice Hall.
4. Breakenridge, D., (2008). PR 2.0 - New Media, New Tools, New Audiences. Pearson Education. United States of America.
5. Kelleher, T. (2007)., Public Relations Online (1st ed.). Sage Publication, Inc.



KUT 402/3
MANAGERIAL COMMUNICATION

COURSE SYNOPSIS

This course provides an understanding of the concepts and strategies used in Managerial Communication. Generally, this course will expose students to leadership communication skills, information and processes for decision making, negotiation skills, utilizing of communication technology, audience analysis and strategic of effectiveness and effiency of communication assessment. At the end this course students will practice and apply the best managerial communication skills.

COURSE OUTCOMES

1. Comprehend the managerial communication skills, contemporary theories and concepts in managerial communication.
2. Apply communication methods and technology tools to generate skills in the management of environmental organizations.
3. Explain the role of communication in management, particularly in decision making, and problem-solving.
4. Evaluate situational analysis and planning in order to achieve effectiveness in managerial communication.

REFERENCES

1. Hynes, G. E. (2015). Managerial communication: Strategies and applications (6th ed.). Thousand Oaks, CA: Sage.
2. Munter, M. (2012). *Guide to Managerial Communication: Effective Business Writing and Speaking.* (9th ed.) Upper Saddle River, NJ: Prentice-Hall. ISBN: 13: 978-0-13-214771-2
3. O'Rourke, J. S. (2012). *Management Communication* (5th Ed). Prentice Hall; ISBN-13: 978-0132671408
4. Bell, A. H. & Smith, D. M. (2010). *Management Communication* (3rd Ed). Wiley; ISBN-13: 978-0470084458

KUT 406/3
CRISIS COMMUNICATION IN NEW MEDIA

COURSE SYNOPSIS

Every day something happens in the world of business, economics, and/or in the lives of celebrities that involve crises. In this course the students will examine theories and concepts that lay at the intersections of communication, business, social psychology, and interpersonal relationships. This course will also address historic and contemporary examples of crises in order to give the students both a theoretical and hands-on approach to crisis communication and an understanding of how it relates to our daily world.

COURSE OUTCOMES

1. Critically analyze crisis communication in new media case studies
2. Critically discuss crisis communication and management strategies and tactics for detection, prevention, preparation, containment, and recovery.
3. Recommend the application of learned new media crisis communication and management skills to a real world context

REFERENCES

1. Frandsen, F. & Johansen, W. (2017). Organizational Crisis Communication: A Multivocal Approach. CA: Sage.
2. Sheehan, M. & Quinn-Allan, D. (2015). Crisis Communication in a Digital World. UK: Cambridge University Press
3. Coombs, W. T. (2014). Ongoing Crisis Communication: Planning, Managing, and Responding. Fourth Edition. CA: Sage.
4. Ulmer, R. R., Sellnow, T. L., & Seeger, M. W. (2017). Effective Crisis Communication: Moving From Crisis to Opportunity. Fourth Edition. CA: Sage.
5. Schenkler, I. & Herrling, T. (2004). Guide to Media Relations. Prentice-Hall

KUT 411/3
DIGITAL MEDIA PRODUCTION

COURSE SYNOPSIS

The students will use digital technologies to address communication needs identified from the 'real' business world. Specifically, each student develops practical skills in information visualization, multiple cameras and green screen, audio recording, multimedia design and the use of communication and presentation tools. Their work is informed by a study of the principles of multimedia learning followed by an application of these principles to broader communication strategies both in the studio and in the field.

COURSE OUTCOMES

1. Discover effective ways to realize ideas by developing new skills and collaborating with others who have complementary skills.
2. Practice of audio/visual acquisition and manipulation and their applications in multimedia production.

3. Create solutions, integrating technical knowledge and design principles, for multimedia products and the implementation of multimedia projects.
4. Ability to critique digital media projects through a three-step process of description, analysis, and evaluation.

REFERENCES

1. Schreer, O (2014) Media Production, Delivery and Interaction for Platform Independent Systems
2. Format-Agnostic Media. John Wiley & Sons, Incorporated
3. Clarke, M.J (2013) Transmedia television : new trends in network serial production. *New York : Bloomsbury*
4. Guillaume, P (2013) *Music and Acoustics : From Instrument to Computer.* John Wiley & Sons
5. Jonas, L. Bo, R (2013) Collaborative media : production, consumption, and design interventions. Cambridge, Massachusetts : The MIT Press
   a. Format-Agnostic Media. John Wiley & Sons, Incorporated
6. Adobe Creative Team (2013) ,*Adobe Audition CC Classroom in a book.* Adobe Press; 1 edition
7. Hodgson, J (2010) *Understanding Records : A Field Guide to Recording Practice.* Continuum International Publishing
8. Paul,W. (2010) *Basic MIDI*. SMT; Min edition
9. Leslie, M (2012) Production management for television . *London ; New York : Routledge*
10. Lidstone, W (2012) *Media Composer 6 : Professional Picture and Sound Editing*. Course Technology / Cengage Learning.

KUT 412/3
ANIMATION FOR INTEGRATED MEDIA

COURSE SYNOPSIS

Students will study animation using the following perspectives: historical, aesthetic and technological with the familiarization of the Adobe Flash and Adobe After. Students will experiment a wide variety of animation techniques such as interface design, as well as measurement as it applies to embedded items. This course also requires the writing of an instructional design document. At the end of this course, students will have at least one completed fully functional Flash and After Effects project for their portfolios demonstrating a strong knowledge of the software.

COURSE OUTCOMES

1. Integrate the principles of animation in new media and communication.
2. Demonstrate skills and understanding in creating vector animation and editing video effects.
3. Creatively explain the design process in a report and presentation.

REFERENCES

1. Fred Gerantabee, AGI Creative Team. (2012) Adobe Flash CS6 Digital Classroom.
2. Jerron Smith, AGI Creative Team. (2012). Adobe After Effects CS6 Digital Classroom.
3. Flash CS3 [Computer software]. (2007). Adobe. ($249 student/teacher version through Adobe website)
4. Creative Suite 3 Web Standard [Computer software]. (2007) Adobe. ($399 student/teacher version through Adobe website) Has Flash, Dreamweaver, Fireworks, and Contribute. There are several flavors of the Creative Suite as well, including packages that include Photoshop and Illustrator.

KUT 322/3
ELECTRONIC ENTREPRENEURSHIP

COURSE SYNOPSIS

This course aims to improve understanding and knowledge about the theories and processes associated with the business. The course is kepadaproses-relevant processes related to information technology applications expose potential students of IT in the business world, as well as master students with business skills. It also includes step-by-step formation of the business.

COURSE OUTCOMES

1. Identify needs that are relevant to electronic business.
2. Explain the steps and theories related to electronic business.
3. Distinguish the processes related to electronic business.

REFERENCES

1. William G. Nickels (2008) Understanding Business. Edition 6. Irwin McGraw-Hill.
2. AB Aziz Yusof (2011). Engineering Entrepreneurship, Selangor, Malaysia: Pearson
3. ABAziz Yusof (2000). Usahawan dan Pengukuhan Jaringan Rakan Niaga, Kedah, Malaysia: Penerbit UUM.



4. Barringger, Bruce R & Ireland, R. Duane (2008). Entrepreneurship: Succesfully Launching New Ventures, 2nd edn, New Jersey: Prentice Hall.
5. Kuratko, Donald F (2009). Introduction to Entrepreneurship, 8th edn, Canada: South Western.
6. Khalidah Khalid, Business Management: A Malaysian Perspective, 1st edn, Shah Alam: Oxford Fajar Sdn. Bhd.

KUT 421/3
SKILLS IN ORGANIZATIONAL STRATEGY AND PERFORMANCE MANAGEMENT

COURSE SYNOPSIS

This course aims to provide interfaith understanding to students about the concepts and process management of strategies and achievement. In the strategic management of aspects, this course touches aspects environmental analysis, determination methodological findings and terraces strategy, formulation of strategic objectives, strategic method map creation, and the determination of measuring achievement of strategic objectives, and strategic initiatives. In the maintenance aspect of achievement, this course explains the docking between strategic design and achievement, method of measure achievement, method of workers and develop the achievements of workers.

COURSE OUTCOMES

1. Explain the key concepts related to the management strategy and performance.
2. Apply knowledge about the process of formulating, implementing and monitoring the strategic plan of the organization.
3. Correlate the strategic objectives with the performance of employees and organizations to achieve competitive advantage organizations.

REFERENCES

1. Michael A. Hitt, R. Durane Ireland dan Robert E. Hoskisson (2011). *Strategic Management* (Ninth Edition). Mason, OH, USA: South-Western Cengage Learning.
2. Herman Aguinis (2009). *Performance Management* (Second Edition). Upper Saddle River, New Jersey: Pearson Education, Inc.
3. Harvard Business School (2005). *Strategy: Create and Implement the Best Strategy for Your Business*. Boston, Massachusetts: Harvard Business School Publishing Corporation.
4. Richard F. Gerson dan Robbie G. Gerson (2006). *Positive Performance Improvement: A New Paradigm for Optimizing Your Workforce*. Mountain View, CA: Davies-Black Publishing.
5. Robert S. Kaplan dan David P. Norton (1996). *The Balanced Scorecard: Translating Strategy Into Action*. Boston, Massachusetts: Harvard Business School Publishing Corporation.
6. Andy Neely, Chris Adams and Mike Kennerley (2002). *The Performance Prism: The Scorecard for Measuring and Managing Business Success*. Great Britain: Pearson Education Limited.

KUT 404/3
EVENT MANAGEMENT

COURSE SYNOPSIS

This course is designed to help students improve their leadership and operation required to manage a successful event. This course provides an 'overview' for event management techniques and strategies needed to manage the event.

COURSE OUTCOMES

1. Identify the types of events and can distinguish them.
2. Appoint the best way to be taken into account when organizing the event.
3. Combining specific skills to operate and organize a successful event.
4. Assessing the results of the event for the purpose of improving future events.

REFERENCES

1. Van der Wagen (2007). Event Management for Tourism, Cultural, Business and Sporting Events. 3rd ed. Australia: Pearson
2. Supovitz, F. (2005). The Sports Event Management and Marketing Playbook. John Wiley & Sons, Inc.
3. Silvers, J.R. (2004). Professional Event Coordination. John Wiley & Sons, Inc.
4. Goldblatt, J. (2005). Special Events: Twenty-First Century Global Event Management. (5th ed.) Wiley Publication
5. Allen, J. et.al (2005). Festival and Special Event Management (3rd ed.) Wiley Publication

KUT 403/3
ETHICS AND LAW IN NEW MEDIA COMMUNICATION

COURSE SYNOPSIS

This course aims to improve understanding and knowledge about the policy and the law and ethics related to the communications and new media. The focus of the course is to the law and ethics relevant to the field of communications and new media. It also includes an introduction to the basic laws of Malaysia.

COURSE OUTCOMES

1. Explain the law and ethics related to communication and new media.
2. Interpret policies that are relevant to the field of communication and new media.
3. Distinguish law and ethics related to new media and communication.

REFERENCES

1. Suhaini Muda dan Ahmad Shamsul Abd Aziz, (2007). Undang-undang Komunikasi.
2. Kuala Lumpur: Pearson Prentice Hall.
3. Cyber laws of Malaysia. Petaling Jaya: International Law Book Services.
4. Abdul Aziz Bahri. (2008). Perlembagaan Malaysia teori & praktis. Shah Alam: Arah Pendidikan.
5. Aun, W. M. (2005). The Malaysian Legal System. Petaling Jaya: Pearson.
6. Kamal Halili Hassan. (1990). Penulis dan Undang-undang. Dewan Bahasa dan Pustaka. Kuala Lumpur.
7. Mohd Safar Hasim, (2002). Mengenali Undang-undang Media dan Siber. Kuala Lumpur: Utusan Publications & Distributors Sdn. Bhd.
8. Rau. P, SampathKumar, T. J & Kayveas. M. (2006). General principle of the Malaysia legal system. Petaling Jaya: International Law Book Service.
9. Safinaz Mohd Hussein, 2002. Undang-undang Komunikasi dan Multimedia. Kuala Lumpur: Prentice Hall.

KUT 405/3
SEMINAR ON NEW MEDIA COMMUNICATION

COURSE SYNOPSIS

This course aims to expose students to the issues in regards to new media communication. In addition, students are exposed to the latest research related to new media in a variety of perspectives. This course will help improve students' ability to understand the challenges of communication in traditional and new paradigms in the context of new media.

COURSE OUTCOMES

1. Identify issues of new media communication.
2. Justify the challenges of new media communication.
3. Conclude the results of research related to new media communication.

REFERENCES

1. Leah A Lievrouw & Sonia Livingstone (2006) Handbook of New Media: Student Edition; Sage Publications Ltd.
2. Martin Lister, Jon Dovey, Seth Giddings , Iain Grant , Kieran Kelly; (2009); New Media: A Critical Introduction; Routledge; 2 edition.
3. Nicholas Gane and David Beer (Oct 28, 2008) New Media: The Key Concepts; Berg Publishers; English Ed edition
4. 4. Robert I. Berkman and Christopher A. Shumway (2003) Digital Dilemmas: Ethical Issues for Online Media Professionals (Media and Technology); Wiley-Blackwell
5. John V. Pavlik & Shawn McIntosh (2010) Converging Media: A New Introduction to Mass Communication; Oxford University Press, USA; 2 edition.

KUT 432/2
FINAL YEAR PROJECT 1

COURSE SYNOPSIS

This course comprises the first phase of final year project, and provides the opportunity to apply knowledge and skills in planning and managing projects. At the end of the semester, the students will defend their project proposal prior to a full project execution in the next semester.

COURSE OUTCOMES

1. Formulate project planning, implementation and management of their selected project.
2. Practice ethical and professional norms for the implementation of the projects.
3. Ability to prepare project proposal, present and justify the projects.

REFERENCES

1. Merrigan. G. & Huston, C. L. (2014). Communication Research Methods. 3rd Edition. Publisher: Oxford University Press: UK
2. Berger, A.A (2000). Media and Communication Research Methods: An Introduction to Qualitative and Quantitative Approaches. Sage Pub, CA
3. Federick, W., Ronald, ER., Everett, MR. (1988). Research Methods and the New Media. Free Press, Macmillan, NY.



4. Martin Lister, Jon Dovey, Seth Giddings & Iain Grant (2009). New Media: A Critical Introduction, Routledge.
5. Ranjit Kumar .(2010). Research Methodology: A Step-by-Step Guide for Beginners, Sage Publications Ltd; CA.
6. Jones (1988). Doing Internet Research. Sage Pub, CA.

KUT 433/4
FINAL YEAR PROJECT 2

COURSE SYNOPSIS

This course comprises the second phase of final year project, and provides the opportunity to apply knowledge and skills in managing and implementing projects. At the end of the semester, the students will present their project report in a seminar.

COURSE OUTCOMES

1. Execute project and management of their selected project.
2. Practice ethical and professional norms for the implementation of the projects.
3. Ability to prepare project report, present and justify the projects.

REFERENCES

1. Merrigan. G. & Huston, C. L. (2014). Communication Research Methods. 3rd Edition. Publisher: Oxford University Press: UK
2. Berger, A.A (2000). Media and Communication Research Methods: An Introduction to Qualitative and Quantitative Approaches. Sage Pub, CA
3. Federick, W., Ronald, ER., Everett, MR. (1988). Research Methods and the New Media. Free Press, Macmillan, NY.

4. Martin Lister, Jon Dovey, Seth Giddings & Iain Grant (2009). New Media: A Critical Introduction, Routledge.
5. Ranjit Kumar .(2010). Research Methodology: A Step-by-Step Guide for Beginners, Sage Publications Ltd; CA.
6. Jones (1988). Doing Internet Research. Sage Pub, CA.

KIT 432/4
INDUSTRIAL TRAINING

COURSE SYNOPSIS

The course will expose students to the technical and application aspects as well as other organizational aspects such as company organization structure, company operation, department function, work procedure, safety procedure, management, communication, technical skills, project management and presentation. The students are also required to submit their log book and report at the end of the Industrial Training. Overall, the course is a practical-based course.

COURSE OUTCOMES

1. Display good work performance and adapt to the working environment during training period.
2. Demonstrate good communication skills, leadership and work ethics during training period.
3. Perform assigned task given by host company.

REFERENCES

1. UniMAP Industrial Training Guideline
2. UniMAP Industrial Training Log Book

JOB OPP0RTUNITIES

1. Public Relations Executives/ MassComm
2. Corporate Communications Executives
3. Interactive Designer
4. Event Manager

UNIVERSITY COURSES

UUW 224/2
ENGINEERING ENTREPRENEURSHIP

COURSE SYNOPSIS

The objective of this course is to expose students to the basic knowledge of entrepreneurship and basic business management. It consists of the characteristic of entrepreneurship, the model to develop business, development of business proposal, economic analysis, sources of funding and the management of entrepreneurship technology.

COURSE OUTCOMES

1. Ability to explain the elements and the concept of entrepreneurship, creativity and innovation and evaluation of opportunities.
2. Ability to analyze the business planning
3. Ability to evaluate the issues in entrepreneurship context

REFERENCES

1. Kathleen Allen, 'Entrepreneurship for Scientists and Engineers', International Edition, Pearson, 2010.
2. Mohani Abdul, Kamarulzaman Ismail, Zainal Abidin Mohamed and Abdul Jumaat Mahajar, 'Pembudayaan Keusahawanan', Prentice Hall, 2008.
3. Peggy A, Lambing and Charles R. Kuehl, 'Entrepreneurship', 4th Edition, Pearson, 2007.

4. Rosli Mahmood, et. all , 'Prinsip-prinsip Keusahawanan: Pendekatan Gunaan', 2nd Edition, Cengage Learning, 2010.
5. William G. Sullivan, Elin M. Wicks and James T. Luxhoj, 'Engineering Economics', 13th Edition, Pearson, 2006.

UUW 233/2
ISLAMIC & ASIAN CIVILIZATIONS
(FOR LOCAL STUDENTS ONLY)

COURSE SYNOPSIS

This course discusses the basic concepts of knowledge civilization. In addition students are also exposed to the universal Islamic values as a result of a clash of Asia civilizations. It also creates a Malaysian society that respects for religion belief and also cultural system are practiced.

COURSE OUTCOMES

1. Kebolehan untuk mengenalpasti dan mentafsir konsep,teori dan elemen asas pengajian tamadun dan ketamadunan.
2. Keupayaan untuk menghubungkait dan melaporkan elemen – elemen asas pelbagai tamadun penting di Asia melalui kuliah dan sumber-sumber rujukan lain.
3. Kebolehan menterjemah dan menghuraikan nilai-nilai universiti yang luhur dan murni yang merentasi pelbagai tamadun penting di Asia melalui kerja kumpulan.
4. Keupayaan meneroka dan menulis konsep ketamadunan melalui pelbagai sumber selaras dengan hasrat untuk membentuk masyarakat bangsa Malaysia yang berpengetahuan dan bertamadun tinggi.

REFERENCES

1. Shuhairimi Abdullah, Noor Salwani Hussin, Norhudi'in Danu & Mohd Kasturi Nor Abd Aziz (2016). *Pengenalan Ilmu Ketamadunan*, Pearson Malaysia Sdn Bhd,Selangor.
2. Azizan Baharuddin, Osman Bakar, Zaid Ahmad. (2009). *Modul Pengajian Tamadun Islam & Tamadun Asia*, Penerbit Universiti Malaya : Kuala Lumpur
3. Azizan Baharuddin, (2005). *Peradaban menurut Perspektif Islam*. Kuala Lumpur: Pusat Dialog Peradaban, Universiti Malaya.
4. Bertrond Fort. (2005). *One Year of Culture and Civilizations Dialogue 2003/2004*. Singapore Asia-Europe Foundation.
5. Zaid Ahmad. (2005) *"Ibnu Khaldun's Approach in Civilizational Studies in Massino Companini, Studies on Ibn Khaldun, Corso Milano Italy :* Polimetrica International Scientific Publisher.

UUW 235/2
ETHNIC RELATIONS
(FOR LOCAL STUDENT ONLY)

COURSE SYNOPSIS

This course focuses on discussion of basic concepts of ethnic relations and emphasis is given to the plural society in Malaysia. This course will guide students to evaluate and discuss issues related to ethnic relations around them (living on campus) and ethnic relations in Malaysia.

COURSE OUTCOMES

1. Mengenalpasti dan mengamalkan konsep asas hubungan etnik, pluraliti dan masyarakat plural di Malaysia.
2. Menghubungkait dan menghuraikan secara kritikal faktor agama, politik, perlembagaan dan ekonomi dalam konteks hubungan etnik.
3. Menterjemah dan meneroka cabaran serta sumbangan kerajaan dan masyarakat dalam memperkukuhkan hubungan etnik.

REFERENCES

1. A. Aziz Deraman (2005), *Masyarakat dan Kebudayaan Malaysia* , Kuala Lumpur: Dewan Bahasa dan Pustaka
2. Abdul Aziz Bari. (2000). Perlembagaan Malaysia: Asas-asas dan Masalah. Kuala Lumpur: Dewan Bahasa dan Pustaka
3. Azmi Aziz & Shamsul AB. (2004). The relegious, the plural, the secular and the modern: a brief critical survey on Islam in Malaysia. Inter-Asia cultural studies. Volume 5. Number 3. December.
4. Wan Mohd Nor Wan Daud. (2001). Pembangunan di Malaysia. Kuala Lumpur ISTAC
5. Zaid Ahmad, Ho Hui Ling, Sarjit Singh Gill, Ahmad Tarmizi Talib, Ku Halim Ku Ariffin, Lee Yok Fee, Nazri Muslim & Ruslan Zainuddin,(2006). Hubungan Etnik Di Malaysia. Oxford Fajar



UUW 322/2
THINKING SKILLS

COURSE SYNOPSIS

The aim of this course is to develop and enhance students' thinking skills in helping them make decision and resolve issues. Generally, there are two main ideas of thinking skills which are mostly acquired. They are creative thinking and critical thinking. The introduction the soft skills of the main idea in thinking skill concepts such as logical thinking, creative thinking, critical thinking; it is hoped that students can acquire creative and innovative ways with better judgement in resolving issues, especially pertaining to career and self development.

COURSE OUTCOMES

1. Student will be able to understand, and discuss the related thinking skills philosophies, theories and concepts in local and Western perspectives.
2. Student will be able to use, choose, apply and discuss the appropriate and suitable thinking skill concepts and strategies in lateral, logical, critical and creative ways in managing and resolving issues.
3. Student will be able to understand and choose to employ or illustrate suitable processes of making decisions and; detect as well as describe the influence factors in thinking skills. They will also be able to analyze case studies given with appropriate theories and concepts.

REFERENCES

1. Butterworth & Thwaite.,'Thinking Skills. 4th ed. UK', Cambridge University Press, 2005.
2. Chong Hoe, Lok.,'Pemikiran Kritis dan Logik. Pulau Pinang', Universiti Sains Malaysia Printing, 2003.
3. De Bono, Edward,'Pemikiran Lateral untuk Pengurusan. Kuala Lumpur', Golden Book Sdn. Bhd, 2001.
4. Mohd, Ainon & Hassan, Abdullah.,'Belajar Berfikir'. Pahang: PTS Publication, 2003.
5. Wright, Larry.,'Critical Thinking: An Introduction to Analytical Reading and Reasoning'. USA:Oxford University Press, 2001.

UUT 122/ BUW 122/2
SKILLS AND TECHNOLOGY IN COMMUNICATION
(FOR ENGINEERING AND BUSINESS STUDENTS)

COURSE SYNOPSIS

The purpose of this course is to expose students to communication and information technology. This course introduces students to the basic aspects of human. Students are introduced to motivation, knowledge and skills as tools for competent communication. The first part of the course discusses the basic process in effective communication such as perception, verbal and non-verbal communication, listening skills, basic communication models and information acquisition. The second part deals with competency in communication in the contexts of interpersonal communication, communication in organisation, small group communication, internet communication, basic skills for presentation and intercultural communication.

COURSE OUTCOMES

1. Ability to define the concepts of communication and technology in communication.
2. Ability to describe the elements of communication.
3. Ability to describe the communication skills in various context.
4. Ability to apply the basic technology in communication context.

REFERENCES

1. Devito, J.A.,'Human communication: The Basic Course'. 9th Ed', Pearson Education Inc, 2003.
2. Devito, J.A.,'The Interpersonal Communication Book'. 12th Edition, Pearson Education Inc, 2009.
3. Pearson, J. Nelson, p. Titsworth, S. Harter, L.,' Human Communication 2nd Edition',New York: McGraw Hill, 2006.
4. Wood, J.T., 'Communication Mosaics: An introduction to the field of communication. 3rd Ed. Wadsworth', Thomson Learning, 2004.
5. LaBerta, C., 'Computers Are Your Future Complete'. 11th Edition, Pearson Education Inc, 2011.
6. Pearson, Compiled by Nor'izah Ahmad, Mohammad Rezal Hamzah & Aida Sharmila Wati Wahab, 2011.

BUW 123/3
BUSINESS COMMUNICATION
(FOR BUSINESS STUDENTS ONLY)

COURSE SYNOPSIS

This course applies the communication tools and analysis to business management issues. It also focuses on developing students' ability in problem solving, by using negotiation concepts and communication elements in business environment. The module emphasizes on the patterns and principles of business communication, multicultural and global communication management, communication technology and its trends in business settings, organizational and managerial communication as well as preparation in the formal writing and oral presentation.

COURSE OUTCOMES

1. Ability to explain the concepts of communication in business.
2. Ability to discuss and apply the skills of business.
3. Ability to analyze the concepts of communication in business contexts.

REFERENCES

1. Bovee, C. and V. Thill, J., 'Business Communication Essentials', 4th Edition,) Prentice Hall; 4th Edition, 2009.
2. Krizan, Merrier, Logan, Williams, 'Business Communication'. Thomson - South Western, 2009.
3. Locker, K. and Kaczmarek, S., 'Business Communication: Building Critical Skills', McGraw-Hill/Irwin; 4th Edition, 2008.
4. Marry Ellen Guffey, Bertha Du-Babcock, 'Essentials of Business Communication', Thomson Publishing. 2007
5. Marry Ellen Guffey, 'Business Communication: Process and Product', South-Western College Pub; 6th Edition, 2007.

UUW 237/2
MALAYSIAN CULTURES
(FOR INTERNATIONAL STUDENTS ONLY)

COURSE SYNOPSIS

This course is design as an introduction course for all university international students in order for them to develop a sense of understanding and affiliation with the local cultures. The contents of this course will cover the background of Malaysia, the communities and cultures of Malaysia and also all the major and minor races in Malaysia. Student will be available to view the culture of Malay, Chinese, Indian, Sabahan and Sarawakian throughout the 14 weeks of this course.

COURSE OUTCOMES

1. Identify the concept and basic theories on society, culture and sociology of ethnics in East and West Malaysia
2. Intrepret on culture that exist based on multi ethnicity in Malaysia.
3. Compare the development proses of multi-etnic Malaysia toward a developed country.

REFERENCES

1. Julian C. H. Lee, Thinking through Malaysia: Culture and identity in the 2lst Century, Strategic information and Research Development Centre, 2012, Malaysia.
2. Ghulam-Sarwar Yousof, Issues in Traditional Malaysian Culture, Partridge Singapore, April 26, 2Ol3.
3. Khoo Boo Teik Khoo, Francis Loh, Democracy in Malaysia Discourses and Practices (Google eBook), Routledge Jan 14, 2014.
4. Gaik Cheng Khoo, Reclaiming Adat: Contemporary Malaysian Film and Literature UBC press, Nov l, 2011.
5. Mohamed Anwar Omar Din (2011) Asal Usul Orang Melayu: Menulis Semula Sejarah Jurnal Melayu, Bangi: Penerbit UKM.

UUW 239/2
MALAYSIAN STUDIES
(FOR INTERNATIONAL STUDENTS ONLY)

COURSE SYNOPSIS

This course will focus on the history of Malaysian nation building by addressing the aspect of politics, economics and social. Malaysian studies also consist the background of old kingdoms in Southeast Asia and the origin of Malacca Sultanate with the tradition and culture of Malay king and sultanate, rise and fall of Malacca, nationalism and the era of colonialism. It also adress the road that lead to Independent of Malaya, democratic process, administration, challenge and issue in the era of globalization. It also has a chapter on history of Perlis.

COURSE OUTCOMES

1. Discuss the concept and basic theories on the development of Malaysia.
2. Interpret the elements of social, politics and economics of Malaysia and the states within.

REFERENCES

1. Anand Radhakrishnan&Lydia Leong *(2002). Malaysia*, Gareth Stevens Pub., Dec 1. Juvenile Nonfiction
2. Chandra Jeshurun (2007). *Malaysia: Fifty Years of Diplomacy*, 1957-2007, The Other Press.
3. Charles de Ledesma, Mark Lewis, Pauline Savage, Rough Guides (Firm) *(2003). Malaysia, Singapore and Brunei*, Rough Guides.
4. Julian C. H. Lee, (2012). *Thinking Through Malaysia: Culture and Identity in the 21st Century*, Strategic Information and Research Development Centre.

5. Mohd Fauzi, Yaacob (2009)*Malaysia: Transformasi dan Perubahan Sosial*, Kuala Lumpur, Arah Pendidikan Sdn Bhd.

EUT 442/2
PROFESSIONAL ENGINEERS (FOR ENGINEERING STUDENTS ONLY)

COURSE SYPNOSIS

This course aims to explain the main concepts in engineering ethics, risk management and occupational safety and health as well as to expose the students to basic of law in the engineering context. The materials will be of introductory nature to enable engineers to appreciate factors that have to be taken into account in decision-making. At the end of the course, students will be able to identify and discuss issues and challenges faced by engineers relating to engineering ethics, risk management and to understand the legal requirements related to engineering field.

COURSE OUTCOMES

1. Ability to understand, identify and evaluate the issues and challenges of engineering ethics.
2. Ability to explain and identify hazards, evaluate and review the function of risk management and occupational safety and health (OSHA).
3. Ability to identify, discuss and evaluate the aspects and procedures of legal on engineering issues.

REFERENCES

1. Charles B. Fleddermann, "Engineering Ethics", Prentice Hall 3rd Edition.
2. Lee Mei Pheng, "General Principles of Malaysian Law", Fajar Bakti 3rd Edition, 1998.
3. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, 2005.
4. Registration of Engineers Act 1967 and Registration of Engineer Regulation 1990.
5. R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, "Engineers in Society", Mc Graw Hill 2nd Edition.

EUT 444/3
MANAGEMENT FOR ENGINEERS (FOR ENGINEERING STUDENTS ONLY)

COURSE SYPNOSIS

This course aims to teach students on how to apply project management skills when undertaking projects and To provide basic tools of engineering economy to enable the students to carry out professional quality economic evaluations. At the end of the course, students will be able to identify and discuss issues and challenges faced by engineers relating to project management in the current economic scenarios.

COURSE OUTCOMES

1. Ability to analyze and evaluate project requirements and integrate the processes of project management like work plans, scheduling, cost estimation and perform project evaluation
2. Ability to analyze and evaluate economic scenarios and integrate decision making process to engineering project and business ventures.

REFERENCES

1. Stanley E. P., Samuel J. M., Jack R. M, Scot M. S. and Margaret M. S., "Project Management : Planning, Scheduling, and Controlling Projects", John Wiley & Sons, 2008.
2. William G. Sullivan, Elin M. Wicks and James Luxhoj, "Engineering Economy", Prentice Hall, 2005.
3. S. Kant Vajpayee, "Fundamental of Economic for Engineering Technologist and Engineers", Prentice Hall, 2001.
4. G. J. Thuesen and W. J. Fabrycky, "Engineering Economy", Prentice Hall, 2001.

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CENTRE FOR INTERNATIONAL LANGUAGES

The Centre for International Languages (CIL) or Pusat Bahasa Antarabangsa, is formerly known as the Department of International Languages (DIL). Established on March 1, 2013, the Centre focuses on providing students and staff of Universiti Malaysia Perlis, and the community within its vicinity, with great opportunities to learn languages.

CIL currently provides language courses which are a requirement for students enrolled in all UniMAP programmes, at both diploma and undergraduate degree levels. It caters to the needs of the ever-growing number of students who seek to be proficient not only in Bahasa Melayu and English, but also in a third language of their choice. Apart from Bahasa Melayu and English, other languages offered at CIL are Arabic, German, Japanese, Korean, Mandarin and Thai.

CIL places priority in equipping UniMAP students with language skills and competencies which are imperative in this era of knowledge and innovation-based economy. In addition, through our language courses, we sharpen 21st century skills in our students and clients, in supporting and nurturing them to be enterprising individuals who will be able to contribute positively in the world of work. Amongst others, the skills include being creative and innovative, adaptable, being able to work in a team, being effective communicators and are good in problem solving. The team at CIL also support students' learning through the provision of language advisory services, and are ever willing to serve in ensuring that our students and clients get the best from what we have to offer.

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LIST OF COURSES

UNIVERSITY REQUIRED COURSES

- **UVW110/2 BASIC MALAY LANGUAGE**
  (Only for International Students)
- **UVW410/2 UNIVERSITY MALAY LANGUAGE**
- **UVA111/2 FOUNDATION ENGLISH**
- **UVW211/2 ENGLISH FOR GENERAL PURPOSES**
- **UVW312/2 ENGLISH FOR TECHNICAL COMMUNICATION**
  (Only for Students in Engineering and Engineering Technology Programmes)
- **UVW313/2 ENGLISH FOR ACADEMIC PURPOSES**
  (Only for Students in Business and New Media Communication Programmes)

OPTIONAL COURSES

- **UVW112/2 FOUNDATION ENGLISH**
- **UVW114/2 MANDARIN I**
- **UVW214/2 MANDARIN II**
- **UVW314/2 MANDARIN III**
- **UVW414/2 MANDARIN IV**
- **UVW115 /2 THAI I**
- **UVW215/2 THAI II**
- **UVW315/2 THAI III**
- **UVW415/2 THAI IV**
- **UVW116/2 ARABIC I**
- **UVW216/2 ARABIC II**
- **UVW316/2 ARABIC III**
- **UVW416/2 ARABIC IV**
- **UVW117/2 APANESE I**
- **UVW217/2 JAPANESE II**
- **UVW317/2 JAPANESE III**
- **UVW417/2 JAPANESE IV**
- **UVW118/2 GERMAN I**
- **UVW218/2 GERMAN II**
- **UVW318/2 GERMAN III**
- **UVW418/2 GERMAN IV**
- **UVW119/2 KOREAN I**
- **UVW219/2 KOREAN II**
- **UVW319/2 KOREAN III**
- **UVW419/2 KOREAN IV**

UNIVERSITY REQUIRED COURSES

UVW110/2
BASIC MALAY LANGUAGE (ONLY FOR INTERNATIONAL STUDENTS)

COURSE SYNOPSIS

The aim of this course is to develop students' ability to use the language effectively for purposes of practical communication. The course is based on the linked language skills of listening, reading, speaking and writing, and these are built on as students' progress through their studies. The syllabus also aims to offer insights into the culture and civilization of countries where the language is spoken, thus encouraging positive attitudes towards language learning.

PREREQUISITE

This course is to be registered by all International students EXCEPT students from countries where the Malay Language is used as their national language or spoken language, e.g. students from Indonesia, Brunei and Singapore.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Understand basic structure of Malay language grammar.
2. Explain simple words in Malay language.
3. Connect and build relations between simple sentences in Malay language.

REFERENCES

1. Hawkins, Joyce M. (Ed). (2006). *Kamus dwibahasa Oxford Fajar Inggeris – Melayu Melayu – Inggeris* (edisi keempat). Selangor: Oxford Fajar Sdn. Bhd.
2. Noor Asliza Abdul Rahim, Abdul Jalil Ramli, Zuhairah Idrus & Suhaidah Said (2009). *Modul bahasa Melayu asas*. Perlis: Universiti Malaysia Perlis.
3. Othman Puteh, Talib Abdullah & L. Shirley (2009). Kamus bergambar (edisi kelima). Selangor: Oxford Fajar Sdn. Bhd.
4. Suhaidah Said, Nor Suhaila Che Pa, Noor Asliza Abdul Rahim, Zuhairah Idrus & Abdul Jalil Ramli (2012). *Modul bahasa Melayu asas (edisi kedua)*. Perlis: Unit Penerbitan UniMAP.
5. Zarina Othman, Roosfa Hashim & Rusdi Abdullah (2012). *Modul komunikasi bahasa Melayu antarabangsa*. Bangi: Penerbit Universiti Kebangsaan Malaysia.

UVW410/2
UNIVERSITY MALAY LANGUAGE

COURSE SYNOPSIS

The objective of the course is to expose students to the four language skills: listening, speaking, reading and writing. The listening and speaking skills are merged, and focus is given not only on forms and functions, but also on pronunciation. The reading and writing skills; on the other hand, emphasize on accuracy and grammar, structure and semantics (meaning). Topics for essay writing provide opportunity for students to explore analysis processes, syntax and elaboration.

PREREQUISITE

This course is compulsory for **ALL** local students **AND** students from countries where the Malay Language is used as their national language or spoken language, e.g., Indonesia, Brunei, Singapore.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Apply different aspects oral and written language skills.
2. Analyze language and grammar application in the contexts given.
3. Debate using critical and analytical form of language.

REFERENCES

1. Anwar Ridhwan & Lai Choy. (2008). *Kamus kata berimbuhan DAYA*. Selangor: Penerbitan Minda (M) Sdn. Bhd.
2. Asmah Haji Omar. (2006). *Panduan wacana akademik teori dan penerapan*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
3. Dewan Bahasa dan Pustaka. (2005). *Kamus Dewan (edisi ke-4)*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
4. N.A. Salleh. (2009). *Cara mudah mengenal pasti kesalahan lazim dalam bahasa Melayu*. Selangor: Perintis Books Sdn. Bhd.
5. Nik Safiah Karim, Farid M.Onn, Hashim Hj.Musa & Abdul Hamid Mahmood. (2006). *Tatabahasa Dewan* (edisi baharu). Kuala Lumpur: Dewan Bahasa dan Pustaka.
6. Samsudin Wahab. (2008). *Surat, minit mesyuarat,dokumen perniagaan dan laporan*. Kuala Lumpur: PTS Professional Publishing Sdn. Bhd.
7. Sulaiman Masri, Abdullah Yusof & Mohd Ra'in Shaari. (2007). *Bahasa Melayu: Dimensi pengajaran dan pembelajaran.* Kuala Lumpur: Utusan Publications & Distributors Sdn. Bhd.

UVA111/2
FOUNDATION ENGLISH

COURSE SYNOPSIS

This course is designed to help students perform effectively and competently in social and academic context. The learning of language skills is integrated within a communicative approach with an emphasis on speaking skills. It aims to raise the students' language proficiency to an intermediate level through the use of language in different context.

PREREQUISITE

All local students must register for this course, **EXCEPT** those who have:
a) obtained Band 3 and above for Malaysian University English Test (MUET), or
b) passed English III (DVW 311- Cohort 2015/2016 onwards) with minimum grade C, or
c) passed English II (DUW212/DVW212- Cohort 2014/2015 and previous) with minimum grade C.

All international students must register for this course, **EXCEPT** those who have:
a) passed Intermediate Level for the IEC Course, or
b) obtained TOEFL 337-459/ IELTS 2.5-3.5 and above.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Apply strategies which will enable them to read scripted and semi-authentic texts.
2. Use targeted grammatical items correctly.
3. Compose guided and semi-guided essays.
4. Engage and contribute to group discussions.

REFERENCES

1. Azar, B.S. (2003) Fundamentals of English Grammar (3rd Edition). Englewood Cliffs, N.J.: Prentice Hall.
2. Elder, J. (2003) Exercise your college reading skills. New York: McGraw Hill.
3. Fuchs, M., Bonner, M., & Westheimer, M. (2002) Focus on grammar: An intermediate course for reference and practice. (2nd Edition). New York: Longman.
4. Langan, J. (2008) College writing skills (7th Edition). Singapore: McGraw Hill.
5. Macmillan English dictionary for advanced learners. (2011) (2nd Edition). Oxford, United Kingdom: Macmillan Publishers Limited. (Original work published 2002).
6. Reid, J.M. (2000). The process of composition (3rd Edition). New York: Longman.

UVW211/2
ENGLISH FOR GENERAL PURPOSES

COURSE SYNOPSIS

This course emphasizes on productive skills; writing and speaking by using authentic materials to help students to become competent users of English. It aims to consolidate students' English language proficiency and communicative ability. This learner centered course adopts language in context, thematic and skills-based approaches.

PREREQUISITE

All local students with any of the following requirements must sit for this course:
a) Obtained Band 3 for Malaysian University English Test (MUET), or
b) Passed Foundation English with minimum grade C, or
c) Passed English III (DVW311- Cohort 2015/2016) with minimum grade C, or
d) Passed English II (DUW212/DVW212 - Cohort 2014/2015 and previous) with minimum grade C

All international students with either of the following requirements must sit for this course:
a) Those who passed Intermediate Level for the IEC Course, or
b) Those who scored 2.5-3.5 in TOEFL or 337-459 in IELTS.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Comprehend authentic reading texts of varying levels of complexity.
2. Apply targeted grammatical items correctly.
3. Compose guided and semi-guided essays.
4. Manage arguments in group discussions.

REFERENCES

1. Anthony A. et. al. (2011). Malaysian University English Test. Selangor, Malaysia: Local Publications.
2. Azar, B.S. (n.d.). Understanding and using English grammar. New York: Pearson Education Inc.
3. Paul, C. et. al. (2011). The complete text and guide MUET. Malaysia: Arah Pendidikan Sdn. Bhd.
4. Renn, D. & Cameron, S. (2008). Hemispheres 1. New York: McGraw Hill
5. Richards, C. et. Al. (2010). Text MUET a strategic approach. Malaysia: Pearson Malaysia Sdn. Bhd.



UVW312/2
ENGLISH FOR TECHNICAL COMMUNICATION
(ONLY FOR STUDENTS IN ENGINEERING AND ENGINEERING TECHNOLOGY PROGRAMMES)

COURSE SYNOPSIS

This course is designed to prepare engineering and other technical disciplinary students to achieve confidence in extracting, evaluating and synthesizing information with a view to write good technical documents. Various theories of technical communication will be introduced throughout this course. Students will learn how to prepare technical documents as well as on how to write clearly and concisely. Students will also be exposed to primary and secondary research, techniques of analyzing and interpreting different information and applying functional organization in report writing. At the end of the semester, students are required to formally present their research report orally.

PREREQUISITE

Students must have either one of these qualifications:
a) passed UVW211 English for General Purposes with minimum grade C, or
b) obtained at least a MUET Band 4, or
c) passed English III (DVW311- Cohort 2015/2016) with minimum grade C, or
d) passed English II (DUW212/DVW212 - Cohort 2014/2015 and previous) with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Explain the basic theories and concepts discussed in the course.
2. Analyze data of relevant information to be used in the report.
3. Write a technical report with appropriate graphics and formats.
4. Present written assignment.

REFERENCES

1. Blicq, R., & Moretto. (2004). Technically Write (6th Ed.). Upper Saddle River, New Jersey: Pearson.
2. Ingre, D. (2003). Survivor's guide to technical writing. Mason, OH: South Western.
3. Lannon, J. M., & Gurak, L. J. (2011). Technical Communication (12th Ed.). United States: Pearson.
4. Shafiq Hizwari Md. Hashim, Loo Shih Min, Liew Khe Li & Sri Kandy Putri Naru Abdul Hamid Naru. (2012). Technical Communication for University Students. Kuala Lumpur, Malaysia: Pearson Malaysia.
5. Smith-Worthington, D., & Jefferson, S. (2011). Technical writing for success (3rd Ed.). United States: South-Western Cengage Learning.

UVW313/2
ENGLISH FOR ACADEMIC PURPOSES (ONLY FOR STUDENTS IN BUSINESS AND NEW MEDIA COMMUNICATION PROGRAMMES)

COURSE SYNOPSIS

Using a learner-centred approach, this course is aimed at preparing business students to improve their general academic writing skills by familiarising them with the fundamentals of academic writing. By the end of the semester, students are required to produce an argumentative essay individually, with topics that are related to their respective disciplines. Students are required to conduct library research; both printed and online material such as books, journals, periodicals etc. Apart from that, students are also required to apply the correct form of APA citation style in their essays. Although the primary focus of the course is on writing , this course also provides substantial activities on reading and speaking. Students are required to present their topics orally by the end of the semester.

PREREQUISITE

Students must have either one of these qualifications:
a) Passed UVW211 English for General Purposes with minimum grade C, or
b) Obtained at least a MUET Band 4, or
c) Passed English III (DVW311- Cohort 2015/2016) with minimum grade C, or
d) Passed English II (DUW212/DVW212 - Cohort 2014/2015 and previous) with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Conduct library research on topic selected.
2. Read and respond to academic texts critically.
3. Plan and write an argumentative essay.
4. Present their chosen academic topic verbally.

REFERENCES

1. Bailey, S. (2011). *Academic writing: A handbook for international students*. (2nd ed.). NY, USA: Routledge.
2. Barry, M. (2011). *Steps to academic writing*. Cambridge, UK: Georgian Press.
3. Brandt, C. (2009). *Read, research and write: Academic skills for ESL students in higher education*. Wiltshire, UK: SAGE Study Skills Series
4. Chin, P., Koizumi, Y., Reid, S., Sean Wray,. & Yamazaki, Y. (2011). *Academic writing skills:*

5. *Student's book 1*. Cambridge, UK: Cambridge University Press.
6. Cox, K., & Hill, D. (2011). *EAP now! English for academic purposes students' book*. (2nd ed.). NY, USA: Pearson/Longman.
7. Rogers, L. (2011). *DELTA academic objectives: Writing skills coursebook*.?: Delta Publishing.
8. Soles, D. (2009). *The essential of academic writing*. (2nd ed.). Boston, USA: Wadsworth Cengage Learning.

OPTIONAL COURSES

UVW112/2
FOUNDATION ENGLISH

COURSE SYNOPSIS

This course covers the major aspects of reading, writing, speaking and listening competence and it also includes sub-skills of grammar and dictionary skill. This course is designed to enhance students' English language proficiency and communicative ability. This course will adopt a learner-centered approach to help students attain good command of the English language.

PREREQUISITE

All **students** must register for this course **EXCEPT**:

a) Those who have obtained Band 4 and above for Malaysian University English Test (MUET)
b) Those who obtained TOEFL 525 / IELTS 5.5 and above
c) UniMAP Diploma graduates who have passed Diploma English I and II with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Comprehend various types of reading texts.
2. Apply various grammatical items correctly.
3. Compose main types of essays.
4. Manage arguments in group discussion.

REFERENCES

1. Azar, B.S. (2003) *Fundamentals of English grammar* (3rd Edition). Englewood Cliffs, N.J.: Prentice Hall.
2. Elder, J. (2008). *Exercise your college reading skills*. New York: McGraw Hill.
3. Fuchs, M., Bonner, M., & Westheimer, M. (2000). *Focus on grammar: An intermediate course reference and practice.* (2nd Edition). New York: Longman.
4. Langan, J. (2008). *College writing skills* (7th Edition). Singapore: McGraw Hill.
5. *Macmillan English dictionary for advanced learners.* (2011) (2nd ed.). Oxford, United Kingdom: Macmillan Publishers Limited. (Original work published 2002).
6. Reid, J. M. (2000). *The process of composition* (3rd Edition). New York: Longman.

UVW114/2
MANDARIN I

COURSE SYNOPSIS

This course is designed to introduce students to Mandarin language. The course will cover listening, speaking, reading and writing in spoken and written Mandarin. The students will be introduced to Pin Yin which will help them to pronounce accurately. They will be able to read and understand short and simple sentences and able to write simple Chinese characters with the help of Pin Yin. Students will also learn short and simple common daily expressions.

PREREQUISITE

Students who register **MUST NOT** have any formal qualifications in the language at PMR/SPM level; **and MUST NOT** have followed any education system which uses the language as the medium of instruction.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Recognize simple Chinese characters with the help of Pin Yin.
2. Read and understand simple and short sentences with the help of Pin Yin.
3. Respond to daily common conversation.
4. Write simple Chinese characters with the help of Pin Yin.

REFERENCES

1. Lo, J. & Yih,E. (2009). *Go! Chinese*. Singapore: Cengage Learning Asia Pre Ltd.
2. Lai, S. Y. & Lim, Y. L. (2010). *Shenghuo Huayu! An Introductory Course to the Chinese Language*. Singapore: Cengage Leaning Asia Pre Ltd.
3. Qin, H. (2011). *A Dictionary of Everyday English Metaphors (English-Chinese).* Beijing: Peking University Press.
4. Zhou, X. K. (2009). *Dr.Zhou's Rhymes For Learning Chinese-Book1*, Beijing: Peking University Press.
5. Xu, J. L. (2008). Jia *You! Chinese for the Global Communication, Vol.1*. Singapore: Cengage Learning Asia Pre Ltd.

UVW214/2
MANDARIN II

COURSE SYNOPSIS

At this level students of Mandarin Language 2 will be introduced to simple use of grammar. Students will able to read and understand longer sentences and conversations. They will learn to write longer sentences with the help of Pin Yin. Students will be introduced to different social contexts through the topics covered as well as introduced to shorts Mandarin songs.

PREREQUISITE

Pass Mandarin I with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Read and understand short dialogues of different social contexts with the help of Pin Yin.
2. Write simple and short sentences with the help of Pin Yin.
3. Engage in simple dialogues within different contexts.

REFERENCES

1. Lo, J. & Yih, E. (2009). *Go! Chinese*. Singapore: Cengage Learning Asia Pre Ltd.
2. Lai, S. Y. &Lim, Y. L., (2010). *Shenghuo Huayu! An introductory course to the Chinese Language*. Singapore: Cengage Leaning Asia Pre Ltd.
3. Qin, H. (2011). *A dictionary of everyday English metaphors (English-Chinese).* Beijing: Peking University Press.
4. Zhu, X. K. (2009). *Dr.Zhou's rhymes for learning Chinese-Book2*, Beijing: Peking University Press.
5. Xu, J. L., (2008). Jia *You! Chinese for the global communication, Vol.1*. Singapore: Cengage Learning Asia Pre Ltd.

UVW314/2
MANDARIN III

COURSE SYNOPSIS

At this level, students of Mandarin Language 3 will be introduced to basic business Mandarin language used in business. Students will be able to read short paragraphs with the help of Pin Yin and able to respond to questions from short paragraphs. Students will also able to write longer sentences with the appropriate Chinese stroke order.

PREREQUISITE

Pass Mandarin II with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Understand and categorize type of the words from dialogues in Mandarin and recognize about 450 Chinese characters.
2. Listen and express ideas and feelings as well as apply into different situation and event.
3. Practise reading long article in various topics with correct pronunciation and write short paragraph.
4. Use computer programs to type Chinese characters and send electronic mail.

REFERENCES

1. Lo, J., & Yih, E. (2009). Go*! Chinese, Singapore*: Cengage Learning Asia Pre Ltd.
2. Lai, S. Y.& Lim, Y. L. (2010). *Shenghuo Huayu! An introductory course to the Chinese Language*. Singapore: Cengage Leaning Asia Pre Ltd.
3. Liu, M. (2007). *BBC basic business Chinese.* Beijing: Peking University Press.
4. Qin, H. (2011). *A dictionary of everyday English metaphors (English-Chinese).* Beijing: Peking University Press.
5. Xu, J. L. (2008). Jia *You! Chinese for the global communication (Vol.2).* Singapore *:* Cengage Learning Asia Pre Ltd.

UVW414/2
MANDARIN IV

COURSE SYNOPSIS

At this level, students of Mandarin Language 4 are expected to gain more vocabulary from what they have learned from Mandarin III. The topics covered will expose students to practice Mandarin language in business contexts. Students will be able to read and write longer sentences with appropriate grammar and Chinese stroke order without the help of Pin Yin. Students should also be able to hold a conversation in Mandarin especially for business purposes.

PREREQUISITE

Pass Mandarin III with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Engage in the longer conversations of business contexts.
2. Read and understand business contexts given without the help of Pin Yin.
3. Construct longer dialogues with the correct use of grammar without the help of Pin Yin.

REFERENCES

1. Lo, J. & Yih, E. (2009). Go*! Chinese, Singapore*: Cengage Learning Asia Pre Ltd.
2. Lai, S. Y. & Lim, Y. L. (2010), *Shenghuo Huayu! An Introductory Course to the Chinese Language.* Singapore: Cengage Leaning Asia Pre Ltd.
3. Liu, M. (2007). *BBC Basic Business Chinese.* Beijing: Peking University Press.
4. Qin, H., (2011). *A Dictionary of Everyday English Metaphors (English-Chinese).* Beijing: Peking University Press.
5. Xu, J. L., (2008). Jia *You! Chinese for the Global Communication, Vol2.* Singapore*:* Cengage Learning Asia Pre Ltd.

UVW115 /2
THAI I

COURSE SYNOPSIS

This course is designed for students who have no background in Thai language. The course will cover listening, speaking, reading and writing in spoken and written Thai. The students will be introduced to Thai phonetic transcriptions which will help them to pronounce with the correct tone, read and understand short and simple sentences. Students will be able to write simple words and sentences in Thai script. They will also learn short and simple daily expressions.

PREREQUISITE

Students who register **MUST NOT** have any formal qualifications in the language at PMR/SPM level; **and MUST NOT** have followed any education system which uses the language as the medium of instruction.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Identify and pronounce simple words and sentences with the correct tone.
2. Respond to simple common daily expressions and conversations.
3. Read and understand simple words and sentences with the help of phonetic transcriptions.
4. Write simple words and sentences with the help of phonetic transcriptions.

REFERENCES

1. Becker, Bin P. (2003). *Thai for beginners.* Bangkok: Paiboon Publishing.
2. Becker, B.P. (2003). *Improving your Thai pronounciation.* Bangkok: Paiboon Publishing.
3. Ponmanee, S, (2000), *Learn to Read Thai.* Chiangmai: Thaigreat.
4. Tontraseney, W. (1981). *Bahasa Thai,* Kuala Lumpur: Universiti Malaya.
5. Wiworn Kasavatana-Dohrs. (2007). *Everyday Thai for beginners.* Silkworn Book.

UVW215/2
THAI II

COURSE SYNOPSIS

At this level, students will be introduced to simple use of the grammar. Students will learn to read and understand longer sentences and conversations about daily activities. They will learn to write longer sentences with the help of phonetic transcription. Throughout the course, students will have more understanding about Thai culture and practices.

PREREQUISITE

Pass Thai I with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Listen and respond to sentences and short dialogues in various topics relating to daily activities.
2. Express themselves and respond to conversations in different contexts given using the correct tone.
3. Read using special feature in Thai words and longer sentences correctly with the help of phonetic transcriptions.
4. Write longer grammatical sentences with correct spelling with the help of phonetic transcriptions.

REFERENCES

1. Becker, Bin P.(2003).*Thai for Beginners.* Bangkok: Paiboon Publishing.
2. Ponmanee, S, (2000), *Learn to Read Thai.* Chiangmai: Thaigreat.
3. Becker, B.P, (2003), *Improving Your Thai Pronunciation.* Bangkok: Paiboon Publishing.
4. Wiworn Kasavatana-Dohrs(2007) *Everyday Thai for beginners.* Silkworn Book.
5. Tontraseney, W, (1981), *Bahasa Thai.* Kuala Lumpur: Universiti Malaya.

UVW315/2
THAI III

COURSE SYNOPSIS

This course will expand the use of vocabulary relating to social contexts and introduce its use in business contexts. Student will be able to read longer dialogues and paragraphs relating to social and simple business contexts.



Students will learn to write complex sentences to produce dialogues relating to topics learned. At this level the phonetic transcription will be used only when necessary.

PREREQUISITE

Pass Thai II with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Engage in conversations in different social and business contexts.
2. Read and demonstrate understanding in short texts of different social and business contexts.
3. Construct complex sentences with correct use of grammar items to form dialogues relating to different social and business contexts.

REFERENCES

1. Becker, Bin P.(2003). *Thai for Beginners.* Bangkok: Paiboon Publishing.
2. Ponmanee, S, (2000). *Learn to Read Thai.* Chiangmai: Thaigreat.
3. Becker, B.P, (2003). *Improving Your Thai Pronounciation.* Bangkok: Paiboon Publishing.
4. Wiworn Kasavatana-Dohrs. (2007). *Everyday Thai for beginners.* Silkworn Book.
5. Tontraseney, W, (1981). *Bahasa Thai,* Kuala Lumpur: Universiti Malaya.

UVW415/2
THAI IV

COURSE SYNOPSIS

At this level, students are exposed to vocabulary closely related to business contexts. The topics covered will provide students with practice using Thai language in business contexts. Students will be able to read and write longer dialogues and short paragraphs with the correct use of grammar without the help of phonetic transcription. Students should be able to hold a conversation in Thai especially for business purposes.

PREREQUISITE

Pass Thai III with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Read and understand business contexts given without the help of phonetic transcription.
2. Engage in conversations in different business contexts.
3. Construct longer dialogues and short paragraphs relating to the business contexts using the correct Thai of grammar.

REFERENCES

1. Becker, Bin P. (2003). *Thai for Beginners.* Bangkok: Paiboon Publishing.
2. Ponmanee, S. (2000). *Learn to Read Thai.* Chiangmai: Thaigreat.
3. Becker, B.P, (2003). *Improving Your Thai Pronounciation.* Bangkok: Paiboon Publishing.
4. Tontraseney, W, (1981). *Bahasa Thai.* Kuala Lumpur: Universiti Malaya.
5. Wiworn Kasavatana-Dohrs.(2007). *Everyday Thai for beginners.* Silkworn Book.

UVW116/2
ARABIC I

COURSE SYNOPSIS

This course is designed for beginners with no prior knowledge of Arabic Language. The course covers listening, speaking, reading and writing skills. Students will be exposed to Arabic characters and correct pronunciation. Students will be able to read and understand short sentences and dialogues. They will learn basic grammar to enable them to write simple sentences in Arabic.

PREREQUISITE

Students who register **MUST NOT** have any formal qualifications in the language at PMR/SPM level; **and MUST NOT** have followed any education system which uses the language as the medium of instruction.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Pronounce simple words and sentences correctly.
2. Respond to common daily expressions and conversations.
3. Read and understand simple sentences and dialogues.
4. Write simple words and sentences.

REFERENCES

1 Abdullah Sulaiman Al-Jarbuk, Tammam Hassan Umar, Mahmud Kamil al-Naqah,
2. Abdullah Kamil Al-Abadi, Ali Muhammad Al-Fiqqi & Rusydi Ahmad Taimah (1984). Taklimu al-Lughah al-Arabiyyah Lighairi al-Natiqin Biha, Al-Mamlakah al-Arabiyyah al-Saudiyyah. Jamiah Ummu al-Quran.
3. Muhammad Roihan Hasbullah

M.A (Hj.) (2002). Perbualan bahasa Arab untuk peringkat rendah dan menengah. Kuala Lumpur: Pustaka Syuhada.
4. Sekumpulan guru-guru Bahasa Arab (1987). Al-Jadid al-Lughati al-Araabiyyah Li al-Sanah al-Ula al-Ikdadiyah. Gombak Utara Selangor: Pustaka Markiland.
5. Bahasa Arab 1 (2002). Bahagian Bahasa Arab, Universiti Sains Malaysia (Pusat Bahasa & Terjemahan).
6. Zaid Al-Hamid (2001). Pelajaran bahasa Arab untuk semua. Kuala Lumpur: Speedy Self Study System.
7. Fuad Ifram al-Bustaniy (1986). Al-Munjid Al-Tullab. Beirut, Lubnan: Darul Syarq.
8. Lingua Phone (2000). London: Lingua Phone Institut Limited.

UVW216/2
ARABIC II

COURSE SYNOPSIS

At this level, students will learn basic vocabularies. Students will be exposed to more basic grammar and sentence structures. They will also learn to read and write longer sentences and conversations about daily activities. These will further develop students' listening, speaking, reading and writing skills.

PREREQUISITE

Pass Arabic I with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Listen and respond to sentences and short dialogues in various topics relating to daily activities.
2. Express themselves and respond to conversations in different contexts given.
3. Read and understand longer sentences and dialogues.
4. Write longer sentences with correct spellings.

REFERENCES

1. H. Ridlo. Masduki (Prof.Dr.), H.Chatibul Umam (Prof. Dr.) H. Moh. Matsna (Dr.) (2000).العربية لطلاب الجامعة . Kuala Lumpur: Darul Ulum Press.
2. Nuhammad Akram Saaduddin (at all), (1990). العربية الفصيحةالقلم للناطقين بغير ها وبها :. Kuala Lumpur: Fajar Ulung Sdn. Bhd. L.B.C. Publishers International Book Centre.
3. Ishak Mohd. Rejab (Prof. Madya Dr.) (1987). Kursus bahasa Arab (Bahagian 11). Kuala Lumpur: Yayasan Dakwah Islamiah Malaysia (YADIM).
4. Ali al-Jarim, Mustafa Amin (1966),النحو الواضح فى قواعد اللغة العربية , Mesir.
5. Elias A. Elias & Ed. E. Elias (n.d.),القاموس العصري , عربي – انكليزيMesir.
6. Institut Agama Islam Negeri (IAIN), Sharif Hidayatullah, Jakarta, (1977), العربية بالنماذج.Jakarta, Indonesia: Bulan Bintang, (Penerbit dan Penyebar buku-buku Teks).
7. Lingua Phone (2000). London: Lingua Phone Institut Limited.
8. Sono Cairo Audio, VIDEO CD, (t.t.) , تعليم اللغة العربية للمتحدثين بالانجليزية, Cairo Egypt.
9. Syed Umar al-Sagaf, Muhamad Khalil Hj. Ahmad dan Mohd. Abdul Rahim , Mohd. Abdul Rahman (2000), اللغة العربية الاتصالية, Kuala Lumpur: Dewan Bahasa dan Pustaka.
10. Universiti Putra Malaysia (t.t.),مذكرة اللغة العربية للمستوى الثالث, Fakulti Bahasa Moden dan Komunikasi.
11. Mustaffa Abdullah (terjemahan oleh Siti Rohaya Sarnap & Siti Sujinah Sarnap (2000). Cara mudah belajar bahasa Arab. Sinagpore: JAHABERSA & CD.
12. Al-said Muhmmad Badawi (Dr.), (1983), تعليم اللغة العربية لغير الناطقين بها , Tunisia.
13. Hassan Bin Hj. Arshad (2000), BAHASA ARAB (al-Qawaid dan al-Maqalah) Universiti Sains Malaysia (Pusat Bahasa & Terjemahan).

UVW316/2
ARABIC III

COURSE SYNOPSIS

This course will expand the use of vocabulary relating to daily activities and social contexts. Students will be introduced to use vocabularies learned to produce complete sentences in communication. Students will be able to read longer dialogues and paragraphs relating to daily activities and social contexts. Students will also learn more various grammar items to write complex sentences and dialogues relating to topics learned.

PREREQUISITE

Pass Arabic II with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Listen and respond to sentences and short dialogues in various topics relating to daily activities.
2. Express themselves and respond to conversations in different contexts given.
3. Read and understand longer sentences and dialogues.
4. Write longer sentences with correct spellings.

REFERENCES

1. Mahmud Ismail As-sini (Dr.) (1993). العربية للناشئين : منهج متكامل لغير الناطقين بالعربية.Arab Saudi : Darul Ma'arif Mamlakah.

2. Nuhammad Akram Saaduddin (et al.) (1990). العربية الفصيحةالقلم للناطقين بغير ها وبما : Kuala Lumpur: Fajar Ulung Sdn. Bhd. L.B.C. Publishers International Book Centre.
3. Ishak Mohd. Rejab (Prof. Madya Dr.). (1987). Kursus Bahasa Arab (Bahagian 11). Kuala Lumpur: Yayasan Dakwah Islamiah Malaysia (YADIM).
4. Ali al-Jarim, Mustafa Amin (1966). النحو الواضح فى قواعد اللغة العربية . Mesir.
5. Linguaphone: Rakaman kaset dan buku panduan (1990). London: Linguaphone Institute Limited, St Giles House.
6. Sohair Abdul Moneim Sery (1997). Kursus Bahasa Arab (Arabtone). Selangor: Anglophone (Malaysia). Sdn. Bhd.
7. Penterjemah: Siti Rohani (2000). Cara mudah belajar Bahasa Arab. Malaysia: Jahabersa Sdn. Bhd.

UVW416/2
ARABIC IV

COURSE SYNOPSIS

At this level, students will use expanded vocabulary and focus on producing longer and grammatically correct sentences. Students will be exposed to read longer paragraphs relating to different social and religious contexts. Students are also engaged in writing more complex and longer sentences relating to the topics learned.

PREREQUISITE

Pass Arabic III with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Listen and respond to paragraphs and short dialogues of various topics.
2. Demonstrate understanding of paragraphs and short passages.
3. Engage in conversations in different contexts.
4. Construct longer paragraphs and essays with correct application of grammar.

REFERENCES

1. Ahmad Hassan Ziyat (n.d.). تاريخ الأدب العربي, Darul Kutub Misriyyah, Mesir.
2. Batras Al-Bustaniy (1989). أدباء العرب. بيروت :, دار النذير Darul Nazir, Beirut
3. Abdul Rahman Al-Barquni (1979). شرح ديوان المتنبي. بيروت : دار الكتاب Darul Kitab, Beirut
4. Syauqi Dhaif (n.d.). البارودى رائد الشعر الحديث, Darul Ma'arif, Kaherah, Mesir.
5. Subhi Soleh (1960). دراسات فى فقه اللغة Darul 'Ilmi Malayin, Beirut.
6. Ali Abdul Wahid Wafi (1945). فقه اللغة Darul Nahdhah, Mesir
7. Imil Badi' Ya'kub (1982). فقه العربية وخصائصها اللغة Darul 'Ilmi Malayin, Beirut.

UVW117/2
JAPANESE I

COURSE SYNOPSIS

Designed for beginners with no prior knowledge of Japanese Language, this course covers listening, speaking, reading and writing skills. Students will learn to write 2 types of Japanese Writing System, Hiragana and Katakana. Students will be engaged to classroom interactions, practicing daily greetings and simple conversations. Students will be introduced to basic elements of the Japanese culture through the topics covered.

PREREQUISITE

Students who register **MUST NOT** have any formal qualifications in the language at PMR/SPM level; **and MUST NOT** have followed any education system which uses the language as the medium of instruction.

COURSE OUTCOMES

By the end of the course, students will be able to
1. Identify and pronounce different Japanese words with the correct tone.
2. Understand and respond daily life greetings and expressions.
3. Read and understand simple sentences with reference to the Hiragana and Katakana chart.
4. Memorize and write basic and modified Japanese characters.

REFERENCES

1. Ku Mohd Nabil. (2010). *Modul Bahasa Jepun II*. Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis.
2. The Association For Overseas Technical Scholarships.(1998). *Minnna no Nihongo 1*, Tokyo : 3A Corporation.
3. The Association For Overseas Technical Schorlarships.(1997). *Shin Nihongo no Kiso1* (Asian Edition).
4. Hirai, E. & Miwa, S.(2000).*Minna no Nihongo 1* BunkeiRenshuuTyou, Tokyou : 3A Corporation.
5. Miyagi, S. & Mitsui, A.(1997). *Everyday listening in 50 days*: Tokyo: Bonjinsha Corporation The Association For Overseas Technical Scholarship(Aots),'Shin Nihongo-No Kiso 1', Standard Question, 3a Corpration, 1993.

UVW217/2
JAPANESE II

COURSE SYNOPSIS

Students will be exposed to new vocabulary and will begin to use simple sentences in spoken and written Japanese. They will be introduced to simple grammatical and sentence structures. Students will learn how to read and write short sentences. Basic elements of the Japanese culture will be also taught in the topics covered throughout the course.

PREREQUISITE

Pass Japanese I with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Listen and respond to daily life conversations.
2. Read and understand short paragraphs and dialogues given.
3. Produce simple Japanese sentences and dialogues with the correct pronunciation.
4. Write simple sentences with references to the Hiragana and Katakana chart using approximately 120 Japanese words given.

REFERENCES

1. Ku Mohd Nabil. (2010). *Modul Bahasa Jepun II*. Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis.
2. Hirai, E. & Miwa, S.(2000). *Minna no Nihongo 1*BunkeiRenshuuTyou, Tokyo:3A Corporation.
3. The Association For Overseas Technical Scholarships.(1998). *Minnna no Nihongo 1*,Tokyo:3A Corporation.
4. The Association For Overseas Technical Schorlarships. (1997). *Shin Nihongo no Kiso 1* (Asian Edition).
5. Miyagi, S. & Mitsui, A.(1997).*Everyday Listening in 50 days*: Tokyo: Bonjinsha Corporation

UVW317/2
JAPANESE III

Students will be exposed to expanded vocabulary and higher level grammar, particles and sentence structure. Students will learn reading, writing and speaking longer sentences and dialogues. Throughout the course, students will also learn the elements of Japanese culture in the topics covered.

PREREQUISITE

Pass Japanese II with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Respond to conversations in different social contexts.
2. Demonstrate understanding of longer paragraphs and dialogues.
3. Construct sentences and dialogues using the correct grammar and particles.
4. Compose long sentences with reference to the Hiragana and Katakana chart using approximately 300 words.

REFERENCES

1. Ku Mohd Nabil. (2010). *Modul Bahasa Jepun II*. Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis.
2. The Association For Overseas Technical Scholarships. (1998). *Minnna no Nihongo 1*,Tokyo:3A Corporation.
3. The Association For Overseas Technical Schorlarships. (1997). *Shin Nihongo no Kiso 1* (Asian Edition).
4. Hirai, E. & Miwa, S.(2000). *Minna no Nihongo 1*BunkeiRenshuuTyou, Tokyo: 3A Corporation.
5. Miyagi, S. & Mitsui, A. (1997). *Everyday Listening in 50 days*: Tokyo: Bonjinsha Corporation

UVW417/2
JAPANESE IV

At this level, students will use expanded vocabulary and focus on producing longer and grammatically correct sentences. They will also use the correct particles in both written and spoken Japanese. Students will be engaged in higher level communicative practice. Basic Chinese Characters (Kanji) will be introduced and students will learn more of Japanese culture elements through the topics covered.

PREREQUISITE

Pass Japanese III with minimum Grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Read and respond to longer paragraphs and dialogues on various topics.
2. Engage in conversations in different social contexts independently.
3. Construct longer sentences and paragraphs using the correct grammar and order of particles in spoken and written text.

REFERENCES

1. Ku Mohd Nabil. (2010). *Modul Bahasa Jepun II*. Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis.

2. The Association For Overseas Technical Scholarships. (1998). *Minnna no Nihongo 1*,Tokyo: 3A Corporation.
3. The Association For Overseas Technical Schorlarships. (1997). *Shin Nihongo no Kiso 1* (Asian Edition).
4. Hirai, E. & Miwa, S. (2000). *Minna no Nihongo 1*BunkeiRenshuuTyou, Tokyo: 3A Corporation.
5. Miyagi, S. & Mitsui, A.(1997).*Everyday Listening in 50 days*: Tokyo: Bonjinsha Corporation

UVW118/2
GERMAN I

COURSE SYNOPSIS

The objective of this course is to expose students to German language. Students will gain listening, speaking, reading and writing skills in standard spoken and written German language. Students will recognize the basic elements and structures of the language with an understanding of the culture in which the language is spoken. Students will be able to construct 4-5 word sentences for the purpose of communication. Students will also be able to read and comprehend short simple texts.

PREREQUISITE

Students who register **MUST NOT** have any formal qualifications in the language at PMR/SPM level; **and MUST NOT** have followed any education system which uses the language as the medium of instruction.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Recognize and pronounce simple words and sentences in German.
2. Read and understand simple text.
3. Constructed simple sentences in spoken and written German.

REFERENCES

1. Gudrun Gotz, Eveline Schwarz. (2011), AussichtenA1. Deutsch als Fremdsprache für Erwachsene. Stuttgart, Ernst Klett GmbH.
2. Julia Guess. (2009), Deutsch Aktiv. Berlin und München Langenscheidt KG.
3. Dieter Maenner. (2006), Eurolingua Deutsch 1, Berlin, Cornelsen Verlag.
4. Ulrike Albrecht, Dorothea Dane. (2005), Passwort Deutsch 1 & 2, Stuttgart, Ernst Klett International GmbH.
5. Hanns-Josef Ortheil. (2010), Deutsch zum Ausprobieren, München, Sprachinstitut Treffpunkt.

UVW218/2
GERMAN II

COURSE SYNOPSIS

The objective of this course is to extend students' knowledge of the German language which they started in German I. Students will continue and expand the basic elements, structures and constructions of the language as well as understand the culture of the people who speak the language. Students will be able to construct longer sentences in both written and spoken for the purpose of communication, express themselves using simple phrases and also to read and comprehend short simple texts.

PREREQUISITE

Pass German I with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Listen to and discuss on topics related to daily conversation.
2. Illustrate understanding of short paragraphs and dialogues.
3. Experiment using grammatical component in sentences in spoken German.
4. Compose sentences in writing for daily situations.

REFERENCES

1. Gotz, G. Schwarz, E. (2011). AussichtenA1. Deutsch als Fremdsprache für Erwachsene. Stuttgart: Ernst Klett GmbH.
2. Guess, G. (2009) Deutsch Aktiv. Berlin und München: Langenscheidt KG.
3. Maenner, D. (2006) Eurolingua Deutsch 1 & 2. Stuttgart: Ernst Klett, International GmbH.
4. Dane, A.D. (2005). Passwort Deutsch 1 & 2. Stuttgart: Ernst Klett, International GmbH.
5. Ortheil, H.J. (2010). Deutsch zum Ausprobieren, München: Sprachinstitut Treffpunkt.

UVW318/2
GERMAN III

COURSE SYNOPSIS

The objective of this course is the intorduction to, and use of vocabulary related to social contexts and its use in bussiness contexts. Students will be able to read longer dialogues and paragraphs related to social and simple bussiness contexts. Students will learn to construct longer sentences to produce dialogues related to topics learned.

PREREQUISITE

Pass German II with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Listen and respond to sentences and short dialogues of various topics relating to daily activities.
2. Demonstrate understanding of short paragraphs and texts of different social and business contexts.
3. Engage in conversations in different social and business contexts.
4. Construct longer sentences and phrases with correct use of grammar.

REFERENCES

1. Gotz, G. Schwarz, E. (2011). AussichtenA1. Deutsch als Fremdsprache für Erwachsene. Stuttgart: Ernst Klett GmbH.
2. Guess, G. (2009) Deutsch Aktiv. Berlin und München: Langenscheidt KG.
3. Maenner, D. (2006) Eurolingua Deutsch 1 & 2. Stuttgart: Ernst Klett, International GmbH.
4. Ortheil, H.J. (2010). Deutsch zum Ausprobieren, München: Sprachinstitut Treffpunkt.

UVW418/2
GERMAN IV

COURSE SYNOPSIS

The objective of this course is to expose and teach the students more complex grammatical forms and sentence structure as compared to level 1, 2, and 3. Classroom tasks demand a higher level of participation and allow students to express themselves using the language. Students are exposed to different authentic situations that they would encounter in their future workplace. Students will also learn how to write essays.

PREREQUISITE

Pass German III with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Listen and respond to sentences and longer dialogues of various topics relating to work in social and Business field.
2. Demonstrate understanding of longer paragraphs and texts of specific business contexts.
3. Engage in conversations in specific business contexts.
4. Write essays with correct use of grammar.

REFERENCES

1. Gotz, G. Schwarz, E. (2011). AussichtenA1. Deutsch als Fremdsprache für Erwachsene. Stuttgart: Ernst Klett GmbH.
2. Guess, G. (2009) Deutsch Aktiv. Berlin und München: Langenscheidt KG.
3. Maenner, D. (2006). Eurolingua Deutsch 1, Berlin: Cornelsen Verlag
4. Dane, A.D. (2005). Passwort Deutsch 1&2, Stuttgart : Ernst Klett, International GmbH.
5. Ortheil, H.J. (2010). Deutsch zum Ausprobieren, München: Sprachinstitut Treffpunkt.

UVW119/2
KOREAN I

COURSE SYNOPSIS

This course is designed for beginners with no prior knowledge of Korean. It introduces students to the Korean language and covers reading and writing of the Hangul script as well as pronunciation. Starting with greetings, the course proceeds to develop communication through basic grammar, vocabulary and reading skills for simple sentences. Students will develop the four skills of listening, speaking, reading and writing in an interactive and integrated manner through theme-based activities that relate to daily life.

PREREQUISITE

Students who register **MUST NOT** have any formal qualifications in the language at PMR/SPM level; **and MUST NOT** have followed any education system which uses the language as the medium of instruction.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Identify and pronounce the different Hangul words with the correct tone.
2. Understand and respond to simple daily life greetings and expressions.
3. Read and understand simple sentences and short dialogues.
4. Memorize and write simple Korean sentences with the correct suffixes.

REFERENCES

1. 47 Korean pronunciation for foreigners. (2009). Seoul University, Korea: Language Education Centre.
2. Easy to learn Korean. (2011). Korea, Seoul: Sungkyun Language Institute.
3. Kim, J. S., Bang, S. W., Lee, Y., Seo, H. J., & Ahn, M. (2004). *Exploring Korean workbook (Beginner's I).* Korea, Seoul: Kyung Hee University Press and the Institute of international Education.



4. Kim, D. G., Park, Y. H., Oh, S. A., Yu, J. Y., & Lee, H. W. (2005). *Korean grammar for foreigners.* Korea, Seoul: The National Institute of the Korean Language.
5. Lee, Z. C. (2007). *Queen' Korean.* (2007). Peking, China: Peking University Press.

UVW219/2
KOREAN II

COURSE SYNOPSIS

In this course, students will become more familiar with the morphology of spoken and written Korean. Students will further develop their proficiency in the skills of listening, speaking, reading and writing. These skills will be taught in an interactive and integrated manner through theme-based activities related to everyday life. The course will also enable students to acquire more accurate pronunciation and articulation of Korean words and sentence patterns. By the end of the course, they will have a better understanding of Korean lifestyle and culture and they will be able to use Korean in a variety of social contexts.

PREREQUISITE

Pass Korean I with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Listen and respond to common daily life conversations.
2. Read and understand short dialogues and passages of different social situations.
3. Produce simple Korean sentences and dialogues with the correct pronunciations.
4. Write sentences and a short paragraph with the correct use of suffixes and sentence structures.

REFERENCES

1. 47 Korean pronunciation for foreigners. (2009). Seoul University, Korea: Language Education Centre.
2. Easy to learn Korean. (2011). Korea, Seoul: Sungkyun Language Institute.
3. Kim, J. S., Bang, S. W., Lee, Y., Seo, H. J., & Ahn, M. (2004). *Exploring Korean workbook (Beginner's I).* Korea, Seoul: Kyung Hee University Press and the Institute of international Education.
4. Kim, D. G., Park, Y. H., Oh, S. A., Yu, J. Y., & Lee, H. W. (2005). *Korean grammar for foreigners.* Korea, Seoul: The National Institute of the Korean Language.
5. Lee, Z. C. (2007). *Queen' Korean.* (2007). Peking, China: Peking University Press.

UVW319/2
KOREAN III

COURSE SYNOPSIS

This course aims to expand students' language skills by introducing more complex sentence structures, colloquial expressions in different cultural contexts. Classroom tasks in this course naturally demand a higher level of participation and hence incorporate learning through the use of audio-visual materials and class discussion. This course will introduce students to basic business Korean use and culture behavior in dealing business with people from Korea.

PREREQUISITE

Pass Korean II with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:
1. Engage in conversations of different social and business contexts.
2. Demonstrate understanding of longer texts of the different social and business contexts.
3. Construct longer sentences and paragraphs with the correct use of suffix and sentence structures.

REFERENCES

1. 47 Korean pronunciation for foreigners. (2009). Seoul University, Korea: Language Education Centre.
2. Easy to learn Korean. (2011). Korea, Seoul: Sungkyun Language Institute.
3. Kim, J. S., Bang, S. W., Lee, Y., Seo, H. J., & Ahn, M. (2004). *Exploring Korean workbook (Beginner's I).* Korea, Seoul: Kyung Hee University Press and the Institute of International Education.
4. Kim, D. G., Park, Y. H., Oh, S. A., Yu, J. Y., & Lee, H. W. (2005). *Korean grammar for foreigners.* Korea, Seoul: The National Institute of the Korean Language.
5. Lee, Z. C. (2007). *Queen' Korean.* (2007). Peking, China: Peking University Press.

UVW419/2
KOREAN IV

COURSE SYNOPSIS

Students are introduced to more complex grammatical forms and sentence structures as compared to level I, II and III. Classroom tasks in this course would demand a higher level of participation and allow students opportunities to

express themselves using the language. Students are exposed to use the language in different authentic contexts that they would encounter in their future workplace.

PREREQUISITE

Pass Korean III with minimum grade C.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Read and respond to longer paragraphs and dialogues on various topics.
2. Engage in conversations in different contexts independently.
3. Construct longer sentences and paragraphs using the correct grammar structures in both spoken and written forms.

REFERENCES

1. 47 Korean pronunciation for foreigners. (2009). Seoul University, Korea: Language Education Centre.
2. Easy to learn Korean. (2011). Korea, Seoul: Sungkyun Language Institute.
3. Kim, J. S., Bang, S. W., Lee, Y., Seo, H. J., & Ahn, M. (2004). Exploring Korean workbook (Beginner's I). Korea, Seoul: Kyung Hee University Press and the Institute of International Education
4. Kim, D. G., Park, Y. H., Oh, S. A., Yu, J. Y., & Lee, H. W. (2005). Korean grammar for foreigners. Korea, Seoul: The National Institute of the Korean Language.
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ENGINEERING CENTRE

The Engineering Centre is located within Main Campus of UniMAP. It was established to manage laboratories and workshops which are vitally needed for various engineering programs offered by UniMAP. The teaching learning approach practiced in UniMAP is essentially based on practical-oriented; hence the use of labs cannot be overemphasized.

OBJECTIVES

Besides managing laboratories and workshop, the Engineering Centre also supports research and development activities in UniMAP. It also aspires to be a centre for designing and creating innovative engineering products. The Engineering Centre offers facilities for courses which require training and technical skills, parallel to industry standard. It also offers 'teaching factory' that is based on industries advanced technology, facilities and conducive environment for research and development activities and training for students and members of staff.

COURSES OFFERED BY ENGINEERING CENTRE

There are two core courses offered by Engineering Centre for undergraduate's level:

- Engineering Skills (ECT111)
- Engineering Skills (ECT112)
- Engineering Skills (PCT111)

And also a core course for diploma level:

- Basic Engineering Skill (DCT100)

ENGINEERING SKILLS (ECT111/ECT112)

- AutoCAD Software Module consist of drawing and editing, layer control and properties modification, hatching, and dimensioning, text and template drawing
- Technical Drawing consists of geometric construction, lettering, tolerance, sectional view and symbols
- MATLAB Software Module consists of M- Files, Projection format, Matrix, vector, scalar and plotting
- Mechanical workshop consists of basic measurement, machining, welding, fitting, sheet metal
- PCB Fabrication process
- PCB design by using OrCAD Software.
- Electrical domestic wiring.
- Mechanical workshop- machining
- PLC - Programmable Logic Control.

BASIC ENGINEERING SKILL, (DCT 100)

- Basic knowledge of computer
- Construction and measurement of electronic circuit
- Basic knowledge of electrical wiring
- An exposure to measurement techniques, fitting and sheet metal process
- Experience to the welding techniques and handling of mechanical machine

LAB FACILITIES

PCB FABRICATION LAB

- Introduction to advance Printed Circuit Board process development including single sided and double sided PCB production. We also can produce multi layer PCB process up to 6 layers.

PLC LAB

- PLC application in automation

CAD/CAM LAB and COMPUTER LAB

- Introducing software of AUTOCAD, MATLAB and ORCAD.

ELECTRICAL WIRING WORKSHOP

- Domestic wiring, installation of surface wiring, PVC conduit and steel conduit wiring systems

MECHANICAL WORKSHOP

- Basic mechanical measurements, sheet metal process, fitting, welding, and machining

BASIC COMPUTER LAB

- Hardware assembly and software installation

TEACHING FACTORY

- Injection moulding, CNC turning, CNC milling, wave solder machine, Rapid Prototyping machine, Rotional machine, Vacum casting, powder metalogy, EDM wire cut

TECHNICAL DRAWING STUDIO

- Basic technical drawing equipment.

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COURSE SYLLABUS

ECT111 /PCT111
ENGINEERING SKILLS

SYNOPSIS

This subject is 100% practical coursework and carried out 3 units credit hours. This course contains six modules which are Basic Workshop, Machining, Wiring, PCB Design, PLC, AutoCAD and Technical Drawing that specifically planned for electronic based programs.

COURSE OUTCOMES

- Ability to apply and construct a basic skills and standard practiced of mechanical machines and equipments
- Ability to apply and construct the basic skills and standard practiced of domestic wiring.
- Ability to apply and construct a logic system using common controller tool (PLC).
- Ability to apply construct a standard practiced of manual technical drawing and able to design a product using common software (AutoCAD)
- Ability to apply and construct the basic skills and standard practiced of PCB layout design and fabrication process.

SYLLABUS

Technical Drawing
- DRAW, DISCUSS and APPLY the engineering practice to deliver an accurate technical drawing

Software: AutoCAD
- DEFINE, DISCUSS and USE the engineering software (AutoCAD) as a tool to create 2D and 3D product

Basic Workshop
- DEFINE and DEMOSTRATE the functions of metrology equipments. DESCRIBE and APPLY the techniques of fitting, sheet metal forming and metal joining (welding).

Machining
- DISCUSS and USE a standard mechanical engineering machines such as Milling, Lathe and Grinding Machine to produce general component.

Domestic Wiring
- DISCUSS, DEMOSTRATE and APPLY the techniques of domestic wiring such as surface and conduit (PVC and GI) techniques.

Programmable Logic Control
- DEFINE, DISCUSS and USE of common logic controller which involves with programming, PLC structure and application.

PCB Design & Fabrication
- DEFINE, DISCUSS and USE the engineering software (OrCAD) as a tool to design PCB layout. DISCUSS a process of PCB fabrication and USE common machines to produce PCB.

REFERENCES

1. Timothy Sean Sykes. (2002). *AutoCAD 2002 One Step at A Time*. Prentice Hall.
2. Ralph Grabowski. (2002). *Using AutoCAD 2002*. Thompson Learning.
3. Mohd Ramzan Mainal, Badri Abdul Ghani, Yahya Samian. (2000). *Lukisan Kejuruteraan Asas*. UTM



ECT112
ENGINEERING SKILLS

SYNOPSIS

This subject is 100% practical coursework and carried out 3 units credit hours. This course contains six modules which are Basic Workshop Machining, Wiring, Basic Electronics, Matlab, AutoCAD and Technical Drawing that specifically planned for non-electronic based programs.

COURSE OUTCOMES

- Ability to apply and construct a basic skills and standard practiced of mechanical machines and equipments
- Ability to apply and construct a basic skills and standard practiced of domestic wiring.
- Ability to apply and construct a mathematical analysis using Matlab software.
- Ability to apply and construct a basic skills and standard practiced of manual technical drawing and able to design a product using common software (AutoCAD)
- Ability to apply and construct a basic skill of electronics and its applications.

SYLLABUS

Technical Drawing
- DRAW, DISCUSS and APPLY the engineering practice to deliver an accurate technical drawing

Software: AutoCAD
- DEFINE, DISCUSS and USE the engineering software (AutoCAD) as a tool to create 1D and 3D product.

Basic Workshop
- DEFINE and DEMONSTRATE the function metrology equipments. DESCRIBE and APPLY the techniques of fitting, sheet metal forming and metal joining (welding).

Machining
- DISCUSS and USE a standard mechanical engineering machines such as Milling, Lathe and Grinding Machine to produce general component.

Domestic Wiring
- DISCUSS, DEMOSTRATE and APPLY the techniques of domestic wiring such as surface and conduit (PVC and GI) techniques.

Matlab
- DEFINE, DISCUSS and USE of common mathematical analysis software (MATLAB) to calculate matrix, differential, integration, graph, and other mathematical formulas.

Basic Electronics
- DEFINE, DISCUSS and USE of basic electronic devices, electronic components, soldering techniques, testing techniques, measurement techniques and its application.

REFERENCES

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2. Ralph Grabowski. (2002). *Using AutoCAD 2002*. Thompson Learning.
3. William J. Palm III. (2001). *MATLAB for Engineering Students*. McGraw Hill.
4. Mohd Ramzan Mainal, Badri Abdul Ghani, Yahya Samian. (2000). *Lukisan Kejuruteraan Asas*. UTM

INSTITUTE OF ENGINEERING MATHEMATICS

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- Master of Science by Research
- Master of Science (Engineering Mathematics) Mixed Mode

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INTRODUCTION

The Institute of Engineering Mathematics is a centre for planning and monitoring the curriculum of Mathematics and Statistics to all engineering, engineering technology and business programmes in UniMAP. It undertakes exemplary teaching and research across a number of disciplines. Each discipline explores opportunities to support and enhance our subjects, providing exciting interdisciplinary research and innovative approaches to teaching. Our areas of expertise cover Mathematics, Statistics, Mathematical Physics, Simulation and Operational Research. Our scientists are active in internationally recognised research across the disciplines, advancing knowledge in the established fields, alongside novel developments in emerging areas such as fuzzy modeling, computational intelligence applications, computational fluid dynamics and multi-characteristics quality control.

MISSION

To provide excellent services in teaching and research related to Engineering Mathematics that consistent with the university's aspiration.

VISION

To become a competitive institution in teaching and research related to Engineering Mathematics.

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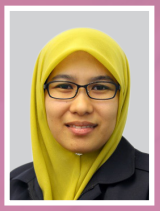




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COURSES OFFERED

DIPLOMA COURSES

DQT101/3 Mathematics I
DQT102/3 Mathematics II
DQT203/3 Mathematics III

DEGREE COURSES

i) Business Programme

BQT133/3 Business Mathematics
BQT173/3 Business Statistics

ii) Engineering Programme

EQT101/3 Engineeering Mathematics I
EQT102/3 Engineering Mathematics II
EQT203/3 Engineering Mathematics III
EQT221/3 Discrete Mathematics & Linear Algebra
EQT241/3 Intermediate Mathematics
EQT271/3 Engineering Statistics
EQT272/3 Probability and Statistics

iii) Engineering Technology Programme

PQT111/3 Mathematics for Engineering Technology I
PQT112/3 Mathematics for Engineering Technology II
PQT213/3 Mathematics for Engineering Technology III
PQT274/3 Statistics for Engineering Technology

COURSE SYLLABUS

EQT101/3
ENGINEERING MATHEMATICS I

COURSE SYNOPSIS

This course will introduce the fundamental principles and concepts in linear algebra and calculus. The topics that will be discussed in this course are complex numbers, matrices, vectors, and differentiation & integration and partial differential equations also topic of Partial Derivatives.

COURSE OUTCOMES

1. Ability to relate relevant concepts and methods in algebra.
2. Ability to relate concepts and methods in calculus.
3. Ability to evaluate solutions of engineering problems using relevant concepts and methods.

REFERENCES

1. Fundamental Mathematics McGraw Hill
2. James, G et.al.(2007): Modern Engineering Mathematics. Pearson Education, 4th edition.
3. Stroud,K.A. (2007): Engineering Mathematics. Industrial Press Inc, 6th edition.
4. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
5. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.

EQT102/3
ENGINEERING MATHEMATICS II

COURSE SYNOPSIS

In this course, students will be exposed to differential equations. Firstly, number of analytical methods will be introduced to solve the first and second order ordinary differential equations and also partial differential equations. The theory of Laplace transforms and it applications to solve ordinary differential equation will be taught and then Fourier series of periodic function will be covered in the last chapter.

COURCES OUTCOMES

1. Ability to solve differential equations which covered first and second order ordinary differential equations and partial differential equations
2. Ability to apply the Laplace transforms method and able to solve and analyze certain differential equations.
3. Ability to apply the fundamental understanding of Fourier series and able to express Fourier series and Fourier series expansions of any given function.
4. Ability to analyze certain physical problems and able to relate the problems with differential equations.

PREREQUISITE

EQT 101
ENGINEERING MATHEMATICS I

REFERENCES

1. Introduction To Ordinary Differential Equation (2010), Penerbit UniMAP
2. W. E. Boyce (2009): Elementary Differential Equations and Boundary Value Problems: International Student Version.John Wiley & Sons Inc,9th edition.
3. B.R. Hunt, L.J. Lardy ,R.L. Lipsman, J.E. Osborn, J.Rosenberg (2008): Differential Equations with Maple Wiley, 3rd edition.
4. R. K. Nagle, E. Bin Saff and A.D. Snider (2008). Fundamentals of Differential Equations and Boundary Value Problems. Addison-Wesley,5th edition.
5. D. G. Zill and M.R. Cullen (2008): Differential Equations with Boundary-Value Problems. Brooks Cole,7th edition.
6. D.G. Zill (2008). A First Course in Differential Equations. Brooks Cole, 9th edition.

BQT133/3
BUSINESS MATHEMATICS

COURSE SYNOPSI

The purpose of the course is to provide the student with mathematical techniques to help them to make better decisions in the business problems. Topics include: Matrix Algebra, Financial Mathematics, Differential Calculus and Integral Calculus.

COURCES OUTCOMES

1. Ability to identify and apply the knowledge of matrix algebra in business models.
2. Ability to apply the knowledge in mathematics to solve the financial problems
3. Ability to relate concepts and methods in calculus and select suitable methods to solve the business problems.



REFERENCES

1. Marek Capiski and Tomasz Zastawniak (2010) *Mathematics for Finance An Introduction to Financial Engineering* (Second Edition), Springer.
2. Laurence D Hoffmann; Gerald L Bradley (2010) *Calculus for business, economics, and the social and life sciences*, McGraw-Hill.
3. Brechner, Robert (2008) *Contemporary Mathematics for Business and Consumers*, South-Western College Pub.
4. Raymond A. Barnett, Michael R. Ziegler, Karl E. Byleen (2008), *Finite mathematics for business, economics, life sciences, and social sciences,* Pearson/Prentice Hall.
5. Zulkarnain Zakaria (2000), *Matematik Perniagaan*, UTM Press

BQT173/3
BUSINESS STATISTICS

COURSE SYNOPSIS

An application-oriented study of statistical concepts and techniques. The course focuses on the student as a user of statistics who needs a minimal understanding of mathematical theory and formula derivation. Major topics of study are exploration data analysis, sampling methods, constructing a hypothesis on one and two samples, performing one-way and two-way analyses of variance, Regression analysis, association test, applying nonparametric methods of statistical analysis and time series & business forecasting. This course will utilize computer-based statistical software to perform statistical computation and interpreting the analysis output correctly.

COURCES OUTCOMES

1. Ability to apply the basic concept of statistical concept and thinking in business probems.
2. Ability to formulate solutions to common business decision problems through statistical analysis.
3. Ability to identify and decide the suitable statistical method and to structure and analyze business problems statistically.

REFERENCES

1. Abdull Halim Abdul, Norazrita Amin, Biliana Bidin, Nor Fashihah Mohd Noor (2010) *Statistics*, McGraw Hill.
2. G. C. Beri (2010) *Business statistics*, McGraw-Hill.
3. Ronald M Weiers; J Brian Gray; Lawrence H Peters (2008) *Introduction to business statistics*, Thomson/South-Western.
4. Mark, L. Bin, Levine, D. M. & Krehbiel, T.C. (2008) *Basic Business Statistics*, 11 edition, Prentice Hall.
5. Bowerman, O. & Orris, P. (2008). *Essentials of Business Statistics*, 2nd edition, McGraw Hill/Irwin.
6. Weiers, R.M. (2007). *Introduction to Business Statistics*. Duxbury Press. An International Thompson Publishing Company.

EQT203/3
ENGINEERING MATHEMATICS III

COURSE SYNOPSIS

This course introduces the definition and concepts in vector calculus, the fundamental theorems of vector calculus and numerical methods. The topics discuss the concept of differentiation and integration in vector calculus, the line, surface and volume integrals as well as the Green's, divergence and Stokes's theorems. In numerical methods topic, several numerical techniques will be introduced to solve nonlinear equations, interpolation, curve fitting, differentiation, intergration and also differential equations. The introduction of finite element method also will be exposed in this course.

COURCES OUTCOMES

1. Ability to apply vector calculus concepts to solve single, double or triple integrals
2. Ability to apply the concept of differentiation and integration in vector calculus to solve classical theorems in vector calculus.
3. Ability to select appropriate numerical methods to solve the mathematical problems

REFERENCES

1. Undergraduate Mathematics for Engineering Student. McGraw Hill
2. Erwin Kreyszig (2006): *Advanced Engineering Mathematics*, 9th edition, John Wiley & Sons, Inc.
3. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
4. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
5. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
6. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.
7. Harman, T.L., Dabney, J. and Richert, N. (1997): *Advance Engineering Mathematics using MATLAB V.4*, Boston: PWS Publishing Company.

EQT221/3
DISCRETE MATHEMATICS & LINEAR ALGEBRA

COURSE SYNOPSIS

This course introduces the definition and concepts in discrete mathematics and linear algebra which is an essential tools in almost all subareas of computer science and communication systems. The topics discuss includes sets and functions, logic, theory number and cryptography, matrices and linear transformation, vector spaces and inner product spaces.

COURCES OUTCOMES

1. Ability to identify and choose the suitable concepts of discrete mathematics in solving engineering problems.
2. Ability to apply the concept of linear algebra in solving engineering problems.
3. Ability to relate and solve engineering problems using discrete mathematics and linear algebra

REFERENCES

1. Rosen, H. Kenneth. 2007. Discrete Mathematics and Its Application (6th Edition).McGraw-Hill, New York.
2. Ross, A. Kenneth & Wright, R. Bin Charles. 1999. Discrete Mathematics (4th Edition). Prentice Hall, Inc, New Jersey
3. Kolman, Bernard & Hill, R. David. 2004. Elementery Linear Algebra (8th Edition). Pearson Education, Inc, New Jersey
4. Buchmann, J.A. 2004. Introduction to Cryptography (2nd Edition). Springer-Verlag, New York
5. Kolblizt, N. 1994. A course in Number Theory and Crytpgraphy (2nd Edition). Springer-Verlag, New York.
6. Ma Siu Lun, Victor Tan. 2006. Linear Algebra I. Pearson Prentice Hall, Inc, New Jersey.
7. Larson, R & Falvo, D. 2010. Elementary Linear Algebra, Brooks/Cole Cengage Learning.

EQT241/3
INTERMEDIATE MATHEMATICS

COURSE SYNOPSIS

This course introduces the definition and concepts in vector calculus and numerical methods. Three important concepts related to scalar and vector fields. The topics discuss also includes numerical differentiation and numerical integration, numerical solution of differential equations and finite difference method.

COURCES OUTCOMES

1. Ability to define the vector integrals and evaluate the line, volume and surface integral using Green, Guass and Stoke theorem.
2. Ability to find the numerical solution of the equation and use the suitable numerical methods to solve the problems.
3. Ability to relate the relevant concept of vector calculus and numerical methods to solve engineering problems.

REFERENCES

1. Erwin Kreyszig (2006): *Advanced Engineering Mathematics*, 9th edition, John Wiley & Sons, Inc.
2. Undergraduate Mathematics for Engineering Student. McGraw Hill
3. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
4. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
5. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
6. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.
7. Harman, T.L., Dabney, J. and Richert, N. (1997): *Advance Engineering Mathematics using MATLAB V.4*, Boston: PWS Publishing Company.

EQT271/3
ENGINEERING STATISTICS

COURSE SYNOPSIS

The goal of this course is to introduce students with the appropriate statistical methods for data collection, analysing and interpreting data. Moreover, in this course, the statistical concepts and methods are discussed within the context of statistics is a study about variation. The basic concepts of randomness, quantifying uncertainty through probability models and making inference about population are the essence of this course. The course begins with describing and exploring data. Various graphical tools and numerical measures used to describe data will be introduced. Some basic probability concepts, discrete and continuous probability distribution are among topics for modelling uncertainty. Making inference through estimation and hypothesis test based on parametric and non-parametric methods are being explored in the second part of this course. The last chapter discuss the topic of simple linear regression model.

COURCES OUTCOMES

1. Ability to describe basic statistical concepts, apply basic statistical skills and develop statistical reasoning skills.



2. Ability to apply, analyze and evaluate the suitable methods of statistical inference for a given statistical problem and design an application of inferential method.
3. Ability to interpret, apply and analyze the procedures of simple linear regression model and synthesize the regression model for making prediction

REFERENCES

1. Walpole, R., Myers, R., Myers, S. and Keying Ye (2006): *Probability & Statistics for Engineers & Scientist, 8th edition,* Pearson.
2. Ledolter, J. and Hogg, R. (2009): *Applied Statistics for engineers and Physical Scientists,* Pearson.
3. Mendenhall, W. and Sincich, T. (2006): *Statistics for engineering and the sciences, 5th edition,* Pearson.
4. McClave, J., Sincich, T. and Mendenhall, W. (2008): *Statistics, 11rd edition,* Pearson.
5. David, S.M., George, P.M. and Bruce, C. (2008): *Introduction to the Practise of Statistics, 6th edition, Palgrave.*
6. David, S.M. (2008): *The Basic Practise of Statistics, 5th edition,* Palgrave.

EQT272/3
PROBABILITY & STATISTICS

COURSE SYNOPSIS

This course provides an elementary introduction to probability and statistics with applications. Topics include probability theorem, random variables, probability distribution, statistical inference which is including estimation and hypothesis testing and finally the regression concept.

COURCES OUTCOMES

1. Ability to apply the theory of probability and solve discrete and continuous random variables.
2. Ability to understand and apply the concepts of probability distribution.
3. Ability to apply hypothesis testing and simple linear regression model to solve engineering problems.

REFERENCES

1. Richard J. Larsen and Morris L. Marx, (2001): *An Introduction to Mathematical Statistics and Its Applications*, 3rd edition, Prentice Hall.
2. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
3. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
4. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
5. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.
6. Harman, T.L., Dabney, J. and Richert, N. (1997): *Advance Engineering Mathematics using MATLAB V.4*, Boston: PWS Publishing Company.

PQT111/3
MATHEMATICS FOR ENGINEERING TECHNOLOGY I

COURSE SYNOPSIS

This course will introduce the fundamental principles and concepts in algebra, calculus and statistics. The topics that will be discussed in this course are complex numbers, matrices, vectors, differentiation & integration and statistics.

COURCES OUTCOMES

1. Ability to solve mathematical problems using basic concepts of algebra (complex numbers, matrices and vectors).
2. Ability to solve mathematical problems using basic concepts of calculus (differentiation and integration).
3. Ability to solve statistical problems using data analysis.

REFERENCES

1. Fundamental Mathematics, McGraw Hill
2. James, G et.al. (2007): Modern Engineering Mathematics. Pearson Education, 4th edition.
3. Stroud,K.A. (2007): Engineering Mathematics. Industrial Press Inc, 6th edition.
4. Mario F. Triola.(2009). Elementary Statistics Using Excel. Addison-Wesley. 4th Edition.
5. Beverly Dretzke. (2008). Statistics With Microsoft Excell. Prentice Hall. 4th Edition.
6. Devore, J.L. (2007): Probability and Statistics for Engineering and the Sciences. Duxbury Press,7th edition.
7. Montgomery, D.C. (2006): *Applied Statistics and Probability for Engineers*. Wiley, 4th edition.

PQT112/3
MATHEMATICS FOR ENGINEERING TECHNOLOGY II

COURSE SYNOPSIS

This course will introduce the concepts of ordinary differential equations. The topics that will be discussed in this course are the methods in solving the differential equations including first and second order differential equations and its applications. Next, the course

will introduce to the Laplace transform method to solve differential equations and at the end of topic, Fourier Series expansion of a function will be discussed to the students.

COURCES OUTCOMES

1. Able to solve differential equations involving the first and second order differential equation by selecting appropriate techniques and able to relate and analyze the certain physical problems to differential equations.
2. Ability to apply the Laplace transforms method to solve and analyze certain differential equations problems.
3. Ability to apply the fundamental understanding of Fourier series and able to express Fourier series and Fourier series expansions to any given function.

PREREQUISITE

PQT 111
MATHEMATICS FOR ENGINEERING TECHNOLOGY I

REFERENCES

1. Introduction To Ordinary Differential Equation (2010), Penerbit UniMAP
2. W. E. Boyce (2009): Elementary Differential Equations and Boundary Value Problems: International Student Version.John Wiley & Sons Inc, 9th edition.
3. B.R. Hunt, L.J. Lardy ,R.L. Lipsman, J.E. Osborn, J.Rosenberg (2008): Differential Equations with Maple Wiley, 3rd edition.
4. R. K. Nagle, E. Bin Saff and A.D. Snider (2008). Fundamentals of Differential Equations and Boundary Value Problems. Addison-Wesley, 5th edition.
5. D. G. Zill and M.R. Cullen (2008): Differential Equations with Boundary-Value Problems. Brooks Cole, 7th edition.
6. D.G. Zill (2008). A First Course in Differential Equations. Brooks Cole, 9th edition.

PQT213/3
MATHEMATICS FOR ENGINEERING TECHNOLOGY III

COURSE SYNOPSIS

This course will introduce the definition and concepts of partial derivatives and vector calculus. An introduction to some theorems in vector calculus topic will be exposed for students. At the end of study, this course also discusses the topic of numerical methods that introduce several methods in solving mathematical problems.

COURCES OUTCOMES

1. Ability to apply the concepts of partial derivatives and able to evaluate solutions of mathematical problems using suitable methods
2. Ability to apply vector calculus concepts and able to differentiate and solve single, double or triple integrals
3. Ability to solve numerical problems by selecting suitable numerical methods

REFERENCES

1. Undergraduate Mathematics for Engineering Student. McGraw Hill
2. Erwin Kreyszig (2006): *Advanced Engineering Mathematics*, 9th edition, John Wiley & Sons, Inc.
3. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
4. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
5. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
6. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.

PQT 274/3
STATISTICS FOR ENGINEERING TECHNOLOGY

COURSE SYNOPSIS

The goal of this course is to introduce students with the appropriate statistical methods for data collection, analysing and interpreting data. Moreover, in this course, the statistical concepts and methods are discussed within the context of statistics is a study about variation. The basic concepts of randomness, quantifying uncertainty through probability models and making inference about population are the essence of this course. The course begins with describing and exploring data. Various graphical tools and numerical measures used to describe data will be introduced. Some basic probability concepts, discrete and continuous probability distribution are among topics for modelling uncertainty. Making inference through estimation and hypothesis test based on parametric and non-parametric methods are being explored in the second part of this course. The last chapter discuss the topic of simple linear regression model.

COURCES OUTCOMES

1. Ability to describe basic statistical concepts, apply basic statistical skills and develop statistical reasoning skills.



2. Ability to apply, analyze and evaluate the suitable methods of statistical inference for a given statistical problem.
3. Ability to interpret, apply and analyse the procedures of simple linear regression model and making prediction.

REFERENCES

1. Walpole, R., Myers, R., Myers, S. and Keying Ye (2006): *Probability & Statistics for Engineers & Scientist, 8th edition,* Pearson.
2. Ledolter, J. and Hogg, R. (2009): *Applied Statistics for engineers and Physical Scientists,* Pearson.
3. Mendenhall, W. and Sincich, T. (2006): *Statistics for engineering and the sciences, 5th edition,* Pearson.
4. McClave, J., Sincich, T. and Mendenhall, W. (2008): *Statistics, 11rd edition,* Pearson.
5. David, S.M., George, P.M. and Bruce, C. (2008): *Introduction to the Practise of Statistics, 6th edition, Palgrave.*

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CENTRE FOR INDUSTRIAL & GOVERNMENTAL COLLABORATION (CIGC)

The Centre for Industrial & Governmental Collaboration (CIGC) serves as the link between the university and industries in carrying out various R&D activities and academic programmes. The centre also represents the diversity of academic offerings and events based on participation and commitment from the industries. CIGC consists of several main units, namely Graduate Employability & Industrial Networking, Internship & Collaboration, and Information Technology (ICT, Publicity, Administration, Finance & Projects). Among the programmes conducted with the involvement from industries are Industrial Training (InTra), Career Fair, Forums, Seminars with Industries, Job Camps, Graduate Trainee Programs, Degree++ Programs, MoU/MoA with Industries.

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LIST OF COURSES

- **BIT190/3 INDUSTRIAL TRAINING 1**
  [DEGREE IN BUSINESS (INTERNATIONAL BUSINESS) PROGRAMME]

- **BIT290/3 INDUSTRIAL TRAINING 2**
  [DEGREE IN BUSINESS (INTERNATIONAL BUSINESS) PROGRAMME]

- **BIT291/6 INCUBATOR PROGRAMME**
  [DEGREE IN BUSINESS (ENGINEERING ENTREPRENEURSHIP) PROGRAMME]

- **EIT 302/4 INDUSTRIAL TRAINING**
  [DEGREE IN ENGINEERING PROGRAMME]

- **KIT 432/6 INDUSTRIAL TRAINING**
  [DEGREE IN NEW MEDIA COMMUNICATION PROGRAMME]

- **PIT 304/12 INDUSTRIAL TRAINING**
  [DEGREE IN ENGINEERING TECHNOLOGY PROGRAMME]



COURSE OFFERED:

BIT190/3 INDUSTRIAL TRAINING 1
BIT290/3 INDUSTRIAL TRAINING 2
[DEGREE IN BUSINESS (INTERNATIONAL BUSINESS) PROGRAMME]

SYLLABUS

The course will expose students to the technical and application aspects as well as other organizational aspects such as company organization structure, company operation, department function, work procedure, safety procedure, management, communication, technical skills, project management and presentation. The students are also required to submit their logbook and report at the end of the Industrial Training. Overall, the course is a practical-based course.

COURSE OUTCOMES

1. Ability to display good work performance and adapt to the working environment during training period.
2. Ability to demonstrate good communication skills, leadership and work ethics during training period.
3. Ability to perform assigned task given by host company.

REFERENCE

1. UniMAP Industrial Training Guideline (Rev A) – January 2017

BIT291/6
INCUBATOR PROGRAMME
[DEGREE IN BUSINESS (ENGINEERING ENTREPRENEURSHIP) PROGRAMME]

SYLLABUS

This course gives students direct exposure to the real entrepreneurship and business world. Students will be stationed in business incubators, generally assigned to one of the startup companies. Students will go through the experience of starting up a company / business including being exposed to the company procedures, banking activities, development of new product, business networking, management of the company and so on. Students will also get exposure communicating in actual business world and this will develop their skills in fostering an entrepreneurial network.

COURSE OUTCOMES

1. Ability to display good work performance and adapt to the working environment during training period.
2. Ability to demonstrate good communication skills, leadership and work ethics during training period.
3. Ability to perform assigned task given by host company.

REFERENCE

1. UniMAP Industrial Training Guideline (Rev A) – January 2017

EIT 302/4
INDUSTRIAL TRAINING
[DEGREE IN ENGINEERING PROGRAMME]

SYLLABUS

The course will expose students to the technical and application aspects as well as other organizational aspects such as company organization structure, company operation, department function, work procedure, safety procedure, management, communication, technical skills, project management and presentation. The students are also required to submit their logbook and report at the end of the Industrial Training. Overall, the course is a practical-based course.

COURSE OUTCOMES:

1. Ability to display good work performance and adapt to the working environment during training period.
2. Ability to demonstrate good communication skills, leadership and work ethics during training period.
3. Ability to perform assigned task given by host company.

REFERENCES

1. UniMAP Industrial Training Guideline (Rev A) – January 2017

KIT 432/6
INDUSTRIAL TRAINING
[DEGREE IN NEW MEDIA COMMUNICATION PROGRAMME]

SYLLABUS

The course will expose students to the technical and application aspects as well as other organizational aspects such as company organization structure, company operation, department function, work procedure, safety procedure, management, communication, technical skills, project management and presentation. The students are also required to submit their log book and report at the end of the Industrial Training. Overall, the course is a practical-based course.

COURSE OUTCOMES

1. Ability to display good work performance and adapt to the working environment during training period
2. Ability to demonstrate good communication skills, leadership and work ethics during training period
3. Ability to perform assigned task given by host company.

REFERENCES

1. UniMAP Industrial Training Guideline (Rev A) – January 2017

PIT 304/12
INDUSTRIAL TRAINING
[DEGREE IN ENGINEERING TECHNOLOGY PROGRAMME]

SYLLABUS

This practical-based course exposes students to a company technical functions and organizational structure and operation such as departmental function, work procedure, safety procedure, communication, technical skills and project management. During this course, the students will apply knowledge learned in the university and increased the related skills required in their future profession.

COURSE OUTCOMES

1. Ability to evaluate and adapt the working environment during training period.
2. Ability to demonstrate good work performance, good communication skills, leadership and work ethics during training period
3. Ability to operate assigned task given by host company.

REFERENCES

1. UniMAP Industrial Training Guideline (Rev A) – January 2017



CO-CURRICULUM CENTRE

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INTRODUCTION

The Department of Higher Education through a letter dated August 3rd, 2008 had instructed Co-curriculum Centres to be established at all Malaysian Public Institutions of Higher Education. The aim is to achieve the goal that had been outlined in the Country Higher Education Strategic Plan which is to strengthen the 'learning outcomes' through co-curriculum activities.

UniMAP Co-curriculum Unit was established in the year 2002 and was placed under the Centre for Communication Skills and Entrepreneurship. Then, on the 8th of June 2010 the Co-curriculum Centre had moved out from the Centre for Communication Skills and Entrepreneurship, and started operating at a new location at Taman Jejawi Utara. On the 29th of July 2010, the establishment of Co-curriculum Centre was officially launched by the Honourable Dato' Vice Chancellor of UniMAP.

The Co-curriculum Centre offers a lot of co-curriculum and uniformed bodies courses. All degree students are required to enroll at least 3 units of Co-Curriculum courses and student are compulsory to take uniformed body courses in their first year of study. Kindly refer to the table below:

OPTIONS	DETAILS COURSES	UNITS
1	Uniformed Bodies Co-curriculum	2 Unit 1 Unit
2	Uniformed Bodies	package

COURSE OUTCOME

CO1:
Ability to communicate, lead and work effectively in a team.

CO2:
Ability to learn, realize potential, think and access information in order to make effective decisions, while enriching understanding of our diverse world.

BIL.	KURSUS BADAN BERUNIFORM *[UNIFORMED BODIES COURSES]*		TAHUN 1 *(YEAR 1)*		TAHUN 2 *(YEAR 2)*		TAHUN 3 *(YEAR 3)*		TAHUN 4 *(YEAR 4)*	
	KURSUS BERPAKEJ (PACKAGED COURSES)	**TERAS KESUKARELAWANAN (CORE VOLUNTEERISM)**	**SEM 1**	**SEM 2**	**SEM 3**	**SEM 4**	**SEM 5**	**SEM 6**	**SEM 7**	**SEM 8**
1	**2 + 1 UNITS / 3 semesters** Pelajar harus melengkapkan peringkat 1 & 2 untuk memperolehi 2 unit dan mendaftar 1 unit kursus selain daripada badan beruniform *[Students must complete level 1 & 2 to acquire 2 units and enrol 1 unit course from non-uniformed bodies]*	*Kumpulan Latihan Kelanasiswa Malaysia (Udara) *[Malaysian University Rover Training Group (Air)]*	UZW112	UZW113	Pelajar perlu mendaftar 1 unit kursus selain daripada kursus badan beruniform (Sila rujuk Jadual 2) [Students are required to register 1 unit course from non-uniformed bodies' courses. (Please refer to Table 2)]					
		*Sukarelawan Bantuan Perubatan Malaysia *(MERCY MUDA)* *[Student Voluntary Malaysian Medical Relief Society (YOUNG MERCY)]*	UZW114	UZW115						
		*Briged Bomba *[Fire And Rescue Briged]*	UZW120	UZW121						
		*Pandu Puteri Siswi (PPS) *[Girl Guide (PPS)]*	UZW122	UZW123						
		*St. John Ambulans Malaysia *[Malaysian St. John Ambulance]*	UZW124	UZW125						
		*Kumpulan Latihan Kelanasiswa Malaysia *[Malaysian University Rover Training Group]*	UZW126	UZW127						
		*Kumpulan Latihan Kelanasiswa Malaysia (Laut) *[Malaysian University Rover Training Group (Sea)]*	UZW128	UZW129						
2	**3 UNITS / 3 semesters** Pelajar harus melengkapkan peringkat 1- 3 untuk memperolehi 3 unit *[Students must complete level 1 -3 to acquire 3 units]*	*Pancaragam *[Brass Band]*	UZW153	UZW253	UZW353	-	-	-	-	-
		*Kursus Persijilan Bulan Sabit Merah Malaysia *[The Malaysian Red Crescent Certification Course]*	UZW164	UZW165	UZW264	-	-	-	-	-
		*Seni Silat Cekak *[Seni Silat Cekak]*	UZW171	UZW271	UZW371	-	-	-	-	-
		*Taekwon-Do GTF *[Taekwon-Do GTF]*	UZW172	UZW272	UZW372	-	-	-	-	-
		*Karate-Do *[Karate-Do]*	UZW173	UZW273	UZW373	-	-	-	-	-
		*Taekwon-Do WTF *[Taekwon-Do WTF]*	UZW176	UZW276	UZW376	-	-	-	-	-
		*Silat Olahraga *[Sport Silat]*	UZW177	UZW178	UZW277	-	-	-	-	-
3	**4 UNITS / 4 semesters** Pelajar harus melengkapkan peringkat 1- 4 untuk memperolehi 4 unit *[Students must complete level 1 -4 to acquire 4 units])*	Sukarelawanan Siswa/Siswi Koreksional Jabatan Penjara Malaysia (KOR SISKOR) *[Students Voluntary Correctional Malaysian Prison Department (KOR SISKOR)]*	UZW110	UZW111	UZW210	UZW211	-	-	-	-

BIL.	KURSUS BADAN BERUNIFORM *[UNIFORMED BODIES COURSES]*		TAHUN 1 *(YEAR 1)*		TAHUN 2 *(YEAR 2)*		TAHUN 3 *(YEAR 3)*		TAHUN 4 *(YEAR 4)*	
4	**5 UNITS / 5 semesters** Pelajar harus melengkapkan peringkat 1- 5 untuk memperolehi 5 unit *[Students must complete level 1 -5 to acquire 5 units]*	Kor Siswa Siswi Pertahanan Awam (Kor SISPA) *[Malaysia Civil Defense Department]*	UZW162	UZW163	UZW262	UZW263	UZW362	-	-	-
5	**6 UNITS / 6 semesters** Pelajar harus melengkapkan peringkat 1- 6 untuk memperolehi 6 unit *[Students must complete level 1 -6 to acquire 6 units]*	PALAPES Darat *[ROTU Army]*	UZW160	UZW161	UZW260	UZW261	UZW360	UZW361	-	-
		SUKSIS@Kor Sukarelawan Polis Siswa/ Siswa *[SVPC@Students Voluntary Police Corp]*	UZW166	UZW167	UZW266	UZW267	UZW366	UZW367	-	-
		Briged RELA Siswa Siswi (RELASIS) *[Malaysian People's Volunteer Corps]*	UZW168	UZW169	UZW268	UZW269	UZW368	UZW369	-	-

* Kursus ini ditawarkan kepada pelajar tempatan dan antarabangsa. Pelajar mestilah melengkapkan pakej mengikut turutan dan lulus peringkat yang lebih rendah sebelum mendaftar peringkat selanjutnya. Pelajar mestilah melengkapkan pakej kursus badan beruniform yang didaftar dan tidak dibenarkan untuk menukar kepada badan beruniform yang lain. Sekiranya pelajar gagal melengkapkan pakej kursus tersebut maka jumlah unit terkumpul bagi kursus Kokurikulum Badan Beruniform akan di 'reset' ke 0 unit semula.

  Kelas Kokurikulum dan badan beruniform dijalankan pada hari Sabtu atau Ahad sepanjang semester kecuali bagi kursus PALAPES dan SUKSIS yang akan diadakan pada hari Sabtu dan Ahad. Jadual akan dipaparkan di Portal, e-mel Pelajar serta laman web Pusat Kokurikulum.

  Pelajar yang telah melengkapkan Kursus Badan Beruniform Berpakej 2+1, 3, 4, 5 atau 6 unit dibenarkan mendaftar mana-mana Kursus Kokurikulum Bukan Badan Beruniform sepanjang pengajian mereka.

* *This courses is offered to both local and international student Students must register the package in sequence and pass lower level before proceed to the next level. Students must complete uniformed bodies courses package and are not allowed to change to the other uniformed bodies. If the students failed to complete the course package, the number of units accumulated for the uniformed bodies courses will be in 'reset' to 0 units.*

  All curriculum and uniformed bodies classes will be held either on Saturday or Sunday during the semester except for PALAPES and SUKSIS which will be held on Saturday and Sunday. Schedule will be displayed in the Portal, e-mail and Curriculum Centre official website.

  Students who have completed their uniformed bodies courses packaged 2 + 1, 3, 4, 5 or 6 units are allowed to register for any non-uniformed bodies curriculum courses during their studies.

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JADUAL 2: KURSUS-KURSUS TERAS KESUKARELAWANAN (BADAN BERUNIFORM)
TABLE 2: CORE VOLUNTEERISM COURSES (UNIFORMED BODIES)

BIL	KOD *(CODE)*	NAMA KURSUS *(COURSE NAME)*	UNIT	TERAS *(CORE)*	PRA-SYARAT *(PRE-REQUISITE)*
1	UZW112	Kumpulan Latihan Kelanasiswa Malaysia (Udara) I *[Malaysian University Rover Training Group I (Air)]*	1	Kesukarelawanan *(Volunteerism)*	Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 2 Untuk Memperolehi 2 Unit) * Tahun 1 (2 Semester) *Packaged Courses – (Students should Following From Stage 1 -2 To Acquire 2 Units) * Years 1 (2 Semesters)*
	UZW113	Kumpulan Latihan Kelanasiswa Malaysia (Udara) II *[Malaysian University Rover Training Group II (Air)]*	1		
2	UZW114	Sukarelawan Bantuan Perubatan Malaysia (MERCY Muda) I *[Student Voluntary Malaysian Medical Relief Society (Young MERCY) I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW115	Sukarelawan Bantuan Perubatan Malaysia (MERCY Muda) II *[Student Voluntary Malaysian Medical Relief Society (Young MERCY) II]*	1		
3	UZW120	Briged Bomba I *[Fire And Rescue Briged I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW121	Briged Bomba II *[Fire And Rescue Briged II]*	1		
4	UZW122	Pandu Puteri Siswi I (PPS I) *[Girl Guide I (PPS I)]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW123	Pandu Puteri Siswi II (PPS II) *[Girl Guide II (PPS II)]*	1		
5	UZW124	St. John Ambulans Malaysia I *[Malaysian St. John Ambulance I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW125	St. John Ambulans Malaysia II *[Malaysian St. John Ambulance II]*	1		
6	UZW126	Kumpulan Latihan Kelanasiswa Malaysia I *[Malaysian University Rover Training Group I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW127	Kumpulan Latihan Kelanasiswa Malaysia II *[Malaysian University Rover Training Group II]*	1		
7	UZW128	Kumpulan Latihan Kelanasiswa Malaysia I (Laut) *[Malaysian University Rover Training Group I (Sea)]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW129	Kumpulan Latihan Kelanasiswa Malaysia II (Laut) *[Malaysian University Rover Training GrouP II (Sea)]*	1		
8	UZW153	Pancaragam I *[Brass Band I]*	1	Kesukarelawanan *(Volunteerism)*	Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 3 Untuk Memperolehi 3 Unit) * Tahun 1 - 2 (3 Semester) *Packaged Courses – (Students should Following From Stage 1 -3 To Acquire 3 Units) * Years 1 - 2 (3 Semesters)*
	UZW253	Pancaragam II *[Brass Band II]*	1		
	UZW353	Pancaragam III *[Brass Band III]*	1		
9	UZW164	Kursus Persijilan Bulan Sabit Merah Malaysia I (BSMM I) *[The Malaysian Red Crescent Certification Course I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW165	Kursus Persijilan Bulan Sabit Merah Malaysia II (BSMM II) *[The Malaysian Red Crescent Certification Course II]*	1		
	UZW264	Kursus Persijilan Bulan Sabit Merah Malaysia III (BSMM III) *[The Malaysian Red Crescent Certification Course III]*	1		
10	UZW171	Seni Silat Cekak I *[Seni Silat Cekak I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW271	Seni Silat Cekak II *[Seni Silat Cekak II]*	1		
	UZW371	Seni Silat Cekak III *[Seni Silat Cekak III]*	1		



BIL	KOD *(CODE)*	NAMA KURSUS *(COURSE NAME)*	UNIT	TERAS *(CORE)*	PRA-SYARAT *(PRE-REQUISITE)*
11	UZW172	Taekwon-Do GTF I *[Taekwon-Do GTF I]*	1	Kesukarelawanan *(Volunteerism)*	Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 3 Untuk Memperolehi 3 Unit) * Tahun 1 - 2 (3 Semester) *Packaged Courses – (Students should Following From Stage 1 -3 To Acquire 3 Units) * Years 1 - 2 (3 Semesters)*
	UZW272	Taekwon-Do GTF II *[Taekwon-Do GTF II]*	1		
	UZW372	Taekwon-Do GTF III *[Taekwon-Do GTF III]*	1		
12	UZW173	Karate-Do *[Karate-Do]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW273	Karate-Do II *[Karate-Do II]*	1		
	UZW373	Karate-Do III *[Karate-Do III]*	1		
13	UZW176	Taekwon-Do WTF I *[Taekwon-Do WTF I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW276	Taekwon-Do WTF II *[Taekwon-Do WTF II]*	1		
	UZW376	Taekwon-Do WTF III *[Taekwon-Do WTF III]*	1		
14	UZW177	Silat Olahraga I *[Sport Silat I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW178	Silat Olahraga II *[Sport Silat II]*	1		
	UZW277	Silat Olahraga III *[Sport Silat III]*	1		
15	UZW110	Sukarelawan Siswa/Siswi Koreksional Jabatan Penjara Malaysia I (Kor Siskor I) *[Students Voluntary Correctional Malaysian Prison Department I (Kor Siskor I)]*	1	Kesukarelawanan *(Volunteerism)*	Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 4 Untuk Memperolehi 4 Unit) * Tahun 1 - 2 (4 Semester) *Packaged Courses – (Students should Following From Stage 1 -4 To Acquire 4 Units) * Years 1 - 2 (4 Semesters)*
	UZW111	Sukarelawan Siswa/Siswi Koreksional Jabatan Penjara Malaysia II (Kor Siskor II) *[Students Voluntary Correctional Malaysian Prison Department II (Kor Siskor II)]*	1		
	UZW210	Sukarelawan Siswa/Siswi Koreksional Jabatan Penjara Malaysia III (Kor Siskor III) *[Students Voluntary Correctional Malaysian Prison Department III (Kor Siskor III)]*	1		
	UZW211	Sukarelawan Siswa/Siswi Koreksional Jabatan Penjara Malaysia IV (Kor Siskor IV) *[Students Voluntary Correctional Malaysian Prison Department IV (Kor Siskor IV)]*	1		
16	UZW162	Kor Siswa Siswi Pertahanan Awam I (Kor SISPA I) *[Malaysia Civil Defense Department I]*	1	Kesukarelawanan *(Volunteerism)*	Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 5 Untuk Memperolehi 5 Unit) * Tahun 1 – 3 (5 Semester) *Packaged Courses – (Students should Following From Stage 1 -5 To Acquire 5 Units) * Years 1 - 3 (5 Semesters)*
	UZW163	Kor Siswa Siswi Pertahanan Awam II (Kor SISPA II) *[Malaysia Civil Defense Department II]*	1		
	UZW262	Kor Siswa Siswi Pertahanan Awam III (Kor SISPA III) *[Malaysia Civil Defense Department III]*	1		
	UZW263	Kor Siswa Siswi Pertahanan Awam IV (Kor SISPA IV) *[Malaysia Civil Defense Department IV]*	1		
	UZW362	Kor Siswa Siswi Pertahanan Awam V (Kor SISPA V) *[Malaysia Civil Defense Department V]*	1		

BIL	KOD *(CODE)*	NAMA KURSUS *(COURSE NAME)*	UNIT	TERAS *(CORE)*	PRA-SYARAT *(PRE-REQUISITE)*
17	UZW160	PALAPES Darat I *[ROTU Army I]*	1	Kesukarelawanan *(Volunteerism)*	Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 6 Untuk Memperolehi 6 Unit) * Tahun 1 – 3 (6 Semester) *Packaged Courses – (Students should Following From Stage 1 -6 To Acquire 6 Units) * Years 1 - 3 (6 Semesters)*
	UZW161	PALAPES Darat II *[ROTU Army II]*	1		
	UZW260	PALAPES Darat III *[ROTU Army III]*	1		
	UZW261	PALAPES Darat IV *[ROTU Army IV]*	1		
	UZW360	PALAPES Darat V *[ROTU Army V]*	1		
	UZW361	PALAPES Darat VI *[ROTU Army VI]*	1		
18	UZW166	SUKSIS-I @ Kor Sukarelawan Polis Siswa/Siswa *[SVPC- I @ Students Voluntary Police Corp]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW167	SUKSIS-2 @ Kor Sukarelawan Polis Siswa/Siswa *[SVPC- 2 @ Students Voluntary Police Corp]*	1		
	UZW266	SUKSIS-3 @ Kor Sukarelawan Polis Siswa/Siswa *[SVPC- 3 @ Students Voluntary Police Corp]*	1		
	UZW267	SUKSIS-4 @ Kor Sukarelawan Polis Siswa/Siswa *[SVPC- 4 @ Students Voluntary Police Corp]*	1		
	UZW366	SUKSIS-5 @ Kor Sukarelawan Polis Siswa/Siswa *[SVPC- 5 @ Students Voluntary Police Corp]*	1		
	UZW367	SUKSIS-6 @ Kor Sukarelawan Polis Siswa/Siswa *[SVPC- 6 @ Students Voluntary Police Corp]*	1		
19	UZW168	Briged RELA Siswa Siswi (RELASIS) I *[Malaysian People's Volunteer Corps I]*	1	Kesukarelawanan *(Volunteerism)*	
	UZW169	Briged RELA Siswa Siswi (RELASIS) II *[Malaysian People's Volunteer Corps II]*	1		
	UZW268	Briged RELA Siswa Siswi (RELASIS) III *[Malaysian People's Volunteer Corps III]*	1		
	UZW269	Briged RELA Siswa Siswi (RELASIS) IV *[Malaysian People's Volunteer Corps IV]*	1		
	UZW368	Briged RELA Siswa Siswi (RELASIS) V *[Malaysian People's Volunteer Corps V]*	1		
	UZW369	Briged RELA Siswa Siswi (RELASIS) VI *[Malaysian People's Volunteer Corps VI]*	1		



JADUAL 3: KURSUS-KURSUS 1 UNIT TERAS SELAIN DARIPADA KESUKARELAWANAN (BADAN BERUNIFORM)
TABLE 3: OTHER THAN VOLUNTEERISM CORE I UNIT COURSES (NON-UNIFORMED BODIES)

BIL	KOD *(CODE)*	NAMA KURSUS *(COURSE NAME)*	UNIT	TERAS *(CORE)*	PRA-SYARAT *(PRE-REQUISITE)*
1	UZW101	*Golf *[Golf]*	1	Sukan *(Sport)*	Ditawarkan Secara Tunggal *(Offered in Single)*
2	UZW102	*Besbol *[Baseball]*	1		
3	UZW103	*Woodball *[Woodball]*	1		
4	UZW104	*Bola Sepak *[Football]*	1		
5	UZW105	*Bola Jaring *[Netball]*	1		
6	UZW106	*Tenis *[Tennis]*	1		
7	UZW107	*Ekuestrian *[Equestrian]*	1		
8	UZW108	*Angkat Berat *[Weightlifting]*	1		
9	UZW109	*Bola Tampar *[Volleyball]*	1		
10	UZW132	*Penerbitan Video *[Video Publishing]*	1	Kebudayaan *(Cultural)*	
11	UZW151	*Asas Gamelan *[Foundations of Gamelan]*	1		
12	UZW152	*Kumpulan Jazz I *[Jazz Band I]*	1		
13	UZW154	*Angklung I *[Angklung I]*	1		
14	UZW155	*Seni Pergerakan Kreatif *[Arts of Creative Movement]*	1		
15	UZW156	*Drama, Pementasan & Seni Lakon *[Drama, Playwright & Acting]*	1		
16	UZW157	*Seni Teater Bahasa Inggeris *[English Theatre Arts]*	1		
17	UZW174	*Lawan Pedang *[Fencing]*	1	Sukan *(Sport)*	
18	UZW175	*Futsal *[Futsal]*	1		
19	UZW179	*Olahraga *[Athletic]*	1		
20	UZW180	*Renang I *[Swimming 1]*	1		
21	UZW181	*Boling Padang *[Lawn Bowl]*	1		
22	UZW182	*Petanque *[Petanque]*	1		
23	UZW183	*Kayak *[Canoe]*	1		
24	UZW184	*Badminton *[Badminton]*	1		
25	UZW185	*Hoki *[Hockey]*	1		
26	UZW186	*Sepak Takraw *[Sepak Takraw]*	1		
27	UZW187	*Ragbi *[Rugby]*	1		
28	UZW188	*Memanah *[Archery]*	1		
29	UZW189	*Ping Pong *[Table Tennis]*	1		
30	UZW191	*Khidmat Masyarakat *[Community Services]*	1	Khidmat Komuniti *(Community Services)*	
31	UZW192	*Daya Usaha & Inovasi *[Initiative & Innovation]*	1	Daya Usaha & Inovasi *(Initiative & Innovation)*	Ditawarkan Secara Tunggal *(Offered in Single)*
32	UZW193	*Tajwid *[Tajwid]*	1	Kepemimpinan *(Leadership)*	
33	UZW194	*Pidato *[Elocution]*	1	Pengucapan Awam *(Public Speaking)*	
34	UZW195	*Radio Kampus *[Campus Radio]*	1		
35	UZW197	*Perhimpunan Pengucapan Awam *[Speaking Assembly]*	1		
36	UZW196	*Student In-Free Enterprise (SIFE) *[Student In-Free Enterprise (SIFE)]*	1	Keusahawanan *(Entrepreneurship)*	

CO-CURRICULUM COURSES OFFERED BY CO-CURRICULUM CENTRE

CO-CURRICULUM COURSES

UZW101
GOLF

COURSE SYNOPSIS

The Golf Co-Curriculum course aims to expose the students to the science of the game of golf in both theoretical and technical skills. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of golf, while the technical portion focuses on the practical training i.e. skills in playing golf.

REFERENCES

1. James, L. and Moore, T., 'Golf's Three Noble Truths: The Fine Art of Playing Awake', New World Library, 2010.
2. Lumb, N., 'A Beginner's Guide to Golf' Smithmark Publishers, 1989.
3. McCord, Gary., 'Golf For Dummies by', Wiley Publishing, 2006.
4. Parks, P., 'How to improve at Golf', Tunbridge Wells Ticktock, 2007.
5. Smith, A., 'Andrew's Essential Guide to Beginners Golf', Andrew's Book Company, 2009

UZW102
BASEBALL

COURSE SYNOPSIS

The Baseball Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the baseball game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of baseball, while the technical portion focuses on the practical training i.e. skills in playing baseball.

REFERENCES

1. Eckart, E., 'I Can Play Baseball (Welcome Books)', Children's Press (CT), 2002.
2. Freeman, S. H., 'Basic Baseball Strategy: An Introduction for Coaches and Players', McGraw-Hill, 2006.
3. Morgan, J., 'Baseball for Dummies', For Dummies, 2005.
4. Wallace, J., 'Baseball: 365 Days', New York Abrams, 2008.
5. Wark, L., 'Baseball (Basics for Beginners)', Kids Can Press, 1994.

UZW103
WOODBALL

COURSE SYNOPSIS

The Woodball Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the woodball game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of woodball, while the technical portion focuses on the practical training i.e. skills in playing woodball.

REFERENCES

1. Rules of Beach Woodball (International Woodball Federation), Revolution Publication, 1996.
2. http://www.iwbf-woodball.org/ Woodball Rules
3. http://www.woodball.org/

UZW104
FOOTBALL

COURSE SYNOPSIS

The Soccer/Football Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the soccer/football game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of soccer/football, while the technical portion focuses on the practical training i.e. skills in playing soccer.

REFERENCES

1. Carr, D., and Metzler, M.W., 'Soccer: Mastering the Basics with the Personalized Sports Instruction System (A Workbook Approach)', Benjamin Cummings, 2000.
2. Drewett, J., 'How to improve at football', Tunbridge Well Ticktock Media, 2005.
3. Lewis, M. and Lalas, A., 'Soccer for Dummies', Inc. LASTUnited States Soccer Federation, 2000.
4. Negoesco, S., 'Soccer', McGraw-Hill, 1992.
5. Wark, L. and Ritchie, S., 'Soccer (Basics for Beginners)', Kids Can Press, 1994.

UZW105
NETBALL

COURSE SYNOPSIS

The Netball Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the netball game. The theoretical aspect of the course covers the history, background, terminology, self-



management and other related aspects of netball, while the technical portion focuses on the practical training i.e. skills in playing netball.

REFERENCES

1. Galsworthy, Bin, 'Netball: The Skills of the Game', Crowood Press, 1996.
2. Mullan, N., Netball (Successful Sports)', Heinemann Library, 1997.
3. Navin, A., 'Netball: Skills Techniques Tactics (Crowood Sports Guides)', Crowood Press, 2008.
4. Shakespear, W., 'Netball: Steps to Success - 2nd Edition (Steps to Success Activity Series)', Human Kinetics, 2009.
5. Woodlands, J., 'The Netball Handbook', Human Kinetics, 2006.

UZW106
TENNIS

COURSE SYNOPSIS

The Tennis Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the tennis game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of tennis, while the technical portion focuses on the practical training i.e. skills in playing tennis.

REFERENCES

1. Claxton, D., 'Tennis', McGraw-Hill, 1998.
2. Kumar, N., 'Complete Book of Lawn Tennis', New Delhi India Anmol Publication, 2006.
3. Metzler, M., 'Tennis: Mastering the Basics with the Personalized Sports Instruction System (A Workbook Approach)', Benjamin Cummings, 2000.
4. O'Meara, D.J., and Murray, T.J., 'Tennis Unlimited (The Basic Elements of Sports Series)', ICS Books, 1997.
5. Patrick McEnroe, P., 'Tennis for Dummies', For Dummies, 1998.

UZW107
EQUESTRIAN

COURSE SYNOPSIS

This course aims to train the students in mastering the basic skills of horses handling and management. In addition, it exposes students to the knowledge on horses grooming, installation of equipment and riding techniques. Equestrian sports provide the opportunities for students to interact, foster the spirit of sportsmanship, cooperation, responsibility, and are able to develop positive personality among students.

REFERENCES

1. Black, D., 'Horses and Owner's Guide', Greenwich Editions, 2001.
2. Draper, J., 'The Ultimate Book of the Horse and Rider' LB, 2000.
3. Foster, C., 'Basic Jumping (Crowood Equestrian Guides)', Crowood Press, 1991.
4. Foster, C., 'Basic Riding (Crowood Equestrian Guides)', Crowood Press, 1991.
5. Ripman, Bin, 'Basic Training (Crowood Equestrian Guides)', Crowood Press (UK), 1992.

UZW108
WEIGHTLIFTING

COURSE SYNOPSIS

This course emphasizes on the identification, regulatory and basic refereeing system of weightlifting sports. Systematic planning in the weightlifting sport is able to develop students' performance to the optimum fitness level. Mastery of basic skills in bio-mechanics allows students to practice weightlifting skills safely. Economical energy coupled with high degree of self confidence in this sport lead to excellence in the weightlifting sport.

REFERENCES

1. Buku kejurulatihan angkat berat pilot tahap 1 (P.A.B.M) & MSN
2. El-Hewie, M.F., 'Essentials of Weightlifting and Strength Training', Shaymaa Publishing Corporation, 2006.
3. Everett, G., 'Olympic Weightlifting: A Complete Guide for Athletes & Coaches', Catalyst Athletics, 2009.
4. Drechsler, A.J., 'The Weightlifting Encyclopedia: A Guide to World Class Performance', A is A Communications, 1998.
5. Kinetics, H. and Sandler, D., 'Weight Training Fundamentals (Sports Fundamentals Series)', Human Kinetics, 2003.

UZW109
VOLLEYBALL

COURSE SYNOPSIS

Make curricular sports activities of Volleyball as an activity participated by all students through the activities planned in order to master the basic skills of volleyball, the organization of the game, and the rules of the game.

In addition to member interaction opportunities, fun and occupy their free time with useful things as well as fostering a sense of sportsmanship and cooperation, responsible and contribute to the university.

REFERENCES

1. Lee E.Brown, Vance A.Ferrigno, 2005, Training for speed, agility and Quickness, Second Edition, human kinetic.
2. Kinda S.Lenberg, 2004 Coaching Volleyball Defensive Fundamentals and Tecnhniques, Second Edition, Coaches Choice.

UZW171
SENI SILAT CEKAK I

COURSE SYNOPSIS

Martial Arts Fight Co-Curriculum course aims to expose students to the knowledge of martial arts self defence fight in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background back, terminology, self-management and other related to Martial arts. While technically, this course focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

REFERENCES

1. Malay, 'Silat Cekak Hanafi - Peneraju Warisan Mutlak', 2005.
2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
3. Talib, A., 'Silat: A perspective on the Malay Martial Arts', Amiruddin Dato Seri Paduka Haji Talib Talib, 2009.
4. www.silatcekak.org.my, 2010.
5. www.silatcekakhanafi.org, 2010.

UZW271
SENI SILAT CEKAK II

COURSE SYNOPSIS

Martial Arts Fight II Co-Curriculum course aims to expose the students the knowledge of martial arts self defence fight in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background back, terminology, self-management and other related to Martial arts. While technically, this course focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

REFERENCES

1. Malay, 'Silat Cekak Hanafi - Peneraju Warisan Mutlak', 2005.
2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
3. Talib, A., 'Silat: A perspective on the Malay Martial Arts', Amiruddin Dato Seri Paduka Haji Talib Talib, 2009.
4. www.silatcekak.org.my, 2010.
5. www.silatcekakhanafi.org, 2010.

UZW371
SENI SILAT CEKAK III

COURSE SYNOPSIS

Martial Arts Fight III Co-Curriculum course aims to expose the students the knowledge of martial arts self defense fight in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background back, terminology, self-management and other related to Martial arts. While technically, this course focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

REFERENCES

1. Malay, 'Silat Cekak Hanafi - Peneraju Warisan Mutlak', 2005.
2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
3. Talib, A., 'Silat: A perspective on the Malay Martial Arts', Amiruddin Dato Seri Paduka Haji Talib Talib, 2009.
4. www.silatcekak.org.my, 2010.
5. www.silatcekakhanafi.org, 2010.

UZW172
TAEKWON – DO GTF I

COURSE SYNOPSIS

Taekwon-Do I (GTF) Co-Curriculum course aims to expose the students to the knowledge of martial arts that is Taekwon-Do (GTF) in terms of theoretical and technical skills. In terms of theory, this course is focused on historical background, terminology, self-management and other related with Taekwon-Do. While technical, this course is more focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

REFERENCES

1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (GTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, Bin, 'Taekwondo: The State of the Art', Broadway, 1999.



UZW272
TAEKWON - DO GTF II

COURSE SYNOPSIS

Course Co-Curriculum II Taekwon-Do (GTF) is an extension of Taekwon-Do I (GTF). Through this course, emphasis is given to the technical aspects related to each stage of belts. Among the aspects to be covered include the philosophy, theory, and etc. In addition, the students are exposed to the theory of how to manage a tournament or competition.

REFERENCES

1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (GTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, Bin, 'Taekwondo: The State of the Art', Broadway, 1999.

UZW372
TAEKWON - DO GTF III

COURSE SYNOPSIS

Course Co-Curriculum Taekwon-Do III (GTF) is an extension of Taekwon-Do II (GTF). This course is the last course in a series of courses Taekwon-Do (GTF). Theoretical and technical knowledge learned in previous courses will be practiced through discussion, presentation, practice, practices by students and by increasing the test belts. In addition, the students will be exposed to theory and practice of the method of Taekwon-Do class management and coaching.

REFERENCES

1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (GTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, Bin, 'Taekwondo: The State of the Art', Broadway, 1999.

UZW173
KARATE-DO

COURSE SYNOPSIS

The karate-do co-curriculum course exposes the students to the knowledge of martial arts karate-do in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other associated with the art of karate-do. While technically, this course is focused on practical training (practical) skills in the art of karate-do.

REFERENCES

1. Frost, Bin, 'Koei-Kan Karate-Do: Practice and Precept', Frog Books, 1998.
2. Funakoshi, G., 'Karate-Do Kyohan: The Master Text', Kodansha International, 1973.
3. Funakoshi, G., 'Karate-Do Nyumon: The Master Introductory Text', Kodansha International, 1994.
4. Funakoshi, G., 'The Twenty Guiding Principles of Karate: The Spiritual Legacy of the Master', Kodansha International, 2003.
5. Healy, K., 'Karate A Step By Step Guide to Shotokan Karate', New Delhi Health Harmony, 2002

UZW273
KARATE-DO II

COURSE SYNOPSIS

The karate-do co-curriculum course exposes the students to the knowledge of martial arts karate-do in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other associated with the art of karate-do. While technically, this course is focused on practical training (practical) skills in the art of karate-do.

REFERENCES

1. Karate A Step By Step Guide to Shotokan Karate (KevinHealy) New Delhi Health Harmony, 2002.

UZW373
KARATE-DO III

COURSE SYNOPSIS

The karate-do co-curriculum course exposes the students to the knowledge of martial arts karate-do in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other associated with the art of karate-do. While technically, this course is focused on practical training (practical) skills in the art of karate-do.

REFERENCES

1. Karate A Step By Step Guide to Shotokan Karate (KevinHealy) New Delhi Health Harmony, 2002.

UZW176
TAEKWON-DO WTF I

COURSE SYNOPSIS

Taekwon-Do I (WTF) Co-Curriculum course aims to expose the students to the knowledge of martial arts that is Taekwon-Do (WTF) in terms of theoretical and technical skills. In terms of theory, this course is focused on historical background, terminology, self-management and other related with Taekwon-Do. While technical, this course is more focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

REFERENCES

1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (WTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, Bin, 'Taekwondo: The State of the Art', Broadway, 1999.

UZW276
TAEKWON-DO WTF II

COURSE SYNOPSIS

Taekwon-Do II (WTF) Co-Curriculum course aims to expose the students to the knowledge of martial arts that is Taekwon-Do (WTF) in terms of theoretical and technical skills. In terms of theory, this course is focused on historical background, terminology, self-management and other related with Taekwon-Do. While technical, this course is more focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

REFERENCES

1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (WTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, Bin, 'Taekwondo: The State of the Art', Broadway, 1999.

UZW376
TAEKWON-DO WTF III

COURSE SYNOPSIS

Taekwon-Do III (WTF) Co-Curriculum course aims to expose the students to the knowledge of martial arts that is Taekwon-Do (WTF) in terms of theoretical and technical skills. In terms of theory, this course is focused on historical background, terminology, self-management and other related with Taekwon-Do. While technical, this course is more focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

REFERENCES

1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (WTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, Bin, 'Taekwondo: The State of the Art', Broadway, 1999.

UZW174
FENCING

COURSE SYNOPSIS

The fencing co-curriculum course aims to expose the students to the science of fencing sports theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, the skills of defence of oneself and other related aspects of fencing sports. While technically, this course is more focused on skills in practical training (practical).

REFERENCES

1. Cheris, E., 'Fencing: Step to Success', Champaign IL Human Kinetics, 2002.
2. Evangelista, N., 'The Art and Science of Fencing', McGraw-Hill; 1st Edition, 1999.
3. Evangelista, N., 'The Inner Game of Fencing: Excellence in Form, Technique, Strategy and Spirit', McGraw-Hill; 1st Edition, 2000.

4. Pitman, Bin, 'Fencing: Techniques of Foil, Epee and Sabre', Crowood Press, 1988.
5. Price, R. G., 'The Ultimate Guide to Weight Training for Fencing (Ultimate Guide to Weight Training...)', Sportsworkout.com; 2nd Edition, 2009

UZW175
FUTSAL

COURSE SYNOPSIS

Make curricular sports activities of Futsal as an activity participated by all students through the activities planned in order to master the basic skills of futsal, organization of games and game laws. In addition to the opportunity of interaction, fun and occupy their free time with useful things as well as fostering a sense of difficulty and collaborative, responsible and contribute to the the university.

REFERENCES

1. V.Hermans &R.Engler, 2011, Futsal:Technique, Tactics, Training, Midenhead Mayer & Mayer Sport (UK) Ltd.
2. T.Burn, 2004, Holistic Futsal, Lulu Enterprises Incorporated.

UZW179
ATHLETIC

COURSE SYNOPSIS

Course aims to expose students to the science of Athletics that is the foundation of all sports. In Sports Sports there are many types of events such as running, jumping, and throwing a stone. This course covers the planning, implementation and evaluation of the work, leadership and the right skills. In addition, students can learn about management in a competition advocate the Athletics.

REFERENCES

1. Introduction to coaching theory IAAF 1991, Author Peter Thompsen .Ref ISBN1 873574010
2. Run, Jump,Throw Author Harald Muller and Wolfgang Rotzdorf, 2009
3. Biomechanics and exercise physioly in running. Authors Frans Bosch and Roald Klomp, 2005.ISBN 0443074410 Competition Rules 2014-2015 www.iaaf.org

UZW180
SWIMMING I

COURSE SYNOPSIS

The swimming co-curriculum course aims to expose the students to the science of swim in the theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology and other related aspects of swimming activities. While technical, this course is more focused on the practical training in terms of swimming skills.

REFERENCES

1. Brems, M., 'The Fit Swimmer: 120 Workouts & Training Tips', Mc-Graw Hill; 1st Edition, 1984.
2. Keegan, N., 'Swimming (Vintage Contemporaries)', Vintage, 2010.
3. Kumar, N., 'Complete Book of Swimming', New Delhi: India Anmall Publication, 2006.
4. Mason, P., 'How to Improve at Swimming', Tumbrigde Wells Ticktock Media, 2005.
5. Thomas, D., 'Swimming: Steps to Success – 3rd Edition (Steps to Success Sports Series)', Human Kinetics; 3rd Edition, 2005.

UZW181
LAWN BOWL

COURSE SYNOPSIS

The lawn bowl co-curriculum courses aims to expose the students to the knowledge of lawn sports in the theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects of lawn sports. While technically, this course is more focused on the practical training (practical) skills in lawn bowls.

REFERENCES

1. Bell, J., 'Bowls: Skills, Techniques, Tactics (Crowood Sports Guides)', Crowood Press; illustrated Edition, 2007.
2. Dobbie, J., 'Successful Lawn Bowls', John Wiley & Sons Australia Ltd; Revised Edition, 1987.
3. Marshall, Bin L. G., ' Lawn Bowls Champions Secrets', Lulu.com, 2008.
4. Newton, A., 'Fundamental of Lawn Bowls', Angus & Robertson; 2nd Edition, 1993.
5. Taylor, T. & Esch, H. L., 'Lawn Bowling Handbook', Harold L. Esach, 1948.

UZW182
PETANQUE

COURSE SYNOPSIS

The petanque co-curriculum courses aims to expose the students to the knowledge of petanque sports in theory and technical skills. In terms of theory, this course is more focused on the history,

background, terminology, management of oneself and other aspects associated with petanque sports. While technically, this course is more focused on practical training (practical) skills in petanque.

REFERENCES

1. Durbin, M. 'From Gutterballs to Strikes', McGraw-Hill; 1st Edition, 1998.
2. Fieux, P., 'La Petanque de Competition', Les Presses du Midi, 2002.
3. Fieux, P., 'Dictionary de la Petanque', Presses du Midi, 2003.
4. Freeman, G., 'Petanque: The French Game of Boules', Hyperion Books, 1987.
5. Philpott, P., 'The Art of Wrist-Spin Bowling', Crowood Press, 1997.

UZW183
CANOE

COURSE SYNOPSIS

The canoeing co-curriculum course aims to expose the students to the sports science of canoeing theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with canoeing. While technically, this course is more focused on the practical training (practical) skills in canoeing.

REFERENCES

1. Evans, J and Mattos, Bin, 'The Ilustrated Handbook of Kayaking, Canoeing and Sailing', 2007.
2. Harrison, D., 'Whitewater Kayaking (Canoe & Kayak Techniques)', Stackpole Books; 1st Edition, 1998.
3. Harrison, D. & Morser, Bin, 'Canoeing: Canoe & Kayak Techniques', Stackpole Books; 1st Edition, 1998.
4. Johson, S., 'The Complete Sea Kayaker's Handbook', International Marine/Ragged Mountain Press; 1st Edition, 2001.
5. Mattos, Bin & Evans, J., 'The Ilustrated Handbook of Kayaking', Canoeing and Sailing, 2007.

UZW184
BADMINTON

COURSE SYNOPSIS

The badminton co-curriculum course aims to expose the students to the knowledge of badminton in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with badminton. While technically, this course is more focused on the practical training (practical) skills in playing badminton.

REFERENCES

1. Chen, G. & Chen, Carol, 'Coaching Badminton 101', Coaches Choice, 2009.
2. Davis, P. 'Badminton (Play the Game)', Ward Lock Limited; 3rd Edition, 1998.
3. Golds, M., 'Badminton: Skills of the Game', Crowood Press, 2002.
4. Grice, T., 'Badminton: Steps to Success – 2nd Edition (Steps to Success Activity Series)', Human Kinetics; 2nd Edition, 2007.
5. Metzlar, M., 'Badminton: Mastering the Basic with the Personalized Sports Instructions System', Boston Allyn & Bacon, 2001.

UZW185
HOCKEY

COURSE SYNOPSIS

The hockey ho-curriculum course aims to expose the students to the sport science of hockey in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with hockey. While technically, this course is more focused on the practical training (practical) in terms of skills in playing hockey.

REFERENCES

1. Andershttp://www.amazon.com/Field-Hockey-Steps-Success-Sports/dp /0736068376/ref=pd_cp_b_2, E., 'Field Hockey: Steps to Success', Human Kinetics; 2nd edition, 2008.
2. Barth, K. and Nordmann, L., 'Learning Field Hockey', Meyer & Meyer, 2007.
3. Complete Book of Hockey (Anupam Sharma) New Delhi India: Anmol Publication 2006.
4. French, L., http://www.amazon.com/How-Play-Hockey-Step---Step/dp/0711704902/ref=sr_1_5?s=books&ie=UTF8&qid=1279557235&sr=1-5'How to Play Hockey: A Step-By-Step Guide', Jarrold Sports, Jarrold Publishing, 1993.
5. Mitchell-Taverner, C., http://www.amazon.com/Hockey-Techniques-Tactics-Claire-Mitchell-Taverner /dp /0736054375 /ref=sr_1_2?s=books&ie=UTF8&qid=1279557235&sr=1-2'Field Hockey Techniques & Tactics', Human Kinetics; 2nd edition, 2004



UZW186
SEPAK TAKRAW

COURSE SYNOPSIS

The sepak takraw co-curriculum course aims to expose the students to the science of sepak takraw sports, theoretically and technically. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with sepak takraw. While technically, this course is more focused on the practical training (practical) in terms of skills in playing sepak takraw.

REFERENCES

1. Books LLC, 'Sport in Southeast Asia: Sepak Takraw', Books LLC, 2010.
2. Dunsmore, S., 'Sepak Raga (Takraw) The South East Asian Ball Game', Sarawak Museum, 1983.
3. Lorna Fe P. Lopez, 'Physical education, health and music (sepak takraw)', Rex Book Store.Inc, Philippine Copyright, 2000.

UZW187
RUGBY

COURSE SYNOPSIS

The rugby co-curriculum course aims to expose the students to the knowledge of rugby in terms of theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other aspects associated with rugby. While technically, this course is more focused on the practical training (practical) skills in playing rugby.

REFERENCES

1. Biscombe, T. and Drewett, P., 'Rugby: Steps to Success', Human Kinetics; 2nd edition, 2009.
2. Brown, M., Guthrie, P. and Growden, G., 'Rugby For Dummies', For Dummies; 2nd edition, 2007.
3. Richardshttp://www.amazon.com/ Game Hooligans-History-Rugby-Union/dp /1845962559/ref=sr_1_2?s=books&ie= UTF8&qid=1279559168&sr=1-2, H., 'A Game for Hooligans: The History of Rugby Union', Mainstream Publishing, 2007.
4. Williams, T. and Bunce, F., 'Rugby Skills, Tactics and Rules', Firefly Books; Revised edition, 2008.
5. http://www.irlfunds.org/new zealand/news.html

UZW188
ARCHERY

COURSE SYNOPSIS

The archery co-curriculum course aims to expose the students to archery, shooting sports science in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects concerning shooting. While technically, this course is more focused on the practical training (practical) skills in archery.

REFERENCES

1. Axford, R., 'Archery Anatomy: An Introduction to Techniques for Improved Performance', Souvenir Press, 1996.
2. Engh, D., 'Archery Fundamentals (Sports Fundamentals Series)', Human Kinetics; 1st edition, 2004.
3. Haywood, M. and Lewis, C., 'Archery: Step to Success', Champaign IL Kinetics, 2006.
4. Ruis, S. and Stevenson, C., 'Precision Archery', Human Kinetics; 1st edition, 2003.
5. Sorrells, Bin, 'Beginner's Guide to Traditional Archery', Stackpole Books; 1st edition, 2004.

UZW189
TABLE TENNIS

COURSE SYNOPSIS

The table tennis co-curriculum course aims to expose the students to the knowledge of ping pong sports in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with ping-pong. While technically, this course is more focused on the practical training (practical) skills in playing ping-pong.

REFERENCES

1. Heaton, J., 'Table Tennis: Skills, Techniques, Tactics (Crowood Sports Guides)', Crowood Press, 2009.
2. Hodges, L., 'Table Tennis : Step to Success', Champaign IL Human Kinetic, 1993.
3. McAfee, R., 'Table Tennis: Steps to Success (Steps to Success Activity Series)', Human Kinetics; 1st edition, 2009.
4. Roetert, P. and Ellenbecker, T., 'Complete Conditioning for Tennis (Complete Conditioning for Sports Series)', Human Kinetics; 2007.
5. Seemiller, D. and Holowchak, M., "Winning Table Tennis: Skills, Drills, and Strategies', Human Kinetics,1996.

UZW132
VIDEO PUBLISHING

COURSE SYNOPSIS

Course is about the process of publishing Video.Kursus will begin pre- production phase which touches on the work of the management before undergoing the process of filming or production phase of learning .The process will run until the end of Phase Post - Production for the completion of the work of editing .

REFERENCES

1. Deborah S.Patz. (2010). Film Production Management 101 second edition. Michael Wiese Productions (ISBN: 978—932907-77-3)
2. Brordwell&Thomsan. (2008).Film Art An Introduction Eight Edition .N.York : The McGraw-Hill Companieslc. (ISBN:-13:978-0071101592)
3. Legal Reseach Board. (2008). Film Cencorship Act 2002 (ACT 620) & Perbadanan Kemajuan Filem Nasional Malaysia ACT 1981 (ACT 244). Intrnasional Law Book Services. Selangor, Malaysia. (ISBN 967-891468-9)
4. Tom Ang. (2006). Digital Video An Introduction. Star Standard, Singapore. (ISBN-13: 978-1-40531-254-7)
5. Gloman, chuck Bin (2003).303 Digital lFilmmaking Solution: Solve Ang Video Shoot or edit problem in 10 minutes or less. McGraw-Hill (ISBN: 0-07-141651-X)
6. Beacham, Frank (1994). American Cinematographer video manual second Edition. Sinclair Printing Company, United States. (ISBN: 0-935578-1-9)

UZW151
FOUNDATIONS OF GAMELAN

COURSE SYNOPSIS

The Basic Gamelan Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the traditional art of gamelan. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of traditional art of gamelan, while the technical portion focuses on the practical training i.e. the skills in playing gamelan.

REFERENCES

1. Ahmad, A., 'Lagu- lagu Gamelan: Buku 1', UM, 1997.
2. Nasarudin, M.G., 'Buku Muzik Tradisional Malaysia Edisi Baharu', DBP, 2003.
3. Pickvance, R., 'A Gamelan Manual: A player's guide to the central Javanese gamelan', Jaman Mas Books, 2006.
4. Sutton,R. A., 'Traditions of Gamelan Music in Java: Musical Pluralism and Regional Identity (Cambridge Studies in Ethnomusicology)', Cambridge University Press, 2008.
5. Tenzer, M., 'Balinese Music', Periplus Editions, 1998.

UZW152
JAZZ BAND I

COURSE SYNOPSIS

The Jazz Group Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the jazz music. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of jazz music, while the technical portion focuses on the practical training i.e. skills in playing the jazz music.

REFERENCES

1. Mause, A.D., 'How to Play Jazz Guitar: For Group or Individual Instruction (Acorn Basic Lessons, 120360)', Acorn Music Press, 1978.
2. Meeder, C., 'Jazz: the Basics', Routledge, 2007.
3. Mike, C., 'The Sound of Improvisation: A Basic Method for Individuals, Small Groups, Jazz Band - Book One', Alfred Publishing Co., 1976.
4. Sutro, D., 'Jazz for Dummies', NJ Wiley Pub, 2006.
5. Szwed, J.F., 'Jazz 101: A Complete Guide to Learning and Loving Jazz', Hyperion, 2000.

UZW153
BRASS BAND I

COURSE SYNOPSIS

The Brass Band Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of brass musical instruments. The theoretical aspect of the course covers the history,background,terminology,self-management and other related features of brass band, while the technical portion focuses on practical training of playing the brass musical instruments in group.

REFERENCES

1. Bailey, W. and Caneva, T., 'The Complete Marching Band Resource Manual: Techniques and Materials for Teaching, Drill Design, and Music Arranging (Plastic Comb)', University of Pennsylvania Press, 2003.
2. Brand, V. and Brand, G., 'Brass Bands in the Twentieth Century', Egon Publishers Ltd, 1979.
3. Burns, M., 'Keeping the Beat on the Street: The New Orleans Brass Band Renaissance', Louisiana State University Press, 2008.



4. Cameron, A., 'A Whole Brass Band', Harbour, 1992.
5. Newsome, R., 'The Modern Brass Band: From The 1930s To The New Millennium', Ashgate Publishing, 2006.

UZW253
BRASS BAND II

COURSE SYNOPSIS

Brass Band II Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of brass musical instruments. The theoretical aspect of the course covers the history,background,terminology,self-management and other related features of brass band, while the technical portion focuses on practical training of playing the brass musical instruments in group.

REFERENCES

1. Bailey, W. and Caneva, T., 'The Complete Marching Band Resource Manual: Techniques and Materials for Teaching, Drill Design, and Music Arranging (Plastic Comb)', University of Pennsylvania Press, 2003.
2. Brand, V. and Brand, G., 'Brass Bands in the Twentieth Century', Egon Publishers Ltd, 1979.
3. Burns, M., 'Keeping the Beat on the Street: The New Orleans Brass Band Renaissance', Louisiana State University Press, 2008.
4. Cameron, A., 'A Whole Brass Band', Harbour, 1992.
5. Newsome, R., 'The Modern Brass Band: From The 1930s To The New Millennium', Ashgate Publishing, 2006.

UZW353
BRASS BAND III

COURSE SYNOPSIS

Brass Band III Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of brass musical instruments. The theoretical aspect of the course covers the history,background,terminology,self-management and other related features of brass band, while the technical portion focuses on practical training of playing the brass musical instruments in group.

REFERENCES

1. Bailey, W. and Caneva, T., 'The Complete Marching Band Resource Manual: Techniques and Materials for Teaching, Drill Design, and Music Arranging (Plastic Comb)', University of Pennsylvania Press, 2003.
2. Brand, V. and Brand, G., 'Brass Bands in the Twentieth Century', Egon Publishers Ltd, 1979.
3. Burns, M., 'Keeping the Beat on the Street: The New Orleans Brass Band Renaissance', Louisiana State University Press, 2008.
4. Cameron, A., 'A Whole Brass Band', Harbour, 1992.
5. Newsome, R., 'The Modern Brass Band: From The 1930s To The New Millennium', Ashgate Publishing, 2006.

UZW154
ANGKLUNG

COURSE SYNOPSIS

Angklung Co-Curriculum course seeks to expose the students to both the theoretical and traditional aspects of the traditional art of angklung music. The theoretical aspect of the course covers on the history, background, terminology, self-management and other related to angklung, while the technical portion focuses on practical training (practical) of skills in playing the angklung musical instruments.

REFERENCES

1. Benary, Bin, ,Angklung Sampler Book',Self Published, 1993.
2. LLC, Bin, 'Indonesian Music: Gamelan, Music of Indonesia, Indonesian Popular Music Recordings, Gamelan Gong Kebyar, Kecak, Angklung, I La Galigo', Books LLC, 2010.
3. Nasarudin, M.G., 'Buku Muzik Tradisional Malaysia Edisi Baharu', DBP, 2003.
4. Tenzer, M., 'Balinese Music', Periplus Editions, 1998.
5. Winitasasmita, M.H., 'Angklung: Petunjuk praktis', Balai Pustaka, 1978.

UZW155
ART OF CREATIVE MOVEMENT

COURSE SYNOPSIS

Creative movement Co-Curriculum course aims to expose the students to the knowledge of arts creative movement in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background, terminology, self-management and other related arts creative movement, while technically, this course is more focused practical training (practical) of skills in the art of creative movement.

REFERENCES

1. Bossler, C., '15 minutes Dance Workout', London Dorling Kindersley, 2009.

2. Kaufmann, K.A., 'Inclusive Creative Movement and Dance', Human Kinetics, 2005.
3. Dora, M.Bin, 'See what I can do!: A book of creative movement', Prentice-Hall, 1973.
4. H'Doubler, M.N. and Mary Alice Brennan, M.A., 'Dance: A Creative Art Experience', University of Wisconsin Press, 1959.
5. Whitehouse, M.S., 'Authentic Movement (v. 1)', Jessica Kingsley Publishers, 1999.

UZW156
DRAMA, PLAYWRIGHT AND ACTING

COURSE SYNOPSIS

The drama, playwright and acting co-curriculum course aims to expose the students to the knowledge of drama, theatre in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, self-management and other related aspects of drama, theatre and arts. The technical terms, this course is more focused on the practical training (practical) skills in drama, theatre and playwright.

REFERENCES

1. Adler, S., 'The Art of Acting', Applause Books, 2000.
2. Bernard, I., 'Film and Television Acting, Second Edition: From stage to screen', Focal Press; 2nd edition, 1997.
3. Comey, J., 'The Art of Film Acting: A Guide For Actors and Directors', http://www.amazon.com/Art-Film-Acting-Actors-Directors/dp/0240805070/ref=pd_sim_b_4Focal Press; 1st edition, 2002.
4. Marsh, M., 'Screen Acting', Nabu Press, 2010.
5. Tucker, P., 'Secret of Screen Acting', New York Routledge, 2003.

UZW157
ENGLISH THEATRE ARTS

COURSE SYNOPSIS

The course is an introduction of English Language drama for students to gain skills and confidence in spoken English through the teaching of dramatic performance arts which would involve basic acting, annunciation and pronunciation, situational awareness, emotional display, role-playing, improvisation and exercises to enhance spoken English. The goal is to imbue students with better spoken communicative abilities to help them in their personal and professional lives.

REFERENCES

1. Camenzuli, Domm (1988), 40 Simple Drama Games, Bushfire Press;
2. Dowdy J.K. & Kaplan S. (2011), Teaching Drama in the Classroom, Sense Publishers;
3. McGuire, Brian (2003), Student Handbook for Drama, Pearson;
4. Neelands, J. & Goode T. (2000), Structuring Drama Work, CUP;
5. Mok, A (2001), Task-based Learning, Language Arts and the Media. A Resource Book for Secondary English Teachers, INSTEP, Faculty of Education, HKU.

UZW191
COMMUNITY SERVICE

COURSE SYNOPSIS

The community service co-curriculum course fosters community spirit of volunteerism among the students. In addition, the course will also help the process of forming communication network and self-stimulate the intellectual of the community.

REFERENCES

1. Carole Bin, 'Community Care for an Aging Society: Issues, Policies, and Services (Springer Series on Lifestyles and Issues in Aging)', Springer Publishing Company; 1st edition, 2004.
2. Faizulaswad, 'Modul perlaksana kursus & seminar Motovasi', 2003.
3. Faizulaswad, 'Modul teknik-teknik belajar yang berkesan', 2003.
4. Kamaruddin Hussin, 'Modul konsep kumpulan Dinamika & Peranan Fasilitator dalam mengendalikan latihan kumpulan secara berkesan', 1999.
5. Marlene, G. and Lesser, G., 'Clinical Social Work Practice: An Integrated Approach', Allyn & Bacon; 3rd edition, 2007.

UZW192
INITIATIVE & INNOVATION

COURSE SYNOPSIS

This course intends to train the students to master the basic skill of design and engineering. Additionally, it gives an exposure to students to know ways of using recycling materials, mechanisms that can be used and techniques of designing. This course gives the opportunity to students to spill out ideas that are constructive and apply it in a form of a product, high level of cooperativeness, be responsible and ability to develop student personality that is excellent

REFERENCES

1. Ocvirk, Otto G. et al. (1998). Art Fundamentals: Theory and Practice. Boston, Mesachusetts.
2. *Acoustic*.



UZW193
TAJWID

COURSE SYNOPSIS

This course covers an introduction to the basics of Tajweed knowledge, basic knowledge of the laws of the holy Qur'an is right, and so Talaqqi and practice reading the Quran in mujawwad. Students learn the basic rules and laws fluently, held talks in a feedback session, complete Quran recitation, Tajweed and subsequently apply the knowledge Talaqqi Musyafahah and undergo testing for evaluation.

REFERENCES

1. Theory and Practice of Tajwid," Encyclopedia of Arabic Language and Linguistics, IV, Leiden, Brill, 2007
2. Surul Shahbudin bin Hassan (2007). Ilmu Tajwid Hafs 'An 'Asim. Kuala Lumpur : Prospecta Printers Sdn. Bhd.
3. Ustaz Mahadi bin Dahlan & Ustaz Azharuddin Sahil (2005). Al-Quran Rasm Uthmani – Bertajwid dan Disertai Makna. Kuala Lumpur : Pustaka Haji Abdul Majid.
4. Haji Abdul Ghani Arifin (2005). Panduan Tajwid & Taranum. Kuala Lumpur: Sarjana Media.
5. Theory and Practice of Tajwid," Encyclopedia of Arabic Language and Linguistics, IV, Leiden, Brill, 2009

UZW194
ELOCUTION

COURSE SYNOPSIS

Speech curriculum courses expose students to the purposes, techniques and types of speech. Speech emphasizes interpersonal communication skills, self-confidence, motivation, enthusiasm and accurate information.

REFERENCES

1. Abdullah Hassan & Ainon Muhammad (1994). Bahasa Melayu untuk maktab Perguruan. Kuala Lumpur: Fajar Bakti.
2. Abdullah Hassan (1994) Tatabahasa Dinamika. Kualala Lumpur: Utusan Publication & Distributors.
3. Abdul Halim A. Karim (1992) Pengucapan Awam. Sungai Petani: Intan.
4. Amat Johari Moain (1989) Sistem Panggilan Dalam Bahasa Melayu: Kuala Lumpur: Dewan Bahasa dan Pustaka. 3
5. Ahmad Kamal Mohamad (1992) Kejayaan Berkomunikasi. Kuala Lumpur: Nurin Enterprise.
6. Awang Sariyan (1980) Kesalahan Umum Penggunaan Bahasa Malaysia. Kuala Lumpur: Dewan Bahasa dan Pustaka.

UZW195
CAMPUS RADIO

COURSE SYNOPSIS

Radio is one of the most effective medium or disseminator of information, and also more extensive compared to TV. Campus Radio curriculum will expose students to the ethics of broadcasting, editing management, recording, and live events. Campus Radio will help students to communicate better and have better ethical in delivering information to the public.

REFERENCES

1. Multimedia dan Teknologi Komunikasi Edisi Kedua (2005)

UZW197
SPEAKING ASSEMBLY

COURSE SYNOPSIS

The course is an introduction to speech communication which emphasizes the practical skill of public speaking, including techniques to lessen speaker anxiety, and the use of visual aids to enhance speaker presentations. Its goal is to provide a platform to prepare students for success in typical public speaking situations and also to provide them with the basic principles of organization. Master of the skills used in public speaking will greatly improve the student's confidence and also chances of being understood. An effective presentation includes good content, organization, delivery, audience, and analysis. These are the tools that the students will be exposed to while attending the course.

REFERENCES

1. O'Hair, Dan, Rob Stewart, and Hannah Rubenstein. Speaker's Guidebook: Text and Reference. 3rd ed. New York: Bedford/St. Martin's, 2007.
2. Abdul Mua'ti @ Zamri Ahmad (2008). Panduan Pengucapan Awam (Edisi Kedua). Dewan Bahasa & Pustaka, Kuala Lumpur.
3. Jaffe, C. (2013). Public Speaking: Concepts & Skills for a Diverse Society (Seventh Edition). Boston, MA, USA: Wadsworth, Cengage Learning.
4. Beebe S.A. & Beebe S. J. (2012). Public Speaking: An Audience-Centered Approach (8th Edition). Boston, MA: Pearson Education, Inc.
5. Sprague, J., Douglas, S. & David B. (2010). The Speaker's Handbook (Ninth Edition). Boston, MA, USA: Wadsworth, Cengage Learning.

UZW196
STUDENT IN-FREE ENTERPRISE (SIFE)

COURSE SYNOPSIS

SIFE co-curriculum course is to inculcate entrepreneurial culture and foster a sense of community among students. In addition, this course also has 3 elements that are taken to contribute to the entrepreneurial community, education and the environment. It is implemented so that the students can help the community to improve the standard of living for those in need.

REFERENCES

1. Kuratko, Donald F (2009). *Introduction to Entrepreneurship*, 8th edn, Canada: South Western.
2. Scarborough, Norman M. & Zimmerer, Thomas W (2004). *Esssentials of Entrepreneurship and Small Business Management*, 4th edn, New Jersey: Pearson Education.
3. AB Aziz Yusof (2003). *Prinsip Keusahawanan*, Prentice Hall-Pearson Malaysia Education.
4. AB Aziz Yusof (2000). *Usahawan dan Pengukuhan Jaringan Rakan Niaga, Kedah, Malaysia*: Penerbit UUM.
5. Barringer, Bruce R & Ireland, R. Duane (2008). *Entrepreneurship: Succesfully Launching New Ventures*, 2nd edn, New Jersey: Prentice Hall.

UZW160
ROTU ARMY I

COURSE SYNOPSIS

Candidates must fulfil the conditions that have been set by ATM Selection Board. Training will start after the candidates have succeeded in the selection test by PALAPES Base and Reserve Team Section. Level I and II aims are to expose students to Basic Military Training (Theory and Practical) and life in camp.

REFERENCES

1. Modul Latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

UZW161
ROTU ARMY II

COURSE SYNOPSIS

Candidates must fulfil the conditions that have been set by ATM Selection Board. Training will start after the candidates have succeeded in the selection test by PALAPES Base and Reserve Team Section. Level I and II aim are to expose students to the Basic Military Training (Theory and Practical) and life in camp.

REFERENCES

1. Modul Latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

UZW260
ROTU ARMY III

COURSE SYNOPSIS

This training is the addition from Level I, II and III. Emphasis made towards the administration leadership principle, planning and grouped training.

REFERENCES

1. Modul Latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

UZW261
ROTU ARMY IV

COURSE SYNOPSIS

This training is the addition from Level I, II and III. Emphasis made towards the administration leadership principle, planning and grouped training.

REFERENCES

1. Modul Latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995



UZW360
ROTU ARMY V

COURSE SYNOPSIS

This course is the continuity from Level III and IV. In this level, student is trained to become a head, lead the team in all related to training, administration and social. Student will be evaluated and given the support to be accredited in the Commissioning Ceremony and Certificate Awarding by DYMM SPB Yang Dipertuan Agong.

REFERENCES

1. Modul Latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

UZW361
ROTU ARMY VI

COURSE SYNOPSIS

This course is the continuity from Level III, IV and V. In this level, student is trained to become a head, lead the team in all related to training, administration and social. Student will be evaluated and given the support to be accredited in the Commissioning Ceremony and Certificate Awarding by DYMM SPB Yang Dipertuan Agong.

REFERENCES

1. Modul Latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

UZW162
MALAYSIA CIVIL DEFENSE DEPARTMENT I (Kor SISPA I)

COURSE SYNOPSIS

This course offers basic knowledge and skills of marching, first aid essentials, human blood circulation, fire burns treatment, treatment for bone injuries, joint and muscle pain, treatment of insect bites and poisonous animals, Cardiopulmonary resuscitation, and extrication techniques. The students will learn the theoretical and practical rescue, and also first aid during accidents to enhance the understanding, mentally and physically ready to face any emergency issues.

REFERENCES

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication, Selangor.
3. Ali NAfiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd

UZW163
MALAYSIA CIVIL DEFENSE DEPARTMENT II (Kor SISPA II)

COURSE SYNOPSIS

This course offers basic knowledge and skills of marching, extrication techniques, rope knots, chainsaw safety operation manual, fire science and firefighting equipment, map and compass reading techniques, first aid management and also security during natural disasters. The students will learn the theoretical and practical rescue and first aid during an accident to enhance the understanding and the mental and physical readiness to face any emergency issues.

REFERENCES

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication Selangor.
3. Ali NAfiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd

UZW262
MALAYSIA CIVIL DEFENSE DEPARTMENT III (Kor SISPA III)

COURSE SYNOPSIS

This course offers basic knowledge and skills of marching, National Integrity Plan (NIP), the use of power cutter and hydraulic equipment, toolsandtechniquesof ascending and descending, rescue techniques from high places, the introduction of basic fire-fighting equipment, tools & Basic Trauma Life Support (BTLS) and the introduction of ambulance equipment. The students will learn the theoretical and practical rescue and first aid during an accident to enhance the understanding and the mental and physical readiness to face any emergency issues.

REFERENCES

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.

2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication Selangor.
3. Ali NAfiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd

UZW263
MALAYSIA CIVIL DEFENSE DEPARTMENT IV (Kor SISPA IV)

COURSE SYNOPSIS

This course offers basic knowledge and skills of marching, 999 Emergency services, disaster and crisis management, training management, team management, leadership courses in the organization (PTB), and etiquette and protocol courses. Students will learn the theory and practice of rescue operations and administration of the Civil Defense Department (JPA) to enhance students' understanding of the organizational structure of JPA.

REFERENCES

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication Selangor.
3. Ali NAfiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd

UZW362
MALAYSIA CIVIL DEFENSE DEPARTMENT V (Kor SISPA V)

COURSE SYNOPSIS

This course offers basic knowledge and skills of marching, management of meetings, characteristics, ethics, leadership, etiquette and protocol, endurance training coaching skills courses and courses to be officers. The students will learn in theory and practice regarding the management and administration of the Malaysian Civil Defence Department (JPA) team to further enhance the preparedness of the students with the possibility in the future.

REFERENCES

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication Selangor.
3. Ali NAfiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd

UZW164
THE MALAYSIAN RED CRESCENT SOCIETIES CERTIFICATION COURSE I

COURSE SYNOPSIS

Certified Red Crescent Co-Curriculum course aims to expose the students to both the theoretical and traditional aspects of Certified Red Crescent. The theoretical aspect of the course covers on historical background, terminology, self-management and other related features of Certification by the Red Crescent, while the technical aspects focuses on practical training in terms of skills for the Certification of the Red Crescent.

REFERENCES

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN),1965.
2. DK Publishing, 'ACEP First Aid Manual, 3rd Edition', by, DK Adult, 2010.
3. Handal, K.A., 'The American Red Cross First Aid and Safety Handbook', Little, Brown and Company, 1992.
4. Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
5. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.

UZW165
THE MALAYSIAN RED CRESCENT SOCIETIES CERTIFICATION COURSE II

COURSE SYNOPSIS

Certification of Red Crescent II Co-Curriculum course aims to expose students in terms of sport science in Certification by the Red Crescent theoretical and technical skills. In terms of theory, this course is focused on historical background, terminology, self-management and other related Certification by the Red Crescent. While technically, this course is focus on practical training (practical) in terms of skills Certification of the Red Crescent.

REFERENCES

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN),1965.
2. DK Publishing, 'ACEP First Aid Manual, 3rd Edition', by, DK Adult, 2010.
3. Handal, K.A., 'The American Red Cross First Aid and Safety Handbook', Little, Brown and Company, 1992.
4. Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
5. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.



UZW264
THE MALAYSIAN RED CRESCENT SOCIETIES CERTIFICATION COURSE III

COURSE SYNOPSIS

Certification of Red Crescent III Co-Curriculum course aims to expose students in terms of sport science in Certification by the Red Crescent theoretical and technical skills. In terms of theory, this course is focused on historical background, terminology, self-management and other related Certification by the Red Crescent. While technically, this course is focus on practical training (practical) in terms of skills Certification of the Red Crescent.

REFERENCES

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN),1965.
2. DK Publishing, 'ACEP First Aid Manual, 3rd Edition', by, DK Adult, 2010.
3. Handal, K.A., 'The American Red Cross First Aid and Safety Handbook', Little, Brown and Company, 1992.
4. Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
5. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.

UZW166
SVPC-1 @STUDENTS VOLUNTARY POLICE CORP

COURSE SYNOPSIS

The Co-Curriculum course is to form personality and student development that is knowledgeable, disciplined and patriotic, and also possesses good level of police knowledge. The training programme and SVPC Corp activities are by following the training programme and activity that was provided and approved by PDRM. A total of 672 hours needed to comply with the training needs and SVPC Corp activity for commission purposes. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/ Management, outdoor activity and academic. The reason the SVPC Corp was established are:

a. To produce a SVPC Corp Police officer that is knowledgeable in relation to law, has the attitude and suitable (police) discipline Able to play a role and responsible efficiently and effective as a SVPC Crop Police Officer.
b. To create civic consciousness and good police relationship with society.
c. Nurture physical resilience, mental and strong personality to face challenge.

REFERENCES

1. Akta Polis 1967 (Akta 344)
2. Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
3. Modul Latihan dari PDRM
4. Akta Dadah Merbahaya 1952 (Akta 234)
5. Modul Undang-undang PDRM
6. Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
7. Buku Panduan Senjata
8. Akta Pencegahan Jenayah 1959
9. Manual Pertolongan Cemas PBSMM
10. Manual Senjata Kecil PDRM

UZW 167
SVPC-2 @STUDENTS VOLUNTARY POLICE CORP

COURSE SYNOPSIS

This is the addition from the programme that has been implemented in semester one that intends to shape student personality and development that is knowledgeable, discipline and patriotic, and also possess good police knowledge level. The training programme and SVPC Corp activity is followed by the training programme and activity that has been provided and approved by PDRM. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/Management, outdoor activity and academic.

REFERENCES

1. Akta Polis 1967 (Akta 344)
2. Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
3. Modul Latihan dari PDRM
4. Akta Dadah Merbahaya 1952 (Akta 234)
5. Modul Undang-undang PDRM
6. Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
7. Buku Panduan Senjata
8. Akta Pencegahan Jenayah 1959
9. Manual Pertolongan Cemas PBSMM
10. Manual Senjata Kecil PDRM

UZW 266
SVPC-3 @STUDENTS VOLUNTARY POLICE CORP

COURSE SYNOPSIS

This is the addition from the programme that has been implemented in semester two that intends to shape student personality and development that is knowledgeable, discipline and patriotic, and also possess good police knowledge

level. The training programme and SVPC Corp activity is followed by the training programme and activity that has been provided and approved by PDRM. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/Management, outdoor activity and academic.

REFERENCES

1. Akta Polis 1967 (Akta 344)
2. Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
3. Modul Latihan dari PDRM
4. Akta Dadah Merbahaya 1952 (Akta 234)
5. Modul Undang-undang PDRM
6. Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
7. Buku Panduan Senjata
8. Akta Pencegahan Jenayah 1959
9. Manual Pertolongan Cemas PBSMM
10. Manual Senjata Kecil PDRM

UZW267
SVPC-4 @STUDENTS VOLUNTARY POLICE CORP

COURSE SYNOPSIS

This is the addition from the programme that has been implemented in semester three that intends to shape student personality and development that is knowledgeable, discipline and patriotic, and also possess good police knowledge level. The training programme and SVPC Corp activity is followed by the training programme and activity that has been provided and approved by PDRM. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/Management, outdoor activity and academic.

REFERENCES

1. Akta Polis 1967 (Akta 344)
2. Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
3. Modul Latihan dari PDRM
4. Akta Dadah Merbahaya 1952 (Akta 234)
5. Modul Undang-undang PDRM
6. Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
7. Buku Panduan Senjata
8. Akta Pencegahan Jenayah 1959
9. Manual Pertolongan Cemas PBSMM
10. Manual Senjata Kecil PDRM

UZW366
SVPC-5 @STUDENTS VOLUNTARY POLICE CORP

COURSE SYNOPSIS

This is the addition from the programme that has been implemented in semester four that intends to shape student personality and development that is knowledgeable, discipline and patriotic, and also possess good police knowledge level. The training programme and SVPC Corp activity is followed by the training programme and activity that has been provided and approved by PDRM. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/Management, outdoor activity and academic.

REFERENCES

1. Akta Polis 1967 (Akta 344)
2. Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
3. Modul Latihan dari PDRM
4. Akta Dadah Merbahaya 1952 (Akta 234)
5. Modul Undang-undang PDRM
6. Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
7. Buku Panduan Senjata
8. Akta Pencegahan Jenayah 1959
9. Manual Pertolongan Cemas PBSMM
10. Manual Senjata Kecil PDRM

UZW367
SVPC-6 @STUDENTS VOLUNTARY POLICE CORP

COURSE SYNOPSIS

This is the addition from the programme that has been implemented in semester five that intends to shape student personality and development that is knowledgeable, discipline and patriotic, and also possess good police knowledge level. The training programme and SVPC Corp activity is followed by the training programme and activity that has been provided and approved by PDRM. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/Management, outdoor activity and academic.

REFERENCES

1. Akta Polis 1967 (Akta 344)
2. Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
3. Modul Latihan dari PDRM
4. Akta Dadah Merbahaya 1952 (Akta 234)
5. Modul Undang-undang PDRM
6. Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
7. Buku Panduan Senjata
8. Akta Pencegahan Jenayah 1959
9. Manual Pertolongan Cemas PBSMM
10. Manual Senjata Kecil PDRM



UZW168
MALAYSIAN PEOPLE 'S VOLUNTEER CORP I

COURSE SYNOPSIS

This course exposes students to the introduction of the People's Volunteer Corps (RELA), REAL legislation, union people, the concept of voluntary, external training and marching.

REFERENCES

1. Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
2. Abu Saman Abd Kader (1997). "Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
3. Jamaludin Badusah et al. (2009)". Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi". Jabatan Pengajian Tinggi dan Penerbit Universiti Putra Malaysia.

UZW169
MALAYSIAN PEOPLE 'S VOLUNTEER CORP II

COURSE SYNOPSIS

This course exposes students to the introduction of the People's Volunteer Corps (RELA), REAL legislation, union people, the concept of voluntary, external training and marching.

REFERENCES

1. Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
2. Abu Saman Abd Kader (1997). "Khidmat Masyarakat (PKJ)". Muzakah FKJ ,Institut Teknologi maklumat, Segamat, Johor.
3. Jamaludin Badusah et al. (2009) ."Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi".Jabatan Pengajian Tinggi dan Penerbit Universiti Putra Malaysia.

UZW268
MALAYSIAN PEOPLE 'S VOLUNTEER CORP III

COURSE SYNOPSIS

This course exposes students to the introduction of the People's Volunteer Corps (RELA), REAL legislation, union people, the concept of voluntary, external training and marching.

REFERENCES

1. Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
2. Abu Saman Abd Kader (1997)." Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
3. Jamaludin Badusah et al. (2009)." Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi". Jabatan Pengajian Tinggi dan Penerbit Universiti Putra Malaysia.

UZW269
MALAYSIAN PEOPLE 'S VOLUNTEER CORP IV

COURSE SYNOPSIS

This course exposes students to the introduction of the People's Volunteer Corps (RELA), REAL legislation, union people, the concept of voluntary, external training and marching.

REFERENCES

1. Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
2. Abu Saman Abd Kader (1997)." Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
3. Jamaludin Badusah et al. (2009)". Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi". Jabatan Pengajian Tinggi dan Penerbit Universiti Putra Malaysia.

UZW368
MALAYSIAN PEOPLE 'S VOLUNTEER CORP V

COURSE SYNOPSIS

This course exposes students to the introduction of the People's Volunteer Corps (RELA), REAL legislation, union people, the concept of voluntary, external training and marching.

REFERENCES

1. Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.

2. Abu Saman Abd Kader (1997)". Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
3. Jamaludin Badusah et al. (2009)". Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi". Jabatan Pengajian Tinggi dan Penerbit Universiti Putra Malaysia.

UZW369
MALAYSIAN PEOPLE 'S VOLUNTEER CORP VI

COURSE SYNOPSIS

This course exposes students to the introduction of the People's Volunteer Corps (RELA), REAL legislation, union people, the concept of voluntary, external training and marching.

REFERENCES

1. Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
2. Abu Saman Abd Kader (1997)". Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
3. Jamaludin Badusah et al. (2009)". Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi". Jabatan Pengajian Tinggi dan Penerbit Universiti Putra Malaysia.

UZW120
FIRE AND RESCUE BRIGED I

COURSE SYNOPSIS

The main purpose of this course is expected to
1. Foster the spirit of loyalty to the organization (UniMAP & Fire Brigade) and the National, independent mark, discipline and willing to provide volunteer services at any time and from any where in need.
2. Foster and enhance the "soft skills" among students UniMAP
3. Fire is a threat that there is no war, then this course hopes to promote and provide greater awareness to students and staff about the dangers of fire UniMAP.
4. Provide knowledge, training, skills to students UniMAP as a precaution and prevention.
5. Enhance the spirit of community among the students served the UniMAP especially when there is a fire threat

REFERENCES

1. Manual Pertolongan Cemas (BRCS, SJAA, SAA)
2. Manual Bomba dan Penyelamat Malaysia

UZW121
FIRE AND RESCUE BRIGED II

COURSE SYNOPSIS

The main purpose of this course is expected to
1. Foster the spirit of loyalty to the organization (UniMAP & Fire Brigade) and the National, independent mark, discipline and willing to provide volunteer services at any time and from any where in need.
2. Foster and enhance the "soft skills" among students UniMAP
3. Fire is a threat that there is no war, then this course hopes to promote and provide greater awareness to students and staff about the dangers of fire UniMAP.
4. Provide knowledge, training, skills to students UniMAP as a precaution and prevention.
5. Enhance the spirit of community among the students served the UniMAP especially when there is a fire threat

REFERENCES

1. Manual Pertolongan Cemas (BRCS, SJAA, SAA)
2. Manual Bomba dan Penyelamat Malaysia

UZW122
GIRL GUIDE I (PPS I)

COURSE SYNOPSIS

Course curriculum uniformed bodies 1 Girl Guides Association was implemented in two semesters (semester 1 and 2) aims to produce graduates with soft skills through Girl Guides Association program especially in terms of basic knowledge and skills Guides Princess based on teamwork that can be applied in your career or life.

REFERENCES

1. Ab.Alim Abdul Rahim. (2004). Pengurusan Gerak Kerja Kokurikulum. Kuala Lumpur. Fajar Bakti Sdn. Bhd.
2. Ab. Alim Abdul Rahim. (2004). Panduan Perkhemahan, Simpulan dan Pioneering. Kuala Lumpur. Fajar Bakti Sdn. Bhd.



3. Dasar Pertubuhan dan Undang-undang – Am – Siswi – Pemimpin. (2011). Persatuan Pandu Puteri Malaysia.
4. Persatuan Pandu Puteri Malaysia. (2011). Perlembagaan Persatuan Pandu Puteri Malaysia. Kuala Lumpur.
5. Dasar Pertubuhan dan Undang-undang Perkhemahan Persatuan Pandu Puteri Malaysia (2011).
6. Risalah Upacara dan Istiadat Pandu Puteri. (2011). Persatuan Pandu Puteri Malaysia.
7. Baden -Powell, R. (2005). Ilmu Pengakap Bagi Budak-Budak. (Terjemahan). Batu Caves: Edusystem Sdn. Bhd.
8. Khairul Azman Arshad (2006). Asas Perkhemahan Dan Ikhtiar Hidup. Shah Alam: Fajar Bakti Sdn. Bhd.

UZW123
GIRL GUIDE I (PPS II)

COURSE SYNOPSIS

Course curriculum uniformed bodies 1 Girl Guides Association was implemented in two semesters (semester 1 and 2) aims to produce graduates with soft skills through Girl Guides Association program especially in terms of basic knowledge and skills Guides Princess based on teamwork that can be applied in your career or life.

REFERENCES

1. Ab.Alim Abdul Rahim. (2004). Pengurusan Gerak Kerja Kokurikulum. Kuala Lumpur. Fajar Bakti Sdn. Bhd.
2. Ab. Alim Abdul Rahim. (2004). Panduan Perkhemahan, Simpulan dan Pioneering. Kuala Lumpur. Fajar Bakti Sdn. Bhd.
3. Dasar Pertubuhan dan Undang-undang – Am – Siswi – Pemimpin. (2011). Persatuan Pandu Puteri Malaysia.
4. Persatuan Pandu Puteri Malaysia. (2011). Perlembagaan Persatuan Pandu Puteri Malaysia. Kuala Lumpur.
5. Dasar Pertubuhan dan Undang-undang Perkhemahan Persatuan Pandu Puteri Malaysia (2011).
6. Risalah Upacara dan Istiadat Pandu Puteri. (2011). Persatuan Pandu Puteri Malaysia.
7. Baden -Powell, R. (2005). Ilmu Pengakap Bagi Budak-Budak. (Terjemahan). Batu Caves: Edusystem Sdn. Bhd.
8. Khairul Azman Arshad (2006). Asas Perkhemahan Dan Ikhtiar Hidup. Shah Alam: Fajar Bakti Sdn. Bhd.

UZW124
MALAYSIAN ST. JOHN AMBULANCE I

COURSE SYNOPSIS

This course introduces the basic principles and goals of first aid. Students will explore how to provide assistance in an emergency. They will learn methods of wrapping and pembebatan, as well as how to handle external bleeding and shock conditions. Students will recognize bone fracture, sprain, dislocation, and how to provide emergency treatment for such cases.

REFERENCES

1. First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley.
2. Harvey D. Grant, Robert H. Murray, Jr., J. David Bergeron. Emergency Care, 5th Edition. U.S.A.: Prentice-Hall International.
3. Basic Life Support, Guidelines 2005, Handbook for Healthcare Providers, 4th Edition

UZW125
MALAYSIAN ST. JOHN AMBULANCE II

COURSE SYNOPSIS

This course introduces the basic principles and goals of first aid. Students will explore how to provide assistance in an emergency. They will learn methods of wrapping and pembebatan, as well as how to handle external bleeding and shock conditions. Students will recognize bone fracture, sprain, dislocation, and how to provide emergency treatment for such cases.

REFERENCES

1. First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley.
2. Harvey D. Grant, Robert H. Murray, Jr., J. David Bergeron. Emergency Care, 5th Edition. U.S.A.: Prentice-Hall International.
3. Basic Life Support, Guidelines 2005, Handbook for Healthcare Providers, 4th Edition

UZW126
MALAYSIA UNIVERSITY ROVER TRAINING GROUP I

COURSE SYNOPSIS

KLKM is an international characteristic uniformed body that teaches about the science of life and survival skills. The students will be exposed to the ethical life settings, cooperation, respect, love fellow human beings and the environment through the appreciation of the Treaty and Scout Law.

REFERENCES

1. Aktiviti Pengakap muda Malaysia (1990), Ab. Alim dan Balkis, Dewan Bahasa dan Pustaka
2. Panduan kelana siswa (2010), Persekutuan pengakap Malaysia
3. Panduan Pengakap Raja (2008), Ab. Alim , Persekutuan pengakap Malaysia

UZW127
MALAYSIA UNIVERSITY ROVER TRAINING GROUP II

COURSE SYNOPSIS

KLKM is an international characteristic uniformed body that teaches about the science of life and survival skills. The students will be exposed to the ethical life settings, cooperation, respect, love fellow human beings and the environment through the appreciation of the Treaty and Scout Law.

REFERENCES

1. Aktiviti Pengakap muda Malaysia (1990), Ab. Alim dan Balkis, Dewan Bahasa dan Pustaka
2. Panduan kelana siswa (2010), Persekutuan pengakap Malaysia
3. Panduan Pengakap Raja (2008), Ab. Alim, Persekutuan pengakap Malaysia

UZW128
MALAYSIA UNIVERSITY ROVER TRAINING GROUP I (SEA)

COURSE SYNOPSIS

This course is also known by other names as Sea Rover Scouts Unit, which is part of the 4th of training in the Organization of Scouting Movement Sea Rover. It is a part of Scout Adults make space for youth in enriching their knowledge. Sea Rover Scouts devoted to follow Rover Wood Badge Leadership Course aims to produce Sea Rover Scout Leaders who are skilled, knowledgeable and qualified in the move The Sea Rover Scouts. This section consists of teens aged 17 to 25 years, offering a variety of activities and skills training in developing human capital individuals directly or indirectly. Convergence is also given to the development of self-awareness which emphasizes self-responsibility, obedience to leaders, organizations, communities and the country as well as providing volunteer services to the community, in accordance with Sea Rover Scout motto of "SERVICE"

REFERENCES

1. Panduan Pengurusan Kumpulan Latihan Kelanasiswa Laut Malaysia.
2. Panduan Skim Latihan Pengakap Kelana Laut.
3. Panduan Skim Lencana Pengakap Malaysia

UZW129
MALAYSIA UNIVERSITY ROVER TRAINING GROUP II (SEA)

COURSE SYNOPSIS

This course is also known by other names as Sea Rover Scouts Unit, which is part of the 4th of training in the Organization of Scouting Movement Sea Rover. It is a part of Scout Adults make space for youth in enriching their knowledge. Sea Rover Scouts devoted to follow Rover Wood Badge Leadership Course aims to produce Sea Rover Scout Leaders who are skilled, knowledgeable and qualified in the move The Sea Rover Scouts. This section consists of teens aged 17 to 25 years, offering a variety of activities and skills training in developing human capital individuals directly or indirectly. Convergence is also given to the development of self-awareness which emphasizes self-responsibility, obedience to leaders, organizations, communities and the country as well as providing volunteer services to the community, in accordance with Sea Rover Scout motto of "SERVICE"

REFERENCES

1. Panduan Pengurusan Kumpulan Latihan Kelanasiswa Laut Malaysia.
2. Panduan Skim Latihan Pengakap Kelana Laut.
3. Panduan Skim Lencana Pengakap Malaysia

UZW114
STUDENT VOLUNTARY MALAYSIAN MEDICAL RELIEF SOCIETY (YOUNG MERCY) I

COURSE SYNOPSIS

The MERCY I programme is one of the co-curricular uniform bodies in Universiti Malaysia Perlis where early exposure to volunteerism is instilled. The basic knowledge of humanitarian relief aspect blended with practical exercise is integrated in this MERCY I programme. The students will undergo a Basic Volunteer and Mission Training before getting involved in the planning and implementing a humanitarian project.

REFERENCES

1. Thomas D. Schneid, Larry R. Collins, Disaster Management and Preparedness, CRC November 2000
2. United Nations, Humanitarian Decade: Challenges for Humanitarian Assistance in The Last Decade And Into The Future. Coordination of Humaniatarian Affairs (June 14, 2004)

3. James Macinko, Rosalia Rodriguez-Garcia, Juan Antonio Casas, From Humanitarian Assistance to Human Development, Pan American Health Organization (April 1, 1998)
4. The Sphere Project, The Humanitarian Charter and minimum Standards, Oxfam Publishing, 2005
5. Basmullah, Ikram, Radhi, Najib. Nota Ringkas Panduan Kecemasan, Amalan Hidup Sihat dan Pengurusan Bencana. 2nd edition
6. Jo Bryan Rusin, Volunteers Wanted, Magnolia Mansions Press; First edition (May 1999)
7. Steve Vineyard McCurley, One Hundred and One Ideas for Volunteer Programs (Brainstorm Series), Heritage Arts Publishing (June 1986)
8. The Sphere Project, The Humanitarian Charter and Minimal Standards in Practice, Oxfam Publishing, 2005
9. MERCY Malaysia, A Time To Heal, Caxton Printing, 2005
10. MERCY Malaysia, Annual Report 2005

UZW115
STUDENT VOLUNTARY MALAYSIAN MEDICAL RELIEF SOCIETY (YOUNG MERCY) II

COURSE SYNOPSIS

The MERCY II programme is one of the co-curricular uniform bodies in Universiti Malaysia Perlis where early exposure to volunteerism is instilled. The basic knowledge of humanitarian relief aspect blended with practical exercise is integrated in this MERCY II programme. The students will undergo a Basic Volunteer and Mission Training before getting involved in the planning and implementing a humanitarian project.

REFERENCES

1. Thomas D. Schneid, Larry R. Collins, Disaster Management and Preparedness, CRC November 2000
2. United Nations, Humanitarian Decade: Challenges for Humanitarian Assistance in The Last Decade And Into The Future. Coordination of Humaniatarian Affairs (June 14, 2004)
3. James Macinko, Rosalia Rodriguez-Garcia, Juan Antonio Casas, From Humanitarian Assistance to Human Development, Pan American Health Organization (April 1, 1998)
4. The Sphere Project, The Humanitarian Charter and minimum Standards, Oxfam Publishing, 2005
5. Basmullah, Ikram, Radhi, Najib. Nota Ringkas Panduan Kecemasan, Amalan Hidup Sihat dan Pengurusan Bencana. 2nd edition
6. Jo Bryan Rusin, Volunteers Wanted, Magnolia Mansions Press; First edition (May 1999)
7. Steve Vineyard McCurley, One Hundred and One Ideas for Volunteer Programs (Brainstorm Series), Heritage Arts Publishing (June 1986)
8. The Sphere Project, The Humanitarian Charter and Minimal Standards in Practice, Oxfam Publishing, 2005
9. MERCY Malaysia, A Time To Heal, Caxton Printing, 2005
10. MERCY Malaysia, Annual Report 2005

UZW171
SPORT SILAT I

COURSE SYNOPSIS

Sports Silat course introduces and exposes the students with the martial art in terms of theory and practice. Students will learn the background , concepts, equipment and regulations in martial arts and martial arts sports. Students will also be emphasized in terms of self-discipline. In addition, students will learn the basics of martial arts movement , combination of technical and fundamental movements in martial arts.

REFERENCES

1. Persatuan Silat Kebangsaan Malaysia (PESAKA) (Syarat dan Peraturan Pertandingan Silat Olahraga)
2. Persatuan Silat Kebangsaan Negeri Perlis (PESAKA Perlis)

UZW178
SPORT SILAT II

COURSE SYNOPSIS

Silat course of this exercise is continued from the course exercise Silat I. This course will explore Silat sport again in theory , ternikal and practical. Students will learn about the art of tying headdress , art sampin bond and basic movement and sports games silat martial art. Students will also be emphasized in terms of self-discipline. In addition, students will learn the basics of coaching workshops sports and martial arts martial arts.

REFERENCES

1. Persatuan Silat Kebangsaan Malaysia (PESAKA)
(Syarat dan Peraturan Pertandingan Silat Olahraga)
2. Persatuan Silat Kebangsaan Negeri Perlis (PESAKA Perlis

UZW277
SPORT SILAT III

COURSE SYNOPSIS

Silat course of this exercise is a continuation of the course Silat sport II. This course will explore Silat sport again in theory, ternikal and practical. Students will learn about the art of tying headdress,

art sampin bond and basic movement and sports games silat martial art. Students will also be emphasized in terms of self-discipline. In addition, students will learn the basics of coaching workshops sports and martial arts martial arts.

REFERENCES

1. Persatuan Silat Kebangsaan Malaysia (PESAKA) (Syarat dan Peraturan Pertandingan Silat Olahraga)
2. Persatuan Silat Kebangsaan Negeri Perlis (PESAKA Perlis

UZW112
MALAYSIAN UNIVERSITY ROVER TRAINING GROUP I (AIR)

COURSE SYNOPSIS

Co-curricular courses uniformed bodies Kelana Student Training Group I with another name Air Scout Unit, which is a newly established unit within the Group Kelana Students in Malaysia. This university is a pioneer in the establishment of the Air Scout. Malaysia is the only university that has the Air Scout. Air Scout Training Scheme will be exposed to the new Air Scout and Leadership courses scouter. Air Scout is comprised of adolescents aged from 17 years up to 25 years old offering a range of activities and skills training in developing human capital of individuals directly or indirectly. Concentration is also given to the development of self-awareness that emphasizes self-responsibility, obedience to the leader, organization, community and volunteerism State and providing services to the public, in line with the Scout motto of "Serving"

REFERENCES

1. Panduan Pergurusan Pengakap Kumpulan Latihan Kelana Siswa Malaysia
2. Skim Latihan Pengakap Kelana Udara

UZW113
MALAYSIAN UNIVERSITY ROVER TRAINING GROUP II (AIR)

COURSE SYNOPSIS

Co-curricular courses uniformed bodies Kelana Student Training Group II with another name Air Scout Unit, which is a newly established unit within the Group Kelana Students in Malaysia. This university is a pioneer in the establishment of the Air Scout. Malaysia is the only university that has the Air Scout. Air Scout Training Scheme will be exposed to the new Air Scout and Leadership courses scouter. Air Scout is comprised of adolescents aged from 17 years up to 25 years old offering a range of activities and skills training in developing human capital of individuals directly or indirectly. Concentration is also given to the development of self-awareness that emphasizes self-responsibility, obedience to the leader, organization, community and volunteerism State and providing services to the public, in line with the Scout motto of "Serving"

REFERENCES

1. Panduan Pergurusan Pengakap Kumpulan Latihan Kelana Siswa Malaysia
2. Skim Latihan Pengakap Kelana Udara

UZW110
STUDENTS VOLUNTARY CORRECTIONAL MALAYSIAN PRISON DEPARTMENT I
(KOR SISKOR I)

COURSE SYNOPSIS

This course is a preliminary course in the series Prison Teachers Training courses. Through this course, students will be introduced to the prison organization, its history and its importance in the development of the State. At the initial stage, the students will be exposed to activities, training and education syllabus assignment of the role of the Prison Department of Malaysia, as well as providing the relevant disclosure as volunteer basis, the Prison Act 1995 as amended in 2008, REGULATIONS Prison In 2000, United Nations Standard Minimum Rules (UNSMR) and marching exercises.

REFERENCES

1. Akta Penjara Malaysia. (1995; Pindaan 2008). Undang -undang Malaysia. Kuala Lumpur: Jabatan Penjara Malaysia.
2. Jabatan Penjara Malaysia.(1985). Buku bimbingan penjara. Kuala Lumpur. Unit Perancangan dan Penyelidikan
3. Laporan Tahunan Jabatan Penjara 2010
4. Laporan Tahunan Jabatan Penjara 2011
5. Laporan Tahunan Jabatab Penjara 2012
6. Jamaludin Badusah *et al*. (2009).
7. Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi. Jabatan Pengajian Tinggi & Penerbit Universiti Putra Malaysia
8. Price, D. (1998). Security categorization in prisons. Institute Criminology: Cambridge University



9. United Nations (1957). Standard minimum rules of the treatment of prisoners. New York. United States.

UZW111
STUDENTS VOLUNTARY CORRECTIONAL MALAYSIAN PRISON DEPARTMENT II
(KOR SISKOR II)

COURSE SYNOPSIS

Undergraduate students Correctional II (SISKOR II) is an extension of SISKOR II where he emphasized the safety of the placement, the placement of detention, the placement service and the placement of recovery (PPI) at the Prisons Department. This Course also emphasizes interpersonal skills and character building of students. Students will be exposed to skills training drills, snap and handling of firearms. In addition, students are given an overview of the compulsory attendance (FGM), involving the community program.

REFERENCES

1. Akta Penjara Malaysia. (1995; Pindaan 2008). Undang -undang Malaysia. Kuala Lumpur: Jabatan Penjara Malaysia.
2. Jabatan Penjara Malaysia. (1985). Buku bimbingan penjara. Kuala Lumpur. Unit Perancangan dan Penyelidikan
3. Laporan Tahunan Jabatan Penjara 2010
4. Laporan Tahunan Jabatan Penjara 2011
5. Laporan Tahunan Jabatab Penjara 2012
6. Jamaludin Badusah *et al*. (2009).
7. Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi. Jabatan Pengajian Tinggi & Penerbit Universiti Putra Malaysia
8. Price, D. (1998). Security categorization in prisons.Institute Criminology: Cambridge University
9. United Nations (1957). Standard minimum rules of the treatment of prisoners. New York. United States.

UZW210
STUDENTS VOLUNTARY CORRECTIONAL MALAYSIAN PRISON DEPARTMENT III
(KOR SISKOR III)

COURSE SYNOPSIS:

Undergraduate students Correctional III (SISKOR III) is an advanced course SISKOR III which emphasizes the understanding of the Prison Policy, Promoting Prisons Rehabilitation and Housing Intermediate (RP). School Students are also given skills training and marching outside.

REFERENCES

1. Akta Penjara Malaysia. (1995; Pindaan 2008). Undang -undang Malaysia. Kuala Lumpur: Jabatan Penjara Malaysia.
2. Jabatan Penjara Malaysia. (1985). Buku bimbingan penjara. Kuala Lumpur. Unit Perancangan dan Penyelidikan
3. Laporan Tahunan Jabatan Penjara 2010
4. Laporan Tahunan Jabatan Penjara 2011
5. Laporan Tahunan Jabatab Penjara 2012
6. Jamaludin Badusah *et al*. (2009).
7. Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi. Jabatan Pengajian Tinggi & Penerbit Universiti Putra Malaysia
8. Price, D. (1998). Security categorization in prisons. Institute Criminology: Cambridge University
9. United Nations (1957). Standard minimum rules of the treatment of prisoners. New York. United States.

UZW211
STUDENTS VOLUNTARY CORRECTIONAL MALAYSIAN PRISON DEPARTMENT IV
(KOR SISKOR IV)

COURSE SYNOPSIS

Undergraduate students Correctional IV (SISKOR IV) is an advanced course SISKOR III which emphasizes the Teachers Training Program Occupational Safety and Parole and Community Services in Prison Institutions that become core bussines in correctional services. Students will be exposed to the knowledge base prison rehabilitation program, theoretical training and practical firearms. Rehabilitation Program, and Internal Security Unit. In addition, students are required to undertake university and community ties.

REFERENCES

1. Akta Penjara Malaysia. (1995: Pindaan 2008
2. Undang-undang Malaysia. Kuala Lumpur: Jabatan Penjara Malaysia.
3. Jabatan Penjara Malaysia. (1985). Buku bimbingan penjara. Kuala Lumpur dan penyelidikan
4. Laporan Tahunan Jabatan Penjara 2010
5. Laporan Tahunan Jabatan Penjara 2011
6. Laporan Tahunan Jabatab Penjara 2012
7. Jamaludin Badusah *et al*. (2009). Pembangunan Pelajar: Memperkasakan Kokurikulum Institut Pengajian Tinggi. Jabatan Pengajian Tinggi & Penerbit Universiti Putra Malaysia

8. Price, D. (1998). Security categorization in prisons. Institute Criminology: Cambridge University
9. United Nations (1957). Standard minimum rules of the treatment of prisoners. New York. United States.

