

llmu • Keikhlasan • Kecemerlangan Knowledge • Sincerity • Excellence Program Kejuruteraan & Komunikasi Media Baharu / Engineering & New Media Communication Programmes Sidang Akademik / Academic Session



Buku Panduan Akademik Academic Guide Book

Program Sarjana Muda / Bachelor Degree Programmes



ademi

Program Sarjana Muda / Bachelor Degree Programmes Program Kejuruteraan & Komunikasi Media Baharu / Engineering & New Media Communication Programmes Sidong Akademik 2014/2015 - Academic Session 2014/2015

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dan/and

semua Dekan-dekan Pusat Pengajian dan Pengarah Pusat/Unit di Universiti Malaysia Perlis.

all Deans and Directors of Centres/Units, 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.*



Isi Kandungan/Contents

Muka	Surat/Page	
ITUKU	Julut/Fuge	: 110

Pengenalan/Introduction	4				
Misi, Visi, Lagu UniMAP/Mission, Vision and UniMAP Anthem					
Canselor UniMAP/Chancellor of UniMAP					
Pro Canselor/ Pro Chancellor of UniMAP	9				
Kata Aluan Naib Canselor/Vice Chancellor's Message	10				
Pegawai Utama Universiti/Principal Officers	12				
Bahasa Malaysia (<i>Malay</i>) : Kalendar Akademik	13				
: Syarat Kemasukan Pelajar Tempatar	ı 15				
: Sistem Akademik	40				
: Pusat Pemantapan Akademik	54				
: Bahagian Pengurusan Akademik, Jal	batan Pendaftar 56				
Bahasa Inggeris (English) : Academic Calendar	60				
: Admission Requirements	62				
: Academic System	79				
: Academic Support Centres	92				
: Academic Management Division, Dep	artment of Registry 93				
P. Pengajian Kejuruteraan Mikrolektronik / School of Microelectronic Engineering 97					
P. Pengajian Kejuruteraan Komputer & Perhubungan / School of Computer & Communication Engineering 131					
P. Pengajian Kejuruteraan Mekatronik / School of Mechatronic Engineering 16					
P. Pengajian Kejuruteraan Sistem Elektrik/School of Electrical System	tems Engineering 229				
P. Pengajian Kejuruteraan Pembuatan / School of Manufacturing	Engineering 265				
P. Pengajian Kejuruteraan Bahan / School of Materials Engineering	g 301				
P. Pengajian Kejuruteraan Bioproses / School of Bioprocess Engine	eering 341				
P. Pengajian Kejuruteraan Alam Sekitar / School of Environmental Engineering 385					
Pusat Pengajian Pembangunan Insan dan Teknokomunikasi / School of Human					
Development and Technocommunication (iKOM) 429					
Pusat Bahasa Antarabangsa / Centre for International Languages (CIL) 455					
Pusat Kejuruteraan / Engineering Centre (PK) 47					
Institut Matematik Kejuruteraan/Institute of Engineering Mathematics (IMK) 483					
Pusat Kerjasama Industri / Centre for Industrial and Governmental Collaboration (CIGC) 499					
Pusat Ko-kurikulum / Centre for Co-Curriculum 505					

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



Misi/Mission:

Melahirkan Modal insan kamil yang menyumbang kepada agenda pembangunan dan daya saing industri negara. *To produce holistic human capital that contributes to the nation's development and industrial 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

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 Naib Canselor

Bismillahirahmanirrahim

Assalamualaikum Warahmatullahi Wabarakatuh dan Salam Sejahtera.

Salam Ilmu, Keikhlasan, Kecemerlangan UniMAP,

Bersyukur ke hadrat Ilahi kerana dengan limpah kurniaNya Buku Panduan Pelajar UniMAP bagi Sidang Akademik 2014/2015 dapat dihasilkan.

Setinggi-tinggi tahniah dan syabas diucapkan kepada nadi penggerak yang telah bersungguh-sungguh menerbitkan Buku Panduan ini, yang merupakan sumber informasi bagi anak-anak sekalian untuk lebih mengenali, program-program dan kemudahan yang ditawarkan di UniMAP.

Di kesempatan ini, ingin saya mengucapkan sekalung tahniah kepada anak-anak pelajar yang telah berjaya menempatkan diri di UniMAP. Anda merupakan pelajar yang bertuah kerana terpilih untuk menyertai UniMAP yang merupakan sebuah IPTA yang berwawasan besar.

Justeru saya mengalu-alukan anak-anak pelajar untuk bersama mengharungi cabaran kearah merealisasikan wawasan tersebut. Adalah menjadi harapan UniMAP untuk melahirkan mahasiswa yang versatil, berkualiti tinggi dan berdaya saing daripada pelbagai disiplin ilmu. Justeru, penglibatan aktif anak-anak dalam pelbagai aktiviti yang dianjurkan samada akademik atau non-akademik amatlah digalakkan.

Sebagai sebuah universiti yang dinamik, sumbangan UniMAP tidak hanya berfokus kepada pembangunan pelajar dan staf semata-mata, malah sebagai sebuah gedung ilmu, UniMAP sentiasa proaktif membantu masyarakat dengan berkongsi ilmu-ilmu terkini untuk pembangunan agama, bangsa dan negara.

Sehubungan dengan itu, besarlah harapan saya agar para siswazah baru ini dapat seiringan dengan pembangunan universiti dalam membawa universiti ke arena antarabangsa tidak kira dalam bidang akademik mahupun penyelidikan.

Sebagai penghias bicara akhir, jagalah amanah dan tanggungjawab yang telah diberikan oleh kedua ibu bapa anak-anak pelajar dalam menuntut ilmu demi kepentingan diri, masyarakat, agama, bangsa dan Negara dan sebagai persediaan menjadi pewaris pembangunan negara.

Sekian, Wassalam.



Vice Chancellor's Message

Bismillahirrahmanirrahim

Assalamualaikum Warahmatullahi Wabarakatuh and Salam Sejahtera.

Salam Ilmu, Keikhlasan, Kecemerlangan UniMAP,

All Praise to the Almighty for it is with His Blessings that we have been able to produce the UniMAP Academic Guide Book for the 2014/2015 Academic Session. Thank you to the team that has worked hard to ensure that this book comes to fruition.

Please allow me to congratulate all new UniMAP students. It is our privilege to have you with us, and we hope that together, we will work towards your successes, and ours, as a university with high aspirations and ambitions. We invite all students to come on board with us, to make those aspirations and ambitions a reality. It is the hope of the university that during the time that you are with us, we will be able to harness your potential - to be versatile, of great quality, and to be fiercely competitive, across various disciplines.

Your involvement in both academic and non-academic activities will be very important. To help you find your way around the programmes UniMAP offers and facilities available at the university, we offer you this guide book, which shall serve as a very important source of reference. Use it, look it up, keep it with you – you will find all that you need to know about your programme here.

UniMAP takes its role on students' and staff development very seriously. In addition, as a dynamic university, UniMAP is also proactive in ensuring that the community surrounding the university benefits from our presence. It is thus my fervent hope that together we will contribute towards these aspects of development, taking the university to the international platform, in both academic and research realms.

As future leaders, I ask that in your quest for knowledge, you honour the responsibility that your parents have entrusted to you, for your own good and that of the society and the nation.

Thank you, Wassalam.

Brig. Jen. Datuk Prof. Dr. Kamarudin Hussin Naib Canselor / Vice Chancellor



Pegawai Utama UniMAP UniMAP Principal Officers

ademi



Brig. Jen. Datuk Prof. Dr. Kamarudin Hussin Naib Canselor / Vice Chancellor



Dato' Prof. Dr. Zul Azhar Zahid Jamal Timbalan Naib Canselor (Akademik & Antarabangsa)/ Deputy Vice Chancellor (Academic & International)



Prof. Dr. Abdul Hamid Adom Timbalan Naib Canselor (Penyelidikan & Inovasi)/ Deputy Vice Chancellor (Research & Innovation)



Prof. Madya Dr. Mohd Fo'ad Sakdan Timbalan Naib Canselor (Hal Ehwal Pelajar dan Alumni) / Deputy Vice Chancellor (Students Affairs & Alumni)



En. Zuber Haji Mohamad Pendaftar / Registrar



Pn. Saodah Hassan Bendahari / Bursar



Pn. Mazmin Mat Akhir Pustakawan Kanan / Senior Librarian

Kalendar Akademik Ijazah Sarjana Muda Sidang Akademik 2014/2015

SEMESTER 1 8 September 2014 – 18 Januari 2015 (19 minggu)				
AKTIVITI	JANGK	A MASA	ТЕМРОН	CATATAN
Pendaftaran Pelajar Baru/ Minggu Suai Kenal	1 September 2014	7 September 2014	5 hari	-
Kuliah	08 September 2014	19 Oktober 2014	6 minggu	Hari Malaysia 16 Sept 2014 [Selasa] Konvokesyen UniMAP 27 & 28 Sept 2014 [Sabtu & Ahad] Hari Raya Qurban 5 & 6 Okt 2014 [Ahad & Isnin]
Cuti Pertengahan Semester	20 Oktober 2014	26 Oktober 2014	1 minggu	Hari Deepavali 23 Okt 2014 [Khamis] Awal Muharam 25 Okt 2014[Sabtu]
Kuliah	27 Oktober 2014	21 Disember 2014	8 minggu	
Minggu Ulangkaji	22 Disember 2014	28 Disember 2014	1 minggu	Hari Krismas 25 Dis 2014 [Khamis]
Peperiksaan	29 Disember 2014	18 Januari 2015	3 minggu	Maulidur Rasul 3 Jan 2015 [Sabtu]
Cuti Antara Semester	19 Januari 2015	15 Februari 2015	4 minggu	ZIIII III

Akademil Academic Guide Boo



Kalendar Akademik Ijazah Sarjana Muda Sidang Akademik 2014/2015

SEMESTER 2 16 Februari 2015 – 28 Jun 2015 (19 minggu)				
AKTIVITI	JANGK	JANGKA MASA		CATATAN
				- Tahun Baru Cina 19 - 20 Feb 2015 [Khamis & Jumaat]
Kuliah	16 Februari 2015	5 April 2015	7 minggu	Cuti berganti kepada semua pelajar UniMAP untuk Tahun Baru Cina bermula pada 16 -18 Feb 2015 [Isnin – Rabu]. Semua aktiviti akademik dan kuliah yang dijadualkan sepanjang tempoh ini perlu diganti. Kuliah akan bermula pada 23 Februari 2015
Cuti Pertengahan Semester	6 April 2015	12 April 2015	1 minggu	-
Kuliah	13 April 2015	31 Mei 2015	7 minggu	Hari Pekerja 1 Mei 2015 [Jumaat] Cuti Hari Wesak Mei 2015 Israk Mikraj 16 Mei 2015 [Sabtu] Hari Keputeraan DYMM Tuanku Raja Perlis 17 Mei 2015 [Ahad]
Minggu Ulangkaji	1 Jun 2015	7 Jun 2015	1 minggu	Hari Keputeraan SPB Yang Di-Pertuan Agong 6 Jun 2015 [Sabtu] Nuzul Al-Quran 4 Julai 2015 [Sabtu]
Peperiksaan	8 Jun 2015	28 Jun 2015	3 minggu	-
Cuti Panjang / *Latihan Industri	29 Jun	6 September 2015	10 minggu *Latihan Industri	Hari Raya Aidilfitri 18 & 19 Julai 2015 [Sabtu & Ahad]



Syarat Kemasukan Bagi Program Pengajian Ijazah Sidang Akademik 2014/2015 Calon Lepasan Matrikulasi

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
		Syarat Am Universiti
		Lulus Sijil Pelajaran Malaysia (SPM)/Setaraf dengan mendapat kepujian dalam mata pelajaran Bahasa Melayu / Bahasa Malaysia atau kepujian Bahasa Melayu / Bahasa Malaysia Kertas Julai;
		dan
		Lulus Matrikulasi KPM/Asasi Sains UM/ Asasi UiTM dengan mendapat sekurang- kurangnya PNGK 2.00 ;
		dan
		Mendapat sekurang-kurangnya Tahap 1 (Band 1) dalam Malaysian University English Test (MUET).
		Program Kejuruteraan
1.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mikroelektronik RKOS (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
2.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekanikal RK08 (8 Semester)	Syarat Khas Program: Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:-
3.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Pembuatan RK13 (8 Semester)	(i) Physics / Engineering Physics / Chemistry / Engineering Chemistry; dan (ii) Mathematics
4.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Komputer RK20 (8 Semester)	Calon yang menggunakan kelayakan mata pelajaran Chemistry / Engineering Chemistry pada peringkat Matrikulasi /Asasi perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics.
5.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Sistem Elektrik RK23 (8 Semester)	dan Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
6.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekatronik RK24 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
7.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Industri RK45 (8 Semester)	Syarat Khas Program: Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:-
8.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Perhubungan RK53 (8 Semester)	(i) Physics / Engineering Physics / Chemistry / Engineering Chemistry; dan (ii) Mathematics
9.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Metalurgi RK56 (8 Semester)	Calon yang menggunakan kelayakan mata pelajaran Chemistry / Engineering Chemistry pada peringkat Matrikulasi /Asasi perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics .
10.	ljazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Awam) RK01 (8 Semester)	dan Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
	Kod dan nama terdahulu program ini Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bangunan RK82	
11.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rekabentuk Produk RK84 (8 Semester)	
12.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik RK86 (8 Semester)	
13.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Fotonik RK89 (8 Semester)	
14.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rangkaian Komputer RK93 (8 Semester)	i i i i i i i i i i i i i i i i i i i

Akademik Academic Guide Book



BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
15.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektrik Sistem Tengga	Memenuhi Syarat Am Universiti serta Syarat Khas Program
	KK96 (8 Semester)	Syarat Khas Program:
		Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:-
		(i) Physics / Engineering Physics / Chemistry / Engineering Chemistry/ Biology; dan
		(ii) Mathematics
16.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Alam Sekitar	Calon yang menggunakan kelayakan mata pelajaran Chemistry / Engineering Chemistry / Biology pada peringkat Matrikulasi / Asasi perlu mendapat sekurang- kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics.
	RK07 (8 Semester)	dan
17.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bahan RK12 (8 Semester)	Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
18.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bioproses RK28 (8 Semester)	
19.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Polimer RK32 (8 Semester)	
20.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Bioperubatan RK85 (8 Semester)	
21.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Biosistem RK90 (8 Semester)	

	BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
			Program Perniagaan
·	22.	ljazah Sarjana Muda Perniagaan (Kepujian) Keusahawanan Kejuruteraan RP52 (6 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
			Syarat Khas Program:
			Lulus Sijil Matrikulasi KPM/Asasi Sains UM/Asasi UiTM/setaraf (dalam aliran sains, aliran teknikal atau aliran perakaunan) dengan mendapat:
			Sekurang-kurangnya Gred C (2.00) dalam mana-mana satu (1) daripada mata pelajaran berikut:
			Aliran Sains/Aliran Teknikal:
			Mathematics / Physics / Engineering Physics / Chemistry / Engineering Chemistry / Biology / Computer Science / Civil Engineering Studies / Mechanical Engineering Studies / Electrical And Electronic Engineering Studies / Computing
			Atau
-/-			Aliran Perakaunan:
		11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	Mathematics / Ekonomi / Pengurusan Perniagaan / Akaun
			Dan
//			Mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat Sijil Pelajaran Malaysia (SPM)/setaraf dalam mata pelajaran berikut:
			i) Bahasa Inggeris
-			dan
			ii) Salah satu (1) daripada mata pelajaran berikut:
			Mathematics / Additional Mathematics / Physics / Chemistry / Biology / Lukisan Kejuruteraan / Teknologi Kejuruteraan / Pengajian Kejuruteraan Awam / Pengajian Kejuruteraan Mekanikal / Pengajian Kejuruteraan Elektrik & Elektronik / Prinsip Perakaunan / Ekonomi Asas / Perdagangan / Pengajian Keusahawanan / Perakaunan Perniagaan
			Dan
			Calon tidak cacat anggota.

Academic Guide Book



BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
23.	Ijazah Sarjana Muda Perniagaan	Memenuhi Syarat Am Universiti
	(Kepujian) Perniagaan	serta Suarat Khas Program
	RE09 (6 Semester)	Sgulut Kius Program
		Syarat Khas Program:
		Lulus Sijil Matrikulasi KPM/Asasi Sains UM/Asasi UiTM/setaraf (dalam aliran sains, aliran teknikal atau aliran perakaunan) dengan mendapat:
		Sekurang-kurangnya Gred C (2.00) dalam mana-mana satu (1) daripada mata pelajaran berikut:
		Aliran Sains/Aliran Teknikal:
		Mathematics / Physics / Engineering Physics / Chemistry / Engineering Chemistry / Biology / Computer Science / Civil Engineering Studies / Mechanical Engineering Studies / Electrical And Electronic Engineering Studies / Computing
		atau
		Aliran Perakaunan:
		Mathematics / Ekonomi / Pengurusan Perniagaan / Akaun
		Dan
		Mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat Sijil Pelajaran Malaysia (SPM)/setaraf dalam mata pelajaran:
		i) Bahasa Inggeris
		dan
		ii) Salah satu (1) daripada mata pelajaran berikut:
		Mathematics / Additional Mathematics / Prinsip Perakaunan / Ekonomi Asas / Perdagangan / Pengajian Keusahawanan / Perakaunan Perniagaan
		Dan
		Calon tidak cacat anggota.

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi				
	Program Teknologi Kejuruteraan					
24.	ljazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Bioteknologi Industri) RY21 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program				
25.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Kuasa Industri) RY31 (8 Semester)	Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:-				
26.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Rangkaian Elektronik) RY43 (8 Semester)	 (i) Physics / Engineering Physics / Chemistry / Engineering Chemistry/Biology / Civil Engineering Studies / Mechanical Engineering Studies / Electrical And Electronic Engineering Studies ; dan 				
27.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemesinan) RY55 (8 Semester)	(ii) Mathematics Calon yang menggunakan kelayakan mata pelajaran Chemistry / Engineering Chemistry / Biology / Civil Engineering Studies / Mechanical Engineering Studies Electrical And Electronic Engineering Studies and paringkat Matrikulasi / Acadims				
28.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Sistem Pertanian) RY56 (8 Semester)	mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics. dan				
29.	Ijazah Sarjana Muda Teknologi Kejuruteraan Awam (Kepujian) (Pembinaan) RY11 (8 Semester)	- Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.				
30.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pembangunan Produk) RY57 (8 Semester)					
31.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemprosesan Bahan) RY58 (8 Semester)					

Akademik Academic Guide Book



BAHASA MELAYU

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
32.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Teknologi Robotik dan Automasi) RY32 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
33.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Sistem Elektronik) RY40 (8 Semester)	Syarat Khas Program: Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:- (i) Physics / Engineering Physics / Chemistry / Engineering Chemistry/Biology / Civil
34.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Elektronik Bersepadu) RY44 (8 Semester)	Engineering Studies / Mechanical Engineering Studies / Electrical And Electronic Engineering Studies ; dan (ii) Mathematics
35.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Telekomunikasi Elektronik) RY41 (8 Semester)	Calon yang menggunakan kelayakan mata pelajaran Chemistry / Engineering Chemistry / Biology / Civil Engineering Studies / Mechanical Engineering Studies / Electrical And Electronic Engineering Studies pada peringkat Matrikulasi / Asasi perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics.
36.	ljazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Proses Kimia Industri) RY20 (8 Semester)	Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.

21

	BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
			Program Sains Sosial
	37.	ljazah Sarjana Muda Komunikasi Media Baharu (Kepujian) RA72 (6 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
			Syarat Khas Program:
			Lulus Sijil Matrikulasi KPM/Asasi Sains UM/Asasi UiTM/setaraf (dalam aliran sains, aliran teknikal atau aliran perakaunan) dengan mendapat:
			Sekurang-kurangnya Gred C (2.00) dalam mana-mana satu (1) daripada mata pelajaran berikut:
			Aliran Sains/Aliran Teknikal:
			Mathematics / Physics / Engineering Physics / Chemistry / Engineering Chemistry / Biology / Computer Science / Civil Engineering Studies / Mechanical Engineering Studies / Electrical And Electronic Engineering Studies / Computing
			atau
-/-		- / / · · ·	Aliran Perakaunan:
		(11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	Mathematics / Ekonomi / Pengurusan Perniagaan / Akaun
			Dan
	[]]]		Mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat Sijil Pelajaran Malaysia (SPM)/setaraf dalam mata pelajaran:
			i) Bahasa Inggeris
			atau
			ii) Mendapat sekurang-kurangnya tahap 2 (Band 2) dalam Malaysia University English Test (MUET)
			and the second sec
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Akademik Academic Guide Book

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Syarat Kemasukan Bagi Program Pengajian Ijazah Sidang Akademik 2014/2015 Calon Lepasan STPM

BIL (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
	Syarat Am Universiti
	Lulus Sijil Pelajaran Malaysia (SPM)/Setaraf dengan mendapat kepujian dalam mata pelajaran Bahasa Melayu/Bahasa Malaysia atau kepujian Bahasa Melayu/Bahasa Malaysia Kertas Julai.
	dan
	Lulus Peperiksaan Sijil Tinggi Persekolahan Malaysia (STPM) dengan mendapat sekurang-kurangnya PNGK 2.00 dan mendapat sekurang-kurangnya:
	• Gred C (NGMP 2.00) mata pelajaran Pengajian Am;
	dan
	• Gred C (NGMP 2.00) dalam dua (2) mata pelajaran lain.
	dan
	Mendapat sekurang-kurangnya Tahap 1 (Band 1) dalam Malaysian University English Test (MUET).

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
		Program Kejuruteraan
1.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mikroelektronik RK05 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
2.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekanikal RK08 (8 Semester)	Mendapat sekurang-kurangnya Gred C (NGMP 2.00) pada peringkat STPM dalam mata pelajaran berikut:
3.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Pembuatan RK13 (8 Semester)	(i) Physics / Chemistry; dan
4.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Komputer RK20 (8 Semester)	(ii) Mathematics T / Further Mathematics Calon yang menggunakan kelayakan mata pelajaran Chemistry pada peringkat
5.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Sistem Elektrik RK23 (8 Semester)	 STPM perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SF dalam mata pelajaran Physics. dan
6.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekatronik RK24 (8 Semester)	Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
7.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Industri RK45 (8 Semester)	
8.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Perhubungan RK53 (8 Semester)	
9.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Metalurgi RK56 (8 Semester)	

Academic Guide Book



BAHASA MELAYU

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
10.	ljazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Awam) RK01 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
	Kod dan nama terdahulu program ini Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bangunan RK82	Syarat Khas Program: Mendapat sekurang-kurangnya Gred C (NGMP 2.00) pada peringkat STPM dalam mata pelajaran berikut:
11.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rekabentuk Produk RK84 (8 Semester)	(ii) Physics / Chemistry; dan (ii) Mathematics T / Further Mathematics
12.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik RK86 (8 Semester)	Calon yang menggunakan kelayakan mata pelajaran Chemistry pada peringkat STPM perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics.
13.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Fotonik RK89 (8 Semester)	dan Calan tidak buta warna dan tidak cacat anggata sebinaga menuukarkan keria amali
14.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rangkaian Komputer RK93 (8 Semester)	Calon lidak bata warna aan lidak cacat anggota seningga mengakai kan kerja amail.
15.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektrik Sistem Tenaga RK96 (8 Semester)	
16.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Alam Sekitar RK07 (8 Semester)	
17.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bahan RK12 (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
18.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bioproses RK28 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
19.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Polimer RK32 (8 Semester)	Syarat Khas Program: Mendapat sekurang-kurangnya Gred C (NGMP 2.00) pada peringkat STPM dalam
20.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Bioperubatan RK85 (8 Semester)	mata pelajaran berikut: (i) Physics/ Chemistry / Biology; dan
21.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Biosistem RK90 (8 Semester)	(ii) Mathematics T / Further Mathematics Calon yang menggunakan kelayakan mata pelajaran Chemistry / Biology pada peringkat STPM perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics.
		dan
		Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali

Akademik Academic Guide Book



BIL	(i) Program Pengajian (ii) Kod	Kelayakan Minimum STPM
	(III) Tempon Pengajian	
	1	Program Perniagaan
22.	Ijazah Sarjana Muda Perniagaan (Kepujian) Keusahawanan Kejuruteraan	Memenuhi Syarat Am Universiti serta KEPERLUAN KHAS PROGRAM
	RP52 (6 Semester)	Syarat Khas Program:
		Lulus Sijil Tinggi Pelajaran Malaysia (STPM)/setaraf dengan mendapat:
		Sekurang-kurangnya Gred C (2.00) dalam mana-mana satu (1) daripada mata pelajaran berikut:
		Aliran Sains:
		Mathematics T/ Further Mathematics/ Physics/Chemistry/Biology/Information And Communications Technology (ICT)
		atau
		Aliran Sastera:
		Mathematics M / Ekonomi / Pengurusan Perniagaan / Perakaunan / Computer Science Dan
		Mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat Sijil Pelajaran Malaysia (SPM)/setaraf dalam mata pelajaran berikut:
		i) Bahasa Inggeris
		dan
		ii) Salah satu (1) daripada mata pelajaran berikut:
		Mathematics / Additional Mathematics / Physics / Chemistry / Biology / Lukisan Kejuruteraan / Teknologi Kejuruteraan / Pengajian Kejuruteraan Awam / Pengajian Kejuruteraan Mekanikal / Pengajian Kejuruteraan Elektrik & Elektronik / Prinsip Perakaunan / Ekonomi Asas / Perdagangan / Pengajian Keusahawanan / Perakaunan Perniagaan
		Dan Calantidal anattanata

hullin	BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
	23.	ljazah Sarjana Muda Perniagaan (Kepujian) Perniagaan Antarabangsa RE09 (6 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program Syarat Khas Program: Lulus Sijil Tinggi Pelajaran Malaysia (STPM)/setaraf dengan mendapat: Sekurang-kurangnya Gred C (2.00) dalam mana-mana satu (1) daripada mata pelajaran berikut: Aliran Sains: Mathematics T/ Further Mathematics/ Physics/Chemistry/Biology / Information And Communications Technology (ICT) atau Aliran Sastera:
			Mathematics M / Ekonomi / Pengurusan Perniagaan / Perakaunan / Computer Science Dan Mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat Sijil Pelajaran Malaysia (SPM)/setaraf dalam mata pelajaran berikut: i) Bahasa Inggeris dan ii) Salah satu (1) daripada mata pelajaran berikut: Mathematics / Additional Mathematics / Prinsip Perakaunan/ Ekonomi Asas/ Perdagangan/Pengajian Keusahawanan/Perakaunan Perniagaan Dan Calon tidak cacat anggota.

Akademik Academic Guide Book



BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
		Program Teknologi Kejuruteraan
24.	ljazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Bioteknologi Industri) RY21 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
25.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Kuasa Industri) RY31 (8 Semester)	Syarat Khas Program: Mendapat sekurang-kurangnya Gred C (NGMP 2.00) pada peringkat STPM dalam mata pelajaran berikut:
26.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Rangkaian Elektronik) RY43 (8 Semester)	(i) Physics/ Chemistry / Biology; dan (ii) Mathematics T / Further Mathematics
27.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemesinan) RY55 (8 Semester)	Calon yang menggunakan kelayakan mata pelajaran Chemistry / Biology pada peringkat STPM perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics.
28.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Sistem Pertanian) RY56 (8 Semester)	dan Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
29.	ljazah Sarjana Muda Teknologi Kejuruteraan Awam (Kepujian) (Pembinaan) RY11 (8 Semester)	
30.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pembangunan Produk) RY57 (8 Semester)	
31.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemprosesan Bahan) RY58 (8 Semester)	
32.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Teknologi Robotik dan Automasi) RY32 (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
33.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Sistem Elektronik) RY40 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
34.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Elektronik Bersepadu) RY44 (8 Semester)	Mendapat sekurang-kurangnya Gred C (NGMP 2.00) pada peringkat STPM dalam mata pelajaran berikut:
35.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Telekomunikasi Elektronik) RY41 (8 Semester)	(i) Physics/ Chemistry / Biology; dan (ii) Mathematics T / Further Mathematics
36.	ljazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Proses Kimia Industri) RY20 (8 Semester)	Calon yang menggunakan kelayakan mata pelajaran Chemistry / Biology pada peringkat STPM perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Physics.
		dan Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.

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BAHASA MELAYU

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BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
		Program Sains Sosial
37.	ljazah Sarjana Muda Komunikasi Media Baharu (Kepujian) RA72 (6 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
		Syarat Khas Program:
		Lulus Sijil Tinggi Pelajaran Malaysia (STPM)/setaraf dengan mendapat:
		Sekurang-kurangnya Gred C (2.00) dalam mana-mana satu (1) daripada mata pelajaran berikut:
		Aliran Sains:
		Mathematics T / Further Mathematics / Physics / Chemistry / Biology / Information And Communications Technology (ICT)
		atau
		Aliran Sastera:
		Mathematics M / Ekonomi / Pengurusan Perniagaan / Perakaunan / Computer Science
		Dan
		Mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat Sijil Pelajaran Malaysia (SPM)/setaraf dalam mata pelajaran berikut:
		i) Bahasa Inggeris
		atau
		ii) Mendapat sekurang-kurangnya tahap 2 (Band 2) dalam Malaysia University English Test (MUET)



Syarat Kemasukan Bagi Program Pengajian Ijazah Sidang Akademik 2014/2015 Calon Lepasan Diploma/Setaraf

E	BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
			Lulus peperiksaan Sijil Pelajaran Malaysia (SPM) atau peperiksaan yang diiktiraf setaraf dengannya oleh Kerajaan Malaysia serta mendapat kepujian dalam mata pelajaran Bahasa Melayu atau kepujian Bahasa Melayu Kertas Julai ;
			Dan
			Memiliki kelulusan Diploma atau kelulusan lain yang diiktiraf setaraf dengannya oleh Kerajaan Malaysia dan diluluskan oleh Senat Universiti;
			Atau
			Lulus peperiksaan Sijil Tinggi Persekolahan Malaysia (STPM) tahun 2012 atau sebelumnya dengan mendapat sekurang-kurangnya PNGK 2.00 dan mendapat;
			• Gred C (NGMP 2.00) dalam mata pelajaran Pengajian Am;
			dan
1-1-			• Gred C (NGMP 2.00) dalam dua (2) mata pelajaran lain;
		177799	atau
			Lulus peperiksaan Matrikulasi / Asasi tahun 2012 atau sebelumnya dengan mendapat s ekurang-kurangnya PNGK 2.00 ;
	///	11/////////////////////////////////////	dan
			Mendapat sekurang-kurangnya Tahap 1 (Band 1) dalam Malaysian University English Test (MUET).
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BAHASA MELAYU

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
		Program Kejuruteraan
1.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mikroelektronik RK05 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program Syarat Khas Program:
2.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekanikal RK08 (8 Semester)	Kelayakan Diploma Memiliki Diploma dari Institusi Pengajian Tinggi Awam (IPTA) atau institusi-institusi lain yang diiktiraf dalam bidang yang sesuai dengan kursus yang dipohon.
3.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Pembuatan RK13 (8 Semester)	Mendapat sekurang-kurangnya PNGK 2.50 pada peringkat Diploma . Nota: Penaecualian daripada beberapa mata pelajaran yana berkaitan boleh diberi tertakluk
4.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Komputer RK20 (8 Semester)	kepada keputusan peperiksaan yang diperolehi pada peringkat diploma. (Calon perlu sertakan salinan transkrip akademik dari semester satu hingga semester akhir semasa menghantar permohonan ke UniMAP).
5.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Sistem Elektrik RK23 (8 Semester)	Kelulusan pada peringkat Sijil TIDAK akan dipertimbangkan. atau
6.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekatronik RK24 (8 Semester)	Kelayakan STPM/Matrikulasi/Asasi (Tahun 2012 atau sebelumnya) Mengikut syarat kemasukan kelayakan STPM/Matrikulasi/ Asasi tahun semasa.
7.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Industri RK45 (8 Semester)	
8.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Perhubungan RK53 (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
9.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Metalurgi RK56 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program
10.	ljazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Awam) RK01 (8 Semester) Kod dan nama terdahulu program ini Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bangunan RK82	Syarat Khas Program: Kelayakan Diploma Memiliki Diploma dari Institusi Pengajian Tinggi Awam (IPTA) atau institusi-institusi lain yang diiktiraf dalam bidang yang sesuai dengan kursus yang dipohon. Mendapat sekurang-kurangnya PNGK 2.50 pada peringkat Diploma. Nota: Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi pada peringkat diploma.
11.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rekabentuk Produk RK84 (8 Semester)	(Calon perlu sertakan salinan transkrip akademik dari semester satu hingga semester akhir semasa menghantar permohonan ke UniMAP). Kelulusan pada peringkat Sijil TIDAK akan dipertimbangkan.
12.	12. Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik RK86 (8 Semester)	atau Kelayakan STPM/Matrikulasi/Asasi (Tahun 2012 atau sebelumnya)
13.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Fotonik RK89 (8 Semester)	Mengikut syarat kemasukan kelayakan STPM/Matrikulasi/ Asasi tahun semasa.
14.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rangkaian Komputer RK93 (8 Semester)	
15.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektrik Sistem Tenaga RK96 (8 Semester)	

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BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
16.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Alam Sekitar RK07 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program Syarat Khas Program: Kelayakan Diploma Memiliki Diploma dari Institusi Pengajian Tinggi Awam (IPTA) atau institusi-institusi lain yang diiktiraf dalam bidang yang sesuai dengan kursus yang dipohon. Mendapat sekurang-kurangnya PNGK 2.50 pada peringkat Diploma. Nota: Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi pada peringkat diploma. (Calon perlu sertakan salinan transkrip akademik dari semester satu hingga semester akhir semasa menghantar permohonan ke UniMAP). Kelulusan pada peringkat Sijil TIDAK akan dipertimbangkan. atau
17.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bahan RK12 (8 Semester)	
18.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bioproses RK28 (8 Semester)	
19.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Polimer RK32 (8 Semester)	
20.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Bioperubatan RK85 (8 Semester)	
21.	ljazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Biosistem RK90 (8 Semester)	Kelayakan STPM/Matrikulasi/Asasi (Tahun 2012 atau sebelumnya) Mengikut syarat kemasukan kelayakan STPM/Matrikulasi/ Asasi tahun semasa.

 BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
Program Perniagaan		
22.	ljazah Sarjana Muda Perniagaan (Kepujian) Keusahawanan Kejuruteraan RP52 (6 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program Syarat Khas Program:
23.	ljazah Sarjana Muda Perniagaan (Kepujian) Perniagaan Antarabangsa RE09 (6 Semester)	Kelayakan Diploma Memiliki Diploma dari Institusi Pengajian Tinggi Awam (IPTA) atau institusi-institusi lain yang diiktiraf dalam bidang yang sesuai dengan kursus yang dipohon.
		Mendapat sekurang-kurangnya PNGK 2.50 pada peringkat Diploma . Nota: Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi pada peringkat diploma. (Calon perlu sertakan salinan transkrip akademik dari semester satu hingga semester akhir semasa menghantar permohonan ke UniMAP).
		Kelulusan pada peringkat Sijil TIDAK akan dipertimbangkan.
		atau
		Kelayakan STPM/Matrikulasi/Asasi (Tahun 2012 atau sebelumnya)
 		Mengikut syarat kemasukan kelayakan STPM/Matrikulasi/ Asasi tahun semasa.
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BAHASA MELAYU

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM		
	Program Teknologi Kejuruteraan			
24.	ljazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Bioteknologi Industri) RY21 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program Syarat Khas Program:		
25.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Kuasa Industri) RY31 (8 Semester)	Kelayakan Diploma Memiliki Diploma dari Institusi Pengajian Tinggi Awam (IPTA) atau institusi-institusi lain yang diiktiraf dalam bidang yang sesuai dengan kursus yang dipohon.		
26.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Rangkaian Elektronik) RY43 (8 Semester)	Mendapat sekurang-kurangnya PNGK 2.50 pada peringkat Diploma . Nota: Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi pada peringkat diploma. (Calon perlu sertakan salinan transkrip akademik dari semester satu bingga semester akhir		
27.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemesinan) RY55 (8 Semester)	semasa menghantar permohonan ke UniMAP). Kelulusan pada peringkat Sijil TIDAK akan dipertimbangkan. atau		
28.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Sistem Pertanian) RYS6 (8 Semester)	Kelayakan STPM/Matrikulasi/Asasi (Tahun 2012 atau sebelumnya) <i>Mengikut syarat kemasukan</i> kelayakan STPM/Matrikulasi/ Asasi tahun semasa.		
29.	ljazah Sarjana Muda Teknologi Kejuruteraan Awam (Kepujian) (Pembinaan) RY11 (8 Semester)			
30.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pembangunan Produk) RY57 (8 Semester)			

	BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM
	31.	ljazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemprosesan Bahan) RY58 (8 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program Syarat Khas Program:
	32.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Teknologi Robotik dan Automasi) RY32 (8 Semester)	 Kelayakan Diploma Memiliki Diploma dari Institusi Pengajian Tinggi Awam (IPTA) atau institusi-institusi lai yang diiktiraf dalam bidang yang sesuai dengan kursus yang dipohon. Mendapat sekurang-kurangnya PNGK 2.50 pada peringkat Diploma. Nota: Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertaklu kepada keputusan peperiksaan yang diperolehi pada peringkat diploma.
	33.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Sistem Elektronik) RY40 (8 Semester)	
	34.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Elektronik Bersepadu) RY44 (8 Semester)	(Calon perlu sertakan salinan transkrip akademik dari semester satu hingga semester akhir semasa menghantar permohonan ke UniMAP). Kelulusan pada peringkat Sijil TIDAK akan dipertimbangkan.
	35.	ljazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Telekomunikasi Elektronik) RY41 (8 Semester)	Kelayakan STPM/Matrikulasi/Asasi (Tahun 2012 atau sebelumnya) Mengikut syarat kemasukan kelayakan STPM/Matrikulasi/ Asasi tahun semasa.
	36. Ijazah Sarjana Muda Teknologi Kejuruteraa Kimia (Kepujian) (Prose Kimia Industri) RY20 (8 Semester)	Ijazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Proses Kimia Industri) RY20 (8 Semester)	
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BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum STPM	
	Program Sains Sosial		
37.	ljazah Sarjana Muda Komunikasi Media Baharu (Kepujian) RA72 (6 Semester)	Memenuhi Syarat Am Universiti serta Syarat Khas Program	
		Syarat Khas Program:	
		Kelayakan Diploma	
		Memiliki Diploma dari Institusi Pengajian Tinggi Awam (IPTA) atau institusi-institusi lain yang diiktiraf dalam bidang yang sesuai dengan kursus yang dipohon.	
		Mendapat sekurang-kurangnya PNGK 2.50 pada peringkat Diploma.	
		Nota: Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi pada peringkat diploma.	
		(Calon perlu sertakan salinan transkrip akademik dari semester satu hingga semester akhir semasa menghantar permohonan ke UniMAP).	
		Kelulusan pada peringkat Sijil TIDAK akan dipertimbangkan.	
		atau	
		Kelayakan STPM/Matrikulasi/Asasi (Tahun 2012 atau sebelumnya)	
		Mengikut syarat kemasukan kelayakan STPM/Matrikulasi/ Asasi tahun semasa.	

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 Perniaagan dan Sariana 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 mengambil18 unit kursus Keperluan Universiti.

Pelajar juga perlu lulus semua kursus dan mendapat jumlah kredit yang diperlukan mengikut program pengajian masing-masing serta PNGK sekurangkurangnya 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 120 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 untuk Komunikasi Teknikal	2	
e. Tamadun Islam & Tamadun Asia	2	
f. Hubungan Etnik	2	
g. Ko-kurikulum	3	
h. 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 untuk Komunikasi Teknikal	2	
e. Tamadun Islam & Tamadun Asia	2	
f. Hubungan Etnik	2	
g. Kemahiran & Teknologi dalam Komunikasi	2	
h. Ko-kurikulum	3	
i. 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 Akademik	2
e. Tamadun Islam & Tamadun Asia	2
f. Hubungan Etnik	2
g. Kemahiran & Teknologi dalam Komunikasi	2
h. Komunikasi dalam Perniagaan	3
i. 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 Akademik	2
e. Tamadun Islam & Tamadun Asia	2
f. Hubungan Etnik	2
g. Kemahiran & Teknologi dalam Komunikasi	2
h. Komunikasi dalam Perniagaan	3
i. 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	18	
a. Kemahiran Berfikir	2	
b. Bahasa Melayu Universiti	3	
c. Bahasa Inggeris Akademik	2	
d. Tamadun Islam & Tamadun Asia	2	
e. Hubungan Etnik	2	
f. Bahasa Asing	4	
g. Ko-kurikulum	3	
JUMLAH	120	

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 utama untuk pengijazahan. Kursus-kursus tersebut ialah:

a. Keusahawanan Kejuruteraan (2 unit)

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

b. Hubungan Etnik (2 unit)

Semua pelajar wajib mengambil kursus Hubungan Etnik.



- c. Tamadun Islam & Tamadun Asia (2 unit) Kursus Tamadun Islam & Tamadun Asia wajib diambil oleh semua pelajar.
- d. Bahasa Melayu Universiti (2 unit) Kursus Bahasa Melayu Universiti wajib diambil oleh semua pelajar.
- e. Bahasa Inggeris Untuk Komunikasi Teknikal/ Bahasa Inggeris Akademik (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). Pelajar yang memperolehi band 1, 2 dan 3 dalam MUET dikehendaki mengambil Bahasa Inggeris Asas dan lulus gred C sebelum dibenarkan mengambil Bahasa Inggeris untuk Komunikasi Teknikal atau Bahasa Inggeris Akademik. Dua (2) unit tambahan kursus Bahasa Inggeris Asas ini boleh dikira sebagai Kursus Opsuen. Pelajar yang memperolehi band 4 dan 5 dalam MUET, boleh mengambil 2 unit tambahan kursus Bahasa Inggeris Asas dan dikira sebagai kursus opsyen.

f. Kemahiran Berfikir (2 unit)

Semua wajib mengambil kursus Kemahiran Berfikir.

g. Kemahiran dan Teknologi Dalam Komunikasi (2 unit)

Kursus Kemahiran dan Teknologi dalam Komunikasi wajib diambil oleh pelajar Sarjana Muda Teknologi Kejuruteraan dan Sarjana Muda Perniagaan. h. Komunikasi Dalam Perniagaan (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. Kursuskursus ini menjadi sebahagian keperluan 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 manamana kursus Teras Teknologi Kejuruteraan mesti mengulanginya sebelum layak dipertimbangkan untuk pengijazahan

7.

Kursus Pra-Syarat

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 kursuskursus 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 Opsyen

Kursus Opsyen merupakan mana-mana kursus yang ditawarkan oleh Pusat Pengajian Pembangunan Insan dan Teknokomunikasi (iKOM) dan Pusat Bahasa Antarabangsa untuk pelajar program Program Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan. Sebanyak 2 unit Kursus Opsyen perlu diambil oleh pelajar program Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan sepanjang pengajian mereka di UniMAP. Pra-syarat merupakan kursus yang wajib diambil dan lulus oleh pelajar, sebelum mendaftar kursus yang berikutnya. Kursus yang berikutnya itu dikenakan pra-syarat ke atasnya seperti yang ditentukan dalam struktur akademik program Ijazah Sarjana Muda. Untuk mendaftar kursus berikutan yang mempunyai pra-syarat, pelajar perlu terlebih dahulu lulus kursus pra-syarat tersebut. Pelajar yang gagal dalam kursus pra-syarat tersebut. Pelajar yang gagal dalam kursus pra-syarat tersebut seiring dengan kursus yang berikutnya (dalam semester sama), namun hendaklah memohon dan mendapatkan kelulusan Dekan Pusat Pengajian. Perkara ini walau bagaimanapun, tidak terpakai bagi kursus-kursus bahasa

Sistem Unit

Setiap kursus diberikan nilai yang dikenali sebagai **UNIT** (kecuali mana-mana kursus-kursus yang diluluskan oleh Senat Universiti). Unit diberikan berdasarkan skop dan kedalaman kursus berkenaan. Kecuali dalam keskes tertentu, nilai unit bagi kursus yang mempunyai unit adalah seperti **Jadual 2**:

Jadual 2 : Penilaian Unit bagi setiap minggu untuk	٢
Semester 14 Minggu	

Bentuk Pertemuan	Nilai Unit	Jumlah Pertemuan Setiap Minggu
Kuliah	1	1 jam 🚽
Makmal/Tutorial	1	2 jam
Projek Tahun Akhir	1	3 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 adalah bersamaan 2 jam pertemuan dalam seminggu atau 28 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.
- 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 12 minggu Latihan Industri untuk mendapatkan 4 kredit, pelajar Sarjana Muda Teknologi Kejuruteraan Tahun 4 pula dikehendaki untuk menjalani 12 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 multinasional di Malaysia dan bagi Pilihan Kedua (3+1), pelajar akan menjalani Latihan Industri di syarikat multinasional di Malaysia dan 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 12 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 dalam 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) akan menyelaraskan bersama pusat-pusat lain kursuskursus yang melibatkan industri seperti di bawah:

1. Pendedahan Industri (IndEx)

- a. Skim singkat 1 hari
- b. Pakar-pakar, pengurus dan jurutera-jurutera dari industri dijemput untuk mengadakan taklimat, demonstrasi dan dialog mengikut jadual yang disediakan

Sidang Akademik 2014/2015 - Academic Session 2014/2015



- c. Melibatkan lawatan ke industri
- d. Pendedahan ini adalah bagi pelajar-pelajar yang telah menyempurnakan pengajian Tahun 1
- 2. Pendedahan Keusahawanan Industri (IndEnt)
 - a. Program singkat 1 hari
 - b. Penyertaan sektor Industri Kecil, firma R&D dan badan-badan kerajaan seperti Kementerian Pembangunan Usahawan dan Koperasi.
 - c. Berbentuk taklimat, dialog, dan demonstrasi
 - d. Melibatkan pelajar-pelajar Tahun 2

Program Inkubator Perniagaan

Pendekatan Pengajaran dan Pembelajaran untuk program Sarjana Muda (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 12 minggu. Mereka akan mendapat 6 jam kredit.

Pelajar dibimbing oleh syarikat-syarikat dalam Inkubator Perniagaan. Ini akan memberi mereka peluang untuk menjadi sebahagian daripada pasukan yang terlibat dalam pembangunan produk yang mungkin membawa kepada pengkomersilan. Mereka dapat mengetahui bagaimana idea dan inovasi boleh membawa kepada penghasilan produk untuk pengguna. Di samping itu, mereka juga akan melihat sendiri aliran proses perniagaan.

Pada akhir Program Inkubator Perniagaan, pelajar dikehendaki menyediakan satu laporan mengenai pengalaman mereka sepanjang Program Inkubator Perniagaan yang telah mereka jalani dalam syarikatsyarikat terpilih.

Inkubator perniagaan Malaysia telah membentuk satu kumpulan yang rapat di bawah National Incubator Network Association (NINA) dan 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 pertubuhanpertubuhan 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 Antarabangsa) pula akan mengikuti Latihan Industri mengikut Pilihan Pertama (2+2) atau Pilihan Kedua (3+1).

Bagi Pilihan Pertama, iaitu *Pilihan 2+2*, pelajar akan mengikuti 2 fasa (2 bulan + 2 bulan) Latihan Industri di syarikat-syarikat multinasional 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 multinasional 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.

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 3(a), 3(b) dan 3(c)** di bawah:

Jadual 3(a): Abjad Pertama; Peringkat Pengajian /Jenis program yang ditawarkan di peringkat Sarjana Muda

Huruf Pertama di dalam Kod	Jenis Program
E	Sarjana Muda Kejuruteraan
В	Sarjana Muda Perniagaan
Р	Sarjana Muda Teknologi Kejuruteraan
К	Sarjana Muda Komunikasi Media Baharu
U	Kursus Umum (Subjek ini boleh diambil oleh pelajar dari semua program pengajian)

Jadual 3(b): Abjad Kedua; Pusat Pengajian yang Menawarkan Kursus

Huruf Kedua di dalam Kod	Pusat Pengajian
E	PPK Sistem Elektrik
Μ	PPK Mikroelektronik
К	PPK Komputer & Perhubungan
Ν	PPK Mekatronik
В	PPK Bahan
Р	PPK Pembuatan
R	PPK Bioproses
А	PPK Alam Sekitar
D	Pusat Pengajian Teknologi Kejuruteraan
0	Mekanikal
G	Pusat Pengajian Teknologi Kejuruteraan Elektronik
L	Pusat Pengajian Teknologi Kejuruteraan Elektrik
S	Pusat Pengajian Teknologi Kejuruteraan Awam
Т	Pusat Pengajian Teknologi Kejuruteraan Kimia
С	Pusat Kejuruteraan
Q	Institut Matematik Kejuruteraan
I	Pusat Kerjasama Industri

Huruf Kedua di dalam Kod	Pusat Pengajian		
F	Pusat Pengajian Inovasi Perniagaan &		
1	Teknousahawan		
11	Pusat Pengajian Pembangunan Insan dan		
0	Teknokomunikasi		
V	Pusat Bahasa Antarabangsa		
Z	Pusat Ko-kurikulum		

Jadual 3(c): Abjad Ketiga; Kursus Teras atau Kursus Keperluan Universiti;

Huruf Ketiga di dalam Kod	Jenis Kursus		
Т	Kursus Teras/Elektif		
W	Kursus Keperluan Universiti		

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 4** di bawah:

B	C	1	2	3	4	ANGKA	DESKBIDSI
↓	↓	↓	↓	\downarrow	↓	ANGKA	DESKRIPSI
↓	↓	Ļ	↓↓	↓	\rightarrow	4	Unit/Kredit
↓	Ļ	Ļ	Ļ	L	\rightarrow	3	Kelompok Kursus. (Penentuan kelompok
Ļ	Ļ	Ļ	L	\rightarrow	\rightarrow	2	kursus ditentukan oleh Pusat Pengajian masing-masing)
		L	\rightarrow	\rightarrow	\rightarrow	1	Aras/ Tahap Kursus program Sarjana Muda: • 1=subjek Tahun 1, • 2= subjek Tahun 2, • 3= subjek Tahun 3, • 4= subjek Tahun 4,
Ļ	L	\rightarrow	\rightarrow	\rightarrow	\rightarrow	JENIS KURSUS	Sila rujuk Jadual 3(c)
L	\rightarrow	\rightarrow	\rightarrow	\rightarrow	\rightarrow	PUSAT PENGAJIAN	Sila rujuk Jadual 3(b)
\rightarrow	\rightarrow	\rightarrow	\rightarrow	\rightarrow	\rightarrow	PERINGKAT PENGAJIAN	Sila rujuk Jadual 3(a)
		B C ↓ ↓	B C 1 \downarrow \rightarrow \downarrow \downarrow \rightarrow \downarrow \downarrow \rightarrow \downarrow \downarrow \rightarrow	B C 1 2 \downarrow	B C 1 2 3 \downarrow	B C 1 2 3 4 \downarrow	BC1234 \downarrow \rightarrow \downarrow \downarrow \downarrow \downarrow \rightarrow \rightarrow \downarrow \downarrow \downarrow \rightarrow \rightarrow \rightarrow \downarrow \downarrow \downarrow \rightarrow \rightarrow \rightarrow \downarrow \downarrow \rightarrow \rightarrow \rightarrow \rightarrow \downarrow \downarrow <

Jadual 4: Kod Kursus

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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-pendafataran ini adalah sebelum bermula cuti semester pada semester semasa. Semua pelajar (Aktif/Percubaan/Berhutang) **DIWAJIBKAN** melakukan proses pra-pendaftaran ini.

Pelajar dinasihatkan mendaftar pada tarikh yang ditetapkan. Kursus yang perlu didaftarkan adalah kursus yang akan diambil pada semester akan datang (semua kursus termasuk Kokurikulum). Pelajar digalakkan berjumpa Rakan Pendamping Siswa (RPS) dan mengisi borang HEA-09a sebelum membuat proses Pra-pendaftaran tersebut. Pelajar yang gagal membuat proses Pra-pendaftaran dalam tempoh yang ditetapkan akan menyebabkan pendaftaran rasmi kursus bagi semester hadapan terjejas (tempat tertakluk kepada kekosongan). Pelajar tidak perlu mencetak slip pra-pendaftaran ini 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. Hanya 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.

Pelajar juga perlu mengisi Borang HEA-09a (Borang Pendaftaran Kursus). Keterangan mengenai Pendaftaran Kursus pelajar berstatus Aktif diringkaskan seperti di **Jadual 5** di bawah:

Jadual 5: Ringkasan Pendaftaran Kursus Pelajar Berstatus Aktif

Status Pelajar	Minimum	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.

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 pengesahan daripada Dekan dan 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 6** berikut:

Jadual 6: Ringkasan Pendaftaran Kursus Pelajar Percubaan (P)

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

2. Gugur Kursus

- 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.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

3. Tarik Diri Kursus (TD)

- 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.
- 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 digalakkan 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).

- 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).
- 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 kursuskursus 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 tidak akan diambil kira dalam pengiraan PNG/PNGK dan kredit.

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 keskes 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 Jabatan Pendaftar atau 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. Sidang Akademik 2014/2015 - Academic Session 2014/2015

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 sekurangkurangnya 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 yang dibenarkan mengambil Kursus Kuratif (iaitu kursus yang ditawarkan semasa cuti panjang), keputusan peperiksaan Kursus-kursus Kuratif akan dicantumkan dengan keputusan peperiksaan Semester 2 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 satusatu 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). Walau bagaimanapun, bagi pelajar yang memperolehi pengecualian kredit, tempoh maksimum yang dibenarkan tertakluk kepada pengecualian kredit yang diberikan oleh pihak Universiti 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. Pendaftaran 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.

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 7: 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 8: Gred Abjad dan Mata Penilaian

GRED	MATA NILAI	STATUS
Α	4.00	
A-	3.75	
B+	3.50	
В	3.00	111110
В-	2.75	LULUS
C+	2.50	
C	2.00	

GRED	MATA NILAI	STATUS
C-	1.75	
D+	1.50	
D	1.00	TIDAK LULUS
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
- Sekiranya pelajar memperolehi PNGK (CGPA) > 2.00 dan mendapat Gred C- atau Gred D+ untuk Kursus Teras, ianya adalah dikira sebagai LULUS.

Jadual 9: 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	Α	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	С	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					
	$\langle \rangle \rangle$		1		
$PNGK = \underline{Jumlah NG Terkumpul}$ $Jumlah Bil. Unit Terkumpul$ $= \underline{62.00 + 59.75}$ $20 + 18$ $= 3.20$					



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 benarbenar 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 kursuskursus 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 yang lain Sidang Akademik 2014/2015 - Academic Session 2014/2015



seperti Bahasa Arab, Bahasa Jerman, Bahasa Jepun, Bahasa Mandarin, Bahasa Korea, Bahasa Rusia dan Bahasa Thai.

5. Pusat Kokurikulum

Pusat Kokurikulum menawarkan pelbagai kursus kokurikulum dan kursus-kursus Badan Beruniform. Semua pelajar wajib untuk mengambil 3 unit kursus Kokurikulum. Pusat ini menawarkan sehingga 44 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

ademi

Bahagian Pengurusan Akademik ini bertanggungjawab untuk mengendalikan 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:

- 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.
- ix. Mengendalikan urusan peminjaman dan pemulangan jubah staf akademik.
- x. Menyemak kelayakan pengijazahan untuk pelajar tahun akhir serta mengeluarkan surat penamatan pengajian dan kelayakan pengijazahan untuk pelajar yang layak bergraduat.
- xi. Bertanggungjawab terhadap konvokesyen pelajar dari segi jemputan serta pinjaman dan pemulangan pakaian konvokesyen.
- xii. Menguruskan proses penyediaan dan penyerahan skrol pengijazahan kepada graduan.
- xiii. Merekod dan mengemaskini data siswazah.

3. Unit Senat

UnitSenatbertanggungjawabuntukmengendalikan urusan yang berkaitan dengan Senat Universiti. Antara tugas dan tanggungjawab yang dijalankan adalah:

- 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.
- 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.

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Academic Calendar 2014/2015 Session

(Degree Programme)

SEMESTER 1 8 th September 2014 – 18 th January 2015 (19 Weeks)					
ACTIVITIES	DA	ΤE	PERIOD	NOTE	
Registration New Intake / Orientation	1 st September 2014	7 th September 2014	5 Days	-	
Lecture	8 th September 2014	19 th October 2014	6 Weeks	Malaysia Day 16 th September 2014 UniMAP Convocation 27 th September & 28 th September 2014 Hari Raya Aidiladha 5 th October, 6 th & 7 th October 2014	
Mid Semester Break	20 th October 2014	26 th October 2014	1 Week	Deepavali 23 rd October 2014 Awal Muharam 25 th October 2014	
Lecture	27 th October 2014	21 st December 2014	8 Weeks	-	
Revision Week	22 nd December 2014	28 th December 2014	1 Week	Christmas 25 th December 2014	
Examination Week	29 th December 2014	18 th January 2015	3 Weeks	Maulidur Rasul 3 rd January 2015	
Semester Break	19 th January 2015	15 th February 2015	4 Weeks	-	



Academic Calendar 2014/2015 Session (Degree Programme)

SEMESTER 2 16 February 2015 – 28 June 2015 (19 Weeks)				
ACTIVITIES	DA	TE	PERIOD	NOTE
Lecture	16 th February 2015	5 th April 2015	7 Weeks	Chinese New Year 19 th February 2015 - 20 th February 2015 Additional leave for all UniMAP students for Chinese New Year is from 16 th February to 18 th February 2015. All academic activities scheduled during this period must be replaced. Official Class/lecture will begin on 23 rd February 2015
Mid Semester Break	6 th April 2015	12 th April 2015	1 Week	-
Lecture	13 th April 2015	31 st May 2015	7 Weeks	Labour Day 1 st May 2015 Wesak Day May 2015 Israk Mikraj 16 th May 2015 Birthday of DYMM Tuanku Raja Perlis 17 th May 2015
Revision Week	1st June 2015	7 th June 2015	1 Week	Birthday of SPB Yang Di-Pertuan Agong 6 th June 2015 Nuzul Al-Quran 4 th July 2015
Examination Week	8 th June 2015	28 th June 2015	3 Weeks	
Semester Break / Industrial Training	29 th June 2015	6 th September 2015	10 Weeks * Industrial Training	Hari Raya Aidilfitri 18 th July 2015 & 19 th July 2015



Admission Requirements for Undergraduate Degree Program Academic Session of 2014/2015 International Students

Country	General Requirements	Specific Requirements		
China	Completed 12 years of education in 3 levels of achaeling (Primary School, Junior Middle	Bachelor of	(Electronic-Based)	
	School, and Senior Middle School).	Engineering	English Mathematics Physics (Chamistry	60% 60%
	Graduated from Senior Middle School with Senior High School Certificate.		(Bio-Based)	00%
	Obtain minimum average score of 60% in Senior High School Certificate.		English Mathematics Physics/Chemistry/Biology	60% 60% 60%
	 Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed bu the Universitu Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%
Indonesia	Completed 12 years of education in 3 levels of	Bachelor of	(Electronic-Based)	
indonesia	schooling (Primary School, Junior Secondary School, and Senior Secondary School @ Sekolah Menengah Atas). • Pass Senior Secondary @ Sekolah Menengah Atas examination.	Engineering	 English Mathematics Physics/Chemistry 	60% 60% 60%
	• Pass with minimum Grade Point Average (GPA) of		(Bio-Based)	
 Atas exam Obtain TOE (Candidates equivalent to undergo Inte in UniMAP). Other requ 	 Obtain TOEFL 525 / IELTS 5.5 / Equivalent 		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ 	60% 60% 60%
	the University Senate.		Accounting	



Country	General Requirements		Specific Requirements	
Saudi Arabia	• Completed 12 years of education in 3 levels of schooling (Elementary School, Intermediate School, and General Secondary School/Technical Junior College)	Bachelor of Engineering	(Electronic-Based) English Mathematics Physics/Chemistry 	60% 60% 60%
	Pass and obtain at least 60% in General Secondary Education Certificate (Tawiihiyah)/		(Bio-Based)	
	Secondary Vocational School Diploma/ Secondary Commercial School Diploma/ Secondary Agricultural School Diploma		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or 	60% 60% 60%
	equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).		Business/Economics/Commerce/ Accounting	60%
	• Other requirements that have been endorsed by the University Senate.			
Iraq	• Completed 11 or 12 years of education in 3 levels of schooling (Primary School, Intermediate Secondary School, and Preparatory Secondary School/Vocational Secondary School)	Bachelor of Engineering	(Electronic-Based)	
			 English Mathematics Physics/Chemistry 	60% 60% 60%
	• Pass and obtain at least 60% in Preparatory Secondary School/Vocational Secondary School.		(Bio-Based)	
	Obtain TOEFL 525 / IELTS 5.5 / Equivalent		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	(Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).	Bachelor of Business	English Mathematics Physics/Chemistry/Biology or	60% 60% 60%
	 Other requirements that have been endorsed by the University Senate. 		Business/Economics/Commerce/ Accounting	60%

Country	General Requirements		Specific Requirements	
Nigeria	 Completed 12 years of education in 2 or 3 levels of schooling (Primary School, Junior Secondary School and Senior Secondary School/Technical Secondary School) Pass and obtain at least B in five (5) subjects in 	Bachelor of Engineering	(Electronic-Based) • English • Mathematics • Physics/Chemistry	60% 60% 60%
	 Obtain TOEFL 525 / IELTS 5.5 / Equivalent Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	(Bio-Based) English Mathematics Physics/Chemistry/Biology English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	60% 60% 60% 60% 60% 60%
Thoiland	 Completed 12 years of education in 3 levels of schooling (Primary School, Lower Secondary School and Upper Secondary School/Religious School) Pass and obtain at least CGPA 2.4 or 60% in Higher Secondary School Certificate (Mathayam Suksa 6) Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Engineering Bachelor of Business	(Electronic-Based) English Mathematics Physics/Chemistry English Mathematics Physics/Chemistry/Biology English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	60% 60% 60% 60% 60% 60% 60% 60%

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Country	General Requirements		Specific Requirements	
Uzbekistan	Completed 11 or 12 years of education in 2 levels of schooling (Primary School, General Secondary School and Technical Secondary School/ Upper Secondary School /Specialized Secondary	Bachelor of Engineering	(Electronic-Based) English Mathematics Physics (Chemistry) 	60% 60%
	School)		(Bio-Based)	00%
	Secondary School/ Upper Secondary School / Specialized Secondary School.		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 Obtain TOEFL 5257 TELTS 5.57 Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / TELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/Accounting 	60% 60% 60%
Yemen	 Completed 12 years of education in 2 levels of schooling (Basic and Upper Secondary School / Vocational Secondary School) Pass both Intermediate School Certificate (ISC) 	Bachelor of Engineering	(Electronic-Based) • English • Mathematics • Physics/Chemistry	60% 60% 60%
	and General Secondary School Certificate (Al- Thanawiya) examination.		(Bio-Based)	
	• Obtain at least 60% in General Secondary School Certificate (Al-Thanawiya).		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%

Country	General Requirements		Specific Requirements	
Somalia	 Completed 12 years of education in 2 levels of schooling (Primary School and Secondary School) Pass and obtain at least 60% in Secondary School Leaving Certificate (SSLC) or Technical 	Bachelor of Engineering	(Electronic-Based)	60%
			Mathematics Physics/Chemistry	60% 60%
	Secondary School Certificate.		(Bio-Based)	1
	Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification		English Mathematics Physics (Chemistry/Biology	60% 60%
	equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).	Bachelor of Business	English Mathematics Physics/Chemistry/Biology	60% 60% 60%
	Other requirements that have been endorsed by the University Senate.		Business/Economics/Commerce/ Accounting	60%
Mauritius	 Completed 12 years of education in 3 levels of schooling (Primary School, Lower Secondary School and Upper Secondary School) Pass Higher School Certificate / General Certificate of Education A-level examination and pass at least three (3) subjects (Advanced Level). Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). 	Bachelor of Engineering	(Electronic-Based)	
			EnglishMathematicsPhysics/Chemistry	60% 60% 60%
- FEI II			(Bio-Based)	
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
		Bachelor of Business	 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	• Other requirements that have been endorsed by the University Senate.		Business/Economics/Commerce/ Accounting	60%
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Country	General Requirements		Specific Requirements	
Sudan	• Completed 11 years of education in 2 levels of schooling (Basic School and Secondary School / Technical School)	Bachelor of Engineering	(Electronic-Based) English Mathematics 	60% 60%
	 Pass and obtain at least 60% in Sudan Secondary School Certificate. Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 		Physics/Chemistry (Bio-Based)	60%
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
		Bachelor of Business	English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	60% 60% 60%
Syria	 Completed 12 years of education in 3 levels of schooling (Basic Education I School, Basic Education II School and General Secondary School / Technical Secondary School) Pass and obtain at least 60% in Al-Shahada Al Thanawiyah Al Amma @ Secondary School Leaving Certificate / Al Shahada Al-Thanawiyah Al-Fanniyya @ Technical Baccalaureat. 	Bachelor of Engineering	(Electronic-Based) English Mathematics Physics/Chemistry 	60% 60% 60%
			(Bio-Based)	
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%

Country	General Requirements		Specific Requirements	
Jordan	Completed 12 years of education in 2 levels of schooling (Basic School and Secondary School / Vocational Secondary School)	Bachelor of Engineering	(Electronic-Based) • English • Mathematics	60% 60%
	Pass and obtain at least 60% in <i>Al-Tawjihi</i> @ General Secondary Education Certificate / Vocational Certificate		Physics/Chemistry (Bio-Based)	60%
Obtain TOEFL 525 / IELTS 5.5 / Equivalent		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%	
	equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or 	60% 60% 60%
	• Other requirements that have been endorsed by the University Senate.		Business/Economics/Commerce/ Accounting	60%
Pakistan	 Completed 12 years of education in 2 levels of schooling (Secondary School and Higher Secondary School) Pass and obtain at least 60% in Higher Secondary School Certificate (HSSC). Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). 	Bachelor of Engineering	(Electronic-Based)	
			EnglishMathematicsPhysics/Chemistry	60% 60% 60%
			(Bio-Based)	
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
		Bachelor of Business	 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	the University Senate.		Business/Economics/Commerce/ Accounting	60%
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Country	General Requirements	Specific Requirements		
Libya	 Completed 12 years of education in 2 levels of schooling (Basic School and Secondary School) Pass and obtain at least 60% in Secondary Education Certificate. 	Bachelor of Engineering	(Electronic-Based) • English • Mathematics • Physics/Chemistry	60% 60% 60%
	• Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).		(Bio-Based) • English • Mathematics • Physics/Chemistry/Biology	60% 60% 60%
	Other requirements that have been endorsed by the University Senate.	Bachelor of Business	English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	60% 60% 60%
Ethiopia	 Completed 12 or 13 years of education in 3 levels of schooling (Primary School, General Secondary School and Preparatory Secondary School/ Technical/Vocational School) Pass and obtain at least Grade C for 5 subjects in Ethiopian Higher Education Entrance Examination (EHEEE) or Technical/Vocational School Certificate. Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Engineering Bachelor of Business	(Electronic-Based) • English • Mathematics • Physics/Chemistry (Bio-Based) • English • Mathematics • Physics/Chemistry/Biology • English • Mathematics • Physics/Chemistry/Biology or • Business/Economics/Commerce/ Accounting	60% 60% 60% 60% 60% 60% 60% 60%

Country	General Requirements		Specific Requirements	
Iran	• Completed 12 years of education in 3 levels of schooling (Primary School, Secondary School and Pre-University)	Bachelor of Engineering	(Electronic-Based) • English • Mathematics	60% 60%
	 Pass Secondary/High School Diploma and Pre- University Certificate (KONKUR) with minimum score of 13 in KONKUR. Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). 		Physics/Chemistry (Bio-Based)	60%
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
		Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or 	60% 60% 60%
	• Other requirements that have been endorsed by the University Senate.		Business/Economics/Commerce/ Accounting	60%
Palestine	 Completed 12 years of education in 2 levels of schooling (Basic School and Secondary School/ Technical Secondary School) Pass and obtain at least 60% in Secondary School Certificate (<i>Al-Tawjihi</i>). Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). 	Bachelor of Engineering	(Electronic-Based)	1
			EnglishMathematicsPhysics/Chemistry	60% 60% 60%
LUI			(Bio-Based)	J
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
		Bachelor of Business	 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	the University Senate.			Business/Economics/Commerce/ Accounting
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Country	General Requirements		Specific Requirements	
Chad	Completed 13 years of education in 2 levels of schooling (Primary School and Secondary School)	Bachelor of	(Electronic-Based)	
	• Pass and obtain at least 60% in <i>Baccalaureat</i> .	Linginicering	EnglishMathematicsPhysics/Chemistry	60% 60% 60%
	• Obtain TOEFL 525 / IELTS 5.5 / Equivalent		(Bio-Based)	
	(Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP)		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/	60% 60% 60%
			Accounting	
Algeria	Completed 13 years of education in 2 levels of schooling (Primary School and Secondary School)	Bachelor of Engineering	(Electronic-Based)	T
	 Pass Diploma of Secondary Education (<i>Baccalaureat</i>) with minimum score of 15. Obtain TOEFL 525 / IELTS 5.5 / Equivalent (<i>Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to updates in English Course for sity (6) months</i> 		 English Mathematics Physics/Chemistry 	60% 60% 60%
			(Bio-Based)	
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
 Other requirements the University Senate. 	 in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%

Country	General Requirements		Specific Requirements	
Bangladesh	• Completed 12 years of education in 2 levels of schooling (Secondary School and Higher Secondary School)	Bachelor of Engineering	(Electronic-Based) • English • Mathematics	60% 60%
	 Pass and obtain at least 60% in Higher Secondary School Certificate (HSSC). 		• Physics/Chemistry (Bio-Based)	60%
	• Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification		English Mathematics Physics/Chemistru/Biology	60% 60% 60%
	 equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	60% 60% 60%
United Arab	 Completed 12 years of education in 3 levels of schooling (Primary School, Preparatory School and Secondary School) Pass and obtain at least 60% in Secondary School Leaving Certificate (<i>AI-Tawjihiyya</i>). Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent to 0551, 525 (151 To 5 5 or expression) 	Bachelor of Engineering	(Electronic-Based)	
(UAE)			EnglishMathematicsPhysics/Chemistry	60% 60% 60%
- LLI			(Bio-Based)	·
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
 equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ 	60% 60% 60%	
			Accounting	

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Country	General Requirements	Specific Requirements			
Lebanon	anon • Completed 12 years of education in 3 levels of schooling (Primary School, Intermediate School Engineering and Secondary School)		(Electronic-Based) • English • Mathematics	60% 60%	
	 Pass and obtain at least 12/20 in Baccalauréat Libanais. 		Physics/Chemistry (Pio Based)	60%	
Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required			• English • Mathematics • Physics/Chemistry/Biology	60% 60% 60%	
	 undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%	
Myanmar	• Completed 11 years of education in 3 levels of	Bachelor of	(Electronic-Based)		
schoolir High Sc • Pass Ur minimu	chooling (Primary School, Middle School, and ligh School) ass University Entrance Examination and obtain ninimum average score of 360/600 or 60%.	Engineering	 English Mathematics Physics/Chemistry 	60% 60% 60%	
	• Obtain TOEFL 525 / IELTS 5.5 / Equivalent		(Bio-Based)		
	(Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%	
	in UniMAP). • Other requirements that have been endorsed by the University Senate.	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%	

Country	General Requirements	Specific Requirements		
Tunisia	nisia• Completed 13 years of education in 2 levels of schooling (Primary School and Secondary School)Bachelor of Engineering• Pass and obtain at least 12/20 in Baccalauréat.		(Electronic-Based) English Mathematics Physics/Chemistry 	60% 60% 60%
	• Obtain TOEFL 525 / IELTS 5.5 / Equivalent		(Bio-Based)	
	(Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in I IniMAP)		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	60% 60% 60%
Cameroon	Completed 14 years of education in 2 levels of	Bachelor of	(Electronic-Based)	
	schooling (Primary School, Secondary School and High School) • Pass GCE A-Level with average score of 60%/	Engineering • English • Mathematics • Physics/Chemistry (Bio-Bo • English • Mathematics • Physics/Chemistry/B	 English Mathematics Physics/Chemistry 	60% 60% 60%
	equivalent, and obtain at least C in relevant subjects.		(Bio-Based)	ed)
	• Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
		Bachelor of Business	 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	• Other requirements that have been endorsed by the University Senate.		Business/Economics/Commerce/ Accounting	60%

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Country	General Requirements	Specific Requirements		
Egypt	Egypt • Completed 11 or 13 years of education in 3 levels of schooling (Primary School, Preparatory		(Electronic-Based)	
	School and General Secondary School/Technical Secondary School)	5 5	 English Mathematics Physics/Chemistry 	60% 60% 60%
	• Pass and obtain at least 60% in Secondary Education Certificate (<i>Thanaweya Amma</i>).		(Bio-Based)	
	Obtain TOEFL 525 / IELTS 5.5 / Equivalent		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or 	60% 60% 60%
	 Other requirements that have been endorsed by the University Senate. 		Business/Economics/Commerce/ Accounting	60%
Cambodia	 Completed 12 years of education in 3 levels of schooling (Primary School, Lower Secondary School and Upper Secondary School) Pass Diploma of Upper Secondary with minimum score of C/60%/equivalent. Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of	(Electronic-Based)	
		Engineering	EnglishMathematicsPhysics/Chemistry	60% 60% 60%
			(Bio-Based)	
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
		Bachelor of Business	 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
			or • Business/Economics/Commerce/ Accounting	60%

Country	General Requirements	Specific Requirements		
Vietnam • Completed 12 ye schooling (Primo School and Uppe	• Completed 12 years of education in 3 levels of schooling (Primary School, Lower Secondary School and Upper Secondary School)	Bachelor of Engineering	(Electronic-Based) • English • Mathematics	60% 60%
	 Pass University Entrance Examination and obtain minimum average score of 6.0/60%/equivalent. 		Physics/Chemistry (Bio-Based)	60%
	• Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	60% 60% 60%
Turkey	• Completed 12 years of education in 2 levels of	Bachelor of Engineering Bachelor of Business	(Electronic-Based)	
	 schooling (Basic School and High School) Pass <i>Lise Diplomasi</i> and obtain minimum average score of 3.00/60%/eauivalent. 		 English Mathematics Physics/Chemistry 	60% 60% 60%
-LLI	Obtain TOEFL 525 / IELTS 5.5 / Equivalent		(Bio-Based)	
	(Candidates who do not possess qualification equivalent toTOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). • Other requirements that have been endorsed by		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
			 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
			Business/Economics/Commerce/ Accounting	60%

Akademik Academic Guide Book



Country	General Requirements	Specific Requirements		
Tanzania	 Completed 13 years of education in 2 levels of schooling (Primary School and Secondary School). 		(Electronic-Based) English Mathematics Physics/Chemistry 	60% 60%
	Pass Advanced Certificate of Secondary Education (A level) with 'principal pass' in at least 2 related subjects.		(Bio-Based)	0070
	Obtain minimum Grade C in English at O level.		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 Obtain FOLL 2323 / IELTS 5.3 / Equivalent (Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%
Zimbabwe	 Completed 13 years of education in 2 levels of schooling (Primary School and Secondary School). Pass Zimbabwe General Certificate of Education Advanced Level with 'principal pass' in at least 2 	Bachelor of Engineering	(Electronic-Based) English Mathematics Physics/Chemistry 	60% 60% 60%
	related subjects.Obtain minimum Grade C in English at Zimbabwe General Certificate of Education Ordinary Level.		(BIO-Based) • English • Mathematics • Physics/Chemistry/Biology	60% 60% 60%
	 Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP). Other requirements that have been endorsed by the University Senate. 	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting 	60% 60% 60%

Country	General Requirements		Specific Requirements	
Qatar	Completed 12 years of education in 3 levels of schooling (Primary School, Preparatory School and Secondary School)	Bachelor of Engineering	(Electronic-Based) English Mathematics Dwise (chemistry) 	60% 60%
	Pass and obtain at least 60% in General Secondary Education Certificate (Al-Thanawiyya Al-Amma)		• Physics/Chemistry (Bio-Based)	00%
	Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess qualification		 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	equivalent to TOEFL 525 / IELTS 5.5 are required to undergo Intensive English Course for six (6) months in UniMAP).	Bachelor of Business	 English Mathematics Physics/Chemistry/Biology 	60% 60% 60%
	 Other requirements that have been endorsed by the University Senate. 		Business/Economics/Commerce/ Accounting	60%

Akademik Academic Guide Book

The 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 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 Sidang Akademik 2014/2015 - Academic Session 2014/2015

Communication students 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 120 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. English for Technical Communication	2	
e. Islamic and Asian Civilization	2	
f. Ethnic Relations	2	
g. Co- Curriculum	3	
h. Optional Course	2	
TOTAL	137	

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

BACHELOR OF ENGINEERING TECHNOLOGY		
COURSES	UNIT (S)	
ENGINEERING TECHNOLOGY	127	
CORE COURSES	123	
UNIVERSITY REQUIREMENT COURSES	19	
a. Engineering Entrepreneurship	2	
b. Thinking Skills	2	
c. University Malay Language	2	
d. English for Technical Communication	2	
e. Islamic and Asian Civilization	2	
f. Ethnic Relations	2	
g. Skills and Technology in Communication	2	
h. Co- Curriculum	3	
i. 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. English for Academic Purposes	2	
e. Islamic and Asian Civilization	2	
f . Ethnic Relations	2	
g. Skills and Technology in Communication	2	
h. Business Communication	3	
i. Co - Curriculum	3	
TOTAL	122	

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

BACHELOR OF BUSINESS (INTERNATIONAL BUSINESS)	
COURSES	UNIT
BUSINESS CORE COURSES	74
ELECTIVES	30
UNIVERSITY REQUIREMENT COURSES	18
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. English for Academic Purposes	2
e. Islamic and Asian Civilization	2
f. Ethnic Relations	2
g. Skills and Technology in Communication	2
h. Business Communication	3
i. Co- Curriculum	3
TOTAL	124

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

BACHELOR OF NEW MEDIA COMMUNICATION		
COURSES	UNIT	
NEW MEDIA COMMUNICATION CORE COURSES	87	
ELECTIVES	15	
UNIVERSITY REQUIREMENT COURSES	18	
a. Thinking Skills	2	
b. University Malay Language	3	
c. English for Academic Purposes	2	
d. Islamic and Asian Civilization	2	
e. Ethnic Relations	2	
f. Foreign Language	4	
g. Co- Curriculum	3	
TOTAL	120	

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 for 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 (2 units)

All students are required to take 2 units of 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. Ethnic Relations (2 units)

Ethnic Relations is compulsory for all students.

- Sidang Akademik 2014/2015 Academic Session 2014/2015 Two (2) units are to be collected from Uniformed Bodies, where the 1st unit needs to be taken in
- c. Islamic and Asian Civilization (2 units) Islamic and Asian Civilization is compulsory for all students.
- d. University Malay Language (2 units) University Malay Language is compulsory for all students.

e. University English Language (2 units) It is compulsory for all students to take English for Technical Communication (for Bachelor of Engineering and Bachelor of Engineering Technology) or English for Academic Purposes (for Bachelor of Business and Bachelor of New Media Communication). Students who have obtained band 1. 2 or 3 in MUET need to take Foundation English and pass with grade C before enrolling for English for Technical Communication/English for Academic Purposes. For students who acquired band 4 or 5 in MUET, they can take 2 additional units of Foundation English which be considered as an Optional Course.

f. Thinking Skills (2 units)

Thinking Skills is compulsory for all students.

g. Skills and Technology in Communication (2 units)

Skills and Technology in Communication is compulsory for all Bachelor of Engineering Technology and Bachelor of Business students.

- h. Business Communication (3 units) Business Communication is compulsory for all students of Bachelor of Business
- i. 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.



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 Technocommunication (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. The subsequent courses have prerequisites which have to be fulfilled as determined in the academic programme structure of the degree programmes offered. Students 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.

The Unit System

Each course is given a value known as the UNIT (except for courses approved by the Senate). 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 2:**

Table 2: 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
Final Year Project	1	3 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 is equivalent to 2 contact hours per week or 28 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 12 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 12 weeks of Industrial Training in order to collect 12 credits for this course. Third year students of Bachelor of New Media Communication arerequired to undergo 12 weeks of Industrial Training in order to collect 12 credits for this course.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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 multinational companies in Malaysia. For Option 2 (3+1), students will undergo Industrial Training in the selected multinational companies in Malaysia for the first 3 months, followed by an educational trip abroad (International Business Field Trips).

Bachelor of Business (Engineering Entrepreneurship) students will undergo practical training via the Business Incubator programme for 12 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 \times 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.



Bau Pandan Academic Guide Book

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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

- 1. Industrial Exposure (IndEx)-for students who have completed Year 1.
 - a. Short term exposure programme 1 day
 - b. Talks, briefings, demonstrations by and dialogues with experts, managers and engineers from the industry
 - c. Visits to industry
- 2. Industrial Entrepreneurship Exposure (IndEnt) for Year 2 students
 - a. Short term exposure programme 1 day
 - b. Briefings, demonstrations by and dialogues with small sector industries, R&D firms and government bodies such as the Ministry of Entrepreneur and Cooperative Development.

Business Incubator Programme

Teaching and Learning approaches for Bachelor of Business (Engineering Entrepreneurship) programme, not only includes lectures and tutorials but also Practical Training through the Business Incubator Program. After the 4th semester, students will participate in the Business Incubator Programme for 12 weeks which will earn them 6 credit hours.

Students are mentored by companies in Business Incubators, providing them the opportunity to be part of the team involved in product development which may even lead to commercialisation. They will experience how ideas and innovations can lead to products for consumers. In addition to that, they will see for themselves the flow of business processes. At the end of the programme, students are required to prepare a report on their experience throughout the Business Incubator Programme in the selected companies.

Malaysian Business Incubators form a tightly-knit group under the National Incubator Network Association (NINA) which is affiliated with the Association of Asean Business Incubation (AABI). Its members include Technology Park Malaysia, Malaysian Technology Development Corporation, Sirim and Kulim Technology Park Corporation. UniMAP works closely with these organisations to ensure the success of the programme.

International Business Field Trips

Students will undergo industrial training in their second (2nd) and fourth (4th) semester. They have two options to choose from; Option 1 (2+2) or Option 2 (3+1). For the Option 1 (2+2), students will undergo two phases (2 months +2 months) of Industrial Training in selected multinational companies in Malaysia. Coordination will be conducted in collaboration with UniMAP Centre for Industrial and Governmental Collaboration (CIGC).

For Option 2 (3+1), students will undergo Industrial Training in selected multinational companies in Malaysia for the first 3 months and then proceed to an educational trip abroad for a period of 1 month. Students are given the freedom to choose any one of the two options given for their Industrial Training according to their interest and financial abilities.



Course Code

Each course is assigned a code. For Bachelor of Engineering, Bachelor of Engineering Technology, Bachelor of Business and Bachelor of New Media Comunication programmmes, the codes are summarized in **Tables 3(a), 3(b) and 3(c)** below:

Table 3(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		
В	Bachelor of Business		
Р	Bachelor of Engineering Technology		
К	Bachelor of New Media Communication		
U	General Course (This subject can be taken by students from all programmes)		

Table 3(b): Second Alphabet; Courses offered by faculties

Second alphabet in the code	Faculty offering courses		
E	School of Electrical Systems Engineering		
М	School of Microelectronic Engineering		
К	School of Computer & Communication Engineering		
N	School of Mechatronic Engineering		
В	School of Material Engineering		
Р	School of Manufacturing Engineering		
R	School of Bioprocess Engineering		
А	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		
Т	School of Chemical Engineering Technology		
С	Engineering Centre		
Q	Institute of Engineering Mathematics		
I	Centre for Industrial Collaboration		
F	Centre of Business Innovation and Technopreneurship (PPIPT)		
U	School of Human Development and Technocommunication (iKOM)		

Second alphabet in the code	Faculty offering courses
V	Centre for International Languages
Z	Co-Curriculum Centre

Table 3(c): Third Alphabet - University Requirement and Core Courses

Third alphabet	Types of Courses
in the code	(University Requirement or Core Courses)
Т	Core Courses
W	University Requirement 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 4**.

Table 4: Course Code

Α	В	С	1	2	3	4	NUMPERS	DESCRIPTION
↓	↓	↓↓	↓	↓↓	↓	↓	NUMBERS	DESCRIPTION
↓	↓	↓	↓	↓	↓	\rightarrow	4	Units/Credits
↓	↓↓	↓↓	\downarrow	↓↓	L	\rightarrow	3	Course numbers.
Ļ	Ļ	Ļ	Ļ	L	\rightarrow	\rightarrow	2	(The course number is determined by each School)
			L	→	→	\rightarrow	1	Level of courses: • 1= 1 st year subjects, • 2= 2 nd year subjects, • 3= 3 rd year subjects, • 4= 4 th year subjects,
Ļ	Ļ	L	\rightarrow	\rightarrow	\rightarrow	\rightarrow	TYPE OF COURSE	Refer Table 3(c)
↓	L	\rightarrow	\rightarrow	\rightarrow	\rightarrow	\rightarrow	FACULTIES	Refer Table 3(b)
L	\rightarrow	\rightarrow	\rightarrow	\rightarrow	\rightarrow	À	TYPE OF PROGRAMME	Refer Table 3(a)

Pre-Registration

Pre-registration is a system that enables 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 preregistration 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 Cocurriculum Courses). Students are encouranged to meet with their Rakan Pendamping Siswa (RPS) and to fill up the HEA-09a form prior to the Pre-registration process. Students who fail to Pre-register their courses within the period set run the risk of their official registration to be affected (seats for the course are subject to availability). For the preregistration, students are not required to print the Preregistration slip or to get the approval from their RPS.

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 reasume 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. Students must also fill the HEA-09a form (Course Registration Form). **Table 5** below summarises units that students can register for each semester based on their status:

Student Status	Minimum	Maximum
Active Student	10	22
Active student with Industrial Training (LI) and Final Year Project (FYP)	10	28

Table 5: Summary of Units for Active Student

*** Students who do not take FYP or LI can take more than 22 units but with the approval from the Dean.

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 6** below:

Student Status	Minimum	Maximum
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).
- 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 in week 12 (week of study).
- b. Permission to allow students to withdraw a course is subject to the minimum unit allowed except with permission of the Dean.
- c. Witdrawal 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 refers 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.
- 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, approval must be obtained 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 transcrip, the GPA/CGPA and credit amassed will not be taken into account.
- 8. Student who change programmes across different fields 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 transcrip, 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 allowed 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, medical certificate from hospitals other than that mentioned, must be approved 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 Sidang Akademik 2014/2015 - Academic Session 2014/2015

after the application for postponement is approved by the university. Students who leave university before the approval is granted, do so 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 Ademic Guide Book

Sidang Akademik 2014/2015 - Academic Session 2014/2015

the next semester. Students are also required to obtain minimum Cumulative Grade Point Average (CGPA) of 2.00 in order to graduate.

For 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 order to determine the GPA and student academic status. If the combined average is better, then the student will be given a new status, but if the combined average is less than the result for Semester II, 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 the programme within a minimum of 6 semesters (3 years) and a maximum of 10 semesters (5 years). However, for students who obtain credit exemption, the maximum period allowed is subject to the exemption provided by the university.

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. 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.

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 depends 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:

Figure 7: 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:

Figure 8: Letter grades and points

GRADE	GRADE POINT	STATUS
Α	4.00	
A-	3.75	
B+	3.50	0455
В	3.00	PASS
В-	2.75	
C+	2.50	
С	2.00]

GRADE	GRADE POINT	STATUS
C-	1.75	
D+	1.50	
D	1.00	FAIL
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 \geq 2.00 and has obtained C-/D+ in his/her Core Course, they would be considered as having **PASSED**.

Figure 9: Calculation of GPA and CGPA:

UNIT	GRADE VALUE [NG]	GRADE [G]	TOTAL NG						
3	3.75	A-	11.25						
4	2.50	C+	10.00						
4	3.50	B+	14.00						
4	4.00	A	16.00						
3	1.75	C-	5.25						
2	2.75	В-	5.50						
20	1		62.00						
3	3.50	B+	10.50						
4	2.00	C	8.00						
4	4.00	A	16.00						
4	3.50	B+	14.00						
3	3.75	A-	11.25						
18			59.75						
		1							
		1							
CGPA = <u>Total Accumulated Grade Value</u> Total Accumulated Unit									
<u>2.00 + 59.75</u> 20 + 18 3.20									
	UNIT 3 4 4 3 2 20 3 4 4 4 4 4 3 18 2 20 20 20 20 20 20 20 20 20	GRADE (NG) 3 3.75 4 2.50 4 3.50 4 4.00 3 1.75 2 2.75 20	GRADE (NG) GRADE [G] 3 3.75 A- 4 2.50 C+ 4 3.50 B+ 4 4.00 A 3 1.75 C- 2 2.75 B- 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 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 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, students 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 Technocommunication (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 Center 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 standards.

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-curiculum Centre

The Co-curiculum 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 44 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 Sidang Akademik 2014/2015 - Academic Session 2014/2015

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 is responsible for handling affairs related to student enrolment, data processing and student records, examinations and graduation of students and the Senate.

The units in the Academic Management Division, Registrar Department are:

1. Admissions and Student Records Unit

The Admissions and Student Records Unit is responsible for handling matters related to the admission of the students, student records and processing of data. This unit carries out the following tasks:

- i. Conduct the overall process of recruitment and registration of local of students at first degree and diploma level.
- ii. Conduct the process of recruitment and enrolment of international students at undergraduate level.
- iii. Manage and operate the data processing aspects of the Student Information System.
- iv. Manage students' personal records and student status, including students' application of Postponement of Studies and change of programmes.
- v. Manage students' online course registration every semester.
- vi. Manage the process of unit exemptions and credit transfer for students.





Examinations and Graduation Unit

The examination and Graduation Unit is responsible to manage and monitor the process of Final Examinations and other matters related. This unit is responsible for the following:

- i. Issue the Examination Circular to Schools/ Centres/Institutes.
- ii. Issue Examination Schedules for Diploma and Degree Programmes.
- iii. Manage the Final Examination during the prescribed period.
- iv. Acts as the Secretariat for the University Examination Council.
- v. Manage the processing of examination data using the Student Information System.
- vi. Issue Final Exam results.
- vii. Manage students' appeal for a review of examination results.
- viii. Issue academic transcripts after the Convocation.
- ix. Conduct the process of borrowing and returning of robes for academic staff.
- x. Review students eligibility to graduate for final year students and issue Completion of Study letter.
- xi. Responsible for the students convocation process with regard to the invitation, borrowing and returning of robes.
- xii. Manage the preparation and delivery of graduation scrolls to the graduates.
- xiii. Record and update data of graduates.

3. The Senate Unit

The Senate Unit is responsible for handling matters related to the Senate. The unit is responsible for the following:

i. Plan activities of the Senate and Committee, as secretariat and coordinate with other relevant parties in offering new and existing programmes.

- Provide Academic Calendar, manage the list of courses offered and deal with the Ministry of Education Malaysia (MOE) and the Public Service Department (JPA) on new programmes offered, the establishment of schools / departments and units.
- iii. Manage the nomination of Honorary Degree recipients

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School of Microelectronic Engineering

Programmes Offered

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

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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 acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in Electronic (Microelectronic) 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

Ability to understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO7

Ability to demonstrate understanding of 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

Ability to understand the need for, and an ability to engage in life-long learning

PO12

Ability to demonstrate understanding of project management and finance principles

107



Curriculum Structure 2014/2015 Bachelor of Engineering (Honours) (Microelectronic Engineering)

YEAR	YEAR 1		YEAR 2		YEAR 3			YEAR 4	
SEMESTER	I	П	Ш	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	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	EMT271/3 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	EMT112/3 Analog Electronic I	EMT238/3 Electromagnetic Theory	EMT212/3 Analog Electronic II	EMT352/3 Advanced Devices	EMT381/4 Microelectronic Design Project		EMT478/3 Instrumentation	EMT480/3 Reliability and Failure Analysis
							al Training &	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			4 Industrie	EUT443/2 Engineering Management	EUT440/3 Engineers in Society
		UUT122/2 Skills & Technology in Communication					EIT 302/		
University Required (17)	UVW410/2 University Malay Language	EUWXXX/1 Co-Curiculum	*EUWXXX/2 Option	EUW224/2 Engineering Entrepreneurship	EUW235/2 Ethnic Relations	EUW233/2 Islamic & Asia Civilization			
	EUWXXX/1 Co-Curiculum		EUWXXX/1 Co-Curiculum		EUW322/2 Thinking Skills	UVW312/2 English for Technical Communication			
140	18	18	18	17	16	17		16	16

*EUWXXX/2 if MUET Band 3 and below is compulsory to take UVW112/2 Foundation English. **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 acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in 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 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

Ability to understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO7

Ability to demonstrate understanding of 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

Ability to understand the need for, and an ability to engage in life-long learning

PO12

Ability to demonstrate understanding of project management and finance principles



Curriculum Structure 2014/2015 Bachelor of Engineering (Honours) (Electronic Engineering)

YEAR	YEAR 1		YEAR 2		YEAR 3			YEAR 4	
SEMESTER	I	Ш	Ш	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	idustrial 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	EMT271/3 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	EMT112/3 Analog Electronic I	EMT238/3 Electromagnetic Theory	EMT 212/3 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			IT 302/4 Ir	EUT443/2 Engineering Management	EUT440/3 Engineers in Society
		UUT122/2 Skills & Technology in Communication					Ξ		
University Required (17)	UVW410/2 University Malay Language	EUWXXX/1 Co-Curiculum	*EUWXXX/2 Option	EUW224/2 Engineering Entrepreneurship	EUW235/2 Ethnic Relations	EUW233/2 Islamic & Asia Civilization			
	EUWXXX/1 Co-Curiculum		EUWXXX/1 Co-Curiculum		EUW322/2 Thinking Skills	UVW312/2 English for Technical Communication			
140	18	18	18	17	16	17	4	16	16

*EUWXXX/2 if MUET Band 3 and below is compulsory to take UVW112/2 Foundation English. **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 acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in Electronic (Photonic) 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

Ability to understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO7

Ability to demonstrate understanding of 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

Ability to understand the need for, and an ability to engage in life-long learning

PO12

Ability to demonstrate understanding of project management and finance principles

111



Curriculum Structure 2014/2015 Bachelor of Engineering (Honours) (Photonic Engineering)

YEAR	YEA	YEAR 1 YEAR 2 YEAR 3		R 3		YEAR 4			
SEMESTER	I	Ш	Ш	IV	v	VI		VII	VIII
Engineering Core	EMT114/3 Introduction to Electric Circuit	EMT124/3 Fundamental of Electrical Engineering	EMT294/3 Principles of Optics	EMT212/3 Analog Electronic II	EMT393/3 Advanced Optics	EMT360/3 Control Engineering	ation	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	ieering Inno	EMT475/3 Computer Organization Architecture	EMT494/3 Optical Communication
	EMT181/3 Physics for Electronics	EMT112/3 Analog Electronic I	EMT238/3 Electromagnetic Theory	EMT297/3 Physics of Semiconductor	EMT396/3 Principles of Integrated Circuit Design	EMT383/4 Photonic Design Project	EIT 302/4 Industrial Training & Engin	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				EUT443/2 Engineering Management	EUT440/3 Engineers in Society
		UUT122/2 Skills & Technology in Communication							
University Required (17)	UVW410/2 University Malay Language	EUWXXX/1 Co-Curiculum	*EUWXXX/2 Option	EUW224/2 Engineering Entrepreneurship	EUW235/2 Ethnic Relations	EUW233/2 Islamic & Asia Civilization			
	EUWXXX/1 Co-Curiculum		EUWXXX/1 Co-Curiculum		EUW322/2 Thinking Skills	UVW312/2 English for Technical Communication			
140	18	18	18	17	16	17	4	16	16

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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.

References

 Alexander, C.K, Sadiku, M.N.O, Fundamental of Electric Circuit, 3rd Editions, Mc Graw-Hill, 2009

- Nilsson, J.W. Riedel, S.A, Electric Circuit, 6th Edition, Prentice Hall, 2001
- Irwin, J.D, Nelms, R.M, Basic Engineering Circuit Analysis, 8th Edition, John Wiley, 2005
- obbins, A.H, Miller, W.C, Circuit Analysis: Theory and Practice, 3rd Edition, Thomson/Delmar Learning, 2003
- 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.

REFERENCES:

- 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.
- Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., "C How To Program", Pearson-Prentice Hall, 2006.
- K. N. King, "C Programming: A Modern Approach, 2nd Edition", W. W. Norton & Company, 2008.
- 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.

References

- 1. Floyd, T., Electronic Devices, 7th Edition, Prentice Hall, 2002.
- Boylestad, R.L, Nashelsky, L., Electronic Devices and Circuit Theory, 8th Edition, Prentice Hall, 2002.
- Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 10th Edition, Prentice Hall, 2008
- 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.

References

- 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.
- Z.A.Yamayee and J.L.Bala. (1993). Electromechanical Energy Devices & Power Systems. USA: Wiley & Sons.
- C.S Rangan, G.R. Sarma & V.S. Mani, "Instrumentation Devices & System" Tata, McGraw-Hill Publishing Company Limited, 2004.
- 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.

References

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

School of Microelectronic Engineering



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.

References

- 1. P.A. Tipler and G. Mosca, "Physics for Scientist and Engineers (with Modern Physics)", Freeman Company (2008).
- Serway and Jewett, "Physics for Scientist and Engineers (with Modern Physics)", 9th ed., Brooks/Cole, (2013).
- J.D. Cutnell, K.W. Johnson, and K.D. Fisher, "Physics", 9th Ed., John-Wiley & Sons, (2012).
- D. Halliday and R. Resnick, "Fundamental of Physics", Ext. 7th Ed. Wiley, (2004).
- 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.

References

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

EMT 212/3 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, tupes of feedback connection. practical feedback circuit, feedback amplifier; Oscillator: Basic operating, principles of an oscillator, phase shift, Wien Bridge, Crustal 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.

- 1. Donald A. Neaman, Electronic Circuit Analysis and Design, 2nd Ed., Mc-Graw Hill, 2006
- Floyd, T., Electronic Devices, 7th Ed., Pearson Education. Inc.,2005



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.

References

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

 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.

References

- 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.

- 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.
- R. Jacob Baker, "CMOS Circuit Design, Layout, and Simulation, 3rd Edition (IEEE Press Series on Microelectronic Systems)", Wiley-IEEE Press, 2010.
- Neil Weste, David Harris, "CMOS VLSI Design: A Circuits and Systems Perspective, 4th Edition", Addison Wesley, 2010.
- Wayne Wolf, "Modern VLSI Design: IP-Based Design, 4th Edition", Prentice Hall, 2009.
- 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

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
- Richard C. Detmer, "Introduction to 80x86 Assembly Language and Computer Architecture", Jones & Bartlett Publishers, 2009
- 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
- John Crisp, "Introduction to Microprocessors and Microcontrollers", Newnes, 2004

EMT 271/3 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.

References

- 1. S. M. Sze, K. K. Ng, *Physics of* semiconductor devices, John Wiley, 2007, USA.
- 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.
- 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 microstructural features of different material classes will be outlined in order to relate material with its characteristics.

- 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.



- 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.

References

- Simon Haykin, Barry Van Veen "Signals and Systems", 2nd. Ed., Wiley, 2003
- Bhagwandas Pannalal Lathi, "Signal processing and linear systems", Oxford University Press, 2000

- 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.

References

- 1. Introduction to Optics, F. L. Pedrotti, L. M. Pedrotti, and L. S. Pedrotti, Third Edition, Benjamin Cummings (2006)
- 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.

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

References

- 1. S. M. Sze, K. K. Ng, *Physics of semiconductor devices*, John Wiley, 2007, USA.
- F. P. Robert Advanced Semiconductor Fundamentals, 2nd ed. 2003, Prentice Hall, USA.
- 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.
- 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.

References

- 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.
- S. M. Sze, K. K. Ng, Physics of Semiconductor Devices, John Wiley & Sons.
 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.

- 1. Ciletti M. D., "Verilog 2001 for Beginners", Compiled by Norina Idris et al., Prentice Hall, 2008.
- 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.
- 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.

References

- 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.
- 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.

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.

- Campbell, S. A. (2001). Science And Engineering of Microelectronics Fabrication. New York: Oxford University Press.
- 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.
- Semiconductor Devices, Physics and Technology, 2nd Edition, S.M. Sze, John Wiley & Sons, Inc, 2002.
- 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.

References

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

References

- Modern Control Systems 11th Edition, Richard C. Dorf and Robert H. Bishop, 2008
- Control Systems Engineering 4th Edition, Norman S. Nise, John Wiley & Sons, 2004.
- Modern Control Engineering 5th Edition, Ogata K., Prentice Hall, 2010
- 4. Automatic Control Systems Farid Golnaraghi and Benjamin Kuo, 2009.
- 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.

- Niel H.E. Waste, David Harris (2005). CMOS VLSI Design: A Circuits and Systems Perspective, 3rd Edition Addison Wesley.
- Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic (2003). Digital Integrated Circuits: A Design Perspective. 2nd Edition. Prentice Hall.
- Keating and Pierre Bricaud (2002). Reuse Methodology Manual for System-on-a-Chip Designs. 3rd Edition. Springer.
- 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),

- MOS scaling effect; short channel effect, hot carrier effect, device characterisation;
- vi) IV and CV test.

References

- Hong Xiao. (2001). Introduction to Semiconductor manufacturing Technology. Prentice Hall.
- Michael Quirk & Julian Serba. (2001). Semiconductor Manufacturing Technology. Prentice Hall.
- S.Wolf & R.N. Tauber. (1986). Silicon processing for the VLSI Era – Volume 1 Process Technology.
- S.Wolf & R.N. Tauber. (1986). Silicon processing for the VLSI Era – Volume 2 Process Integration.
- 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 provides an understanding of integrated circuit testing for improved testability and the reliability in electronic devices. Students will have the opportunity to identify and apply techniques required for the design of Integrated Circuits with facilities for testing and reliability. This course also will expose students how to apply advanced verification techniques into the design flow, debug and test their design through the use of industry standard EDA tools.

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

Topics covered are: Fundamental Concepts of Power Electronics, Power Semiconductor Devices, Power Electronic Circuits, AC-DC Conversion, AC-AC Conversion, DC-DC Conversion and DC-AC Conversion.

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References

- 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.

EMT 393/3 ADVANCED OPTICS

Course Synopsis

This course is the extension course from Principles of Optics and focusing on the Principles of Photonics, from Ray Optics to Non-Linear Optics. It is advanced mathematics based courses, with the knowledge in EM Theory and Quantum Physics.

References

- 1. B.E.A. Saleh, "Fundamental of Photonics", Wiley-Interscience, 2007.
- 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.

References

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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

EMT 395/3 PHOTONIC FABRICATION ENGINEERING

Course Synopsis

This course will develop the student's basic understanding of the principles of Diffractive Optical Elements (DOE). The students are also required to gain in depth knowledge of the cleanroom protocol. The required topics are photolithography, fabrication process of DOE and optical performance testing, electronic packaging, development trends, design and packaging of High Power LED and Reliability Engineering.

References

1. Donald C. O'Shea, Thomas J. Suleski, Alan D. Kathman, Dennis W. Prather, "Diffractive



Optics: Design, Fabrication, and Test", SPIE Publications (December 29, 2003)

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

EMT 396/3 PRINCIPLES OF INTEGRATED CIRCUIT 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, 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.

- R. Jacob Baker, "CMOS Circuit Design, Layout, and Simulation, 3rd Edition (IEEE Press Series on Microelectronic Systems)", Wiley-IEEE Press, 2010.
- Neil Weste, David Harris, "CMOS VLSI Design: A Circuits and Systems Perspective, 4th Edition", Addison Wesley, 2010.
- Wayne Wolf, "Modern VLSI Design: IP-Based Design, 4th Edition", Prentice Hall, 2009.
- 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

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.

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).

- 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.
- V. V. Mitin, V. A. Kochelap, M. A. Stroscio, Introduction to Nanoelectronics – Science, Nanotechnology, Engineering, and Applications, Cambridge University Press.



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.

References

- 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
- Hong Xiao, Introduction to Semiconductor Manufacturing Technology, Prentice Hall, 2001
- Tai-Ran Hsu. MEMS Packaging (2004). EMIS Processing Series 3. INSPEC.
- 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.

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
- 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 474/3 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 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.

- 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
- Amnon Yariv, Pochi Yeh, Photonics: Optical electronics in Modern Communications, 2007



- Ghatak and Thyagarajan, Introduction to Fiber Optics, Cambridge University Press, 1998.
- John M. Senior, Optical Fiber Communications; Principles and Practice, 2nd Edition, Prentice-Hall, 1992.

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.

References

- 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
- 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.

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

 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.

- 1. Behzad Razavi, Design of Analogue CMOS Integrated Circuit, McGraw-Hill, 2000.
- Phillip E. Allen, Douglas R. Holberg, CMOS Analogue Circuit Design, Oxford University Press, 2002.
- 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; 2 edition, 2007,
- 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 tupes 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

EMT 483/3 SYSTEM ON CHIPS

Course Synopsis

This course will cover system on chip design including design methodology, IP design and platform-based design. This course will also cover various important elements for chip design such as sequential circuit, clock tree, low power design, power distribution and deep submicron interconnect.

References

- Niel H.E. Waste and David Harris "CMOS VLSI Design: A Circuits and Systems Perspective", 3rd ed., Addison Wesley, 2004
- Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic "Digital Integrated Circuits: A Design Perspective", 2nd ed., Prentice Hall, 2003

- Keating and Pierre Bricaud "Reuse Methodology Manual for System-on-a-Chip Designs", 3rd ed., Springer, 2002
- Sudeep Pasricha and Nikil Dutt "On-Chip Communication Architectures: System on Chip Interconnect", Morgan Kaufmann, 2008
- Wayne Wolf "Modern VLSI Design: System-on-Chip Design", 3rd ed., Prentice Hall PTR, 2002

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.

- 1. Ifeachor & Jervis,"Digital Signal Processing: a practical Approach", 2/e, Prentice Hall.
- 2. Sanjit K. Mitra, "Digital Signal Processing, A Computer-Based Approach", 4/e., McGraw Hill, 2005



- Proakis and Manolakis, "Digital Signal Processing", Pearson, 4/e
 S. Orfanidis," Introduction to
- 4. S. Orfanidis," Introduction to Signal Processing", PH 1996
- 5. C.T. Chen," Digital Signal Processing", Oxford 2001
- 6. B.P.Lathi," Signal Processing and Linear Systems", Oxford

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.

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.
- Tai-Ran Hsu. MEMS Packaging (2004). EMIS Processing Series 3. INSPEC.

- 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

References

1. Robert F. Fischer, Bijana Tadic, "Optical System Design", McGraw-Hill Professional; 1 edition (2000).

- W. J. Smith, "Modern Lens Design", 2nd ed., McGraw-Hill, (2005).
- D. Malabar, & Z. Malacara, "Handbook of Optical Design", 2nd ed., Marcel-Dekker, (2004).
- Warren J. Smith, "Modern Optical Engineering", McGraw-Hill Professional; 3rd edition (2000)

EMT 494/3 OPTICAL COMMUNICATION

Course Synopsis

This course is to introduce the various optical fiber modes, configurations and various signal degradation factors associate with optical fiber. Also study the various optical source and optical detectors and their used in optical communication systems.

- R. Ramaswami, "Optical Networks: A Practical Perspective, 3rd Edition", Morgan Kaufmann; 3rd edition (July 16, 2009)
- 2. J, Senior, "Optical Fiber Communications: Principles and Practice", Prentice Hall; 3 edition (December 26, 2008)



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.

References

- 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

School of Microelectronic Engineering



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.) (Computer Network Engineering)
Bachelor of Engineering (Hons.) (Computer Network Engineering)
Diploma in Computer Engineering

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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.
- o Ensuring a balance of theory and practical expertise.
- o Ensuring that learning is always at world-class level.





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Academic Guide Book

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School of Computer and Communication Engineering



Bachelor of Engineering (Honours) (Computer Engineering)

Programme Objectives (PEO)

PEO 1

Graduates are leaders in the field of computer engineering or chosen field as demonstrated through career advancement

PEO 2

Graduates who are members and contribute to professional society.

PEO 3

Graduates pursue continuing education opportunities

PEO 4

Graduates make contributions through research and development

PEO 5

Graduates who are entrepreneur

Programme Outcomes (PO)

PO 01

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

PO 02

Ability to identify, formulate and solve complex engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

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

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate the understanding of project management and finance principles.



Curriculum Structure for Bachelor of Engineering (Honours) (Computer Engineering)

YEAR	FIR	FIRST SECOND THIRD		RD		FOURTH			
SEMESTER	I	Ш	Ш	IV	v	VI		VII	VIII
Engineering core (97)	EKT101/4 Electric Circuit Theory	EKT119/3 Electric Circuit II		EKT242/3 Electromagnetic Theory	EKT343/3 Principles of Communication Engineering			EKT445/2 Final Year Project I	EKT446/4 Final Year Project II
	EKT102/3 Basic Electronic Engineering	EKT104/4 Analog Electronic Circuits I	EKT214/4 Analog Electronic Circuits II	EKT232/3 Signals and Systems	EKT 353/3 Principles of Digital Signal Processing	EKT318/3 Modern Control Systems		EKT424/4 Real-Time Systems	EKT421/3 Software Engineering
		EKT124/3 Digital Electronics I	EKT221/4 Digital Electronics II	EKT222/4 Microprocessor Systems	EKT322/4 Embedded Systems Design	EKT303/4 Principles of Computer Architecture	trial Training	Program Elective I /3	Open Elective/3
		EKT 103/3 Electrical Engineering		EKT212/4 Measurement and Instrumentation		EKT453/3 Group Design Project		Program Elective II/ 3	
	EKT120/4 Computer Programming		EKT224/3 Algorithm and Data Structures		EKT336/3 Computer Networks	EKT333/3 Modern Operating Systems	302/4 Indus		
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II				EUT440/3 Engineers in Society	EIT	EUT443/2 Engineering Management	
	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		UVW312/2 English for Technical Communication		UUW224/2 Engineering Entrepreneurship	UUW233/2 Islam & Asia Civilisation		UUW235/2 Ethnic Relation	UVWXXX/2 Option Subjects
		UZWXXX/1 Co-curriculum	UZWXXX/1 Co-curriculum		UUW322/2 Thinking Skills	(TITAS)			UVW410/2 University Malay Language
137	17	17	17	17	17	18	4	16	14
Total Units for Graduation 133 + 4 (Industrial Training) = 137									

Open Elective: Any subjects offered by the school or other schools. Elective I & II: EKT466 Artificial Intelligence, EKT 425 Parallel Computing, EKT 426 Database Management System, EKT 345 Microwave Engineering, EKT 460 Image Processing, EKT450 Mobile Communication Systems, EKT465 Optical Communication Systems, EKT 435 Network Security, EKT454 Wireless Network & Communication
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)

PO 01

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

PO 02

Ability to identify, formulate and solve complex engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

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

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate the understanding of project management and finance principles



Curriculum Structure for Bachelor of Engineering (Honours) (Communication Engineering)

YEAR	FIF	FIRST SECOND		OND	THIRD			FOUR	тн
SEMESTER	I	П	ш	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 Communication Engineering	-	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 356/4 Microwave Communication		Program Elective I /3	Program Elective II /3
		EKT 103/3 Electrical Engineering		EKT212/4 Measurement and Instrumentation	EKT353/3 Principle of Digital Signal Processing	EKT303/4 Principle of Computer Architecture	strial Training	EKT453/3 Group Design Project	
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II					02/4 Indus	EUT443/2 Engineering Management	EUT440/3 Engineers in Society
	UUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra	EQT272/3 Probability and Statistic			EIT 30		
University Required (17)	1-1-1-1-1		UZWXXX/1 Co-curriculum		UVW312/2 English for Technical Communication	UUW224/2 Engineering Entrepreneurship			
	UZWXXX/1	UZWXXX/1	UVWXXX/2 Option Subjects			11/04/610/2		UUW235/2	UUW322/2 Thinking Skills
			UUW233/2 Islam & Asia Civilisation (TITAS)			University Malay Language			
133	17	17	16	17	17	18	4	16	15
Total Units for Graduation 133 + 4 (Industrial Training)= 137									

Elective I & II : EKT 467 Radar Engineering, EKT469 Advanced Digital Communication, EKT447 Communication Hardware Design, EKT448 Radio And Television Engineering, EKT449 Advanced Digital Signal Processing, EKT 460 Image Processing, EKT 461 Audio & Video Signal Processing, EKT462 Digital And Data Communication Systems, EKT 463 Satellite Communication, EKT 464 Communication Links, EKT465 Optical Communication Systems, EKT466 Artificial Intelligence, EKT468 Waveform Coding

Bachelor of Engineering (Honours) (Computer Network Engineering)

Programme Objectives (PEO)

PEO 01

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

PEO 2

Graduates who are members and contribute to professional society.

PEO 3

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

PEO 4

Graduates make contribute towards research and development.

PEO 5

Graduates who are entrepreneurial engineer.

Programme Outcomes (PO)

PO 01

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

PO 02

Ability to identify, formulate and solve engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

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

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate the understanding of project management and finance principles



Curriculum Structure for Bachelor of Engineering (Honours) (Computer Network Engineering)

YEAR	FIRST		SECOND		THIRD			FOU	RTH
SEMESTER	I	Ш	Ш	IV	v	VI	1	VII	VIII
Engineering Core (97)	EKT101/4 Electric Circuit Theory	EKT103/3 Electrical Engineering	EKT221/4 Digital Electronics II	EKT222/4 Microprocessor Systems	EKT303/4 Principles of Computer Architecture	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	EKT124/3 Digital Electronics I	EKT204/4 Analog Electronic Circuits	EKT232/3 Signals and Systems	EKT343/4 Principles of Communication Engineering	EKT318/3 Modern Control Systems		EKT433/4 Network Modeling	EKT434/3 Network Programming
	EKT102/3 Basic Electronic Engineering	EKT112/4 Principles of Measurement and Instrumentation		EKT242/3 Electromagnetic Theory	EKT335/3 Principles of Computer Network	EKT333/3 Modern Operating Systems		Program Elective I /3	Open Elective / 3
		ECT111/3 Engineering Skills		EKT214/4 Analog Electronic Circuits II	EKT334/4 Algorithm and Data Structures	EKT314/4 Instrumentation Electronics		Program Elective II /3	
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT272/3 Probability and Statistic			EUT440/3 Engineers in Society		EUT443/2 Engineering Management	
	UUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra						
University Required (15)	UZWXXX/1 Co-curriculum	UVW410/2 University Malay Language	UVW312/2 English for Technical Communication	UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relation				UVWXXX/2 Option Subjects
			UUW322/2 Thinking Skills	UUW233/2 Islam & Asia Civilisation (TITAS)					
135	17	18	18	18	17	17	4	14	12
Total Units for Graduation 131 + 4 (Industrial training)= 135									

Open Elective: Any 4th Year subjects offered by the school or other schools. Elective I & II : EKT 353 Principles of Digital Signal Processing, EKT466 Artificial Intelligence, EKT 425 Parallel Computing, EKT 426 Database and Open Management System, And Open EKT 345 Microwave Engineering, EKT 460 Image Processing, EKT464 Mobile Computing, EKT465 Optical Communication EKT454 Wireless Network & Communication

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 threephase balanced systems.

References

- 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
- Irwin, J.D., Nelms, R.M., Basic Engineering Circuit Analysis, 9th edition, John Wiley, 2008

- 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.Troubleshootina. 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.

References

- 1. Floyd, T., "Electronic Devices", 8th Edition, Prentice Hall, 2007
- Boylestad, R.L., "Electronic Devices and Circuit Theory", 10th Edition, Prentice Hall, 2008.
- 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.

References

- 1. Chapman S.J., "Electric Machinery Fundamentals", Fourth Edition, 2005, McGraw Hill, Singapore.
- 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.
- 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.

References

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

EKT 112/4 PRINCIPLES OF 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.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

References

- A.K. Ghosh. Introduction to Measurement and Instrumentation 2nd Ed., Prentice Hall of India, 2007.
- A.J. Diefenderfer. Principles of Electronic Instrumentation 3rd Ed., Thomson, 1994.
- H.S. Kalsi. Electronic Instrumentation, Tata McGraw-Hill Publishing Company Limited, 2005.
- 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 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 responce of AC circuit and two port network.

References

- Sadiku, M. N. O, Alexander, C. K., Fundamentals of Electric Circuits, Singapore, 4th ed., McGraw-Hill, 2009.
- Nilsson, J. W. and Riedel, S.A., Electric Circuits, 9th ed, Prentice Hall, 2011.
- Boylestad, R.L, Introductory Circuit Analysis, 12th ed., Prentice Hall, 2010.
- Dorf, R.C., Svodoba, J.A., Introduction to Electric Circuits, 8th ed., John Wiley, 2010.
- 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.

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.
- Hanly, J.R. and Koffman, E.B., "C Program Design for Engineers", 2nd Ed., Addison-Wesley, 2001.
- Tan, H.H. and D'Orazio, T.B., "C Programming for Engineering & Computer Science", McGraw Hill, 1999.
- Sprankle and Maureen, "Problem Solving and Programming Concepts" 7th Ed., Prentice Hall, 2006.

EKT 124/3 DIGITAL ELECTRONICS I

Course Synopsis

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.





References

- Rafikha Aliana A Raof, Norina Idris, Phaklen Eh Kan, Mohammad Nazri Md. Noor. (2006). Digital Electronics Design. 1st Edition. Malaysia: Prentice Hall.
- Floyd. TL. (2006). Digital Fundamentals. 9th Edition. New Jersey: Prentice Hall.
- 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 204/4 ANALOG ELECTRIC CIRCUITS

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.

References

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

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.

References

- 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.
- H.S. Kalsi. Electronic Instrumentation, Tata McGraw-Hill Publishing Company Limited, 2005.
- 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 opamp 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, crustal 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

References

- Floyd, T., 'Electronic Devices', 8th Ed., Pearson Education, Inc, 2008.
- 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.
- Bogart, T.F., 'Electronic Devices and Circuits', 6th Ed., Prentice Hall, 2004.
- Kasap S.O. 'Principles of Electronics Materials and Devicies', McGraw-Hill Science/ Engineering/Math; 3rd Ed., 2005.

EKT221/4 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 Datapath, Sequencing and Control as well as Computer Organisation.

References

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

EKT222/4 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.

References

- R.S. Gaonkar (2002). Microprocessor Architecture, Programming, and Applications with the 8085. Prentice Hall, 5th Edition.
- 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



Sidang Akademik 2014/2015 - Academic Session 2014/2015

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.

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
- 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
- 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 relate 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.

References

- Simon Haykin, Barry Van Veen. (2003). Signals and Systems. 2nd ed. John Wiley & Sons, Inc.
- 2. M.J. Roberts (2003). Signals and Systems, Analysis Using Transform Method and MATLAB. International Edition. McGraw-Hill

- Charles L. Philips, John M. Parr, Eve A. Risking.(2003). Signals and Systems and Transforms. 3rd Edition. Prentice Hall International.
- Alan V.Oppenheim and Alan S. Willsky. Signals and Systems, 2nd Edition Prentice Hall, 1996.
- 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.

References

- 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.

School of Computer and Communication Engineering

Sidang Akademik 2014/2015 - Academic Session 2014/2015

- 3. Fawwaz T Ulaby (2004). Fundamentals of Applied Electromagnetics. Pearson, Prentice Hall.
- Roald K. Wangsness. (1987). 4. Electromagnetic Fields, John Wiley and Sons, 1987.
- Bo Thidé. (2009). 5. 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, organisation and architecture. The sullabus 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.

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.

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 & Sustems. 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.
- Bentley, J.P.(1995). Principles 4. of Measurement Systems. Longman Singapore Publisher.
- 5. Kuphaldt T.R.(2009), Lessons in Industrial Instrumentation. Version 0.4 - 2009

MODERN CONTROL SYSTEMS

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

representation, stability of linear

frequency domain analysis, and design of control systems using lead

and lag compensating networks.

sustems, time response, root locus,

equation and state space

EKT318/3

Course Synopsis





References

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

References

- 1. Muhammad Ali Mazidi & Janice Gillispie Mazidi. (2000).The 8051 Microcontroller and Embedded Systems. Prentice Hall 2000
- 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.

References

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

EKT 334/4 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.

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 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.

References

- J.F. Kurose, Computer Networking A Top-Down Approach, 4th Edition. Addison Wesley, USA, 2008.
- A. S. Tanenbaum. Computer Networks, 5th Edition, Prentice Hall, 2011.
- Leon-Garcia and A. Widjaja, Communication Networks: Fundamental Concepts and Key Architectures. 2nd Edition. McGraw Hill Publication, 2004.
- 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.

References

- 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.
- K. C. Mansfield Jr. and J. L. Antonakos (2002). An Introduction to Computer Network, Prentice Hall.
- 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.

References

- 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.
- 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.

References

- Wayne Tomasi. (2004). Electronic Communication System, Fundamental Through Advanced. 5th Ed. Pearson Prentice Hall. (Text)
- K. Sam Shanmugan.
 (2002). Analog and Digital Communication. Wiley.
- 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 345/4 MICROWAVE ENGINEERING

Course Synopsis

This course aims to expose students with basic concept of parameters that are being used in microwave communication network. Analyze 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.

References

- David M. Pozar. (2004). Microwave Engineering. Wiley Ed.
- 2. Max W. Medley Jr. (1993). Microwave and RF Circuits Analysis, Synthesis and Design. Artech House Inc.
- 3. Randall W.Rhea (2005). HF Filter Design and Computer Simulation. McGraw Hill Inc.
- Om P.Gandhi, "Microwave Engineering And Applications", Maxwell Macmillan Int. Edition, 1989.
- 5. Collin, R.E., "Foundations For Microwave Engineering", Mc-Graw Hill, 1992.

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School of Computer and Communication Engineering

EKT 353/3 PRINCIPLE OF DIGITAL SIGNAL PROCESSING

Course Synopsis

To introduce the applications and review of signal and systems including z-transform. Digital structures, discrete Fourier transform, mathematical analysis of discrete time signal and systems, FFT, IIR filters and their designs, FIR filters and their designs, finite word length effect, simple applications.

References

- 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

References

- 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.
- K. C. Mansfield Jr. and J. L. Antonakos (2002), An Introduction to Computer Network, Prentice Hall
- 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.

References

- 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.
- 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.
- John Proakis and Masoud Salehi. (2007). Digital Communications. 5th edition, McGraw-Hill.



Sidang Akademik 2014/2015 - Academic Session 2014/2015

EKT 421/3 SOFTWARE ENGINEERING

Course Synopsis

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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.

References

- 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.
- Sommerville, I. [2007], "Software Engineering". 8th Edition, Addison Wesley Publication.
- 4. Pressman, R.S. [2007], "Software Engineering". 6th Edition, Mc-Graw-Hill Publication.
- 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.

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.
- 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.

References

- Hall, J. Banks, J. Carson, B. L. Nelson, D. Nicol, "Discrete-Event System Simulation, Fourth Edition, Prentice Hall 2005.
- M. S. Obaidat, G. I. Papadimitriou, "Applied System Simulation: Methodologies and Applications", Springer 2003.
- 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.
- 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.

References

- Harvey M. Deitel, Paul J. Deitel and Sean E. Santry, [2002], "Advanced Java™ 2 Platform How to Program" 2nd Edition, Prentice Hall.
- Marty Hall and Larry Brown, " Core Web Programming: The Sun Microsystems Press JAVA Series" 2nd Edition, Prentice Hall, 2004
- Jan Graba, "An Introduction to Network Programming with Java", 2nd Edition, Springer, 2007.
- 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.

EKT440/4 TELECOMMUNICATION SWITCHING AND NETWORKS

Course Synopsis

This course is to discuss the technology applied in communication network, emphasized on application of concept architecture and layer, signal transmission technique, switching system and switching circuit network. It also discussed on multiplexing as well as to give an exposure of network application and basic network programming.

References

- 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.
- K. C. Mansfield Jr. and J. L. Antonakos (2002). An Introduction to Computer Network. Prentice.
- P. Gnanasivam. (2008). Telecommunication Switching and Networks" New Age Publications (Academic).

5. Viswanathan Thiagarajan (2010). Telecommunication Switching Systems And Networks Phi Learning Publication.

EKT450/3 MOBILE COMMUNICATION SYSYTEMS

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

- wireless network performance and trade-offs
- cellular network planning and modeling
- radio resource management (RRM) and mobility management (MM)
- Wireless wide area network (WWAN) architectures.

References

1. David Tse, Pramod Viswanath, Foundamentals of Wireless Communications, Cambridge Press, 2005. School of Computer and Communication Engineering





Sidang Akademik 2014/2015 - Academic Session 2014/2015

- G. L. Stuber, Principles of Mobile Communication, Kluwer Acdemic, 1996.
- 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.
- 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.

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.

EKT 453/3 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.

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.

References

- 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 Entrepreneurs





School of Mechatronic Engineering

Programme Offered

- Diploma in Engineering (Mechatronic)
- 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)
 - Doctor of Philosophy (Mechatronic Engineering)
 - Doctor of Philosophy (Mechanical Engineering)
- Doctor of Philosophy (Biomedical Electronic Engineering)

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Introduction

School of Mechatronic Engineering was established in 2003 to meet the ever growing needs of professionals – particularly in the field of electromechanical, mechanical and biomedical electronics engineering. This is in-line with demands of the industry consistent with the report of the Malaysian Industrial Master Plan (Laporan Pelan Induk Perindustrian). The curriculum has been designed with a balanced emphasis in both engineering science and practice. Additionally, teaching and learning activities are conducted via various approaches, including embedding theoretical knowledge with laboratory sessions using state-of-the-art equipments. This approach to engineering education greatly benefits UniMAP students and ensuring them in keeping abreast with the latest technological development.

The School of Mechatronic Engineering at UniMAP offers three exciting study programmes, namely the Mechatronic Engineering Programme, Mechanical Engineering Programme and Biomedical Electronic Programme. The curriculum of each programme is designed to produce graduate professionals who equipped with analytical skills and ability to work in all multidisciplinary engineering fields and industries. Additionally, the learning environment will be more enjoyable and competitive with a good mixture between local and international students.

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

The Mechanical Engineering programme emphasizes 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.

The 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.



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Bachelor of Engineering (Honours) (Mechatronic Engineering)

Programmme Objectives (PEO)

Programmme Objectives 1

Graduates who effectively demonstrate engineering knowledge and entrepreneurial skills by providing practical solutions.

Programmme Objectives 2

Graduates who effectively demonstrate professionalism in multi-disciplinary engineering environment, leadership quality and teamwork.

Programmme Objectives 3

Graduates who make contributions to knowledge and establish best engineering practice through research and development.

Programmme Objectives 4

Graduates who demonstrate an ethical commitment to the community and the profession through involvement with professional organizations and society.

Programmme Objectives 5

Graduates who engage in life-long learning as demonstrated through career advancement.

Programmme Outcomes (PO)

PO 1

Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in mechatronic or mechanical or biomedical electronic engineering discipline to the solution of complex engineering problem.

PO 2

Ability to identify, formulate and solve complex engineering problems.

PO 3

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

PO 4

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

PO 5

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

PO 6

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

PO 7

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

PO 8

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

PO 9

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.

Curriculum Structure for Bachelor of Engineering (Honours) (Mechatronic Engineering)

YEAR	FIR	ST	SECOND THIRD		IRD		FOURTH		
SEMESTER	I	Ш	Ш	IV	V	VI		VII	VIII
Core Courses (38)	ENT 161/4 Electrical Circuits	ENT 162/4 Analogue Electronics	ENT 281/3 Signals & Systems	ENT 256/4 Machine Design	ENT 385/3 Control Engineering	ENT 372/4 Robotics	trial Training	ENT 445/2 Final Year Project I	ENT 446/4 Final Year Project II
	ENT 141/3 Engineering Statics	ENT 153/4 Principles of Thermo-fluids and Materials	ENT 263/4 Digital Electronics	ENT 268/3 Electromagnetic Theory	ENT 374/3 Power Systems Engineering	ENT 363/4 Machine Vision Systems		ENT 475/3 Mechatronic Systems Design I	ENT 476/4 Mechatronic Systems Design II
	ECT111/3 Engineering Skills	ENT 142/3 Engineering Dynamics	ENT 286/3 Instrumentation & Measurements	ENT 288/3 Microprocessors	ENT 383/3 Network & Communication Engineering	ENT 386/3 Modern Control Engineering		ENT 471/4 Automation	Elective II/3
			ENT 289/3 Drives and Power Electronics		ENT 373/4 Embedded System Design and Applications	ENT 331/3 Management Production & Control of Quality		Elective I/3	
Non Engineering (22)	ENT189/3 Computer Programming	EQT 102/3 Engineering Mathematics II	EQT 241/3 Numerical Methods & Vector Calculus	EQT 271/3 Engineering Statistics			T302/4 Indus	EUT440/3 Engineers in Society	EUT443/2 Engineering Management
	EQT 101/3 Engineering Mathematics I						Ξ		
	EUT122/2 Skills and Technology in Communication								
University Requirement (17)	UZW XXX/1 Co-Curriculum	UUW 114/2 University Malay Language	UUW 233/2 Islamic & Asian Civilisations	UUW 322/2 Thinking Skills	UUW XXX/2 Option	UUW 235/2 Ethnic Relations			
		UZW XXX/1 Co-Curriculum	UZW XXX/1 Co-Curriculum	UVW 312/2 English for Technical Commnunication	UUW 224/2 Engineering Entrepreneurship				
	19	17	19	17	17	16	4	15	13
Total Units for Graduation 137									

Electives:

Elective I: ENT491/3 Robotic Control or ENT493/3 Advanced Control Systems or ENT488/3 Mobile Robotics Elective II: ENT497/3 Artificial Intelligence in Engineering or ENT474/3 Intelligent Mechatronic Systems or ENT499/3 Digital Signal Processing & Applications

ademic Session 2014/2015



Bachelor of Engineering (Honours) (Mechanical Engineering)

Programme Objectives (PEO)

Programme Objectives 1

Graduates who effectively demonstrate engineering knowledge and entrepreneurial skills by providing practical solutions.

Programme Objectives 2

Graduates who effectively demonstrate professionalism in multi-disciplinary engineering environment, leadership quality and teamwork.

Programme Objectives 3

Graduates who make contributions to knowledge and establish best engineering practice through research and development.

Programme Objectives 4

Graduates who demonstrate an ethical commitment to the community and the profession through involvement with professional organizations and society.

Programme Objectives 5

Graduates who engage in life-long learning as demonstrated through career advancement.

Programmme Outcomes (PO)

PO 1

Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in mechatronic or mechanical or biomedical electronic engineering discipline to the solution of complex engineering problem.

PO 2

Ability to identify, formulate and solve complex engineering problems.

PO 3

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

PO 4

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

PO 5

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

PO 6

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

PO 7

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

PO 8

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

PO 9

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.

Curriculum Structure for Bachelor of Engineering (Honours) (Mechanical Engineering)

YEAR	FIRST		SECOND		THIRD			FOU	RTH
SEMESTER	I	Ш	Ш	IV	v	VI		VII	VIII
Engineering Core (98)	ENT141/3 Engineering Statics	ENT142/3 Engineering Dynamics	ENT241/3 Fluid Mechanics I	ENT247/3 Fluid Mechanics II	ENT345/4 Mechanical Components Design	ENT348/4 Mechanical System Design		ENT445/2 Final Year Project I	ENT446/4 Final Year Project II
	ENT150/3 Engineering Graphic & Computer Aided Drafting	ENT143/3 Thermodynamics I	ENT243/3 Thermodynamics II	ENT245/4 Product Design Development	ENT347/3 Finite Element Methods	ENT342/3 Computational Fluid Dynamics		ENTXXX/3 Elective I	ENTXXX/3 Elective II
	ENT145/3 Materials Engineering	ENT144/2 Machining Skills	ENT242/3 Solid Mechanics I	ENT 246/3 Solid Mechanics II	ENT 388/3 Electronics	ENT346/3 Vibration Mechanics		ENT482/3 Mechanical Design Project I	ENT484/3 Mechanical Design Project II
		ENT188/3 Electrical Technology	ENT286/3 Instrumentations & Measurements	ENT244/3 Manufacturing Processes	ENT343/3 Principles of Heat Transfer	ENT385/3 Control Engineering	Training	ENT457/3 Management, Production & Operations	
						ENT381/2 Microprocessors	ustrial		
Non Engineering (22)	ENT189/3 Computer Programming						T 302/4 Ind		
	EUT122/2 Skills & Technology in Communication					EUT443/2 Engineering Management	5		EUT440/3 Engineers in Society
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT241/3 Numerical Methods & Vector Calculus	EQT271/3 Engineering Statistics					
University Required (17)		UUW114/2 University Malay Language	UUW233/2 Islamic & Asian Civilisations	UVW 312/2 English for Technical Commnunication	UUW224/2 Engineering Entrepreneurship	UUW 322/2 Thinking Skills			
		UUW235/2 Ethnic Relations			UUWXXX/2 Option				
	UUWXXX/1 Co-curriculum	UUWXXX/1 Co-curriculum	UUWXXX/1 Co-curriculum						
	18	19	18	18	17	19	4	11	13
Total Units for Graduation 137									

Elective:

Elective I : ENT461/3 Renewable Energy / ENT463/3 Elasticity / ENT465/3 Rapid Engineering / ENT462/3 Turbomachinery / ENT464/3 Fracture Mechanics / ENT466/3 Design Optimization Elective II : ENT431/2 Defineeration 5 Ab Cardithesian (ENT432/2 Design Optimization

Elective II : ENT431/3 Refrigeration & Air Conditioning / ENT433/3 Plasticity / ENT435/3 Robotics / ENT432/3 Energy Conversion / ENT434/3 Impact Mechanics / ENT436/3 Computer Aided Manufacturing


Bachelor of Engineering (Honours) (Biomedical Electronic Engineering)

Programme Objectives (PEO)

Programme Objectives 1

Graduates who effectively demonstrate engineering knowledge and entrepreneurial skills by providing practical solutions.

Programme Objectives 2

Graduates who effectively demonstrate professionalism in multi-disciplinary engineering environment, leadership quality and teamwork.

Programme Objectives 3

Graduates who make contributions to knowledge and establish best engineering practice through research and development.

Programme Objectives 4

Graduates who demonstrate an ethical commitment to the community and the profession through involvement with professional organizations and society.

Programme Objectives 5

Graduates who engage in life-long learning as demonstrated through career advancement.

Programme Outcomes (PO)

PO 1

Ability to acquire and apply knowledge of mathematics, science, engineering and in-depth technical competence in mechatronic or mechanical or biomedical electronic engineering discipline to the solution of complex engineering problem.

PO 2

Ability to identify, formulate and solve complex engineering problems.

PO 3

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

PO 4

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

PO 5

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PO 7

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PO 8

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

PO 9

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

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	Ш	Ш	IV	v	VI		VII	VIII
Engineering Core (92)	ENT114/3 Circuit Theory	ENT115/3 Analogue Electronics I	ENT117/3 Engineering Mechanics	ENT218/3 Biomechanics	ENT219/3 Biomaterials	ENT221/3 Biomedical Acts, Standards & Safety	strial 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	ENT220/4 Linear Control System	ENT223/3 Electrical Machine & Drives		ENTXXX/3 Elective I	ENTXXX/3 Elective II
			ENT217/3 Principles of Signasl & Systems	ENT265/4 Microcontroller & Interfaces	ENT315/4 Medical Signal Processing	ENT317/4 Medical Electronics & Bioinstrumentation		ENT401/4 Biomedical Instrumentation Design	ENT438/3 Biomedical Design Project
					ENT316/3 Principles of Communication Systems	ENT318/3 Artificial Organs		ENT413/3 Medical Imaging	
					ENT319/3 Thermofluids	ENT 320/3 Mechanics of Materials			
Non Engineering (28)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT241/3 Numerical Methods & Vector Calculus	EQT271/3 Engineering Statistics			r 302/4 Indu	EUT440/3 Engineers in Society	EUT443/2 Engineering Management
	ENT120/4 Computer Programming	ENT111/4 Anatomy & Physiology	ENT210/3 Biochemistry				EI		
	EUT122/2 Skills & Technology in Communication								
University Required (17)	UUW233/2 Islamic & Asian Civilizations	UUW410/2 University Malay Language	UUW224/2 Engineering Entrepreneurship	UUW322/2 Thinking Skills					
	UZWXXX/1 Co-Curriculum	UUW235/2 Ethnic Relation	UZWXXX/1 Co-Curriculum	UVW 312/2 English for Technical Commnunication		UUWXXX/2 Option			
		UZWXXX/1 Co-Curriculum							
	18	18	18	17	17	18	4	16	14
Total Units for Graduation 137									

Elective I (Medical Computing): ENT420/3 Biological System Modeling, ENT402/3 Medical Image Processing, ENT403/3 Artificial Intelligent Systems, ENT404/3 Human Machine Interfaces

Elective II (Medical Instrumentation): ENT426/3 Computed Tomography & Applications, ENT427/3 Clinical Engineering, ENT428/3 Medical Robotics & Automation, ENT419/3 Biosensors

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 bodu and able to apply in biomedical engineering problem solving.

Course Outcomes

- **CO1:** Ability to discuss anatomical and physiological function of various systems in human body.
- **CO2:** Ability to discuss homeostasis in human body and distinguish the homeostatic imbalance.
- **CO3:** Ability to measure and discuss basic physiological signals and parameters.

References

- Seely, R. R., Stephens, T.D., & Tate, P. (2005). Essentials of Anatomy and Physiology. 5th Ed. McGraw Hill.
- Tortora, G.J., Grabowski, S.R. (2002). Principles of Anatomy and Physiology. 10th Ed. Wiley.
- Marieb, E. (2000). Human Anatomy & Physiology. 5th Ed. Benjamin-Cummings.
- Van Wynsberghe, D. M., Noback, C.R., & Carola, R. (1995). Human Anatomy and Physiology. 3rd Ed. Mc-Graw Hill.
- 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

- **CO1:** Ability to distinguish between voltage and current sources and between the behaviour of resistors, capacitors and inductors in both DC and AC circuits.
- **CO2:** Ability to analyze simple DC and AC circuits using basic circuit laws.
- **CO3:** Ability to analyze more complex DC and AC circuits using techniques of network analysis.
- **CO4:** Ability to design and evaluate basic circuits to meet specifications.

- Robert L. Boylestad. (2007). Introductory Circuit Analysis. 11th Ed. Prentice Hall.
- Alexander, C.K. and Sadiku, M.N.O. (2007). Fundamental of Electric Circuits. 3rd Edition, McGraw-Hill.
- 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.
- 5. Robert A. Pease (2008). Analogue Circuits: World Class Designs. Elsevier.



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

- **CO1:** Ability to explain the theory of semiconductor materials and selected electronic devices.
- **CO2:** Ability to illustrate the operation and application of selected electronic devices.
- **CO3:** Ability to design and evaluate diode circuit and biasing of BJT and FET.

References

- Floyd, T. (2008). Electronic Devices. 8th ed. Prentice Hall.
- Boylestad, R.L., and Nashelsky, L. (2008). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.

- Cathey, J.J. (2002), Schaum's outline of theory and problems of electronic devices and circuits, 2nd edition, McGraw-Hill.
- 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 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

- **CO1:** Able to analyze the combinational and sequential logic circuits
- **CO2:** Be able to design and construct simple circuits and system of basic digital electronics

References

- Floyd, T. (2009). Digital Fundamentals. 10th ed. Prentice Hall.
- 2. Mano, M.M. (2002). Digital Design. 3rd ed. Prentice Hall.
- Tocci, R.J. (2001). Digital Systems: Principles and Applications. 8th ed. Prentice Hall.
- Balaniaban, N. and Carlson, B. Digital Logic Design Principles. 1st ed. Wiley.
- 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

CO1: Ability to study and explain fundamental laws in engineering mechanics and solve problems related to resultant force and moment.

- **CO2:** Ability to study, explain and apply equilibrium equations to solve problems of structure with and without friction.
- **CO3:** Ability to study, measure and analyze the relationship of kinematics and kinetics of a particle and rigid body.

References

- Hibbler, R.C. (2010). Engineering Mechanics: Statics. 12th ed. Prentice Hall.
- Hibbler, R.C. (2010). Engineering Mechanics: Dynamics. 12th ed. Prentice Hall.
- Ferdinand P. Beer, E. Russell Johnston & William E.C (2007)., "Vector Mechanics for Engineers: Statics.", 8th ed., Mc Graw Hill.
- Ferdinand P. Beer, E. Russell Johnston & William E.C.(2007), "Vector Mechanics for Engineers: Dynamics.", 8th ed., Mc Graw Hill.
- 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

- **CO1:** Ability to evaluate problems related to static equilibrium force, concepts of mechanics and vector mechanics.
- **CO2:** Ability to evaluate problems related to moment of a force, equilibrium in rigid body and forces acting on structures.
- **CO3:** Ability to evaluate problems related to frictions, centre of gravity, centre of mass for a system and moment of inertia of an area.

References

 R.C. Hibbeler. (2010). Engineering Mechanics: Statics. 12th ed., Prentice Hall.

- Beer and E.R. Johnson Jr. (2005) Vector Mechanics tor Engineer: Statics. 7th Ed. In SI Units, McGraw Hill.
- J.L. Meriam L.G. Kraige (2003). Engineering Mechanics: Statics. 7th ed., John Wiley and Sons.

ENT 142/3 ENGINEERING DYNAMICS

(Pre Requisite: ENT 141/3 Engineering Statics)

Course Synopsis

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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

- **CO1:** Ability to analyze problems related to rectilinear kinematics, law of motions, and also concepts mechanics and vector mechanics.
- **CO2**: Ability to evaluate problems related to kinematics of particle, involving force and acceleration, work and energy, and also impulse and momentum.





CO3: 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

- 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

- **CO1:** Ability to identify, apply the basic concepts of thermodynamics; the concept of energy transfer, the First Law of Thermodynamics and evaluate them.
- **CO2:** Ability to calculate the properties of pure substances and solve problems related to energy evaluate for close and open systems.
- **CO3:** 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

- 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 144/2 MACHINING SKILLS

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

- **CO1:** Ability to describe and choose the proper measurement tools and the safety procedures to complete a particular manufacturing process.
- **CO2:** Ability to construct and describe the proper manufacturing process to complete a finish product.
- **CO3:** Ability to decide and organize the use of proper machine to complete a particular manufacturing process.

References

 S.K.Garg (2006). Workshop Technology: Manufacturing processes. 2nd Edition, Laxmi Publications.



- Krar, Steve F., Gill, Arthur R., Smid, Peter (2005). *Technology* Of Machine Tools. 6th Ed., McGraw Hill.
- Groover, M. P. (2002). Fundamental of Modern Manufacturing. Prentice Hall.
- Schey, J.A. (2000). Introduction to Manufacturing Processes. 3rd Ed., Mc Graw-Hill.

ENT 145/3 MATERIALS ENGINEERING

Course Synopsis

The objective of the course is to enable the students to analyze problems related to material selection, process selection and metal structure in materials engineering. The course covers topics on atomic structure of materials, materials selection, phase diagrams, microstructure, diffusion in solids, physical properties, mechanical properties of metals, light alloys, corrosion and magnetic materials.

Course Outcomes

CO1: Ability to analyze problems related to engineering materials, materials behaviour, atomic structure, materials selection and processing of materials.

- **CO2:** Ability to analyze problems related to metal structure, phase diagrams, diffusion in solids, physical and mechanical properties of metals.
- **CO3:** Ability to analyze problems related to production, forming of metals, light alloys corrosion and magnetic materials.

References

- William D Callister (2010). Materials Science and Engineering. 8th Edition, John Wiley & Sons.
- Donald R. Askeland and Pradeep P. Phule (2003). The Science and Engineering of Materials. 4th Ed., Thomson Brooks/Cole.
- Kenneth G. Budinski (2010). Engineering Materials: Properties and Selection. 9th Ed., Pearson.
- James F Shackelford (2009). Introduction to Materials Science for Engineers. 7th Edition International Edition, Pearson.

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

- **C01:** Ability to design and reproduce drafting and technical drawings using proper techniques.
- **CO2:** Ability to design and reproduce 2-dimensional drawings to 3-dimensional drawings and vice versa.
- **CO3:** Ability to realize basic concepts of drafting and to design engineering projects using computer aided drafting software

- 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.



- Timothy Sean Sykes (2002). AutoCAD 2002 One Step at a Time. Prentice Hall,.
- 4. Ralph Grabowski (2002). Using AutoCAD 2002. Thomson Learning.

ENT 153/4 PRINCIPLES OF THERMO-FLUIDS 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

- **CO1:** Ability to describe the Mechanical properties of materials and analyse tensile, compressive, shear stresses & strains, and torsional deformation.
- **CO2:** Ability to calculate the pressure variation in a static fluid, and to analyze the resulting hydrostatic forces on plane and curved submerged surfaces.
- **CO3:** Ability to describe, explain and analyze an Energy equation for fluid flow problems.

CO4: Ability to identify, analyze and solve energy balance problems for closed and steady flow systems and devices.

References

- William D Callister (2010). Materials Science and Engineering. 8th 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.
- Robert L. Mott (2006). Applied Fluid Mechanics. 6th Edition, Pearson.
- 5. William Fox and Alan T. McDonald (1998). Introduction to Fluid Mechanic.

ENT 161/4 ELECTRICAL CIRCUITS

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

- **CO1:** Ability to solve DC problems using basic laws and circuit theorem.
- **CO2:** Ability to solve AC problems using basic laws and circuit theorem.
- **CO3:** Ability to design and evaluate basic circuits to meet specifications.

- Alexander, C.K. and Sadiku, M.N.O.(2007) Fundamental of Electric Circuits, 3rd Edition, McGraw-Hill.
- 2. Robert L. Boylestad. (2007) Introductory Circuit Analysis. 11th Ed. Prentice Hall.
- Nilssen, J.W. and Riedel, S.(2008) Electric Circuits, 8th Edition, Addison Wesley.

ENT 162/4 ANALOGUE 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

- CO1: Ability to perform the analysis on characteristics of semiconductor devices.
- CO2: Ability to design and evaluate analogue circuits by using semiconductor devices.
- CO3: Ability to solve circuitry problems in a group.

References

- Floyd T., "Electronic Devices", 8th Edition, Pearson Prentice Hall, 2008.
- Boylested R L and Nashelsky L., "Electronics Devices and Circuit Theory", 7th Edition, Prentice Hall, 1999.
- Schuler C A., "Electronics-Principles and Applications", 6th Edition, Prentice Hall, 2003.
- Aminian, A., and Kazimierczuk, M., "Electronic Devices- A Design Approach", Pearson Prentice Hall, 2004.

 Salivahanans S., Kumar N., Vallavaraj A., "Electronic Devices and Circuits", McGrawHill, 2007.

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, threephase 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

- **CO1:** Ability to analyze electrical circuits to solve engineering problems.
- **CO2:** Ability to analyze AC Circuits. **CO3:** Ability to analyze the characteristics three-phase circuits and electromagnetic.
- **CO4:** Ability to analyze the operation of Electrical Machines and their applications.

References

- Charles K. Alexander and Matthew N. O. Sadiku (2004). Fundamentals of Electrical Circuits. 2nd Ed, McGraw Hill.
- James W. Nilsson and Susan A. Reidel (2004). *Electric Circuits*. 6th Ed, Prentice Hall.
- 3. Wildi, T (2002). Electrical machines, drives and power systems. Prentice Hall.
- 4. Bhattacharya, S. K. (1998). Electrical Machines. McGraw Hill.
- 5. P. C. Sen (1997). Principles of Electric Machines and Power Electronics. 2ndEdition, Wiley.

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 wellstructured C applications applied to Mechatronic Engineering

Course Outcomes

- **CO1:** Ability to define the basic programming techniques.
- **CO2:** Ability to apply suitable programming technique to solve a given problem.
- **CO3:** Ability to develop and analyze computer programmes in C and C++ for Mechatronic Applications.

References

- Deitel & Deitel, Suhizaz Sudin, R. Badlishah and Yasmin Yacob (2006). C How To Programme. Pearson-Prentice Hall.
- Ivor Horton's (2003). Beginning visual C++. Wiley Publishing, Inc, Indiana.
- 3. Tan & D Orazio (1999). C Programming for Engineering & Computer Science. Mc Graw Hill.
- Forouzan, B. A. & Gilberg R.
 F. (2001). Computer Science: A Structured Programming Approach Using C. Brooks/Cole.
- Al Kelley and Ira Pohl (2000). C by Dissection: The Essentials of C Programming. 4th ed., Addison-Wesley.
- Sprankle and Maureen (2006). Problem Solving and Programming Concepts. 7th Edition. Prentice Hall.

ENT 216/3 ANALOGUE ELECTRONICS II (Pre Requisite: 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

- **CO1:** Ability to analyze the operation, application and frequency response of power amplifiers and operational amplifiers.
- **CO2:** Ability to analyze the principles of active filters, feedback circuits, oscillators and voltage regulators in electronic applications.
- **CO3:** Ability to design amplifiers, active filters and oscillators.

References

1. Floyd, T. (2008). Electronic Devices. 8th ed. Prentice Hall.

- Boylestad, R.L., and Nashelsky, L. (2008). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
- Cathey, J.J. (2002), "Schaum's outline of theory and problems of electronic devices and circuits", 2nd edition, McGraw-Hill.
- 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

- **CO1:** Ability to explain and analyze the application of Fourier Series in signals and Systems.
- **CO2:** Ability to explain and analyze the application of Laplace Transform in Signals and Systems.
- **CO3:** Ability to explain and analyze the application of *z*-transform in Signals and Systems.
- **CO4:** 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.
- C.L. Phillips, J.M. Parr, E.A. Riskin. (2003). Signals, Systems & Transforms. 3rd Ed. Prentice Hall.
- B.P. Lathi (1998). 'Signal Processing & Linear Systems', Oxford University Press.
- 4. M.J. Roberts (2003). 'Signals & Systems', McGraw Hill.
- Charles L.Philips (2007). Signals, Systems and Transforms. 4th Edition. Prentice Hall.

ENT 218/3 BIOMECHANICS (Pre Requisite: 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

- **CO1:** Ability to define, explain and compare the biomechanics and anatomy terminologies and their relationships
- **CO2:** Ability to differentiate and analyze the relationship of kinematics and kinetics of a particle and rigid body.
- **CO3:** 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.
- Iwan W.G. (2006). Principles of biomechanics & Motion Analysis. 3rd Ed.
- Ellen Kreighbaum and Katharine M Barthels (1996), "Biomechanics: A qualitative approach for studying human movement", 4th Edition.

- 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

- **CO1:** Ability to describe the concept of biocompatibility, analyze and follow basic properties of materials in medical applications.
- **CO2:** Ability to propose the suitable materials for specific biomedical applications and explain and display their effects with respect to biocompatibility.





CO4: 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.
- Callister W.D., "Fundamentals of Materials Science and Engineering: An Integrated Approach", 3rd ed., John Wiley, 2008.
- 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 sustems.

Course Outcomes

- **CO1:** Ability to analyze basic concepts of control theory applications (including biomedical systems).
- **CO2:** Ability to analyze system response, and stability in time domain.
- **CO3:** Ability to analyze system response, and stability in frequency domain.
- **CO4:** Ability to design PID and lead-lag controllers.

References

- Nise, N.S, (2009). Control Systems Engineering. 4th Ed. Wiley.
- 2. Ogata, K. (2002). Modern Control Engineering. 4th ed. Prentice Hall.
- Gopal, M. (1995). Control Systems: Principles and Design. 2nd Ed. Tata McGraw-Hill.
- Khandpur, R.S. (2003), "Handbook of Biomedical Instrumentation", 2nd Ed. Tata McGraw-Hill.
- 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

- CO1: Ability to employ regulatory standards in ensuring safety and reliability of medical technology.
- CO2: Ability to demonstrate safety awareness in dealing with hazards from medical equipment.
- CO3: Ability to manage healthcare technology and demonstrate ethical responsibility in the field of biomedical engineering.

References

- Reese, C.D. (2003). Occupational Health and safety Management: A Practical Approach. Lewis Publishers.
- Carr, J.J. (2000). Introduction to Biomedical Equipment Technology. 4th Ed. Prentice Hall.
- Lusardi, M.M., Nielsen, C.C. (2000). Orthotics and Prosthetics in Rehabilitation. Butterworth-Heinneman.

- 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

- **CO1:** Ability to define and explain basic theory of electromagnetism.
- **CO2:** Ability to apply the fundamental mathematics of vector analysis and Maxwell's equations to solve and analyze electromagnetic problems.
- **CO3:** Ability to identify and differentiate the differences of magnetic materials and relate the EM properties of materials.

CO4: Ability to analyze the characteristic and mechanism of electromagnetic wave in different situation.

References

- 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.
- Kraus, J.D., Fleisch, D.A. (1999). Electromagnetics. 5th ed. McGraw-Hill.
- 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

- CO1: Ability to explain the principle and operation of different types of electrical machines.
- CO2: Ability to compare and analyze the performance characteristics of electrical machines.
- CO3: Ability to explain and compare the different types of electrical drives.
- CO4: Ability to select and design suitable electronic drives for speed control of electrical machines.

References

- Theodore Wildi (2006). Electrical Machines, Drives, and Power Systems. 6th Edition.
- 2. S.J. Chapman (2005), Electric Machinery Fundamentals, 4th Edition, McGraw Hill.
- Leonard L. Gigsby (2007), Electric Power Engineering Handbook, 2nd Edition, CRC Press.
- 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 Outcome

- **CO1:** Ability to identify and calculate various properties of fluids.
- **CO2:** Ability to respond and analyze problems related to fluids statics, fluids kinematics, and conservation of mass and Bernoulli equation.
- **CO3:** 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.

- Robert L. Mott (2006). Applied Fluid Mechanics. 6th Edition, Pearson.
- M.C.Potter and D.C. Wiggert (2002). *Mechanics of Fluids*, 3rd Edition, Brooks/Cole.
- Robert W. Fox and A.T. McDonald (1998). Introduction to Fluid Mechanics. 5th Edition, John Wiley and Sons.
- J.F. Douglas, JM Gasiorek, JA Swaffield and LB Jack (2005). *Fluid Mechanics*. 5th Edition, Prentice Hall.

ENT 242/3 SOLID MECHANICS I

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 Outcome

- **CO1:** Ability to apply the fundamental theory of solid mechanics (mechanical properties, the relation between stress and strain).
- **CO2:** Ability to identify, calculate and analyze cases of axial loading, torsion, bending.
- **CO3:** Ability to apply and solve the combination cases by using the stress and strain transformation.

References

- Hibbeler, R.C. (2008). Mechanics of Materials. 7th ed., Prentice Hall.
- Ferdinand P. Beer (2006). Mechanics of Materials. 4rd ed., McGraw-Hill.
- 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 (Pre Requisite: 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 Outcome

- **CO1:** 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.
- **CO2:** Ability to explain refrigeration cycles, heat pumps and refrigerant selection. Ability to calculate and evaluate problems of refrigeration cycles.
- **CO3:** Ability to describe, apply, evaluate and solve the problems of gas mixtures, gas-vapour mixture and air conditioning.

CO4: 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.

- 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.
- Davin Dunn (2001). Fundamental Engineering Thermodynamics. Illustrate edition, Longman Group, United Kingdom.
- W.Z. Black and J.G. Hartley (1996). Thermodynamics. English/SI version, 3rd edition, Prentice-Hall.
- M.J. Moran and H.N. Shapiro (1998). Fundamentals of Engineering Thermodynamics. 3rd Edition, John Wiley & Sons.
- 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 Outcome

- **CO1:** Ability to describe and choose the right raw materials for selected manufacturing processes.
- **CO2:** Ability to describe, display and analyze the manufacturing processes for a finished product.
- **CO3:** Ability to choose, compare and evaluate the use of proper machine to complete a particular manufacturing process.

References

- S. Kalpakjian and S.R. Schmid (2006). Manufacturing Engineering and Technology. 5th ed., Prentice Hall International.
- S.K. Garg (2006). Workshop Technology: Manufacturing processes. 2nd Edition, Laxmi Publications.
- Krar, Steve F., Gill, Arthur R. and Smid, Peter (2005). *Technology* Of Machine Tools. 6th Ed., McGraw Hill.
- Groover, M.P. (2002). Fundamental of Modern Manufacturing. Prentice Hall.
- 5. Zainal Abidin Ahmad (1999). Proses Pembuatan. Penerbit UTM, Johor.

ENT 245/4 PRODUCT DESIGN DEVELOPMENT

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 Outcome

- **CO1:** Ability to identify design requirements from general problem descriptions.
- **CO2:** Ability to develop systematically a design from concept to prototype.
- **CO3:** Ability to communicate clearly design ideas and information.
- **CO4:** Ability to evaluate critically the designs using engineering criteria and predictive usage.

- 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.

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- Robert L. Mott (1992). Machine Elements in Mechanical Design. 2nd Edition, Maxwell and Macmillan International.
- 7. Alexander H. Slocum (1992). Precision Machine Design, Prentice-Hall International.
- M. F. Spotts (1992). Design of Machine Elements. 6th Edition, Prentice-Hall.
- Robert C. Juvinall and Kurt M. Marshek (1991). Fundamentals of Machine Component Design. 2nd Edition, John Wiley & Sons.

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 Outcome

CO1: Ability to analyze shaft, beam and member subjected to various loadings and develop a stress strain transformation analysis.

- **CO2:** Ability to recognize, calculate and solve deflection in structural analysis, calculate buckling and strain energy applied by various loadings.
- **CO3:** Ability to calculate buckling and strain energy applied by various loadings.

References

- Hibbeler, R.C. (2009). Mechanics of Materials. 12th ed., Prentice Hall.
- Pytel. Kiusalaas (2001). Mechanics of Materials. 3rd ed., McGraw-Hill.
- 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

(Pre Requisite: 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 Outcome

- **CO1:** Ability to analyze dimensional analysis, modelling, and problems related to losses in pipe flows and flow over bodies.
- **CO2:** 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.
- **CO3:** Ability to develop analytical techniques for particle mechanics problems based on Stoke's law/Darcy's law/Carmen-Kozeny equation in fluid systems.
- **CO4:** Ability to analyze different type of turbomachinery.

- 1. Yunus A. Cengel and John M. Cimbala (2008). Fluids Mechanics: Fundamentals and Applications. Int'l Edition, McGraw-Hill.
- Robert L. Mott (2006). Applied Fluid Mechanics. 6th Edition, Pearson.



- . M.C.Potter and D.C. Wiggert (2002). *Mechanics of Fluids*. 3rd Edition, Brooks/Cole.
- Robert W. Fox and A.T. McDonald (1998). Introduction to Fluid Mechanics. 5th Edition, John Wiley and Sons.
- J.F. Douglas, J.M. Gasiorek, JA Swaffield and LB Jack (2005). *Fluid Mechanics*. 5th Edition, Prentice Hall.

ENT 256/4 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

- **CO1:** Ability to discuss, apply, and organize the concept and principle of design process.
- **CO2:** Ability to discuss, apply, and organize machine elements and analyze position, velocity and acceleration of a point in a linkage.

- **CO3:** Ability to analyze, and construct machine elements to develop a mechanism.
- **CO4:** 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.
- Richard G. Budynas and J. Keith Nisbet (2008). Shigley's Mechanical Engineering Design. 8th Ed., McGraw Hall.
- Robert L. Mott (2006). Machine Elements in Mechanical Design.
 4th Ed. in SI Units, Prentice-Hall.
- Charles E. Wilson and J. Peter Sandler (2006). *Kinematics and Dynamics of Machinery*. 3rd Ed., Pearson Prentice-Hall.

ENT 263/4 DIGITAL ELECTRONICS

(Pre Requisite: ENT 162/4 Analogue 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

- **CO1:** Ability to explain the concepts of digital electronic system.
- **CO2:** Ability to analyze the combinational logic circuit.
- **CO3:** Ability to analyze the sequential logic circuit.
- **CO4:** Ability to apply the digital electronic components in Mechatronic engineering applications.

References

- 1. Flyod, T.L., "Digital Fundamentals", 10th. Ed., Prentice Hall 2009.
- 2. M.M. Mano, "Digital Design", 3rd Ed., Prentice-Hall 2002.
- Tocci, RJ., "Digital systems: Principles and Applications", 8th Ed., Prentice Hall 2001.
- N. Balabanian and B. Carlson, "Digital Logic Design Principles", 1st Ed., John Willey
- 5. W. Kleitz, "Digital Electronics: A Practical Approach", 6th Ed., USA: Prentice-Hall, 2004

School of Mechatronic Engineering

ENT 268/3 PRINCIPLES OF ELECTROMAGNETICS

Course Synopsis

This course is designed to introduce the theories and concepts of electromagnetic fields. Student will be exposed to basic postulates of electrostatic and electromagnetic fields and able to solve related problems. Finally the students will be developing the ability to apply the fundamental mathematics of vector analysis and Maxwell's equations to in electromagnetic problems.

Course Outcomes

- **CO1:** Ability to perform analysis on electric field, electric potential and capacitance due to any distribution of electric charges.
- **CO2:** Ability to perform analysis on magnetic field, magnetic flux density and inductance due to any current distribution.
- **CO3:** Ability to perform analysis on Maxwell's equations and problems related to electromagnetic field.

References

 Matthew N.O. Sadiku "Elements of Electromagnetics", 4th Ed., Oxford University Press, 2007.

- William H. Hayt, Jr and John A. Buck "Engineering Electromagnetics", 7th Ed., McGraw Hill International Ed. 2006.
- David K. Cheng, "Fundamentals of Engineering Electromagnetics" Addison Wesley, 1992.
- Fawwaz T. Ulaby, "Fundamentals of Applied Electromagnetics", 5th Ed., Pearson International Edition, 2007.
- Joseph A. Edminister, "Schaum's Outline of Theory and Problems of Electromagnetics", 2nd Ed., McGraw Hill International Ed. 1995.
- Kraus / Fleisch, "Electromagnetics with Applications", 5th Ed., McGraw Hill International Ed. 1999.

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

- **CO1:** Ability to comprehend the concept and identify specific type of signals and systems.
- **CO2:** Ability to analyze the signal using time and frequency domain techniques.
- **CO3:** Ability to develop and formulate a system using both time-domain and frequencydomain techniques.

- Simon Haykin and Barry Van Veen, "Signals and Systems", Wiley, 2nd Edition, 2002.
- 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.
- 4. M.J. Roberts, "Signals and Systems", International Edition, McGraw Hill, 2003.

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 tupe 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

- **CO1:** Ability to explain basic concepts of transducers, sensors and measurement techniques and errors in measurement.
- **CO2:** Ability to apply interfacing concept between transducers, computer and signals obtained from measurement techniques.
- **CO3:** 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
- Bentley, J.P., "Principles of Measurement Systems", 4th Edition, Prentice Hall, 2005.
- Johnson, C., "Process Control Instrumentation Technology", 8th Edition, Prentice Hall, 2006.
- Doebelin, E.O., "Measurement System: Application and Design", Mc Graw Hill, 2004.
- 5. Sinclair, I., "Sensors and Transducers", 3rd Edition, Newnes, 2001.

ENT 288/3 MICROPROCESSORS

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 evaluation of a simple application on a microprocessorbased system. This also includes the knowledge of assembly language programming, I/O interfacing, arithmetic operations, data transfer, timers, serial port programming, interrupts, LCD and keyboard interfacing and data converters. The students must able to design and develop simple real-world applications based on PIC 18 microcontroller system.

Course Outcomes

- **CO1:** Ability to describe and explain the theory and basic architecture of microprocessors.
- **CO2:** Ability to write programmes using assembly language and illustrate the PIC18 microcontroller built-in functions.
- **CO3:** Ability to choose the I/O devices and develop a simple microcontroller-based application.

- 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
- Huang Han-Way PIC Microcontroller: An Introduction to Software and Hardware Interfacing, Thomson & Delmar Learning, 2005

- 4. John B. Peatman Design with PIC Microcontrollers, Prentice Hall, 1998
- 5. Martin Bates "Interfacing PIC Microcontrollers: Embedded Design by Interactive Simulation", Newnes 2006.

ENT 289/3 DRIVES AND POWER ELECTRONICS

Course Synopsis

This course is intended to introduce to the Mechatronic students both theories and applications of: 1) Electromechanical drives, which consists of DC and AC machines, stepper and servo motor, 2) fundamental elements of power electronics and electronic drive control, consisting switching converters and pulse-widthmodulation (PWM) techniques and variable speed operation of induction motor and 3) Actuator, which consists of Linear and rotary driven actuator, characteristics of mechanical actuator. selection of actuator. This course also allows the students to identify and select drives and actuators which are suitable for applications.

Course Outcomes

CO1: Ability to choose based on the characteristics for various types of a drive system.

- **CO2:** Ability to analyze and evaluate the performance of different types of a drive system.
- **CO3:** Ability to design and evaluate the drive system and actuators for an optimum performance in various applications.

References

- 1. Theodore Wildi. Electrical Machines, Drives, and Power Systems. Sixth Edition, 2006.
- 2. Anthony Esposito. Fluid Power with applications. Sixth Edition, 2003.
- Charles E. Wilson and J. Peter Sadler. Kinematics and Dynamics of Machinery. Third Edition in SI Units, 2006.
- 4. Ned Mohan, Electric Drives: An Interactive Approach, MNPERE, 2004.
- W. Bolton, "Mechatronics: Electronic Control Systems in Mechanical & Electrical Engineering", 3rd Ed., 2003.

ENT 315/4 MEDICAL SIGNAL PROCESSING

(Pre Requisite: 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

- **CO1:** Ability to explain the basic concept of DSP and acquisition signal process.
- **CO2:** Ability to explain on the filter used and its design.
- **CO3:** Ability to discuss on image processing method.
- **CO4:** Ability to discuss the tools used for DSP.

- 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



- 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

- CO1: Ability to analyze
 - mathematical function of communication system model.
- **CO2:** Ability to evaluate performance of elements in communication device.
- **CO3:** Ability to propose a conceptual setup of a communication system based on specific requirement.

References

- Louis E. Frenzel (2008), "Principles of Electronic Communication Systems", 3rd Ed., McGraw-Hill, 2008.
- N. Benvenuto, R. Corvaja, T. Erseghe, N. Laurenti (2007), Communication Systems – Fundamentals and Design Methods, Willey.
- Wayne Tomasi (2004), "Electronic Communication System, Fundamental Through Advanced",5th Ed., Pearson Prentice Hall.
- 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

- **CO1:** Ability to define, discuss, apply, distinguish and assemble basic sensors and transducers in a medical instrumentation system.
- **CO2:** Ability to apply, analyze, design, evaluate and assemble instrumentation amplifiers and analogue filter circuits in medical instrumentation.
- **CO3:** Ability to discuss, explain, apply and analyze medical devices involved in the measurement of cardiovascular and respiratory system.
- **CO4:** 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.

School of Mechatronic Engineering

- 2. Webster, J.G. (2003). Bioinstrumentation. Wiley.
- 3. Perez, R. (2002). Design of Medical Electronic Devices. Academic Press.
- Carr, J.J. (2000). Introduction to Biomedical Equipment Technology. 4th Ed. Prentice Hall.
- 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

- **CO1:** Ability to describe concepts, fundamental principle and problems regarding artificial organs.
- **CO2:** Ability to analyze mathematical concepts of human physiology, biotransport and artificial organs.
- **CO3:** Ability to illustrate modelling and simulation of human physiological system and artificial organs.

References

- Marieb E.N. (2006), "Essentials of Human Anatomy and Physiology", 8th Edition, Pearson Benjamin Cummings.
- 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.
- 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 thermodunamics 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

CO1: Ability to define, explain and analyze the fundamental principles of thermofluids.
CO2: Ability to define, explain and analyze the fundamental principles of thermodynamics.
CO3: Ability to define, explain and analyze the fundamental principles of heat transfer.





References

- Massoud, M. (2005). Engineering Thermofluids: Thermodynamics, Fluid Mechanics, and Heat Transfer. 1st Ed. Springer.
- Cengel Y.A, Boles M.A. (2001). Thermodynamics: an engineering approach. 4th Ed. McGraw Hill.
- Marquand, C. (2000). Thermofluids: an integrated approach to thermodynamics and fluids mechanics principles. John Willey.
- 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 331/3 MANAGEMENT PRODUCTION AND CONTROL OF QUALITY

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

- **CO1:** To understand the productivity concepts from different aspects of management,
- **CO2:** To understand the Six Sigma management tools.
- **CO3:** To be able to understand the statistical methods used in quality control and improvement,
- **CO4:** To understand the methods on how labour can improve their productivity and the measurements used to measure the labour productivity.

References

- 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.
- Kolarik, W.J. (2005). Creating Quality Concepts, Systems, Strategies, and Tools. McGraw Hill.
- Besterfield, Dale H. Quality control 7th Edition. Upper Saddle River, New Jersey: Pearson Prentice-Hall, Inc.: 2006.

 C. M. Creveling,, J. L. Slutsky, D. Antis, Jr. Design for Six Sigma in Technology and Product Development, Prentice Hall, 2003

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 Outcome

- **CO1:** Ability to formulate the mathematic equations to fluid mechanics problem.
- **CO2:** Ability to analyze the CFD results using different types of elements.
- **CO3:** 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.
- 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.
- 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.
- Jiyuan Tu, Guan Heng Yeoh and Chaoqun Liu (2008). Computational fluid dynamics: a practical approach. Amsterdam: Butterworth-Heinemann.

ENT 343/3 PRINCIPLES OF HEAT TRANSFER

Course Synopsis

This course offers comprehensive contents about energy transferred by interactions of a system with its

surrounding which is heat and work. Extended from thermodynamics analysis through study of the modes of heat transfer: conduction, convection and radiation, and through development of relations to calculate heat transfer rate. This course also introduces performance parameters for assessing the efficacy of a heat exchanger and develops methodologies for designing a heat exchanger or for predicting the performance of an existing exchanger operating under prescribed conditions. Mass transfer being introduced in order to extend the knowledge of energy transferred.

Course Outcome

- **CO1:** Ability to formulate heat transfer basic principles i.e. conduction, convection and radiation i.e. Fourier equations. Newton's low of cooling and Black body radiation. Emphasis will be given in ability to estimate heat conduction in steady state and apply the transient heat conduction, and also to evaluate convection problem in fluid flow both in internal and external force. **CO2:** Ability to evaluate heat transfer in heat exchangers.
- **CO3:** Ability to evaluate the problems of mass heat transfer, estimate the mass-

transfer coefficient and solve the problem for its application in evaporation process.

References

- Cengel, Y.A. (2008). Heat Transfer: A Practical Approach. 3th ed. In SI Units, McGraw-Hill.
- 2. Holman, J. P. (2010). *Heat Transfer*. 10th Edition, Mc Graw Hill.
- Frank P. Incropera and David P. Dewitt (2007). Introduction to Heat Transfer. 5th Edition, John Wiley & Sons.
- 4. Arpaci, Selamet and Kao (2000). Introduction to Heat Transfer. Prentice Hall.
- Mohammad Zainal Mohd Yusof (1991). Pemindahan Haba Kejuruteraan. Edisi Kedua, 2nd Edition, Penerbit Universiti Teknologi Malaysia.

ENT 345/4 MECHANICAL COMPONENTS DESIGN

Course Synopsis

The objective of the course is to introduce the concepts and principles of mechanical design. The course begins with understanding the design fundamental and followed by the component selection, stress analysis, failure theories, designing mechanical

elements. Mechanical elements are screw and fasteners, mechanical springs, bearings, gear, clutches, brakes and flexible mechanical elements. The knowledge of mechanical design will be implemented in a mini project as laboratory assignment - A design of a mechanical machine by utilizing CAD software, Mdesign and Solidworks.

Course Outcome

- **CO1:** Ability to explain, applies the design principles, display the designed model and analyze the failure criterion in mechanical components.
- **CO2:** Ability to explain material properties, select appropriate material and analyze mechanical components using stress and deformation analysis.
- **CO3:** Ability to analyze, propose and display mechanical components for selected mechanical systems.

References

- 1. Richard Budynas and J. Keith Nisbett (2008). Shigley's Mechanical Engineering Design. Eighth Edition, McGraw Hill.
- Karl T. Ulrich and Steven D. Eppinger (2004). Product Design and Development. 3rd Edition, McGraw-Hill.

- David G. Ullman and David Ullman (2003). Mechanical Design Process. 3rd Edition, McGraw Hill.
- Robert L. Mott (1992). Machine Elements in Mechanical Design.
 2nd Edition, Maxwell and Macmillan International.
- 5. Alexander H. Slocum (1992). Precision Machine Design. Prentice-Hall International.
- M. F. Spotts (1991). Design of Machine Elements. 6th Edition, Prentice-Hall.
- Robert C. Juvinall and Kurt M. Marshek (1991). Fundamentals of Machine Component Design. 2nd Edition, John Wiley & Sons.

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 Outcome

- **CO1:** Ability to describe basic concept of vibrations and its applications, analyze simpleharmonic motion, measure free and force vibration for single degree of freedom.
- **CO2:** Ability to analyze and measure the response of various systems (two degree and multi degrees of freedom) to various inputs (free and force excitation).
- **CO3:** Ability to develop a model and assess vibration system parameter and estimate effectiveness of vibration isolation.
- **CO4:** 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.

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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. Analuses will be conducted using computer programming and commercial FEA software.

Course Outcome

- **CO1:** Ability to understand the fundamental of finite element analysis concepts
- **CO2:** Ability to derive global stiffness matrices for plane frame elements.
- **CO3:** Ability to develop computer programme to solve beam and frame problems by using finite element analysis.
- **C04:** 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.
- I. M. Smith and D.V. Griffiths (2004). Programming the Finite Element Method. 4th Edition, John Wiley & Sons Ltd.
- 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 348/4 MECHANICAL SYSTEM DESIGN

Course Synopsis

This course is intended as an advanced knowledge of mechanical 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. This course will utilize various Computer Aided Design (CAD) software as tools in analyzing and solving mechanical design problems.

Course Outcome

- **CO1:** Ability to define kinematics of mechanisms, sketch and analyze mechanical elements of a system based on kinematics analysis.
- **CO2:** Ability to describe and evaluate dynamics machinery at mechanical system, and sketch linkage and free-body diagrams.
- **CO3:** Ability to describe and evaluate a balancing of machinery and engine dynamics and sketch in static and dynamic balancing of mechanical system.

- 1. R.L. Norton (2008). Design of Machinery. McGraw Hill.
- 2. Dan B. Marghitu (2005). Kinematic Chains and Machine Components Design. Academic Press.
- 3. R. L. Mott (2006). Machine Elements in Mechanical Design. Pearson Prentice Hall.





- John J. Uicker, Jr., Gordon R. Pennock and Joseph E. Shigley (2003). *Theory of machines and mechanisms*. Oxford University Press, USA.
- 5. Myszka (2005). Machines & Mechanisms. Prentice Hall.
- C.E. Wilson and J.P. Sadler (2003). *Kinematics and Dynamics of Machinery*. SI Edition, Pearson Prentice-Hall Publishers.

ENT 363/4 MACHINE VISION SYSTEMS

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

- **CO1:** Ability to perform analysis on image acquisition and processing concepts.
- **CO2:** Ability to perform analysis on image feature extraction techniques.
- **CO3:** Ability to design simple machine vision modules.

References

- 1. Ramesh Jain, Rangachar Kasturi and Brain G Schunck (1995). *Machine Vision*. International edition, McGraw-Hill.
- 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.
- S.N.Sivanandham and M.Paulraj. 'Introduction to Artificial Neural Networks'. Vikas Publications, India, 2003

ENT 372/4 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

- **CO1:** Ability to describe the importance of various types of robots and relate them in various industrial applications.
- **CO2:** Ability to construct and analyze the coordinate representation, transformations and path planning.
- **CO3:** Ability to construct and analyze robot control systems for various industrial applications.
- **CO4:** Ability to design a robot workcell for specific industrial task and measure its validity.

References

- 1. Saeed B Niku (2001). Introduction to Robotics. Prentice hall.
- 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.
- R. D. Klaffer, T. A. Chmielewski and M. Negin (2006). Robotic Engineering: An Integrated Approach. Prentice-Hall, India.

School of Mechatronic Engineering

ENT 373/4 EMBEDDED SYSTEM DESIGN AND APPLICATIONS

(Pre Requisite: ENT 288/3 Microprocessors)

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

- **CO1:** Ability to write a structured programme in C language for embedded system application.
- **CO2:** Ability to choose and apply input output devices to microcontroller.
- **CO3:** Ability to evaluate and develop a self-contained embedded system application.

References

1. Muhammad Ali Mazidi, Rolin D. Mckinlay and Danny Causey (2008). PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18. Pearson Prentice Hall.

- 2. Barry B. Brey (2008). Applying PIC18 Microcontrollers: Architecture, Programming, and Interfacing using C and Assembly. Pearson Prentice Hall.
- 3. Richard H. Barnett, Sarah Cox and Larry O'Cull (2004). Embedded C Programming and the Microchip PIC. Thomson & Delmar Learning.
- 4. Tim Wilmshurst (2007). Designing Embedded Systems with PIC Microcontrollers: Principles and Applications. Newnes.
- 5. Martin Bates (2006). Interfacing PIC Microcontrollers: Embedded Design by Interactive, Simulation. Newnes.

ENT 374/3 POWER SYSTEMS ENGINEERING

(Pre Requisite: ENT 161/4 Electrical Circuits)

Course Synopsis

This course aims to provide basic concepts of power systems which include transmission line, transformer, power flow, fault analysis and system protection.

Course Outcomes

CO1: Ability to discuss the functional concepts of various sections of a power system network.

- **CO2:** Ability to illustrate the functions of single phase, three phase transmission lines and transformers in power flow.
- **CO3:** Ability to analyze fault conditions using symmetrical components.
- **CO4:** Ability to design system protection schemes in a power flow network.

References

- 1. Glover, Sarma and Overbye (2007). *Power Systems Analysis and Design*. Fourth Edition, Thomson.
- 2. Steven W.Blume (2007). Electric Power System Basics-for the Non electrical Professional, Wiley Interscience.
- Mukund R. Patel, (2006); Wind and Solar Power Systems, 2nd Edition, Taylor & Francis. NY
- 4. Gillbert M. Masters, (2004); Renewable and Efficient Electrical Power Systems, John Wiley, NJ
- 5. M. N. Bandyopadhyay, (2006); Electrical Power Systems, Wiley Interscience, New Delhi

ENT 381/2 MICROPROCESSOR

Course Synopsis

The aim of this course is to study the Motorola 68HC11 microprocessor architecture and

relate that knowledge to the design of microprocessor based systems. This includes evaluation of a simple application on a microprocessorbased system. The study of 68HC11 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

- **CO1:** Ability to describe and explain the theory and basic architecture of microprocessor.
- **CO2:** Ability to write and programme a microprocessor system using assembly language.
- **CO3:** Ability to analyze and apply the microcontroller with I/O devices.
- **CO4:** Ability to evaluate a simple application on a microprocessor-based system.

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
- Barry B. Brey, Applying PIC18 Microcontrollers: Architecture, Programming, and Interfacing using C and Assembly, Pearson Prentice Hall 2008

 R.S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5th Edition, Prentice Hall, 2002.

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

- **CO1:** Ability to explain the principle of network and communication systems
- **CO2:** Ability to obtain mathematical model of modulation.
- **CO3:** Ability to apply principle of various types of network and communication systems.
- **CO4:** Ability to select equipments for the industrial network and communication technology.

References

- 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.
- Andrew S. Tanenbaum, Maarten van Steen, "Distributed System: Principles and Paradigms", Prentice-Hall, 2002.
- Behrouz A. Forouzan, "Data Communications and Networking", 4th Ed., Mc-Graw Hill, 2007.
- William Stallings, "Data and Computer Communications", 7th Ed., Prentice-Hall, 2004.

ENT 385/3 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

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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 Outcome

- **CO1:** The ability to obtain the mathematical model for electrical and mechanical systems.
- **CO2:** Ability to perform system response analysis and stability in time domain.
- **CO3:** Ability to perform system response analysis and stability in frequency domain.
- **CO4:** 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

- Nise, N.S., "Control Systems Engineering", 6th Ed., Wiley, 2011.
- Kuo B.C. "Automatic Control System" 8th Edition, Prentice Hall, 1995.
- Ogata, K., "Modern Control Engineering", 4th Ed. Prentice Hall, 2002.
- Gopal, M., "Control Systems: Principles and Design", 2nd Ed. Tata McGraw-Hill, 2002.

ENT 386/3 MODERN CONTROL ENGINEERING (Pre Requisite: ENT 385/3 Control Engineering)

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

- **CO1:** Ability to analyze the concepts of state-space design, non-linear system and digital control.
- **CO2:** Ability to apply the concept of controllability and observability
- **CO3:** Ability to analyze the non linear system.
- **CO4:** Ability to design the digital control.

References

 Norman S. Nise, "Control System Engineering", 4th Edition, Wiley, 2004

- Katsuhiko Ogata; "Modern Control Engineering", 4th Edition, Prentice-Hall, 2002.
- Benjamin C. Kuo; "Automatic Control Systems", 8th Edition, John Wiley, 2003.
- Richard C. Dorf, Robert H. Bishop; "Modern control System", 9th Edition, Prentice Hall, 2001
- Richard Dorf and R.H. Bishop "Modern Control Systems", Addison-Wesley, 1998.

ENT 388/3 ELECTRONICS

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.

Course Outcome

- CO1: Ability to describe and analyze analogue electronics circuits.CO2: Ability to describe and analyze
 - the digital electronics circuits.
- **CO3:** Ability to select and apply suitable electronic components in mechanical engineering applications.



References

- Floyd T. (2005). Electronic Devices. 7th Edition, Pearson Prentice Hall.
- Storey, N. (2006). Electronics: A System Approach. 3rd Ed., Prentice Hall.
- Schuler, C. (2008). Electronics: Principles & Applications. 7th Ed., Mc Graw Hill.
- 4. Tocci, R.J., Wldmer, N.S. and Moss, G.L. (2007). *Digital Systems: Principles and Applications*. 9th Ed., Prentice Hall.
- 5. DIffenderfer, R. (2005). Electronics Devices: Systems and Applications. Thomson Delmar Learning.
- Tocci, R.J. and Ambrosio, F. J. (2003). Microprocessors and Microcomputers: Hardware and Software. 6th Ed., Prentice Hall.
- 7. Hambley, A.R. (2000). *Electronics*. 2nd Ed., Prentice Hall.

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

- **CO1:** Ability to explain the concept of medical imaging modalities used in clinical application.
- **CO2:** Ability to distinguish and explain the sources of energy in medical imaging modalities.
- **CO3:** Ability to discuss and predict tissue reactions to radiation and propose the solution to reduce the radiation by applying Radiation Protection concept.
- **CO4:** 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.
- 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

- **CO1:** Ability to design an instrumentation circuit to acquire biomedical signals
- **CO2:** Ability to develop a PC-based data acquisition device which is capable of acquiring biomedical signals.
- **CO3:** Ability to demonstrate the project needs, design contsraints and requirement for the selected project in Biomedical Electronic Engineering field.

School of Mechatronic Engineering



References

- Webster, J.G. 'Medical Instrumentation: Application and Design', 4th Ed., Wiley, 2010.
- Khandpur, R.S. 'Handbook of Biomedical Instrumentation', 2nd Edition, Tata McGraw-Hill, 2007.
- Webster, J.G.
 'Bioinstrumentation', Wiley, 2003.
- Cromwell, L. 'Biomedical Instrumentation and Measurements', 2nd Ed. Prentice-Hall, 2002.
- 5. Perez, R. 'Design of Medical Electronic Devices', Academic Press, 2002.
- 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

- **CO1:** Apply technical knowledge and problem-solving skills to serve community, society and profession.
- **CO2:** Ability to design and evaluate the specific sub-system in the design device and system.
- **CO3:** Ability to conduct economic evaluation of the selected project in Biomedical Engineering field.

References

- Biomedical Engineering & Design Handbook, Volumes I and II
- 2. Handbook of Biomedical Instrumentation, Khandpur
- 3. Bioinstrumentation, J.G. Webster
- 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 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 Outcome

- **CO1:** Ability to evaluate engineering issue(s)/problem(s) in proposed Final Year Project.
- **CO2:** Ability to propose methodology for proposed Final Year Project.
- **CO3:** Ability to perform audio visual presentations.



Reference

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 Outcome

- **CO1:** Ability to evaluate engineering deliverable via system / prototype / algorithm / software / simulation / experimental analysis.
- **CO2:** Ability to demonstrate project management skills (such as problem solving & interest, creativity, independence and entrepreneurship) in order to achieve project objectives.
- **CO3:** Ability to present the findings of project using audio visual presentations.

Reference

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 Outcome

- **CO1:** Ability to analyze operations management in operations, productivity, project management and forecasting.
- **CO2:** Ability to design operations in goods and services, process control, capacity planning, location and layout strategies.

CO3: Ability to manage operations in supply-chain management, inventory management, aggregate planning, material requirements planning, operations scheduling, maintenance and reliability.

- 1. Jay Heizer and Barry Render (2010). *Operations Management*. 10th Edition, Person.
- 2. Steven Nahmias (2009). Production and Operations Analysis. McGraw Hill.
- 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.
- R. Dan Reid and Nada R. Sanders (2005). Operation Management: An Integrated Approach. 2nd Edition, John Wiley & Sons.
- Faridah Maarof, Maslin Masrom and Mohd Yunus Majid (1998). Penyelidikan Operasi: Penggunaan dan Algoritma. Penerbit Universiti Teknologi Malaysia, Johor.

ENT 471/4 AUTOMATION

(Pre Requisite: ENT 289/3 Drive and Power Electronics)

Course Synopsis

This course aims to conveu the knowledge of automation technologies. It combines the automation technology principles and its relationship with assembly process and sustem, the element of sensor, actuator and drive technologu 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

- **CO1:** Ability to perform analyzes on automation in a production system.
- **CO2:** Ability to perform analyzes and evaluate on elements of an automation system.
- **CO3:** Ability to design and evaluate the automation system for an optimum performance in various applications.

References

- 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
- Frank D. Petruzella (1999), "Programmable Logic Controllers" 2nd Edition, Glencoe/McGraw-Hill
- 4. Ridley, J.E (1999), "Introduction to Programmable Logic Controller"

ENT475/3 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

- **CO1:** Ability to design, develop and evaluate measurement, instrumentation and actuation systems.
- **CO2:** Ability to design and evaluate a mechatronic system using a microcontroller.
- **CO3:** Ability to identify customer need and conduct evaluation based on economic, ethical and sustainable factors for the mechatronic system.

- Bolton, W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition, Addison Wesley Longman: Essex England, 2003.
- D. G. Alciatore and M. B. Histand, Introduction to Mechatronics and Measurement Systems. 3rd edition, McGrawHill.
- 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

ENT476/3 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

- **CO1:** Ability to evaluate the design concept and requirement for a mechatronic system.
- **CO2:** Ability to apply relevant design concept, requirement and tools for the design of a mechatronic system.
- **CO3:** Ability to design and evaluate specific subsystems and processes in a mechatronic system.
- **CO4:** 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.

- D. G. Alciatore and M. B. Histand, Introduction to Mechatronics and Measurement Systems. 3rd edition, McGrawHill.
- D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997.
- Godfrey C. Onwubolu, "Mechatronics: Principles and Applications", Butterworth-Heinemann 2005.
- R. Isermann, Mechatronic Systems: Fundamentals, Springer-Verlag: Great Britain, 2003

Elective Courses

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

- **CO1:** Ability to calculate the linear and non-linear system using ordinary differential equation (ODE).
- **CO2:** Ability to analyze the knowledge about mathematical equation into biological system.
- **CO3:** 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

- **CO1:** Ability to discuss, explain, analyze and judge the concept of tomography and its suitable applications.
- **CO2:** Ability to explain, discuss and analyze the suitable reconstruction algorithm of a tomography system.
- **CO3:** Ability to discuss, explain and analyze the measurements of projection data of a tomography system.
- **CO4:** 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.
- 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.
- T. Grumme, W. Kluge, K. Kretzschmar and A. Roesler (1998), "Cerebral and Spinal Computed Tomography", 3rd ed. Blackwell Science.

ENT431/3 REFRIGERATION AND AIR CONDITIONING

Course Synopsis

The objective of this course is to introduce a comprehensive and wide-ranging theoretical principles and practical aspects of refrigeration and air conditioning systems. The basic of thermodynamics, heat transfer and fluid mechanics that have been learned will be extended and emphasized on this course. Student will be exposed to refrigeration machines, refrigerant compressors, expansion devices and psychrometry of air-conditioning processes.

Course Outcomes

- **CO1:** Ability to identify, describe refrigeration machines, vapour compression system, and solve problems on multipressure systems.
- **CO2:** Ability to identify, analyze and evaluate refrigerant compressors, condensers, expansion devices and evaporators.
- **CO3:** Ability to explain and interpret the psychrometry of air conditioning processes. Ability to analyze and evaluate cooling loads.

- 1. C.P. Arora (2001). *Refrigeration and Air conditioning*. Second Edition Mc Graw Hill.
- Jeffus Larry (2004). Refrigeration and Air conditioning. 4th edition. Pearson/Prentice Hall.
- 3. Ahmadul Ameen (2006). Refrigeration and Air conditioning. Prentice Hall.
- 4. G. F. Hundy (2008). *Refrigeration* and Air conditioning. Elsevier.
- William C. Whitman (2009). Refrigeration and Air conditioning technology. 4th edition. Cengage Learning.



ENT432/3 ENERGY CONVERSION

Course Synopsis

This course offers comprehensive contents about conversion of energies which excluded from renewable energy. This course covers fossil fuel, reciprocating internal combustion engine, Wankel rotary engine, nuclear power plant and battery. This course also discuss about the contemporary issues relate to environment and pollution.

Course Outcomes

- **CO1:** Ability to evaluate energy conversion systems based on thermo-fluid fundamental knowledge.
- **CO2:** Ability to explain contemporaneous issues in energy systems.
- **CO3:** Ability to judge the impact of the usage of energy to environment and pollution issues.

References

- 1. Goswami, D.Y. Kreith, F (2007). Energy Conversion. CRC Press.
- 2. Valone, T.F. (2005). Practical Conversion of Zero-Point Energy. 3rd Edition, Integrity Research Institute.

- Leyzerovich, A. (2005). Wet-Steam Turbines for Nuclear Power Plants. PennWell Corp.
- Kiameh, P (2002). Power Generation Handbook: Selection, Application, Operation, Maintenance. McGraw-Hill Professional.
- 5. Kenneth C. Weston (1992). Energy Conversion. PWS Pub. Co.

ENT433/3 PLASTICITY

Course Synopsis

This course is intended to serve theory plasticity in metal materials. This course is introducing the hardening plasticity, orthotropic plasticity and plasticity instability. The Application of finite elements and production processes are introduced in theory of plasticity.

Course Outcomes

- **CO1:** Ability to apply theory of plasticity to uniform and non-uniform stress states.
- **CO2:** Ability to analyze theory of plasticity in slip line field and in collapse of beam or structure.
- **CO3:** Ability to select the test is related to theory plasticity and estimate plasticity occurs on materials.

- **CO4:** Ability to estimate inelasticity buckling struts and plates, and estimate stress waves in bars.
- **CO5:** Ability to predict theory of plasticity in production processes and apply to finite elements in theory plasticity.

References

- 1. D.W.A. Rees (2006). Basic engineering plasticity: and introduction with engineering and manufacturing applications. Elsevier Ltd.
- 2. Wai Fah-Chen and D.Jian Han (2007). *Plasticity for structural engineers*.

ENT434/3 IMPACT MECHANICS

Course Synopsis

This course offers comprehensive contents about reaction forces that develop during a collision and the dynamic response of structures to these reaction forces. This course develops several different methodologies for analyzing collisions between structures. This is include rigid body theory for structures that are stiff .The analytical methods combine mechanics of contact between elastic-plastic or viscoplastic bodies with dynamics of structural response.

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Course Outcomes

- **CO1:** Ability to analyze reaction forces in collinear impact.
- **CO2:** Ability to evaluate reaction forces in impact for 2D and 3D collision.
- **CO3:** Ability to evaluate reaction forces in impact for rigid body.

References

- 1. W.J Stronge (2007). Impact Mechanics. Cambridge University Press.
- 2. Norman Jones (2001). Structural Impact. Cambridge University Press.
- 3. Anthony C. Fischer (2007). Introduction to Contact Mechanics. Springer.

ENT435/3 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

- **C01:** Ability to describe the importance of various types of robots and relate them in various industrial applications.
- **CO2:** Ability to construct and analyze the coordinate representation, transformations and path planning.
- **CO3:** Ability to construct and analyze robot control systems for various industrial applications.
- **CO4:** Ability to design a robot workcell for specific industrial task and measure its validity.

References

- 1. Saeed B Niku (2010). Introduction to Robotics. 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.

ENT436/3 COMPUTER AIDED MANUFACTURING

Course Synopsis

This course is fundamental knowledge of Computer Aided Design and Computer Aided Manufacturing. In this course the concept of Numerical Control Programming is introduced for milling and lathe. The proper knowledge of Computer Aided Manufacturing will be emphasized on the numerical control programming and geometric modelling techniques also are describing using solid modelling standard.

Course Outcomes

- **C01:** Ability to define Computer Aided Design and describe types of computer Aided Design system and numerical control programming.
- **CO2:** Ability to describe geometric modelling techniques and numerical control.
- **CO3:** Ability to select function of part of CNC machine and demonstrate CNC machine using numerical control programming.



References

- 1. Ibrahim Zeid (2007). *Mastering CAD/CAM*, Special Indian Edition 2007, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
- Mikell P. Groover (2002). Automation, Production Systems, and Computer-Integrated Manufacturing. 2nd Edition, Reprint 2002, Pearson Education Asia.
- 3. Yoram Koren (1983). Computer control of manufacturing systems. International Edition, McGraw Hill Book Co.

ENT461/3 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

C01: Ability to interpret and evaluate the basic concepts and principles of renewable energy technologies and energy resources available today for sustainable development.

- **CO2:** Ability to analyze and evaluate the conversion of Biomass, Wind, Solar and Hydrogen energies to mechanical, thermal and electrical power.
- **CO3:** Ability to discuss and evaluate energy and power in the Geothermal, Tidal, Micro Hydro and other renewable energy.
- **CO4:** 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.
- 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.

ENT462/3 TURBOMACHINERY

Course Synopsis

This course introduces the operating principles of different types of pumps, compressors and conventional prime movers used in power generation. Analysis and design characteristic consideration in turbomachinery is also emphasized.

Course Outcomes

- **CO1:** Ability to explain the operating principles of different pumps, analyze their performance, select proper pump for specific application and design such a pump.
- **CO2:** Ability to discuss the operating principles of hydraulic turbines, analyze and predict their performance and select proper turbine.
- **CO3:** Ability to explain the operating principles of thermal turbines (steam/gas turbines), compare their usage, vary parameters to evaluate their performance.
- **CO4:** Ability to explain the operating principles of different compressors and analyze their performance.

References

- 1. W.W. Peng (2008). Fundamentals of Turbomachinery. John Wiley & Sons.
- 2. Y.A. Cengel and J.M. Cimbala (2006). Fluid Mechanics-Fundamentals and Applications, McGraw Hill.
- S.L. Dixon (1998). Fluid mechanics and Thermodynamics of Turbomachinery. 5th Ed., Pergamon, Oxford.
- B.R. Munson, D.F. Young, and T.H. Okiishi (2006). Fundamentals of Fluid Mechanics. 5th Ed., John Wiley & Sons.
- 5. H. Cohen, GFC Rogers, and HIH Saravanamuttoo (1996). *Gas Turbine Theory*. 4th Ed., Longman.
- C.T. Crowe, D.F. Elger, and J.A. Roberson (2005). *Engineering Fluid Mechanics*. 8th Ed., John Wiley & Sons.
- J.F. Douglas, J.M. Gasiorek, J.A. Swaffield, and L.B. Jack (2005). *Fluid Mechanics*. 5th Ed., Pearson.

ENT463/3 ELASTICTY

Course Synopsis

The theory of elasticity is concerned with modelling the deformations of and stresses in continuous media characterized by linear relationships between stress and strain. Applied elasticity is about developing and applying geometrybased idealizations of real physical situations and structures. Comparison with solutions obtained by using elementary strength of materials in solving engineering problems will be emphasized. Practical problems will be solved and advantages of using particular methods will be illustrated

Course Outcomes

- **CO1:** Ability to apply the fundamental of elasticity to engineering problems, and use appropriate mathematical tools to solve mechanics problems.
- **CO2:** Ability to select the governing equations for 3-D and 2-D solid mechanics, and estimate the critical load that a component can withstand using different failure criteria.

CO3: Ability to analyze a problem and choose any computational tools to model and analyze structural components.

References

Sidang Akademik 2014/2015 - Academic Session 2014/2015

- 1. Martin H. Sadd (2009). *Elasticity:* theory, applications and numerics. 2nd edition, Academic Press, London.
- Anthony Armenakas (2006). Advanced Mechanics of materials and applied elasticity. Boca Raton Fla. Taylor & Francus.
- Albrecht Bertram (2005). Elasticity and plasticity of a large deformations: an introduction. Springer, New York.
- A. I Lurie, translated by A. Belyaev (2005). *Theory of Elasticity*. Springer, Berlin.
- Arthur P. Boresi and Ken P Chong (2000). Elasticity and plasticity of large deformations: an introduction. 2nd edition, John Wiley and Sons, New York.

ENT464/3 FRACTURE MECHANICS

Course Synopsis

This course contains the theory of principles and application of fracture mechanics. The fracture



Sidang Akademik 2014/2015 - Academic Session 2014/2015

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 fatique 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

- **CO1:** Ability to describe the principles of fracture mechanics in engineering materials and examine the related problem under dynamic load.
- **CO2:** 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
 - Stress versus Number of cycles curves.
- **CO3:** Ability to estimate fatigue crack growth in metals on the fracture surface, and evaluate fatigue crack growth experiment using CT specimen.

- **CO4:** Ability to identify the effect of varies environment on the surface fracture and estimate corrosion fatigue in environment.
- **CO5:** Ability to identify cleavage fracture, intergranular fracture and ductile fracture in the fractography, and calculate cohesive strength of solids.

References

- T. L. Anderson (2005). Fracture Mechanic Fundamentals and Applications. 37th Edition, Taylor & Francis Groul.
- E. E. Gdoutos (2005). Fracture Mechanics and Introduction. 2nd Edition, Springer.
- R, J, Sanford (2003). Principle of Fracture Mechanics.1st Edition, Prentice Hall.
- 4. G, E, Dieter (1986). *Mechanical Metallurgy*. 3rd Edition, McGraw-Hill.

ENT465/3 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

- **CO1:** Ability to organize the development of product prototyping design to construct the rapid prototype model.
- **CO2:** Ability to select and describe the rapid prototyping processes for a finished product.
- **CO3:** Ability to select the proper rapid prototyping tools and techniques in terms of hardware and software technologies to construct a finished product.

References

- Frank W. Liou (2007). Rapid Prototyping and Engineering Applications: A Toolbox for Prototype Development. Vol. 210, CRC Press, Dekker Mechanical Engineering Series.
- Kenneth Cooper (2001). Rapid Prototyping Technology: Selection and Application. Vol. 133, CRC Press, Dekker Mechanical Engineering Series.
- D.T. Pham and S.S. Dimov (2001). Rapid Manufacturing: The technologies and applications of Rapid Prototyping and Rapid Tooling. Springer, London.

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 C. K. Chua, K. F. Leong and C. S. Lim (2003). Rapid Prototyping: Principle and Applications. 2nd Edition, World Scientific Publishing.

ENT466/3 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 offthe-shelf routines to gain experience and appreciation.

Course Outcomes

- **CO1:** Ability to apply basic theoretical of optimization in practical engineering design situations.
- **CO2:** Ability to apply mathematical constructs and theoretical tools to solve linear and non-linear design problems.

CO3: Ability to formulate the optimization problem from the constraint associated with design.

References

- 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.

ENT474/3 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

- **CO1:** Ability to organize Artificial Intelligence components in mechatronics systems.
- **CO2:** Ability to display the concepts of pattern recognition and classification.
- **CO3:** Ability to analyze intelligent control with optimal parameter search for complex industrial systems.
- **CO4:** Ability to analyze simple expert system for specific requirements.

- 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
- 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.



Sidang Akademik 2014/2015 - Academic Session 2014/2015

D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997

ENT482/3 MECHANICAL DESIGN PROJECT I

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. Conceptual design of the design project will be continued in ENT484/3 Mechanical Design Project II.

Course Outcomes

CO1: Ability to identify and propose concepts to solve complex mechanical engineering problem.

- **CO2:** 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.
- **CO3:** Ability to evaluate solution that meets customer needs with consideration to patents/ codes/ standards for a design safety/ cultural/ societal/ environmental/and human factors.

ENT484/3 MECHANICAL DESIGN PROJECT II

Course Synopsis

This course will focus on the design of an integrated mechanical engineering project as continuation of ENT482/3 Mechanical Design Project I. The course will start with application of principle of engineering design and selection of the design project related to mechanical engineering. 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

- **CO1:** Ability to design and solve complex mechanical engineering problem.
- **CO2:** 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
- **CO3:** 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.
- **CO4:** Ability to communicate effectively via written, oral presentation and demonstration of the design solution.
- **CO5:** Ability to function in a team for the successful delivery of design project.

ENT488/3 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

- **CO1:** Ability to apply various locomotion systems in mobile robotic applications.
- **CO2:** Ability to analyze the forcetorque requirements of the mobile robots and select the most suitable actuator.
- **CO3:** Ability to solve the kinematics problems for mobile robots.
- **CO4:** Ability to apply suitable sensors and control systems for the wheeled mobile robot mechanisms.
- **CO5:** 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.
- M P Groover, "Automation, Production systems and Computer Integrated Manufacturing", Prentice hall, NJ, 1990

- 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

- **CO1:** Ability to design, develop and construct industrial measurement and instrumentation systems.
- **CO2:** Ability to design and develop industrial actuation systems
- **CO3:** Ability to evaluate, design and construct analog and digital control system using PLC and Microcontroller.

CO4: Ability to design, construct and evaluate simple mechatronic systems that combine electrical/electronic and mechanical components.

- Bolton, W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition, Addison Wesley Longman: Essex England, 2003.
- D. G. Alciatore and M. B. Histand, Introduction to Mechatronics and Measurement Systems. 3rd edition, McGrawHill.
- D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997.
- Godfrey C. Onwubolu, "Mechatronics: Principles and Applications", Butterworth-Heinemann 2005.
- R. Isermann, Mechatronic Systems: Fundamentals, Springer-Verlag: Great Britain, 2003.



ENT 493/3 ADVANCED CONTROL SYSTEMS (Pre Requisite: ENT 386/3 Modern Control Engineering)

Course Synopsis

The aim of this course is to introduce state-space design, nonlinear system and digital control. Students also will be exposed to other control methods, like robust control, predictive control and optimal control.

Course Outcomes

- **CO1:** Ability to analyze the concepts of state-space design, nonlinear system and digital control
- **CO2:** Ability to derive state-space description from continuous-time and discrete-time systems.
- **CO3:** Ability to design sate-feedback and digital controller.
- **CO4:** Ability to evaluate Robust Control, Optimal Control methods.

References

- 1. J R Leigh, "Control Theory", 2nd ed. IEE, 2004
- Charles L. Philips, H. Troy Nagle, "Digital Control Systems Analysis and Design", 3rd ed. Prentice Hall, 1995

- Gene F. Franklin, J. David Powell, Micheal Workman, "Digital Control of Dynamic Systems", 3rd ed. Addison-Wesley,1998.
- M. Gopal, "Digital Control and State Variable Methods", McGraw-Hill, 1997.
- 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

CO1: Ability to perform analysis and examine the right Al techniques for simple applications.

- **CO2:** Ability to perform analysis on different types of Al techniques.
- **CO3:** Ability to design and evaluate AI techniques for Mechatronics Applications.

- Negnevitsky M., (2004). Artificial Intelligence: A guide to Intelligent System, 2nd Edition. Addison Wesley.
- Sivanandam S N., Paulraj M., (2005). Introduction to Artificial Neural Networks, Second Edition. Vikas Publications.
- Russell S.J., Norvig P., Canny J.F., (2003). Artificial Intelligence: A Modern Approach. Prentice Hall.
- 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.



ENT499/3 DIGITAL SIGNAL PROCESSING & APPLICATIONS

(Pre Requisite: 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

- **CO1:** Ability to do the analisys of analogue and digital signals in time domain.
- **CO2:** Ability to do analysis of analogue and digital signals in frequency domain.
- **CO3:** Ability to design digital filter in signal processing
- **CO4:** Ability to use signal processing tools in a specific signal processing application

References

 S.K. Mitra , 'Digital Signal Processing: A Computer Based Approach', Tata McGraw Hill , 2006.

- E.C. Ifeachor and B.W. Jervis, ['] Digital Signal Processing: A Practical Approach['] Prentice Hall, Second Edition 2002.
- Richard G. Lyons, 'Understanding Digital Signal Processing', Prentice Hall, Second Edition, 2004.
- J. G. Proakis and D. G. Manolakis, 'Digital Signal Processing: Principles, Algorithms, and Applications', 1989.
- 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.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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

Programme Offered

- Diploma in Electrical Engineering
- Bachelor of Electrical System Engineering
- Bachelor of Industrial Electronic Engineering
- Bachelor of Electrical in Energy Systems Engineering
 - Master of Science (Electrical System Engineering)
- Master of Science (Electrical Power Engineering)- Mixed Mode
 - Doctor of Philosophy (PhD)

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School of Electrical System Engineering offers three programmes which are Bachelor of Electrical System Engineering, Bachelor of Industrial Electronic Engineering, and Bachelor of Electrical Energy Systems Engineering.

The School of Electrical System Engineering has well equipped teaching areas and laboratories. The laboratory infrastructure is highly developed, with a large number of networked PCs and power engineering workstations. These include Electronic Laboratory, Digital Electronic Laboratory, Computer Programming Laboratory, Electrical Technology Laboratoru. Power Instrumentation Laboratory, System Laboratory, Electrical Machine Laboratory, Power Electronic Laboratory and Electromagnetic and Machine Design Laboratory.

Electrical System Engineering (RK23)

The Electrical System Engineering programme leading to the degree of Bachelor of Engineering (Hons)(Electrical System Engineering) has a strong focus on the preparation of engineers who can serve the needs of the electric power industry. This programme emphasize on the major fields of power engineering, which includes electrical machines, power systems and high voltage engineering. These compulsory courses are offered to cope with the rapid change of technology in power engineering.

Fundamental subjects on electrical circuit and power engineering are taught in the first two years of study. A broad background in mathematics and computing, electric circuits and systems, analogue electronic circuits and components, digital systems, instrumentations, communications, electromagnetics and control, necessary to underpin the more advanced courses given in the subsequent years. Students undergo practical training after at the semester break of third year to gain practical knowledge from electrical power industries. Final year student project enhance practical skills and the use of innovative and creative ideas.

Industrial Electronic Engineering (RK45)

The School of Electrical Systems Engineering also offers Industrial Electronic Engineering program leading to the degree of Bachelor of Engineering (Hons)(Industrial Electronic Engineering). This program focuses on power electronic systems for industrial use with special emphasis on industrial electronic control, electrical machine and drive.

The programme consists of common courses for the first two years providing a broad background in mathematics and computing, electric circuits and systems, analogue electronic circuits and components, digital sustems, instrumentations. communications, electromagnetics and control, necessary to underpin the more advanced courses given in the subsequent years. In the third and fourth year, the students will major in electrical system and power electronic system in which will provide the opportunity for in depth technical study combined with a range of courses aiming to enhance the students understanding of industrial electronic application. Students undergo practical training after at the semester break of third year to gain practical knowledge from electrical power industries.

Electrical Energy Systems Engineering (RK96)

Bachelor of Engineering (Hons) (Electrical Energy Systems Engineering) programme, focuses on technological aspects and management of electricity generation including renewable energy and alternative energy sources. One the main objective of the programme is to promote the use of renewable energy for electricity generation in Malaysia.

This program consists of common courses until third years of studies which providing 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 undergo practical training after at the semester break of third year to gain practical knowledge from electrical power industries,

In fourth year, students will be focused in their major studies which are in electrical energy system and renewable energy system subjects. This will provide the opportunity for in depth study combined with a range of courses aiming to enhance the students understanding of renewable energy applied in electrical power. In general, electrical energy system engineering programme has abroad scope, particularly in the sectors of power generation and energy renewal.

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Bachelor of Engineering (Honours) (Electrical System Engineering)

Programme Objectives (PEO)

Programme Objective 1

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

Programme Objective 2

Graduates who are members of and contribute to professional society.

Programme Objective 3

Graduates who engage in life-long learning or continuous education opportunities.

Programme Objective 4

Graduates who contribute towards research and development.

Programme Objective 5

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 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.

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

PO8

PO7

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 System Engineering)

YEAR	FIRST		SECOND		THIRD		FOURTH		
SEMESTER	I	II	Ш	IV	v	VI		VII	VIII
Discipline Core (96)	EET106/3 Engineering Science	EET110/3 Basic Computer Programming	EET206/3 Electric Circuit II	EET208/3 Electrical Power Technology	EET301/4 Power System Engineering	EET308/3 Power System Analysis		EET445/2 Final Year Project I	EET446/4 Final Year Project II
	EET108/3 Electric Circuit I	EET107/3 Digital Electronics I	EET202/3 Digital Electronics II	EET203/4 Microcontroller Systems Design	EET302/3 Control Systems Engineering	EET307/4 Power Electronics I		EET412/3 Electrical Machine Design	EET416/3 Electrical Drives
		EET109/3 Electronic Devices	EET205/4 Analog Electronics	EET207/3 Signals and Systems	EET306/4 Electrical Machines	EET304/3 Communication System Engineering		EET411/3 Power System Operation & Control	EET417/3 High Voltage Engineering
			EET204/3 Instrumentation and Measurements		EET303/3 Electromagnetic Theory	EET333/3 Engineering Team Project	ining	EET414/3 Substation Design	
							istrial Tra	EETXXX/3 Elective I	EETXXX/3 Elective II
Common Core (24)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EUT440/3 Engineers in Society	EET311/2 Engineering Economics	302/4 Indu		EUT443/2 Engineering Management
		EUT122/2 Skills And Technology in Communication					EITE		
		ECT111/3 Engineering Skills							
University Required (1.7)	UUW233/2 Islamic Civilization and Asia Civilization			UVW 312/2 English for Technical Commnunication		UUW322/2 Thinking Skills		UUWXXX/2 Option	
	UUW410/2 University Malay Language		UZWXXX/1 Co-curriculum	UUW224/2 Engineering Entrepreneurship					
	UUW235/2 Ethnic Relation								
	UUWXXX/1 Uniform Body	UUWXXX/1 Uniform Body							
137	16	18	17	17	17	17	4	16	15
Total Units for Graduation 137									

UUWXXX/2 if MUET Band 3 and below is compulsory to take UUW112/2 Basic English Elective I: EET427/3 Industrial Electronic Control or EET426/3 Power Electronics II or EET431/3 Electrical Energy System or EET432/3 Electrical Energy Utilization Elective II: EET418/3 Power Quality or EET422/3 EMC & Compliance Engineering or EET433/3 Renewable Energy System



Bachelor of Engineering (Honours) (Industrial Electronic Engineering)

Programme Objectives (PEO)

Programme Objective 1

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

Programme Objective 2

Graduates who are members of and contribute to professional society.

Programme Objective 3

Graduates who engage in life-long learning or continuous education opportunities.

Programme Objective 4

Graduates who contribute towards research and development.

Programme Objective 5

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 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

engineer.

Understanding of the social, cultural, global and environmental responsibilities of a professional

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) (Industrial Electronic Engineering)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	ш	IV	v	VI		VII	VIII
Discipline Core (96)	EET106/3 Engineering Science	EET110/3 Basic Computer Programming	EET206/3 Electric Circuit II	EET208/3 Electrical Power Technology	EET301/4 Power System Engineering	EET308/3 Power System Analysis		EET445/2 Final Year Project I	EET446/4 Final Year Project II
	EET108/3 Electric Circuit I	EET107/3 Digital Electronics I	EET202/3 Digital Electronics II	EET203/4 Microcontroller Systems Design	EET302/3 Control Systems Engineering	EET307/4 Power Electronics I	ial Training	EET427/3 Industrial Electronic Control	EET428/3 Power Electronics Drives
		EET109/3 Electronic Devices	EET205/4 Analog Electronics	EET207/3 Signals and Systems	EET306/4 Electrical Machines	EET304/3 Communication System Engineering		EET426/3 Power Electronics II	EET422/3 EMC & Compliance Engineering
			EET204/3 Instrumentation and Measurements		EET303/3 Electromagnetic Theory	EET333/3 Engineering Team Project		EET424/3 Power Electronics For Energy System	
								EETXXX/3 Elective I	EETXXX/3 Elective II
Common Core (24)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EUT440/3 Engineers in Society	EET311/2 Engineering Economics	2/4 Industri		EUT443/2 Engineering Management
		EUT122/2 Skills And Technology in Communication					EIT302		
		ECT111/3 Engineering Skills							
University Required (17)	UUW233/2 Islamic Civilization and Asia Civilization			UVW 312/2 English for Technical Commnunication		UUW322/2 Thinking Skills	Ň	UUWXXX/2 Option	<u> </u>
	UUW410/2 University Malay Language		UZWXXX/1 Co-curriculum	UUW224/2 Engineering Entrepreneurship					
	UUW235/2 Ethnic Relation								
	UUWXXX/1 Uniform Body	UUWXXX/1 Uniform Body							
137	16	18	17	17	17	17	4	16	15
Total Units for Graduation 137									

UUWXXX/2 if MUET Band 3 and below is compulsory to take UUW112/2 Basic English Elective:EET412/3 Electrical Machine Design or EET414/3 Substation Design or EET432/3 Electrical Energy Utilization or EET431/3 Electrical Energy System Elective II: EET418/3 Power Quality or EET417/3 High Voltage Engineering or EET433/3 Renewable Energy System



Bachelor of Engineering (Honours) (Electrical Energy Systems Engineering)

Programme Objectives (PEO)

Programme Objective 1

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

Programme Objective 2

Graduates who are members of and contribute to professional society.

Programme Objective 3

Graduates who engage in life-long learning or continuous education opportunities.

Programme Objective 4

Graduates who contribute towards research and development.

Programme Objective 5

Graduates who are entrepreneurial engineers.

Programme Outcomes (PO)

P01

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			FOU	IRTH
SEMESTER	I	Ш	Ш	IV	v	VI		VII	VIII
Discipline Core (96)	EET106/3 Engineering Science	EET110/3 Basic Computer Programming	EET206/3 Electric Circuit II	EET208/3 Electrical Power Technology	EET301/4 Power System Engineering	EET308/3 Power System Analysis		EET445/2 Final Year Project I	EET446/4 Final Year Project II
	EET108/3 Electric Circuit I	EET107/3 Digital Electronics I	EET202/3 Digital Electronics II	EET203/4 Microcontroller Systems Design	EET302/3 Control Systems Engineering	EET307/4 Power Electronics I		EET431/3 Electrical Energy System	EET428/3 Power Electronics Drives
		EET109/3 Electronic Devices	EET205/4 Analog Electronics	EET207/3 Signals and Systems	EET306/4 Electrical Machines	EET304/3 Communication System Engineering		EET432/3 Electrical Energy Utilization	EET433/3 Renewable Energy System
			EET204/3 Instrumentation and Measurements		EET303/3 Electromagnetic Theory	EET333/3 Engineering Team Project	aining	EET424/3 Power Electronics For Energy System	EET417/3 High Voltage Engineering
							rial Tro	EETXXX/3 Elective I	
Common Core (24)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EUT440/3 Engineers in Society	EET311/2 Engineering Economics	:/4 Indust		EUT443/2 Engineering Management
		EUT122/2 Skills And Technology in Communication					ЕІТ302		
		ECT111/3 Engineering Skills							
University, Required (17)	UUW233/2 Islamic Civilization and Asia Civilization			UVW 312/2 English for Technical Commnunication		UUW322/2 Thinking Skills		UUWXXX/2 Option	
	UUW410/2 University Malay Language		UZWXXX/1 Co-curriculum	UUW224/2 Engineering Entrepreneurship			R		
	UUW235/2 Ethnic Relation								
	UUWXXX/1 Uniform Body	UUWXXX/1 Uniform Body							
137	16	18	17	17	17	17	4	16	15
Total Units for Graduation 137									

UUWXXX/2 if MUET Band 3 and below is compulsory to take UUW112/2 Basic English Elective I: EET427/3 Industrial Electronic Control or EET426/3 Power Electronics II or EET411/3 Power System Operation and Control or EET414/3 Substation Design

Course Syllabus

EET103/4 ELECTRICAL TECHNOLOGY

Course Synopsis

This course is offered to nonelectrical engineering background students. 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

- **C01:** 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.
- **CO2:** Ability to calculate and analyze parameters of three
- phase AC system for Wye and Delta connection. **CO3:** Ability to explain and apply the
- basic concept of magnetism and electromagnetism in DC and AC machines.

References

- Richard J. Fowler. (2008). Electricity Principles and Applications. 7th Edition. Mc Graw Hill.
- Boylestad, Robert L. (2007). Introductory Circuit Analysis. 11th Edition. Prentice Hall.
- Hughes. (2005). Electrical and Electronic Technology. 9th Edition. Prentice Hall.
- 4. Charles K. Alexander & Matthew N.O. Sadiku. Fundamentals of Electric Circuits. International Third Editions, McGraw-Hill.
- Nilsson, J.W. & Riedel. (2005).
 S.A., Electric Circuits. 7th Edition. Pearson Prentice Hall.

EET106/3 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

- **CO1:** Ability to describe and analyze the Mechanical, Electrical and Magnetic properties of materials.
- **CO2:** Ability to understand, apply and analyze concepts and principles of Fluid Statics, Bernoulli and Energy Equations.
- **CO3:** Ability to understand, apply and analyze concepts and principles of First Law and Second Law of Thermodynamics.

- 1. William D. Callister, David G. Rethwisch. (2012), Fundamentals of Materials Science and Engineering: An Integrated Approach. John Wiley & Sons.
- Yunus A. Cengel, Robert H. Turner. (2013). Fundamentals of Thermal-Fluid Sciences, 4th Edition. Int ed. McGraw-Hill.
- William F Smith, William Fortune Smith, Javad Hashemi, (2011,) Foundations of Materials Science and Engineering (SI Units), MCGRAW-HILL Higher Education,
- 4. Robert A. Granger, (2012). Fluid Mechanics. Courier Dover Publications.



5. Sanford Klein, Gregory Nellis, (2011), Thermodynamics, Cambridge University Press, Technology & Engineering.

EET107/3 DIGITAL ELECTRONICS I

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

- **CO1:** Ability to apply the basic principles of numbering system and Algebraic Switching in digital electronics.
- **CO2:** Ability to design and optimizes logic circuit using Boolean functions and Karnaugh maps.
- **CO3:** Ability to design and evaluate digital system applications using combinational and sequential logic design techniques.

References

- 1. Thomas L.Floyd, Digital Fundamentals (2014) 10th edition. Prentice Hall.
- Rafikha Aliana, Norina Idris, Phak Len Eh Kan, Mohammad Nazri. (2007). Digital Electronics Design. 1st Ed. Prentice Hall.
- Ronald J. Tocci. (2007). Digital Systems – Principles and Applications. 10th Ed. Prentice Hall.
- Godse, Atul P. Godse, Deepali A. Godse, Gurpreet Singh Ghai. (2007). Digital Electronics. Technical Publications Pune.
- Nigel, P.C. (1999). A First Course in Digital Electronic. 1st Ed. Prentice Hall.

EET108/3 ELECTRIC CIRCUIT I

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.

Course Outcomes

- **CO1:** Ability to derive importantequations and analyze DC circuits
- **CO2:** A Ability to analyze the first and second order circuits containing passive elements, DC sources and switches using differential equations.
- **CO3:** Ability to calculate and analyze circuits parameters containing sinusoidal steadystate sources using complex impedances and phasor representations.

- Nilssen, J.W. and Riedel, S.(2008) Electric Circuits, 8th Edition, Addison Wesley.
- Robert L. Boylestad. (2007) Introductory Circuit Analysis. 11th Ed. Prentice Hall.
- Alexander, C.K. and Sadiku, M.N.O.(2007) Fundamental of Electric Circuits, 3rd Edition, McGraw-Hill.
- 4. Dorf, R.C. and Svoboda, J.A., (1996) Introduction to Electric Circuits, Wiley.
- 5. David E. Jhonson,(1997),Electric Circuit Analysis, Prentice Hall.



EET109/3 ELECTRONIC DEVICES

Course synopsis

EET 109 exposes 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 specialpurpose 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

- CO1: Ability to explain and differentiate the fundamental concepts of electronic devices.
 CO2: Ability to analyze the basic operations of electronic devices such as diode, BJT and
- various types of FET. **CO3:** Ability to design and evaluate the basic biasing circuits.

References

- Neamen Donald A. (2010). Microelectronics Circuit Analysis and Design. 4th Ed. McGraw Hill. Int. Ed.
- Robert L. Boleystad.. (2009). Electronic Devices and Circuit Theory. 10th Ed. Prentice Hall
- T. Robert Paynter. (2009). Introductory Electronic Devices and Circuits. 10th Ed. Prentice Hall
- Thomas L. Floyd. (2008).
 Electronic Devices:
 Conventional Current Version.
 8th Ed. Prentice Hall
- Puspa Inayat Khalid, Rubita Sudirman, Siti Hawa Ruslan.
 (2001). Modul Pengajaran Elektronik 1. Edisi ke3

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

- **CO1:** Ability to differentiate programming concepts and principles.
- **CO2:** Ability to solve engineering related problems using computer programming techniques
- **CO3:** Ability to design and evaluate computer programs by using programming techniques and tools.

- 1. Cheng, H. (2010). C for Engineers and Scientists. McGraw Hill.
- Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., (2006). C How To Program. Pearson-Prentice Hall.
- Sprankle, Maureen. (2006). Problem Solving and Programing Concepts. 7th Edition. Prentice Hall.
- Hanly, J.R. and Koffman, E.B. (2001). C Program Design for Engineers. 2nd Ed. Addison-Wesley.
- Al Kelley, Ira Pohl. (2000). C by Dissection: The Essentials of C Programming. 4th ed. Addison-Wesley.

EET202/3 DIGITAL ELECTRONICS II

Course synopsis

This course exposes the students to the combinational logic system design, sequential system, memoru and programmable logic devices, register transfer and datapath, sequential and control as well as computer organization.

Course Outcomes

- **CO1:** Ability to construct digital logic circuit using Register Transfer Language
- **CO2:** Ability to analyze and convert ASM chart to logical circuit and vice versa
- CO3: Ability to design a basic computer system

References

- 1. Logic and Computer Design Fundamentals, M.Morris Mano & Charles R.Kime, 4th edition, 2013
- 2. Rafikha Aliana, Norina Idris, Phak Len Eh Kan, Mohammad Nazri. (2007). Digital Electronics Design. 1st ed. Prentice Hall
- 3. Ronald J. Tocci. (2007). Digital Systems - Principles and Applications, 10th ed. Prentice Hall.

- 4. Godse, Atul P. Godse, Deepali A. Godse, Gurpreet Singh Ghai. (2007). Digital Electronics. Technical Publications Pune.
- 5. Nigel, P.C. (1999). A First Course in Digital Electronics. 1st ed. Prentice Hall.

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

- **CO1:** Ability to illustrate and explain the basic microcontroller architecture.
- CO2: Ability to analyze and write a microcontroller programming language in C program.
- CO3: Ability to interface the input and output devices with microcontroller.
- CO4: Ability to design and evaluate a simple microcontroller based sustem and present in aroup.

References

- S. Katzen. (2010). The Essential 1. 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

INSTRUMENTATION AND

Course Synopsis

MEASUREMENT

EET204/3

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

Sidang Akademik 2014/2015 - Academic Session 2014/2015

and transducers; principles and application of signal conditioning circuits including bridges, amplifiers and filters; and finally display, data acquisition and interfacing techniques.

Course Outcomes

- **CO1:** Ability to define, describe and analyze the elements of a complete electronic instrumentation and measurement sustem
- **CO2:** Ability to explain and apply the working principles of various sensors and signal conditioning/processing techniques in instrumentation and measurements
- **CO3:** 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. Rajendra Prasad.(2004). Electrical Measurement and Measuring Instrument. Khanna Publishers, India.
- Walt Jung (2005). Op Amp Applications Handbook. UK, Elsevier.

- 4. Wai Kai Chen (2006). Passive, Active & Digital Filters. US, CRC Press.
- J.Park & S.Mackay (2003). Practical Data Acquisition for Instrumentation and Control Systems. 1st

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 design of small-signal amplifiers. This course offers the students an exposure to the theory and applications of op-amp and frequency response. The basic principles of oscillator are also discussed. Furthermore, the students will also learn in depth about active filters and voltage regulators.

Course Outcomes

- **CO1:** Ability to analyze small-signal and frequency performance of basic amplifier configurations (BJT and FET) and categorize different types of power amplifiers.
- **CO2:** Ability to design the basic circuit of amplifier.

- **CO3:** Ability to differentiate the feedback amplifier and design an oscillator.
- **CO4:** Ability to explain the operation and analyze various types of filters.
- **CO5:** Ability to describe the operation, and design simple linear and non-linear voltage regulator circuits.

References

- Donald A. Neamen. (2010). Microelectronics Circuit Analysis and Design. 4th Ed. Mc Graw-Hill.
- Floyd, T. (2012). Electronic Devices. 9th Ed. Pearson Education, Inc.
- Boylestad, R.L. (2009). Nashelsky, L., 'Electronic Devices and Circuit Theory. 10th Ed. Prentice Hall.
- Adel S. Sedra, Kenneth C. Smith. (2009). Microelectronic Circuits. 6th Ed. Oxford University Press.
- 5. Floyd, T. (2008). Electronic Devices. 8th Ed. Pearson Education, Inc.

EET206/3 ELECTRIC CIRCUIT II

Course Synopsis

This course offers the students an exposure to the theories and concepts of the following as well

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as developing the skills to analyse linear electric circuits:

- i) Mutual Inductance
- ii) Two port network
- iii) Laplace transform
- iv) Frequency response of AC circuits
- v) Fourier series
- vi) Fourier transform

Course Outcomes

- **CO1:** Ability to explain and analyze special types of circuit such as mutual inductance and two port networks.
- **CO2:** Ability to analyze electric circuits using Laplace Transform, Fourier Series and Fourier Transform for the circuit comprising passive elements.
- **CO3:** Ability to analyze electric circuits using Laplace Transform, Fourier Series and Fourier Transform for the circuit comprising passive elements.

References

- Dorf, R.C., Svodoba, J.A. (2010). Introduction to electric circuits. 8th Ed. John Wiley
- Sadiku, M. N. O, Alexander, C. K. (2009). Fundamentals of Electric Circuits. Singapore. 4th Ed. McGraw-Hill

- Nilsson, J. W. and Riedel, S.A. (2008). Electric Circuits. 8th Ed. Prentice Hall. New Jersey
- Irwin, J.D., Nelms, R.M. (2008). Basic Engineering Circuit Analysis. 9th Ed.. John Wiley
- Hyat W.H., Durbin, S.M., Kimmerly, J.E. (2007).
 Engineering Circuit Analysis. 7th Ed. McGraw Hill

EET207/3 SIGNALS AND SYSTEMS

Course synopsis

This course aims to introduce students about basic of signals and systems and learn how certain input to a system will produce the required output. Students will be exposed to signal spectrum concept and the method being utilized to analyze signal and its relations.

Course Outcomes

- **CO1:** Ability to identify type and analyze waveform of the signals and its characteristics in engineering systems.
- **CO2:** Ability to analyze signals and determine the process of the systems.
- **CO3:** Ability to calculate and evaluate the system response using variable methods.

References

- Charles L. Philips, John M. Parr, Eve A. Riskin, "Signals, Systems and Transforms", 5th Ed., Prentice Hall. International Edition, (2013)
- M.J. Roberts, "Signals and Systems, Analysis Using Transform Methods and MATLAB", 2nd Edition, McGraw Hill International Edition, 2012
- 3. P. Rao. (2008). Signals and Systems. Tata Mc Graw Hill
- Simon Haykin, Barry Van Veen. (2005). Signals and Systems. 2nd Ed. Wiley
- Ashok Ambardar. (1999). Analog and Digital Signal Processing. 2nd Ed.

EET208/3 ELECTRICAL POWER TECHNOLOGY

Course synopsis

In Electrical Power Technology courses, student will be exposed to the concept of three-phase system, electromagnetism and magnetic circuit. The next part includes principles and operation of singlephase 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

- **CO1:** Ability to evaluate parameters of three phase system
- **CO2:** Ability to solve electromagnetism problem and analyze its application in magnetic circuit
- **CO3:** Ability to analyze the principles and performance of singlephase and three-phase transformer

References

- Boylestad, Robert L. (2014). 'Introductory Circuit Analysis', 12th Edition, Prentice Hall
- 2. Theraja B.L. (2008). 'A Text Book of Electrical Technology', Volume II (AC & DC Machines), S.Chand & Company Ltd
- Chapman, Stephen J. (2012). 'Electric Machinery Fundamentals', 7th Ed., New York: McGraw-Hill
- Stephen D.Umans (2014).'Fitzgerald & Kingsley Electrical Machinery', 7th edition, McGraw-Hill
- Edward Hughes, Ian McKenzie Smith, John Hiley, Keith Brown. (2008). 'Electrical and Electronic Technology', 10th Ed., Prentice Hall.

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, representations of components in power system, fault and protection system.

Course Outcomes

- **CO1:** Ability to classifytypes and operation of power system generations in groups.
- **CO2:** Ability to solvesingle-line diagram problems using the per-unit system.
- **CO3:** Ability to calculate and analyze the transmission line parameters and models in power system
- **CO4:** Ability to explain and calculate load characteristics and distribution system components in power system.
- **CO5:** Ability to explain and evaluate symmetrical fault and protection system in power system.

References

- Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye.
 2011. Power System Analysis and Design, SI Version. 5th ed. CENGAGE Learning
- 2. Hadi Saadat. (2004). Int. ed. Power System Analysis. Boston: McGraw Hill
- B.M. Weedy& B.J. Cory (2012), Electric Power System, John Wiley & Sons, 5th ed.
- 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.

Course Outcomes

- **CO1:** 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.
- **CO2:** Ability to analyze system's response to test inputs in time or frequency domain.
- **CO3:** Ability to analyzecontrol system problems by utilizingcontrol system graphical tools such as root locus or bode plot.
- **CO4:** Ability to design appropriate controller/s throughsystem compensation in performing control system analysis.

References

- Norman S. Nise. (2011). Control System Engineering. 6th ed. John Wiley & Sons.
- Richard C. Dorf & Robert H. Bishop. (2011). Modern Control Systems. 12th Edition. Prentice Hall.
- Kuo B. C. Automatic Control System. 9th Edition. John Wiley & Sons.
- Ogata K. (2009). Modern Control Engineering. 5th Ed. Prentice Hall.

 Franklin G. F., Powell J. D. and Emani-Naeni A. (2009). Feedback Controlof Dynamic Systems System. 9th Edition. Prentice Hall.

EET303/3 ELECTROMAGNETIC THEORY

Course Synopsis

Purpose of this course is to learn the basic theory and analysis of electromagnetic. Student will be exposed to the basic concepts and effects of electrostatics and magnetostatics. Theory and application of transmission line will be introduced in this course.

Course Outcomes

- **CO1:** Ability to explain the concept of vector analysis in electromagnetic theory
- **CO2:** Ability to explain and analyze the concept of electrostatic
- **CO3:** Ability to explain and analyze the concept of magnetostatic
- **CO4:** Ability to applythe concept of electromagnetic in transmission line analysis

References

1. Principles of Electromagnetics, Matthew N.O Sadiku (2013) Fourth Edition International Version. Amazon. U.A. Bakshi and A.V.Bakshi.
 (2007)Electromagnetic Fields. 1st Ed. Technical Publications Pune.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

- William H.Hayt, John A Buck. (2006). Engineering Electromagnetics. 6th Ed. McGraw Hill. International ed.
- Stuart M Wentworth. (2005). Fundamentals of Electromagnetics with Engineering Applications. John Wiley
- 5. Fawwaz T Ulaby. (2004). Fundamentals of Applied Electromagnetics. Pearson. Prentice Hall.

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 students with real world applications.





Sidang Akademik 2014/2015 - Academic Session 2014/2015

Course Outcomes

- **CO1:** Ability to explain basic principles of communication systems and the essential of communication system in real world.
- **CO2:** Ability to define and differentiate the different types of modulation.
- **CO3:** Ability to define, calculate and analyze noise in communication system.
- **CO4:** Ability to prepare a report in relevant topics using various resources.

References

- Jeffrey S. Beasley, Gary M. Miller. (2008). Modern Electronic Communication. Pearson/ Prentice Hall
- 2. William D. Stanley, John M. Jeffords. (2006). Electronic Communications : Principles and Systems.Thomson Delmar Learning
- Paul Young. (2004). Electronics Communications Techniques. 5th Ed. Prentice Hall
- Wayne Tomasi. (2004). Electronics Communication Systems. 5th Ed. Prentice Hall
- 5. Mullet. (2003). Basic Telecommunications: The Physical Layer. Thomson Learning

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 its application to electrical machines. 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 purpose machines.

Course Outcomes

- **CO1:** Ability to define and explain the principle of electromechanical energy conversion and its application to electrical machines
- **CO2:** Ability to determine and analyze parameters for AC and DC Machines
- **CO3:** Ability to apply related software tools in understanding principle of electrical machines

References

- Stephen J. Chapman, (2010). Electric Machinery Fundamentals. 5th ed., McGraw-Hill.
- Bhattacharya S.K. (2008). Electrical Machines. 3rd ed. Tata McGraw-Hill.
- 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.
- 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 & Interdisciplinary Applications Orientated Technology emphasizing the main criterion of energy efficiency. AC-DC, AC-AC and DC-DC converter performance. including waveform analysis, is developed from theory simulation - laboratory. EET307 introduces an awareness of Electromagnetic Compatibility (EMC) Legislation & the effects of Power Electronic Systems on Power Quality. Design aspects include understanding manufacturer's
data, co-relating data to select power semiconductors and passive components, thermal management and EMC compliance.

Course Outcomes

- **CO1:** Ability to analyse operation, applications area and the need for design efficiency of power electronic systems.
- **CO2:** Ability to calculate and analyse parameters for power rectifier, SCR, Triac and power transistors.
- **CO3:** Ability to analyse and evaluate AC-DC converter, AC-AC converter and DC-DC converter.
- **CO4:** Ability to explain and calculate the design requirements of power quality related EMC compliance and thermal management of power electronic converters.

References

- 1. Daniel W. Hart (2011) Power Electronics. McGraw. Hill.
- 2. S Maniktala. (2006). Switching Power Supplies A to Z. Elsevier Newnes.
- Muhammad H. Rashid.(2004). Power Electronics: Circuits, Devices & Applications. 3rd Ed., Pearson: Prentice-Hall.

- Mohan, Undeland, Robbins. (2003). Power Electronics: Converters, Applications & Design. 3rd Ed., John Wiley.
- Erickson R.W., Maksimovic D. (2001). Fundamentals of Power Electronics. 2nd Ed. Springer.

EET308/4 POWER SYSTEM ANALYSIS

Course synopsis

This course is divided into four parts. Part I, consisting of topic introduction to power system, the main problem in power system, single-line diagram, representation of power system, 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 IV, consisting of topic power system stability with equal area and step by step method. The students are introduced to MiPower software in the laboratory session.

Course Outcomes

CO1: Ability to calculate, analyze power flow with Gauss-Seidel, Newton-Raphson, Decoupled and Fast-Decoupled methods.

- **CO2:** Ability to calculate, and analyze fault current in Symmetrical and Unsymmetrical Fault.
- **CO3:** Ability to calculate and analyze stability system by using Equal-Area method, and Step-by-Step method

References

- Hadi Saadat, 2010. Power System Analysis. 3rd edition. PSA Publishing.
- Professor Tom Overbye.
 (2004). Power System Analysis. Department of Electrical and Computer Engineering University of Wisconsin
- 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
- John J. Grainger, William D. Stevenson, Jr. (1994). Power System Analysis. Mgraw-Hill

EET311/2 ENGINEERING ECONOMICS

Course Synopsis

This course introduces the economic principles and analytical tools needed to think intelligently about economic problems. The course begins by focusing on

253

microeconomics, in which students will examine the concept and principles of individual consumer and firm behaviour. In the second part of the course deals with the thought process, concepts, methods and knowledge bases used by engineers to cost engineering projects and to evaluate the merit of making a particular investment, and to chose the best of a series of alternative investments to achieve a desired objective.

Course Outcomes

- **CO1:** Ability to discover the fundamental ideas that economics has to offer as well as the power and relevance of micro economics to engineering profession.
- **CO2:** Ability to analyze economics analysis that address the economic problem of how to allocate scarce resources among unlimited wants.
- **CO3:** Ability to analyze the practical needs of the engineer towards making informed financial decisions in an engineering project.
- **CO4:** Ability to evaluate the concept the concept of Time Value of Money.

References

- Leland Blank & Anthony Tarquin (2012)Engineering Economy. McGraw Hill. 7th Edition.
- William A. McEachern (2005). McEachern's Economics : A Contemporary Introduction.7th Edition.
- Chan S. Park. (2002). Contemporary Engineering Economics. 3rd Edition. Prentice Hall. New Jersey.
- Pindyck Rubinfield. (2008). Micro Economics. 6th Edition. Prentice Hall, New Jersey.
- Blank Tarquin (2005).
 Engineering Economy. 6th
 Edition. McGraw-Hill

EET333/3 ENGINEERING TEAM PROJECT

Course synopsis

This course introduces the smallscaled 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.

Course Outcomes

- **CO1:** Ability to combine engineering knowledge and solve engineering design problem in team work
- **CO2:** Ability to design a proper process to produce creative and innovative solution.
- **CO3:** Ability to demonstrate effective communication, report writing, presentation and entrepreneur skill.

References

Related journals, proceedings and papers in electrical and electronic engineering 2007 onward.

EET411/3 POWER SYSTEM OPERATION & CONTROL

Course Synopsis

This course aims to provide further understanding of the fundamentals of power system operation and control. It mainly focuses on various aspects of electrical power generation such as energy source and transfer, power plant operation and characteristics, economical and optimal power generation, power system control and optimal power flow, unit commitment, interconnected power system and HVDC system.

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Course Outcomes

- **CO1:** Ability to describe, calculate and analyze energy generation, power system behavior and economics of generating costs.
- **CO2:** Ability to calculate and analyze the optimal dispatch with transmission losses, unit commitment in thermal power plant and design power system control.
- **CO3:** Ability to calculate and analyze interconnection system, operation of generators in parallel with large power system and Tieline interchange between interconnected utilities.
- **CO4:** Ability to describebasic principle of security studies, sensitivity factors and sensitivity methods.
- **CO5:** Ability todescribe, calculate and analyze the basic principles of the HVDC System.

References

- 1. Saadat, H. (2010) 'Power System Analysis'. 3rd ed., PSA Publishing.
- P.S.R. Murthy. (2011). 'Operation and Control in Power Systems'. CRC Press, 2nd edition.
- Sivaganaraju, (2010). 'Power System Operation and Control'. Pearson Education India.

- Wildi, T. (2005). 'Electrical Machines, Drives, and Power System (6th Edition)'. Prentice Hall
- 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

Basically this Electrical Machine Design course consist introduction about magnetic material, magnetic circuit, heating and cooling of electrical Machine and study about transformer design and continue with general test of the characteristic of Transformer, and the end of this topic is analysis the performance of transformer. The courses continue with study about design of rotating electrical machine and general test of the characteristic, and analysis the performance of rotating electrical machine. The end of this subject topic the student also will study about simulation of electromagnetic using FEM. To increases the understanding of electrical machine design sample case also available in this subject. The student also being exposed to practical intensive lab throughout the course.

Course Outcomes

- **CO1:** Ability to analyze magnetic material that used to design electrical machine and magnetic circuit of electrical machine
- **CO2:** Ability to analyze the performance, design winding and core of transformer
- **CO3:** Ability to analyze the performance, design winding and core of rotating electrical machine

References

- Juha Pyrhonen, Tapani Jokinen, Valeria Hrabovcova. (2008).
 Design of rotating electrical machines. John Wiley & Sons.
- S.V.Kulkarni, S.A. Khaparde. (2004). Transformer Engineering Design and Practical. Marcel Dekker Inc.
- Philip Beckley. (2002). Electrical Steels for rotating machine. The institution of Electrical Engineers. ISBN 0 85296 980 5.
- 4. Indrajit Dasgupta. (2002). Design of Transformer. Tata McGraw-Hill Publishing Com. Lmt.
- 5. Jimmie J. Cathey. (2001). Electric Machines, Analysis and Design applying Matlab. McGraw-Hill Publishing Com. Lmt.

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 arounding, substation arounding 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

- **CO1:** Ability to classify type of substation and explain fundamentals and considerations of substation design
- **CO2:** Ability to describe operation, maintenance, selection and functionsof substation equipments part and ability to design simple busbar

- **CO3:** Ability to measure resistivity and grounding resistance and ability to design and analysisground grid substation and safety requirement
- **CO4:** Ability to identify and calculateparameters in protection system of substation equipments caused by internal and external faults.
- **CO5:** Ability to calculate capacity and service area substation and explaintesting and commissioning method of substation equipments.

References

- John MC Donald. (2007). Electrical Power Substations Engineering. 2nd Ed. CRC Press.
- 2. Rao, S. (2003). Electrical Substation Engineering & Practice. Khana Publishers, New Delhi.
- Colin Bayliss. (2002). Transmission and Distribution electrical engineering. Newness, Great Britain.
- 4. Garzon Ruben D. (2002). High Voltage Circuit Breaker. Marcel Decker Inc, USA.
- 5. H. Lee Willis. (2000). Power Distribution Planing. Dekker/ CRC Press.

EET416/3 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

- **CO1:** Ability to differentiate and explain type of motor loads and drive requirements
- **CO2:** Ability to justify and analyse power electronic drives parameters based on load characteristics.
- **CO3:** Ability to explain and calculate converters parameters for power electronic drives.
- **CO4:** Ability to design and recommend appropriate power electronic drives parameters in electrical machines application.

References

1. Bogdan Wilamowski and David Irwin (2011). Power Electronics and Motor Drives, 2nd Ed. CRC Press.

- Gopal Dubey (2012). Fundamentals of Electrical Drives, 7th Reprint Ed. Alpha Science.
- Muhammad Rashid (2013). Power Electronics, Circuits, Devices & Applications, 4th Ed. Prentice Hall.
- Stephen Chapman (2012). Electric Machinery Fundamentals, 5th Ed. McGraw Hill.
- Vedam Subrahmanyam (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 d.c., a.c. and impulse voltages and currents, overvoltage phenomena, insulation coordination, high voltage testing techniques and testing of apparatus and equipment.

Course Outcomes

- **CO1:** Ability to analyze the various breakdown mechanism and applications of vacuum, liquid, solid and composite dielectrics
- **CO2:** Ability to design and evaluate generations and measurements of high voltage AC, DC and impulse generator
- **CO3:** Ability to analyze the overvoltage 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, Mc Graw Hill Education Private Limited
- 2. C.L. Wadhwa. (2007). 'High Voltage Engineering'. New Age International.
- Subir Ray. (2004). 'An Introduction to High Voltage Engineering', Prentice-Hall of India.
- E. Kuffel, W.S. Zaengl, J. Kuffel. (2000). 'High Voltage Engineering: Fundamentals', 2nd ed., Newness.
- M.E. Khalifa. (2000). 'High Voltage Enfineering: Theory and Practice'. 2nd ed. Marcel Dekker Inc.

EET418/3 POWER QUALITY

Course Synopsis

This course covers topics power quality in power system. The student is exposed to some problem in power system such as voltage sags, transient and harmonics. This courses will also covering mitigation or preventive method in power quality issue.

Course Outcomes

- **CO1:** Ability to explain power quality disturbances and typical problems associated with power quality disturbances.
- **CO2:** Ability to solve problems on harmonic distortion on electrical power systems.
- **CO3:** Ability to design basic filters to reduce harmonic distortion.
- **CO4:** Ability to explain the typical equipment that either causes or is susceptible to electrical power quality disturbances.



EET422/3 ELECTROMAGNETIC COMPATIBILITY (EMC) AND COMPLIANCE ENGINEERING

Course Synopsis

Electromagnetic Compatibility (EMC) is an essential part of good product design to ensure compliance with International Regulations and Directives. EET422 (Electromagnetic Compatibility (EMC) and Compliance Engineering) provides an awareness of the directives that manufacturers need to consider for compliant products. EET422 introduces the fundamentals of EMC concepts, circuit design methods, PCB and system layout techniques and the tools available to design compliant products. EET 422 includes EMC test and measurement methods and knowledge of commercial EMC test equipment to enhance diagnostic skills and provide EMC solutions.

Course Outcomes

- **CO1:** Ability to demonstrate the importance of EMC directives, EMC related directives and routes to compliance.
- **CO2:** Ability to discuss and examine an understanding of EMC basics, including interference sources, effects and solutions, common mode and differential mode interference.

- **CO3:** Ability to differentiate EMI solution methods including filters, shielding and grounding, and able to create analytic solutions to compliance requirements.
- **CO4:** Ability to classify EMI sources and propose solutions on practical applications including Power Electronic, analogue and digital systems.
- **CO5:** Ability to explain and discuss EMI compliance testing procedure and able to distinguish essential test equipments including voltage sources, LISN and analyzers.

References

- M I Montrose: E M Nakauchi. (2004). Testing for EMC Compliance: Approaches and Techniques. IEEE.
- T Williams. (2001). EMC for Product Designers. 3rd Ed. Newnes.
- T Williams K Armstrong. (2000). EMC for Systems and Installations. Newnes.
- 4. D. Lohbeck, 'CE Marking. (1998). Newnes.
- 5. Laszlo Tihanyi. (1995). Electromagnetic Compatibility in Power Electronics. Elsevier Science.

EET424/3 POWER ELECTRONICS FOR ENERGY SYSTEM

Course Synopsis

This course gives a detail exposure to the students on the application of power electronics for energy system. In part 1, an introduction of power quality problems that caused by the use of power electronics. Part 2 concentrate on power electronic inverter and waveform shaping techniques used in a typical energy system. Subsequently, in part 3, an introduction of uninterruptile power supplies (UPS) as one of the mitigation devices to solve power quality problems. Part 4 focus on sustainable energy system; i.e. solar energy system and energy management.

Course Outcomes

- **CO1:** Ability explain power quality problems and differentiate their mitigation devices
- **CO2:** Ability to analyze and evaluate inverter topologies and their performances through theoretical and simulation
- **CO3:** Ability to analyze and evaluate the significance of sustainable energy

References

1. Daniel W. Hart (2011). Power Electronics. McGraw.Hill.

School of Electrical System Engineering

- 2. Ewald F. Fuchs, Mohammad A. S. Masoum. (2008). Power quality in power systems and electrical machines. Academic Press/Elsevier.
- M. H. Rashid. (2007). Power Electronics Handbook: Devices, Circuits, and Applications -Engineering Series Academic Press Series in Engineering. Academic Press.
- G. N. Tiwari and M K Ghosal. (2005). Renewable Energy Resources. Alpha Science.
- 5. M. H. Rashid. (2004). Power Electronics: Circuit, Devices and Applications. Prentice Hall.

EET426/3 POWER ELECTRONICS II

Course Synopsis

Efficient Power Management Systems are essential for the proper operation of all modern electronic systems. EET423 provides an in depth study of Switched Mode Power Supplies (SMPS) and includes topology variations, operational modes and control strategies, performance analysis including the effects of parasitic elements and waveform analysis. Design aspects include understanding manufacturer's data, co-relating data to select power semiconductors and passive components, thermal management and EMC compliance.

Course Outcomes

- **CO1:** Ability to explain and classify the Topologies, parameters of related components and thermal management in SMPS.
- **CO2:** Ability to interpret and analyze the rectification techniques, SMPS waveforms, SMPS control strategies and modes control.
- **CO3:** Ability to use related software tools to simulate SMPS Topologies and to determine and analyze device performance.

References

- Pressman, Billings & Morey. (2009). Switching Power Supply Design. 3rd Ed. McGraw Hill
- S Maniktala. (2006). Switching Power Supplies A to Z. Elsevier Newnes.
- Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices & Applications', .3rd Ed. Pearson: Prentice-Hall.
- Mohan, Undeland, Robbins.
 (2003). Power Electronics: Converters, Applications & Design. 3rd Ed. John Wiley
- Erickson R.W., Maksimovic D. (2001). Fundamentals of Power Electronics. 2nd Ed. Springer.

EET427/3 INDUSTRIAL ELECTRONICS CONTROL

Course Synopsis

This course will have a wide explosure about industrial electronics control to the students. The course will be coverege of components, circuits, instruments, equipments and control technique used in industrial automatic systems. At beginning of this couse the topics will be covered are basic principle of industrial electronics control and interfacing devices. The interfacing devices will give wide explosure to the student regarding of operational amplifiers, signal processors, opto-electronic interface devices, transducers, detection sensors, actuator, digital to analog converter and analog to digital converter. The next part of this course will coverage the design of controller, proportional controll, proportional integral control, proportional integral derivative control, presure control and temperature control. The servo and stepper motor control design that used in a variety of industrial automation application are also covered in this course. Tupical applications of these motors are rotary table control, pen positioning and precise position controll will be studied in this course. The student will be expose to



programmable logic controler (PLC), PLC components, PLC programming and operational procedure. The PLC capable to perform more complex motion and process control applications.

Course Outcomes

- **C01:** Ability to explain And calculate Operational amplifiers, opto-electronic, signal processor, interfacing devices, transducers, detection sensors and actuator in industrial electronic control applications.
- **CO2:** Ability to explain and calculate digital and analog controller, temperature control, flow control and its relation to industrial electronic control applications.
- **CO3:** Ability to explain, analyze and design motor controller for industrial electronic control applications.
- **CO4:** Ability to explain and design ladder diagram that will perform a specified operation using PLC programming in applications of industrial electronic control.

References

 Bogdan Wilamowski and David Irwin (2011). The Industrial Electronics Handbook, 2nd Ed. CRC Press.

- Frank Petruzella (2011).
 Programmable Logic
 Controllers, 4th Ed. McGraw Hill.
- Khaled Kamel and Eman Kamel (2013). Programmable Logic Controllers: Industrial Control. McGraw Hill.
- Terry Bartelt (2011). Industrial Automated Systems Instrumentation and Motion Control. Delmar Cengage Learning.
- William Bolton (2009). Programmable Logic Controllers, 5th Ed. Newnes.

EET428/3 POWER ELECTRONICS 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

 CO1: Ability to differentiate and explain type of motor loads and drive requirements.
 CO2: Ability to justify and analyze power electronic drives parameters based on load characteristics.

- **CO3:** Ability to explain and calculateconverters parameters for power electronic drives.
- **CO4:** Ability to design and recommendappropriate power electronic drives parameters in electrical machines application.

References

- 1. Bimal K. Bose. (2010). Power Electronics And Motor Drives: Advances and Trends. Elsevier Science. USA.
- 2. Wildi Theodore. (2006). Electrical Machines, Drives, and Power Systems. Pearson-Prentice Hall. New Jersey.
- Muhammad H. Rashid. (2004). Power Electronics : Circuits, Devices and Application. Second Edition. Prentice Hall International Inc. New Jersey.
- 4. El-Sharkawi A. Mohamed. (2000). Fundamentals of Electric Drives. A division of Thomson Learning. USA.

EET431/3 ELECTRICAL ENERGY SYSTEM

Course Synopsis

To introduce students to the energy sources technology and develop understanding of a number of different types of energy sources

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whose outputs are suitable for conversion into electrical power generation.

References

- El-Hawary, M. E. (2007). Electrical Energy Systems. 2nd Ed. Taylor & Francis
- 2. George G. Karady and Keith E. Holbert. (2005). Electrical Energy Conversion and Transport-An Interactive Computer-Based Approach. John Wiley
- Gilbert M. Masters. (2005). Renewable and Efficient Electric Power Systems. John Wiley & Sons
- G. N. Tiwari and M. K Ghosal. (2005). Renewable energy resources: basic principles and applications. Alpha Science International
- 5. Stanislaw Sieniutycz and Alexis de Vos. (2000). Thermodynamics of Energy Conversion and Transport. Springer

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.

References

- 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
- Wayne C. Turner and Steve Doty. (2009). Energy Management Handbook. 7th Ed. Fairmont Press Inc
- Frank Kreith and D. Yogi Goswami. (2008). Energy Management and Conservation Handbook. CRC Press
- Gilbert M. Masters. (2004). Renewable and Efficient Electric Power Systems. John Wiley and Sons
- 5. Bary W. Kennedy. (2000). Power Quality Primer. Mc Graw 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 introduce students with the relevant conversion, storage, network interfacing and economic assessment techniques for renewable energy systems.

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
- 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

EET445/2 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 Abdem Cuide Book

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and effective presentation of the research outcome in the form of thesis and seminar. The area of research is mainly on Power Electronics, High Voltage, Electrical Power System & Machine Design.

EET446/4 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 area of research is mainly on Power Electronics, High Voltage, Electrical Power System & Machine Design.

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)







School of Manufacturing Engineering

Programmes Offered

 Diploma in Engineering (Manufacturing)
 Bachelor of Engineering (Hons.) (Manufacturing Engineering)
 Bachelor of Engineering (Hons.) (Product Design Engineering)
 Master of Science (Manufacturing Engineering)
 Master of Science (Product Design Engineering)
 Master of Science (Manufacturing System) Mixed Mode
 Doctor of Philosophy (Manufacturing Engineering)
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Introduction

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.

INTERPACTORING ENGINEERING

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 nonacademic staff, academic staff and students as the majority of students are placed in the residential colleges around

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 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 manufacturing students to the 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 globallu.

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 Engineering also offers a Diploma Engineering Manufacturing Engineering), of Science Manufacturing), Master of Science Product Design Engineering) and Doctor of Philosophy Manufacturing 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)

PEO 01

Graduates who are leaders in the field of Manufacturing Engineering or chosen field as demonstrated via career advancement.

PEO 02

Graduates who are members of and contribute to professional society.

PEO 03

Graduates who engage in life-long learning or continuous education opportunities.

PEO 04

Graduates who contribute towards research and development.

PEO 05

Graduates who are entrepreneurial engineers.

Programme Outcomes (PO)

PO 01

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.

PO 02

Ability to identify, formulate and solve complex engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

Ability to understand entrepreneurship, the process of innovation and the need for environment and sustainable development.

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.

Curriculum Structure for Bachelor of Engineering (Honours) (Manufacturing Engineering)

YEAR	FIRST		SECOND		THIRD		FOURTH		RTH
SEMESTER	I	П	III	IV	V	VI		VII	VIII
Engineering Core (37)	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	2/4 Industrial Training	EPT445/2 Final Year Project	EPT446/4 Final Year Project
	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
	EPT162/2 Computer Programming	EPT181/2 CAD/CAM	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
		EPT182/3 Manufacturing Process I	EPT282/3 Manufacturing Process II		EPT385/3 Metrology & Quality Control	EPT361/4 Instrumentation and Control		EPT484/2 Lean Manufacturing	EPT4XX/3 Elective
		EPT183/2 Engineering Workshop			EPT384/3 Advanced Manufacturing Technology	EPT324/2 Heat Transfer		EPT485/2 Production Planning and Control	
					EPT371/2 Finite Element Analysis				
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics			EIT302		
		UUT122/2 Skills and Technology in Communication						EUT443/2 Engineering Management	EUT440/3 Engineers in Society
University Required (17)	UUW233/2 Islamic & Asian Civilisations & UVW410/2 University Malay Language & UUW235/2 Ethnic Relations & UZWXXX/1 Co-Curriculum Subjects	UZWXXX/1 Co-Curriculum Subjects	UVW312/2 English for Technical Communication & UZWXXX/1 Co-Curriculum Subjects	UUW224/2 Engineering Entrepreneurship & UVWXXX/2 Option Subjects		EUW322/2 Thinking Skills			
137	17	19	18	16	17	17	4	14	15
Total Units for Graduation 137									



Bachelor of Engineering (Honours) (Product Design Engineering)

Programme Objectives (PEO)

PEO 01

Graduates who are leaders in the field of Product Design Engineering or chosen field as demonstrated via career advancement.

PEO 02

Graduates who are members of and contribute to professional society.

PEO 03

Graduates who engage in life-long learning or continuous education opportunities.

PEO 04

Graduates who contribute towards research and development.

PEO 05

Graduates who are entrepreneurial engineers.

PROGRAMME OUTCOMES (PO)

PO 01

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.

PO 02

Ability to identify, formulate and solve complex engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

Ability to understand entrepreneurship, the process of innovation and the need for environment and sustainable development.

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.

Curriculum Structure for Bachelor of Engineering (Honours) (Product Design Engineering)

YEAR	FIRST		SECOND		THIRD		FOUTH		лтн	
SEMESTER	I	Ш	III	IV	v	VI		VII	VIII	
Engineering Core (97)	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	4 Industrial Training	EPT445/2 Final Year Project	EPT446/4 Final Year Project	
	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	
	EPT162/2 Computer Programming	EPT192/3 Product Innovation	EPT283/2 Computer Aided Design	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				
					EPT371/2 Finite Element Analysis					
Non Engineering (19)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics			EIT302/			
	1-1-1-1-1-1-	UUT122/2 Skills and Technology in Communication						EUT443/2 Engineering Management	EUT440/3 Engineers in Society	
University Required (17)	UUW233/2 Islamic & Asian Civilisations & UVW410/2 University Malay Language & UUW235/2 Ethnic Relations & UZWXXX/1 Co-Curriculum Subjects	UZWXXX/1 Co-Curriculum Subjects	UVW312/2 English for Technical Communication & UZWXXX/1 Co-Curriculum Subjects	UUW224/2 Engineering Entrepreneurship & UVWXXX/2 Option Subjects		EUW322/2 Thinking Skills				
137	19	18	17	18	17	16	4	13	15	
Total Units for Graduation 137										

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.
- 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.

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

- Jensen C., Helsel J D., Short D R., 2007, Engineering Drawing & Design. 7th ed. Mc-Graw Hill.
- 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.
- 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.
- Goetsch D L., Chalk W.S., Nelson J.A. Rickman R.L., 2005. Technical Drawing. 5th ed. Thomson Delmar Learning.

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

- P.N. Rao. CAD/CAM Principles and Applications. 2nd Edition. McGraw Hill. (2004)
- Ibrahim Zeid. Mastering CAD/ CAM. 1st Edition. McGraw Hill International Edition. (2004)
- 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 introduces students to the knowledge, understanding and synthesis of the basic processes in manufacturing such as metalcasting processes, forming & shaping processes, and joining processes. In the beginning of the course, the fundamental of materials will be given, before they learn the processes in manufacturing. Students will undergo practical sessions in the workshop/lab to help in a better understanding of the subject matter.

References

- 1. Groover M.P., 2004. Fundamentals of Morden Manufacturing: Materials, Processes and Systems. Prentice Hall.
- Kalpakjian S., 2001. Manufacturing Engineering an Technology, 5th Ed. Addision Wesley.
- Schey J.A. 2000. Introduction to Manufacturing Process. 3rd Ed. MC Graw Hill.
- Bruce R.G. et al. 2003. Modern Materials & Manufacturing Process. 3rd Ed. Prentice Hall.

5. Serope Kalpakjian, Steven R. Schmid. *Manufacturing Processes For Engineering Materials*, Fifth Edition, , Pearson Education, 2009

EPT 183/2 ENGINEERING WORKSHOP

Course Synopsis

In the first part of this course, safeties aspects in the workshop will be covered, followed bu fundamental measurement techniques, and use of measuring equipment such as vernier calliper. micrometer, etc., Then, various basic cutting processes, e.g. filing, chiselling, sawing, etc. will be covered. Students will be introduced to fabrication, sheet metal forming, and welding, which consists of introduction to basic knowledge of various cutting methods and hand tools, such as file, hacksaw, chisel, etc. The practices or lab sessions consist of explanations on safety practices in the workshop, fitting work, sheet metal forming, and welding processes.

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 used in the industry to transform raw material to finished products. Practical work will help student's gain effective understanding.

References

- 1. Steve F. Krar, Arthur R.Gill, Peter Smid. *Technology of Machine Tools*. 6th ed. McGraw Hill, 2007.
- 2. S. Kalpakjian, S.R. Schmid (2001). Manufacturing Engineering and Technology. 4th ed. Prentice Hall International.
- Mikell P. Groover (2007), Fundamentals of Modern Manufacturing. 3rd ed. John Wiley & Sons, Inc.
- E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). Materials and Processes in Manufacturing. 8th ed., John Wiley & Sons, Inc.
- 5. Manufacturing Engineering And Technology, Fifth Edition, Serope Kalpakjian, Steven R. Schmid, Prentice Hall, 2005

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

 Serope Kalpakjian, Steven R. Schmid 2006. Manufacturing Engineering and Technology - 5th Edition in SI Units, Prentice-Hall.

- John A. Schey, 2000. Introduction to Manufacturing Processes,3rd Edition, McGraw-Hill.
- 3. Risatti, Howord and Trapp, Kenneth R 2007. A Theory of Craft : Function and Aesthetic Expression, Kindle Edition.
- 4. Arie Walllert, erma Hermens, Maria F.J. Historical Painting Techniques, Materials, and Studio Practice Practice: Preprints of a Symposium, University of Leiden, the Netherlands, 26-29 June 1995 Peek Getty Publications.
- 5. Groover M.P., 2004. Fundamentals of Morden Manufacturing: Materials, Processes and Systems. Prentice Hall.

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.
- Behrouz A. Forouzan and Richard F, Gilberg, 2001.
 Computer Science A Structured Programming Approach Using C, Second Edition, Brooks/Cole.
- Jeri R. Hanly and Elliot B. Koffman, 2002. Problem Solving & Program Design in C, 3rd Edition, Addison Wesley.
- 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.

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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 chapter, the students will understand the principles of DC Machines and three phase induction motors and do some basic calculation of losses and efficiency of DC Machines.

References

- 1. Edward Hughes, Electrical and Electronic Technology. 8th Edition, Prentice Hall, 2002.
- Stephen J. Chapman, "Electric Machinery Fundamentals", 4th Edition, McGraw Hill, 2005.
- Charles K. Alexander & Matthew Sadiku, "Fundamentals of Electric Circuits", International Edu., McGraw Hill, 2001.
- 4. V.K. Mehta, Principles of Electrical Engineering and Electronics.S.Chand 1996.
- Eugene C. Lister and Robert J. Ruch, Electric Circuits and Machines. 7th Edition, McGraw-Hill 2000.

EPT114/3 STATICS

Course Synopsis

This course introduces introduction to mechanics, force vector, equilibrium of particle, force system resultants, equilibrium of rigid body, structural analysis, friction, centroids and center of gravity.

References

- 1. R.C. Hibbeler, 2004. Engineering Mechanics Statics SI Third Edition, Pearson Prentice-Hall, Inc.
- 2. R.C. Hibbeler and Peter Schiavone, 2004. Engineering Mechanics Statics – Statics Study Pack SI Third Edition, Pearson Prentice-Hall, Inc.
- J. L. Meriam and L. Glenn Kraige, 2003. Engineering Mechanics, Statics Fifth Edition, John Wiley & Sons, Inc.
- Ferdinand P. Beer, E. Rusell JohnsonJr and William
 Clausen, 2004. Vector Mechanics for Engineers Statics Seventh Edition. Mc-Graw Hill.
- W. Riley, L. Sturges, D. Morris, 2007. Mechanics of Materials, John Wiley & Sons, Inc.

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

- Serope Kalpakjian, Steven R. Schmid 2006. Manufacturing Engineering and Technology - 5th Edition in SI Units, Prentice-Hall, Inc.
- DeGarmo, Black and Kohser, 2006. Materials and Processes in Manufacturing. 9th Edition. Wiley, ISBN: 0-471-36679-X.
- John A. Schey, 2000. Introduction to Manufacturing Processes, 3rd Edition, McGraw-Hill, Inc.
- Schey, J.A. Introduction to Manufacturing Processes, 3rd Ed., Mc Graw Hill, 2000.
- 5. Bruce R.G. et al. 2003. Modern Materials & Manufacturing Process. 3rd Ed. Prentice Hall.

EPT 192/3 PRODUCT INNOVATION

Course Synopsis

This course starts with basic ideas about inventing which define what invention and innovation constitute. It then describes the differences between invention and non-invention criterion, areas, and invention types. In conjunction with technology, the innovation itself cannot be separated from some fundamental principles of technology such as energies and their forms, storage of energy and

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some general concepts that have been used over and over again in originating, developing and applying many devices and systems such as the area principles. This course also focuses on the invention process to produce novel design concepts and reverse engineering processes applied so as to improve current design concepts. As the course go on, topics on intellectual properties such as patents, trade mark, trade secret and copyright are discussed. These are important legislative documents to protect novel ideas. In addition, strategies on how to generate profits from the invention and innovation activities are covered. Presentation techniques and ethics are also studied using graphic software and materials such as panels and mock-up.

References

- G. Kivenson, 1982, The Art and Science of Inventing, 2nd edition, Van Nostrand Reinhold.
- 2. M. Baxter, 1995, Product Design: Practical Methods for The Systematic Development of New Products, CRC Press.
- P.Trott, 2002, Innovation Management and New Product Development, 2nd edition, Prentice Hall.
- 4. Wego Wang, 2010, Reverse Engineering: Technology of Reinvention, CRC Press.

- 5. M.Crawford, 2003,New Products Management, McGraw-Hill.
- 6. G.E. Dieter, 2000, Engineering Design, 3rd edition, McGraw Hill.
- 7. R.J. Eggert, 2005, Engineering Design, 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, bending and buckling 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. 2005. *Mechanics* of *Materials*, 5th ed., Prentice Hall.
- 2. Raymond, Parnes. 2001. Solid Mechanics in Engineering, John Willey & Sons.
- Madhukar, Vable. 2002. Mechanics of Materials, Oxford University Press.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

- Barber, J.R. 2001. Intermediate Mechanics of Materials, McGraw-Hill.
- Pytel, Kiusalaas. 2001. Mechanics of Materials, 3rd ed., McGraw-Hill.

EPT 212/3 DYNAMICS

Course Synopsis

In this course, students use the concepts of mechanics in dunamic 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 learn the dunamics 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

 Beer, F. P. & Johnston E. R. 2003. Engineering Mechanics-Dynamics. 4th ed. John Wiley & Son.



- 2. Hibbler R. C., 2007. Engineering Mechanics- Dynamics, Prentice Hall.
- 3. Bedford A. & Fowler W., 2005. Engineering Mechanics-Dynamics, Addison Wesley Longman.
- Meriam J.L. , Kraige L.G., 2007. Engineering Mechanics, Dynamics,
- 5. John Wiley.
- Ginsberg. J., 2007. Engineering Dynamics. 3rd Ed. New York: Cambridge University Press.

EPT 261/3 ELECTRONICS

Course Synopsis

In this course, students learn about electronic devices which include analog and digital devices. In analog devices, the topics include introduction to semiconductor. PN junction, diodes, zener diodes, bipolar junction transistor (BJT) and operational amplifier. In digital devices, the topics include 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 basics of electronics. operation concept, and analysis methods including the usage of electronic devices in the industry.

References

- 1. Floyd, T.L., *Electronic Devices*. 7th ed. Prentice Hall, Inc, 2002.
- 2. Floyd, T.L., *Digital Fundamentals*, 8th ed. Prentice Hall, Inc, 2002.
- Tocci, R.J. and, Widmer, N.S., Digital Systems: Principles and Applications. 8thed. Prentice Hall, 2001.
- 4. Knight, S.A. (1996). *Electronics for Engineers*. BH Newness.
- 5. Floyd, T.L. (1995). Electronics Fundamentals, Circuits, Devices & Applications. Prentice Hall.

EPT 281/3 INDUSTRIAL ENGINEERING

Course Synopsis

This course covers processes of design of industrial engineering systems, improvement and the installation of an integrated sustem of people, materials, equipment, information, energy and economics. It involves knowledge of mathematical and economical sciences with the principles and methods of engineering analysis. The main objective is to solve industrial engineering problems in order to increase labour and manufacturing productivity of industrial systems. Tools which make the most effecient solutions will be focused in this course. Other topics include structure of industrial

systems, labour productivity, manufacturing productivity, industrial management and plant layout.

References

- Kalpakjian S, Schmid S.R. Manufacturing Engineering and Technology, 4th ed., Prentice Hall Inc. 2001
- Manek N.J. Industrial Engineering, Laxmi Publications (P) LTD. 2002
- Turner, W.C. et. al. Introduction to Industrial and Systems Engineering, 3rd.ed., Prentice Hall, 1993.
- 4. Roy, R.K. Design of Experiments Using the Taguchi Approach Canada: John Wiley & Sons, Inc. 2001.
- Donna C. S. Summers. *Quality*,3rd ed.,Prentice Hall, 2003.

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 overview to both processes, followed by analyses of machine tools. This is followed by CNC programming, CNC processes, tools and control



systems. Programming codes which include G, N, and M codes will be taught and student will perform geometry machining using the machines. Students will solve problems related with the programming, design and operations of CNC machines. At the end of the course, students present their individual/group projects related to the targeted outcomes.

References

- 1. Serope Kalpakjian and Steven R. Schmid, *Manufacturing Engineering and Technology*, Fifth Edition, Prentice Hall, 2006
- Jon Stenerson, Kelly Curran, Computer Numerical Control Operation and Programming. 3rd ed., Prentice Hall, 2007.
- Steve Krar, Arthur Gill, Peter Smid, Computer Numerical Control Simplified, 1st ed., Industrial Press Inc. New York, 2001.
- By Stephen F. Krar, Arthur Gill, Exploring Advanced Manufacturing Technologies, Industrial Press Inc. New York, 2003.
- 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.

References

- James H. Earle, "Engineering Design Graphics", Ilth ed.,Pearson Prentice-Hall, 2004.
- 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. Farid M. Amirouche, Principles of Computer Aided Design and Manufacturing Prentice Hall; 2 edition (January 22, 2004)
- Cornelius T. Leondes , Cornelius Leondes, Computer-Aided Design,
- 5. Engineering, and Manufacturing: Systems Techniques and Applications, Volume II, Computer-Integra, CRC Press; 1 edition (December 12, 2000)

- 6. Thomas Strothotte (Author), Stefan Schlechtweg (Author) Non-Photorealistic
- Computer Graphics: Modeling, Rendering, and Animation (The Morgan Kaufmann Series in Computer Graphics) [Hardcover] Morgan Kaufmann; 1st edition (April 26, 2002)

EPT 228/3 FLUIDS MECHANICS I

Course Synopsis

In Fluid Mechanics I. students apply basic properties of fluid and concepts of dimensional analysis on fluid flow measurement. fluid friction in pipes, and flow over immersed bodies. This course also covers analysis of hydrodynamical flow fields. It emphasizes the analysis and importance of boundary layer, ideal, and compressible flow in practical engineering applications. The course will also provide the analysis of flow through fluid machines such as pumps and turbines. At the end of the course. students should be able to apply the theory to solve problems related to flow of fluids.

References

 J.F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack, *Fluid Mechanics*, Fifth Edition, Prentice-Hall, 2005.



- B. R. Munson, D. F. Young and T.
 H. Okiishi. *Fundamentals of Fluid Mechanics*. John Wiley & Sons.
- 3. B.S. Massey, *Mechanics of fluids*, Chapman & Hall, London.
- C.T., Crowe, D. F. Elger and J. A. Roberson, *Engineering Fluid Mechanics*, Eight Edition, John Wiley & Sons, 2005.
- 5. R.L. Mott, *Applied Fluid Mechanics*, Sixth Edition, Prentice Hall, 2006.

EPT 235/3 THERMODYNAMICS

Course Synopsis

In this course, basic concepts in thermodynamic laws used in engineering applications such as steam power plant, air-conditioning & refrigeration systems, and internal combustion engine will be covered. The course emphasizes the study of energy sources and conservation through its concept and definition. By the end of semester, students should be able to analyse mixture and the performance of compressors and heat exchangers.

References

1. Cengal Y.A. and Boles M.A., *Thermodynamics: An Engineering Approach*, 7 th Edition, McGraw-Hill Inc., New York, 2006.

- 2. Eastop T.D. & Mac Conkey A., Applied Thermodynamics for Engineering Technologists, 5 th Ed., Prentice Hall, 1993.
- 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.
- Mohd Kamal Ariffin, " Termodinamik Asas", UTM Press, 2005. W.Z. Black and J.G.Hartley.(1996). *Thermodynamics*, English/SI Version.3rd Edition Prentice-Hall.

EPT 262/2 MEASUREMENT AND INSTRUMENTATION SYSTEM

Course Synopsis

This course introduces students to the basic principles in measurement systems including various sensing methods, instrument types and their characteristics, display and recording elements, and their applications in the measurement of temperature, pressure, force, level, and displacement, among many others.

References

- Beckwith, T.G., Maragoni, R.D., Lienhard, J.H., Mechanical Measurement, 6th ed., Prentice Hall, 2006.
- Bently, J. P., Priciple of Measurement System, 3rd ed., Logman, 1995
- Figliola, R.S., Beasly, D.E., Theory and Design for Mechanical Measurements, 3rd ed. John Wiley, 2000
- Morris, A.S., Measurement and Instrumentation Principles, 1st ed., Butterworth Heinemann, 2001
- 5. W.Bolton,Measurement and Instrumentation Systems, Butterworth-Heinemann; 1st Ed. edition (March 23, 1998)

EPT 293/3 ENGINEERING PRODUCT DESIGN I

Course Synopsis

This course aims to develop an understanding of customer's needs and techniques to interpret data into product conceptual solutions that have market value. Students will learn the appropriate engineering approaches and methods to analyze user needs in conjunction with engineering science principles such as materials, statics, dynamics, solid, fluid and thermodynamics to produce



conceptual solutions that fulfill customer needs. The course also focuses on the manipulation of 3D CAD based software to construct product conceptual solutions.

References

- Rudolph J. Eggert, "Engineering Design" New Jersey: Prentice Hall, 2005
- Karl T. Ulrich and Steven D. Eppinger, "Product Design and Development" McGraw- Hill, 2008
- Clive L. Dym and Patrick Little, "Engineering Design: A Project Based Introduction", John Wiley & Sons, 2008
- Lance Bettencourt Service Innovation: How to Go from Customer Needs to Breakthrough Services, McGraw-Hill; 1 edition (May 26, 2010)
- Turkka Kalervo Keinonen, Roope Takala Product Concept Design: A Review of the Conceptual Design of Products in Industry ,Springer; 1 edition (January 23, 2006)

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, fluwheels and auroscopes. 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 studu.

References

- 1. Pennock Gordon R., Shigley Joseph E., Uicker John J., *Theory* of Machines and Mechanisms, OXFORD University Press, 2003
- D. J. Inman, Engineering Vibration. Pearson Prentice Hall, 2001
- 3. S. S. Rao, *Mechanical Vibrations*. Pearson Prentice Hall, 2004

- 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 335 APPLIED THERMODYNAMICS

Course Synopsis

Applied Thermodunamics 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 airconditioning, refrigeration and heat pump cucles. Students should also be able to perform thermodynamic analyses of gas mixtures and gasvapor mixtures.



References

- 1. Cengal Y.A. and Boles M.A., *Thermodynamics: An Engineering Approach*, 7 th Edition, McGraw-Hill Inc., New York, 2006.
- Eastop T.D. & Mac Conkey A., Applied Thermodynamics for Engineering Technologists, 5th Ed., Prentice Hall, 1993.
- 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.
- W.Z. Black and J.G.Hartley. (1996). *Thermodynamics*, English/SI Version.3rd Edition Prentice-Hall.

EPT 341/3 SOLID MECHANICS II

Course Synopsis

This course reviews the earlier course of Solid Mechanics I regarding axial load, torsion, bending and shear. Students will be exposed to problems of thin-walled tubes having closed cross sections and bending deformation of a straight member. The course also discusses the solution of problems where several internal loads occur simultaneously on a member's cross section. The deflection of beam problems is taught using various methods including the application of energy methods. This energy method covers the principle of conservation of energy, virtual work and Castigliano's theorem.

References

- Hibbeler, R.C. 2005. Mechanics of Materials, 5th ed., Prentice Hall.
- Raymond, Parnes. 2001. Solid Mechanics in Engineering, John Willey & Sons.
- Madhukar, Vable. 2002. Mechanics of Materials, Oxford University Press.
- Barber, J.R. 2001. Intermediate Mechanics of Materials, McGraw-Hill.
- Pytel, Kiusalaas. 2001. Mechanics of Materials, 3rd ed., McGraw-Hill.

EPT 361/4 INSTRUMENTATION AND CONTROL

Course Synopsis

This course prepares students with the knowledge and skill in instrumentation and control for instrumentation systems and control engineering in manufacturing industries. Students study basic concepts of instrumentation systems, elements, transducers, instrumentation system analysis, design criteria for measuring instrument and suitable materials. This course will enhance students' knowledge of the principals and usage of instrumentation in manufacturina industries. Students will also learn control system concepts and methods commonly used in the industries. They will be able to applu instrumentation and control techniques in manufacturing environments. 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.
- Nise, Norman S., Control Systems Engineering. 4th ed., USA, John Wiley & Sons, 2004.
- 3. R. C. Dorf, R. H. Bishop, *Modern Control System*, 11th ed., Prentice Hall,2008.
- K. Ogata, Modern Control Engineering, Prentice Hall, 4th edition, 2002.
- 5. W. Bolton, Instrumentation and control, Elsevier, 2004.

School of Manufacturing Engineering
Sidang Akademik 2014/2015 - Academic Session 2014/2015 5. R.G.W. Pye, Injection Mould

EPT 363/3 AUTOMATIC CONTROL

Course Synopsis

In this course, control systems which involve mathematical models of control system, characteristic of feedback control system, performance of feedback control system, stability of feedback control system, Root-Locus Method, and design of feedback control systems will be covered.

References

- 1. Benjamin C. Kou., Automatic Control System, John Willey &Sons. Inc.
- 2. Dorf, R.C. and Bishop, R.H., Modern Control Systems, Addison Wesley, 8th Edition, (1998)
- Mahmud, che Mat Hadzer, Sistem Kawalan Automatik. USM (1999)
- Ogata, K., Modern Control Engineering, 3rd Edition, Prentice Hall, (1997)
- Farid Golnaraghi, Benjamin
 C. Kuo, Automatic Control
 Systems, Wiley; 9th edition (July 7, 2009)

EPT 381/3 TOOLS AND DIE DESIGN

Course Synopsis

This course gives an understanding to students about the concepts and principles of Tool & Die and Mould design applications. It is divided into two sections. The first section deals with Tool & Die design with include the calculation and analysis of part and die using CATIA CAD software. The second section will cover the mould design application with includes calculation and analysis using MouldFlow Software. Students need to carry out projects individually or in a team, and present the project at the end of semester.

References

- Ivana Suchy. Handbook of Die Design. 2nd Edition, McGraw-Hill 2006.
- Vukota Boljanovic J.R. Paquin. Die Design Fundamentals. 3rd Edition. Industrial Press Inc. 2006.
- Szumera, Jim. The Metal Stamping Process, Your product from concept to customer. Industrial Press Inc. 2003.
- David A. Smith. Fundamentals of Pressworking. Society of Manufacturing Engineers, Dearborn, Michigan. 1994.

 R.G.W. Pye, Injection Mould Design, Logman Scientific & Technical, 4th Edition, 1991.

EPT 383/3 AUTOMATION AND ROBOTICS

Course Synopsis

This course introduces industrial automation and robotic which have been used in the industries today. Its covers topics regarding automation systems such as pneumatic, hydraulic, programmable logic control (PLC), material handling, Automated Storage/Retrieval System (ASRS), Automated Guided Vehicles (AGV). Flexible Manufacturing System (FMS), Automated Production Lines, and Automated Assembly Lines. Students learn how to design pneumatic and hydraulic circuits manually before using programmable logic control (PLC) with FluidSIM software in the lab. 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. Jon Stenerson, Industrial Automation and Process Control., Prentice Hall, 2003.
- James A. Rehg, Glenn J. Sartori, Programmable Logic Controllers, Prentice Hall. New Jersey, 2007.
- Jon Stenerson, Fundamentals of Programmable Logic Controllers, Sensors, and Communications, 3rd ed., Prentice Hall, 2004.
- 4. Khairur Rijal Jamaludin, *Reka* Bentuk Sistem Kuasa Bendalir, Universiti Teknologi Malaysia., 2004
- 5. John S. Cundiff, Fluid Power Circuits and Controls, Fundamentals and Applications., CRC Press. 2002.

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. Metrology & Measurement, Bewoor, Tata Mcgraw-Hill, 2009
- Metrology And Properties Of Engineering Surfaces, By Evaristus Mainsah, Jim A. Greenwood, Derek G. Chetwynd, Springer, 2001
- 3. *Quality Control*, 8th Edition, Dale H. Besterfield, Pearson/Prentice Hall, 2008
- 4. Quality Control, Reliability, And Engineering Design, Volume 1984, Balbir S. Dhillon, Marcel Dekker, 1985
- 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

EPT 384/3 ADVANCED MANUFACTURING TECHNOLOGY

Course Synopsis

This course introduces students to advanced manufacturing technology. The content of the course covers advanced manufacturing technology such as Electrochemical Machining (ECM), EBM, LBM, micro-machining and nano-fabrications. It also covers process selections and economics of advanced machining processes. It gives students the basic skills in analysing advanced manufacturing technology and the necessary knowledge to operate and manufacture a particular product. At the end of the course, students will present a proposal to manufacture a particular component.

- S.Kalpakjian, S.R.Schmid, Manufacturing Engineering and Technology. 5th ed., Prentice Hall International, 2006.
- Mikell P. Groover, Fundamentals of Modern Manufacturing, 2nd ed. John Wiley & Sons, Inc., 2002.
- Philip F. Ostwald, Jairo Munoz, Manufacturing Processes and Systems, 9th ed., John Wiley, 1997
- E.Paul DeGarmo, J T. Black, Ronald A. Kohser, Materials and Processes in Manufacturing, 8th ed., John Wiley & Sons, Inc., 1997.
- 5. Michael Fitzpatrick, *Machining* and CNC Technology, McGraw Hill Higher Education., New York, 2005.

EPT 393/3 ENGINEERING PRODUCT DESIGN II

Course Synopsis

In the Product Design Engineering 1 course, students learnt all engineering design phases, focusing on the first two phases which are Problem Formulation and Conceptual Design. In contrast, the course Product Design Engineering 2 focuses on the next phase of Engineering Design, which is Configuration Design. Students will firstly study Product Architecture and then continue to look on the details of Design for X; such as Design for Manufacturing and Assembly, Design for Reliability and Safety, Design for Quality and Robustness, and Design for Environment. At the end of this course, students are usually required to complete a case study.

References

- Rudolph J. Eggert, "Engineering Design" New Jersey: Prentice Hall, 2005
- Karl T. Ulrich and Steven D. Eppinger, "Product Design and Development" McGraw- Hill, 2008
- Clive L. Dym and Patrick Little, "Engineering Design: A Project Based Introduction", John Wiley & Sons, 2008

- 4. Charles S. Wasson, System Analysis, Design, and Development: Concepts, Principles, and Practices (Wiley Series in Systems Engineering and Management), Wiley-Interscience (December 23, 2005)
- Baxter, Mike Product design: a practical guide to systematic methods of new product development / Mike Baxter, Cheltenham: Stanley Thornes, c1995.

EPT 394/3 PRODUCT ERGONOMIC AND SAFETY

This course addresses ergonomics knowledge in product design. It explains the application of anthropometrics data in products, equipment and tool designs. 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 or the disabled in the desian. It also looks into ergonomic hazard, safety analysis & prevention, and the product safety.

References

- Green, W. S. and Jordan, P. W., "Human Factors in Product Design", Taylor & Francis, Florida, 1999.
- Kroemer, K. H. E, Kroemer, H. B., and Kroemer-Elbert, K. E., "How to Design for Ease and Efficiency", 2nd Edition, Prentice Hall, New Jersey, 2001
- David L. Geotsch, Occupational Safety and Health for Technologists, Engineers and Manager, 4th Edition, 2002
- Geaorge E. Dieter, Engineering Design, A materials and Processing Approach, 3rd Edition, university of Maryland. 2000
- Waldemar Karwowski, Gavriel Salvendy, Advances in Human Factors, Ergonomics, and Safety in Manufacturing and Service Industries (Advances in Human Factors and Ergonomics Series), CRC Press; 1 edition (June 24, 2010)

EPT 371/2 FINITE ELEMENT ANALYSIS

Course Synopsis

The main objective of the course is to provide students with the knowledge, comprehension and analysis of some problems using finite element analysis (FEA).



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Topics covered in this course include introduction and brief history, element and terminology, stress and balance, boundary condition, continuity approach, mathematics approach, finite element model (FEM), linear shape function, potential energy approach, Galerkin approach, stiffness matrix formation. finite element equation, guadratic function, 2-D coaxial problems, partial element numerical metric and integration with higher order element, 2-D and 3-D framework's problems with FEA. Topics such as steady heat transfer, torsion and flow problems, finite element formulation, element mass matrix, eigen value evaluation and eigen vector by interactive method and Jacobi are also included. There will be a design project that uses finite element software.

References

- 1. Chandrupatla, T.R. & Belegundu, A.D. 2003. Introduction to Finite Elements in Engineering, 3rd Ed. Prentice Hall International.
- Zienkiewicz, O.C. & Taylor, 2. R.L. 2005. The Finite Element Methods, 6th Ed. Mc Graw Hill: NewYork.
- 3. Cook, R.D., Malkus D.S. & Plesha, M.E. 2001. Concepts and Applications of Finite Element Analysis, 4th Ed. John Wiley & Sons: New York.

- Buchanan, G.R. 1995. Theory 4. and Problems of Finite Element Analysis. Schaum's Outline Series, Mc Graw Hill: New York.
- 5. Huebner, K.H., Thornton, E.A. & Byrom, T.G. 1995. The Finite Element Method for Engineers. 3rd Ed, John Wiley & Sons: New York.

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 bolted joints. It introduces engineering design methodology 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 to identify the critical desian parameters for anu engineering component design and to manipulate them as part of the design process.

References

- 1. Robert C. Juvinall and Kurt M. Marshek, Fundamental of Machine Components Design. John Wiley & Sons, 2005
- Shigely, J. E and Mischke, C. R., 2. Mechanical Engineering Design. McGraw Hill 1989
- 3. M. F. Spotts, T. E. Shoup and L. E. Hornberger, Design of Machine Elements, Pearson Prentice Hall 2004
- 4. Dan F. Marghitu, Kinematic Chains and Machine Components Design. Academic Press 2005
- 5. V. B. Bhandari, Design of Machine Elements. Tata McGraw-Hill 2007

EPT 314/3 MACHINES MECHANISM

Course Synopsis

The course offers students knowledge of basic 3D rigid body kinematics, balancing on rotation mass, gear systems and follower, mechanism-kinematics diagramme, 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 sustems. In addition, they should be able to evaluate analytically the parameters of components of various machines under study.

References

- 1. Myszka, D.H., Machines and Mechanism: Applied Kinematic Analysis, 3rd eds., Prentice Hall (2005)
- Hannah, J. and Stephens, R.C. Mechanics of Machines. Elementary Theory and Examples, 4th eds., Edward Arnold, 1991
- Che Abas Che Ismail,Mohd. Yunus Abdullah,Roslan Abd Rahman, "Mekanik Mesin" Universiti Teknologi Malaysia, 2003
- 4. Machines and Mechanisms", OXFORD University Press, 2003
- 5. P.L. Ballaney, Theory of Machines and Mechanisms, Khanna Publisher 1995

EPT 364/3 MECHATRONICS

Course Synopsis

The aim of this course is to deliver the fundamental knowledge of mechatronics system. Topics covered include input device, output device, signal conditioning, input and output interfacing, networking, and fault finding analysis. Students will also learn how to design and analyse mechatronics systems using Programmable logic Control (PLC).

References

- 1. Bolton, W "Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering", 2rd ed., Pearson-Prentice Hall., 1999.
- 2. R. Iserman, "Mechatronic Systems: Fundamental", Springer, 2003.
- W.Bolton, Mechatronics: A Multidisciplinary Approach (4th Edition) Prentice Hall; 4 edition (June 1, 2009)
- Sabri Cetinkunt, Mechatronics, Wiley; 1 edition (January 23, 2006)
- W. Bolton, Programmable Logic Controllers, Fifth Edition, Newnes; 5th edition (August 7, 2009)

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.

- G. Boothroyd, P. Dewhurst, W. Knight, 'Product Design for Manufacture and Assembly', 2nd Edition, Marcel Dekker Inc., 2002.
- G. Boothroyd, P. Dewhurst, W. Knight, 'Product Design for Manufacture and Assembly, (Manufacturing Engineering and Materials Processing)', Third Edition, CRC Press, 2010
- 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.



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Sidang Akademik 2014/2015 - Academic Session 2014/2015

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 Geometry Dimensioning and Tolerance symbols in 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 plastic products and analyses of plastic material flow inside plastic injection mould to produce plastic products. Students learn to apply and integrate knowledge and understanding of engineering science disciplines to support engineering design activities. In designing activities, students will study reliability testing for the new product development. Lastly, students will study the laws and the actual steps to acquire patents for a new product.

References

- 1. Injection Mould Design Engineering, David O. Kazmer
- R.J. Crawford, "Plastic Engineering", 2nd Edition, Pergamon Press, Unted Kingdom, 1990.

- L. Sors and I. Balazs, "Design of Plastic Moulds and Dies", Elsevier, Amsterdam, 1989.
- 4. Mechanical Tolerance Stackup and Analysis, Bryan R. Fischer, 2006.
- 5. Geometric Tolerancing Workbook.

EPT324/2 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

- 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.
- 5. Anthony F. Mills., 1999, *Heat Transfer*. Prentice Hall.

EPT329/3 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.

- J.F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack, *Fluid Mechanics*, Fifth Edition, Prentice-Hall, 2005.
- C.T., Crowe, D. F. Elger and J. A. Roberson, *Engineering Fluid Mechanics*, Eight Edition, John Wiley & Sons, 2005.
- 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.
- Daugherty, RL, Franzini, JB & Finnemore, EJ, Fluid Mechanics with Engineering Applications, SI metric edn, McGraw-Hill. Douglas, JF, Gasiorek, JM & Swaffield, JA, Fluid Mechanics, Longman.

EPT 403/3 ADVANCED MATERIALS

Course Synopsis

In this course, students learn about recent developments of various classes of advanced materials used in applications such as aerospace, automotive, biomedical and electronic industries. It will emphasize on the important properties exhibited by metallic, polymeric, ceramics and composite materials that make them selected for high-end and advanced applications. The physical and mechanical properties of the various classes of advanced materials (super alloys, titanium and aluminum alloys, intermetallic and biomaterials) will be detailed, and so will the processing techniques associated with producing these materials. The course will also cover the latest advanced materials being developed such as nonmaterial's, shape memory alloys and other functional materials. At the end

of the course students should be able to gain understanding of the physical and mechanical properties of advanced materials and apply the knowledge to select suitable materials for a given engineering application.

References

- 1. El-Eskandarany. S.M. (2001). Mechanical alloying for Fabrication of advanced Engineering Materials. Noyes Publication
- 2. Edelstein. A, Cammarata R.S. (1996). Nanomaterials: synthesis, properties and application
- Mathew, F.L., Rawlings, R.D (1998). Composite Materials: Engineering and Science. Chapman & Hall.
- James F. Shackelford, Introduction to Materials Science for Engineers, 7th edition, Pearson Higher Education.2009
- R.E. Smallman, A.H.W. Ngan, *Physical Metallurgy and Advanced Materials*, 7th Edition. Butterworth-Heinemann 2007.

EPT 412/3 MECHANICAL SYSTEM DESIGN

Course Synopsis

This course incorporates elements covered in an earlier course, Machine Components Design. It completes the overall understanding mechanical system design. Topics covered include: design for installation, limit and matching, impervious, hudraulic sustem and pneumatic, automation, movement control. The simulation system design such as ADAMS will be introduced. Lectures and projects will cover problem solving methodology in the design, analysis, and synthesis of mechanical and thermal systems. This serves as a foundation for dealing with broad engineering projects. Emphasis will be given on creative thinking in the engineering design process in projects involving optimal conversion of resources.

- Ullman D.G. 2004. The Mechanical Design Process, 3rd Ed. International Edition, New York, McGraw Hill.
- 2. Crose.N. 2000. Engineering Design Methods, Strategies for Product Design, 3rd Ed. Chichester, Wiley.



- Esposito A. 2000. Fluid Power with Applications. New Jersey: Prentice Hall Inc.
- Norton R.L. 2005. Machine Design: An Integrated Approach. 3rd ed. New Jersey: Prentice Hall Inc.
- Clive L. Dym and Patrick Little. 2004. Engineering Design: A Project-Based Introduction. 2nd ed. New Jersey: Wiley.

EPT 427/3 PNEUMATICS AND HYDRAULICS SYSTEM DESIGN

Course Synopsis

This course discusses basic pneumatics, sensors, electropneumatics, and hydraulic technologies that are related to industrial applications. Students will study the construction and design of circuits by means of examples and exercises.

References

- 1. Pepperl & Fuchs, training Package Sensoric, Peppel &Fuchs, 2005
- Croser P, Thomson J., Basic Pnuematics textbook, 3rd edition, Festo Didactic, 2002
- Exner H. Freitag R., Hydraulics: Basic Principle and Componets, volume 1, 3rd Edition, Bosch rexroth AG, 2002

- Andrew Parr ,Hydraulics and Pneumatics, Second Edition, Butterworth-Heinemann; 2nd edition (March 22, 1999)
- 5. Jay F. Hooper, Basic Pneumatics, Carolina Academic Press (May 2003)

EPT415/3 VIBRATION

Course Synopsis

The concept of vibration with respect to one-degree-of-freedom and second degree-of freedom, vibration transition, continuity system and instrumentation for measuring vibration are studied. At the end of the course, students should be able to solve problems related to various mechanical systems.

References

- Thompson, W.T., Theory of vibration with application, 6th Edition, New Jersey, Prentice Hall, 1993.
- Rao, S.S., Mechanical Vibration, 3rd Edition, John wiley and Sons, 1995.
- 3. Daniel J. Inman, Engineering Vibration (3rd Edition) Prentice Hall; 3rd edition (May 19, 2007)
- 4. J.P. Den Hartog, Mechanical Vibrations, Crastre Press (November 4, 2008)

 S. Timoshenko, Vibration Problems In Engineering, 2nd Edition, Wolfenden Press; 2nd edition (November 4, 2008)

EPT 424/2 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.

- 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.
- 5. Anthony F. Mills., 1999, Heat transfer. Prentice Hall.

EPT463/3 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

- Ogata K. (2010). Modern Control Engineering. 5th ed. Prentice Hall.
- Norman S. Nise. (2011). Control System Engineering. 6th ed. John Wiley & Sons
- Kuo B. C. (2010). Automatic Control System. 9th ed. John Wiley & Sons.
- Richard C. Dorf, Robert H. Bishop (2011), Modern Control Systems, 12th ed. Prentice Hall.
- Franklin G. F., Powell J. D. and Emani-Naeni A. (2009). Feedback Control of Dynamic Systems System. 9th ed. Prentice Hall.

- U. A. Bakshi, S.C. Goyal, Feedback Control System, 2nd Revised ed. Technical Publication Pune.
- Charles L. Phillips, Royce D. Harbor, Feedback Control System, 4th ed. Prentice Hall

EPT 484/2 LEAN MANUFACTURING

Course Synopsis

This course offers students to understand the concept of Lean Manufacturing. Students learn about lean philosophies and techniques used in lean manufacturing. They will also learn Value Stream Mapping (VSM) which is the heart of Lean Manufacturing solution. Lab sessions will enable students to use lean tools properly through case studies given using simulation software. At the end of this course, students are expected to be able to apply and analyse lean tools to solve appropriate problems incurred on the manufacturing shop floor.

References

- 1. Pascall Dennis, *Lean Production Simplified*, Productivity Press, 2002.
- 2. Shingo, S. A Study of the Toyota Production System, Revised Edition, Cambridge, 1989.

- Taiichi Ohno, Toyota Production System: Beyond Large-Scale Production, Productivity Press; 1 Edition 1988.
- Shigeo Shingo, A Study of the Toyota Production System: From an Industrian Engineering Viewpoint, Productivity Press; 1st Edition 1989.
- James P. Womack, Daniel T. Jones, *Lean Thinking*, Simon & Schuster, 1st Edition, 1996.

EPT 485/2 PRODUCTION PLANNING AND CONTROL

Course Synopsis

In this course, students will understand issues related to production management. At the end of the course students are able to use the appropriate tools and techniques in manufacturing and production lines. The course includes Introduction to Production Management, Demand Forecasting, Capacity Planning, Process Selection & Facility Layout, Aggregate Planning, Inventory management, Materials Requirement Planning (MRP), Production Scheduling and Supply Chain Management.

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References

- Operations Management, 10th Edition, William J. Stevenson Mcgraw-Hill/Irwin, 2008
- 2. Manufacturing Resource Planning (Mrp II): With Introduction To Erp, SCM And CRM By Khalid Sheikh, Mcgraw-Hill Professional, 2003
- Operations Management: Providing Value In Goods And Services, 3rd Edition, James B. Dilworth, Dryden Press, 2000
- 4. Operations Management, Jae K. Shim, Joel G. Siegel, Barron's Educational Series, 1999
- Operations Management By C. Donald J. Waters, Donald Waters, Kogan Page Publishers, 1999

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- F.S. Hillier and Lieberman, G.J, Introduction To Operation Research, 7th Ed. Mc Graw Hill, N.Y. 2001
- 2. H.A. Taha, Operations Research: An Introduction, Prentice-Hall, New Jersey, 1997
- H. A. Eiselt and Carl-Louis Sandblom. Operation Research: A Model Based Approach, 1st Edition. Springer, 2010.
- David J. Rader, Deterministic Operations Research: Models and Methods in Linear Optimization, Wiley 2010.
- Wayne L. Winston., Operations Research: Applications and Algorithms, 4th Edition. Duxbury Press 2003.

EPT 495/2 OPERATIONAL RESEARCH

Course Synopsis

The course is divided into deterministic and stochastic categories used in the engineering field. Both categories involve modeling of problems using tools such as simplex, tasking and transportation. The course also covers operational problems which essentially involve probability such as queuing line and simulation models. All these methods aim to arrive at an optimum solution.



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

Program Offered

- Diploma in Metallurgical Engineering
- Bachelor of Engineering (Hons.) (Materials Engineering)
- Bachelor of Engineering (Hons.) (Metallurgical Engineering)
 - Bachelor of Engineering (Hons.) (Polymer Engineering)
 - M.Sc (Materials Engineering)
 - M.Sc Mixed Mode (Polymer Engineering)

• Ph.D.

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Introduction

Material 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 is responsible for designing, producing, inspecting and testing of engineering materials such as metal alloys, semiconductors, superconductors, ceramics, polymers, plastics and composites. All three programs emphasize learning and practical courses in all courses offered.

Materials Engineering, Metallurgical Engineering and Polymer Engineering are responsible for the research, specification, design and development of materials to advance technologies of many kinds. Materials Engineer, Metallurgical Engineer and Polymer Engineer are responsible for designing, producing, inspecting and testing of engineering materials such as metal alloys, semiconductors, superconductors, ceramics, polymers, plastics and composites. Their expertise lies in understanding the properties and behaviours of different substances, from raw materials to finished products. All these three programs emphasize learning and practical courses in all courses offered.

The next generation of technologies will require advancement in materials engineering to meet the challenges of the 21st century. In accordance with the requirements of industrial and Vision 2020, a high need for professionals in Materials Engineering, Metallurgical Engineering and Polymer Engineering is required in various industries. Thus, these programs aim to produce qualified human resources that have strong knowledge and experts in the field of Materials Engineering, Metallurgical Engineering and Polymer Engineering for a sustainable future.



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Bachelor of Engineering (Honours) (Materials Engineering)

Programme Objectives (PEO)

Programme Educational Objective 1

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

Programme Educational Objective 2

Graduates who are members and contribute to professional society.

Programme Educational Objective 3

Graduates who engage in lifelong learning or continuous education opportunities.

Programme Educational Objective 4

Graduates who contribute towards research and development.

Programme Educational Objective 5

Graduates who are entrepreneurial engineers.

Programme Outcomes (PO)

PO 01

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

PO 02

Ability to identify, formulate and solve complex engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

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

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.



Curriculum Structure for Bachelor of Engineering (Honours) (Materials Engineering)

YEAR	FIR	FIRST SECOND THIRD			FOURTH				
SEMESTER	I.	П	Ш	IV	v	VI		VII	VIII
Engineering Core	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	raining & Engineering Innovation	EBT405/3 Non Destructive Testing	* EBT429/3 Composite Materials OR * EBT439/3 Advanced Electronic Packaging
	EET103/4 Electrical Technology	ECT112/3 Engineering Skills	EBT251/3 Engineering Materials Chemistry	EBT211/4 Physical Metallurgy	EBT323/4 Materials Characterization	EBT315/2 Surface Engineering		EBT402/3 Corrosion Engineering	
	EKT150/3 Computer Programming	EBT112/3 Statics	EBT252/4 Strength of Materials	EBT222/4 Fundamentals of Ceramics	EBT326/4 Polymer Properties	EBT329/3 Polymer Processing		* EBT421/3 Advanced Material Engineering OR * EBT424/3 Construction Materials	
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EBT212/3 Dynamics	EBT253/3 Analytical Chemistry	EBT351/3 Electronic Materials Engineering	EBT324/3 Materials Thermodynamics		EBT427/3 Technical Ceramic	
			EQT203/3 Engineering Mathematics III	EQT271/3 Statistic For Engineer			ndustrial T	EBT445/2 Final Year Project 1	EBT446/4 Final Year Project 2
							EIT302/4 In	* EBT447/4 Materials Selection & Design	* EBT447/4 Materials Selection & Design
Non Engineering	EUT122/2 Skill & Technology in Communication					EUT443/2 Engineering Management		EUT440/3 Engineer in Society	
University Required	UUWXXX/2 Option Subject	UVW410/2 University Malay Language	UVW312/2 English for Technical Communication		UUW235/2 Ethnic Relation	UUW322/2 Thinking Skill			
	UZWXXX/1 Co- Curriculum	UZWXXX/1 Co-Currriculum		UZWXXX/1 Co-Currriculum	UUW224/2 Engineering Entrepreneurship	UUW233/2 TITAS			
120	18	15	19	18	18	17	4	17	11
17		Engl	ish for Technical Co Thinking Skill,	ommunication, Engi University Malay Lo	ineering Entreprene anguage, Co-Curicu	urship, TITAS, Ethni lum, Option Subject	c Relat	tion,	
Total Units for Graduation 137									

* Course begins in the first semester but total credits are given upon completion of the second semester.

Elective Subject

Bachelor of Engineering (Honours) (Metallurgical Engineering)

Programme Objectives (PEO)

Programme Educational Objective 1

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

Programme Educational Objective 2

Graduates who are members and contribute to professional society.

Programme Educational Objective 3

Graduates who engage in life-long learning or continuous education opportunities.

Programme Educational Objective 4

Graduates who contribute towards research and development.

Programme Educational Objective 5

Graduates who are entrepreneurial engineers.

Programme Outcomes (PO)

PO 01

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

PO 02

Ability to identify, formulate and solve complex engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

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

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.



Curriculum Structure for Bachelor of Engineering (Honours) (Metallurgical Engineering)

YEAR	FIRST		SECOND		THIRD			FOUR	тн
SEMESTER	I	Ш	Ш	IV	V	VI		VII	VIII
Engineering Core	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	Engineering Innovation	"EBT405/3 Non Destructive Testing OR "EBT418/3 Welding Metallurgy	EBT419/3 Applied Metallurgy
	EET103/4 Electrical Technology	ECT112/3 Engineering Skills	EBT251/3 Engineering Materials Chemistry	EBT213/4 Extractive Metallurgy I	EBT317/3 Engineering Fluid Mechanics	EBT314/3 Metallurgical Thermodynamics		EBT402/3 Corrosion Engineering	EBT420/3 Metallurgical Forensic Analysis
	EKT150/3 Computer Programming	EPT112/3 Statics	EBT252/4 Strength of Materials	EBT253/3 Analytical Chemistry	EBT313/4 Metallurgical Characterization	EBT315/2 Surface Engineering		*EBT411/3 Engineering Alloys OR *EBT414/3 Electronic Metallurgy	EBT446/4 Final Year Project 2
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EBT212/3 Dynamics	EBT254/3 Transportation Phenomenon in Materials Processing	EBT351/3 Electronic Materials Engineering	EBT319/3 Extractive Metallurgy II	ustrial Training 8	* EBT443/4 Metallurgical Design	*EBT443/4 Metallurgical Design
			EQT203/3 Engineering Mathematics III	EQT271/3 Statistic For Engineer			302/4 Indi	EBT445/2 Final Year Project 1	
on Engineering	EUT122/2 Skills & Technology in Communication					EUT440/3 Engineer in Society	EII	EUT 443/2 Engineering Management	
ž									
University Required	UUWXXX/2 Option Subject	UVW114/2 University Malay Language	UVW312/2 English for Technical Communication		UUW235/2 Ethnic Relation	UUW322/2 Thinking Skill			
	UZWXXX/1 Co-Currriculum	UZWXXX/1 Co-Currriculum		UZWXXX/1 Co-Currriculum	UUW224/2 Engineering Entrepreneurship	UUW233/2 TITAS			
120	18	15	19	18	18	18	4	13	14
17	English for Technical Communication, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject								
Total Units for Graduation 137									

Elective Subject

* Course begins in the first semester but total credits are given upon completion of the second semester.

Bachelor of Engineering (Honours) (Polymer Engineering)

Programme Objectives (PEO)

Programme Educational Objective 1

Graduates who are leaders in the field of polymer engineering or chosen field as demonstrated through career advancement

Programme Educational Objective 2

Graduates who are members and contribute to professional society

Programme Educational Objective 3

Graduates who engage in lifelong learning or continuous education opportunities

Programme Educational Objective 4

Graduates who contribute towards research and development

Programme Educational Objective 5

Graduates who are entrepreneurial engineers

Programme Outcomes (PO)

PO 01

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

PO 02

Ability to identify, formulate and solve complex engineering problems.

PO 03

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

PO 04

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

PO 05

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

PO 06

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

PO 07

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

PO 08

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

PO 09

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.



Curriculum Structure for Bachelor of Engineering (Honours) (Polymer Engineering)

YEAR	FIRST		SECOND		THIRD		FOURTH		н
SEMESTER	I	Ш	Ш	IV	V	VI		VII	VIII
Engineering Core	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EBT109/3 Quality Control	EBT317/3 Fluid Mechanics	EBT303/3 Process Control	EIT 302/4 Industrial Training & Engineering Innovation	EBT435/3 Polymer in Electronic Application	# EBTXXX/3 Elective
	EET103/4 Electrical Technology	EBT 131/3 Engineering Mechanics	EBT 233/4 Plastic Materials	EBT231/4 Elastomeric Materials	EBT334/3 Polymer Testing & Characterization	EBT 333/4 Rubber Processing		EBT437/3 Polymer Composites	EBT446/4 Final Year Project 2
	EKT150/3 Computer Programming	EBT 106/4 Introduction to Polymer	EBT232/4 Polymer Synthesis	EBT 235/4 Structure & Polymer Properties	EBT 335/4 Polymer Blends	EBT337/4 Mass & Heat Transfer in Polymer		EBT441/3 Polymer Engineering Design	EBT 442/3 Polymer Engineering Integrated Design Project
	EBT105/4 Organic Chemistry	ECT112/3 Engineering Skills	EBT 238/3 Physical Chemistry	EQT271/3 Engineering Statistics	EBT336/4 Plastic Processing	EBT338/4 Latex Processing			
				EBT239/4 Thermodynamic in Polymer				EBT445/2 Final Year Project 1	
Non Eng	EUT122/2 Skills & Technology in Communication					EUT443/2 Engineering Management			EUT440/3 Engineer in Society
University Required (15)	UUWXXX/2 Option Subject	UVW410/2 University Malay Language	UVW312/2 English for Technical Communication		UUW322/2 Thinking Skill			UUW233/2 TITAS	
	UZWXXX/1 Co-Currriculum	UZWXXX/1 Co-Currriculum	UUW235/2 Ethnic Relation		UZWXXX/1 Co-Currriculum			UUW224/2 Engineering Entrepreneurship	
120	19	16	18	18	17	17	4	15	13
17	English for Technical Communication, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject								
Total Units for Graduation 137									

Elective: EBT 448/3 Polymer Adhesive & Coating; EBT449/3 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.

References

- Paula, Y. B., 'Organic Chemistry', 4th ed., Person Education International, 2004.
- John Mc Murry., 'Organic Chemistry', 6th ed., Thomson Learning, Inc., 2004.
- Janice Gorzynski Smith, 'Organic Chemistry, second Edition, McGraw. Hill International Edition, 2006.
- Solomons, T.W.G, Craig B.F. 2011. Organic Chemistry, International Student Version, Tenth Edition, John Wiley & Sons, Inc.
- Smith, Michael B.; March, J. 2007. March's Advanced Organic Chemistry - Reactions, Mechanisms, and Structure (6th Edition), John Wiley & Sons, Inc.

EBT 106/4 INTRODUCTION TO POLYMER

Course Synopsis

The aim of this course is to enable the students to learn the concepts of polymer classification, identification, properties and their application in polymer engineering.

References

- Joel R. Fried., 'Polymer Science and Technology', 2nd ed., Prentice Hall Profesional Technical Reference Upper saddle River, 2003.
- 2. Barbara H. Stuart, 'Polymer Analysis', John Wiley and Sons, 2002.
- Paul C, Michall, M. C., 'Fundamental of Polymer Science', CRC press, 2000.
- Sperling, L. H., 'Introduction to Physical Polymer Science', 4th ed., Wiley-Interscience, 2006.

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.

References

- Douglas C. Montgomery. (2008). Introduction to Statistical Quality Control. 6th Edition Wiley.
- Dale H. Besterfield. (2004). Quality Control, 7th edition, Prentice Hall.
- Juran J.M. and Gryna F.M. (1988). Juran's Quality Control Handbook. 4th Ed. Singapore: McGraw-Hill.
- Ishikawa K. (1986). Guide to Quality Control. 2nd Ed. Tokyo: Asian Productivity Organization.
- Shewhart W.A. (2011). Statistical Method from the Viewpoint of Quality Control. New York: Dover Publications.

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.

References

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- Meriam, J. L. & Kraige, L. G. (2013). Engineering Mechanics, Statics seventh Edition. John Wiley & Sons, Inc.
- Bedford, A.M. & Fowler, W. (2007). Engineering Mechanics: Statics & Dynamics, 5th Edition. Prentice Hall.
- Riley, W, Sturges, L. & Morris, D. (2007). Mechanics of Materials. John Wiley & Sons, Inc.
- Ferdinand P. B, Johnson Jr., E. R. & William E. C. (2004). Vector Mechanics for Engineers Statics Seventh Edition. Mc-Graw Hill.

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 method and work and energy method.

References

- Beer, F.P., Johnston, E.R. Jr. & Eisenberg, E.R., Vector Mechanics for Engineers: Statics. 7th ed. In SI Units, Canada, McGraw-Hill, 2004.
- Beer, F.P., Johnston, E.R. Jr. & Eisenberg, E.R., Vector Mechanics for Engineers: Dynamics. 7th ed. In SI Units, Canada, McGraw-Hill. 2004.
- Hibbeler, R.C., Engineering Mechanics: Statics. 3rd ed., Singapore, Prentice Hall, 2004.
- Hibbeler, R.C., Engineering Mechanics: Dynamics. 3rd ed., Singapore, Prentice Hall, 2004.
- Meriam, J.L. & Kragie, L.G., Engineering Mechanics: Statics. 5th ed. USA, SI ver. Wiley, 2003.
- Meriam, J.L. & Kragie, L.G., Engineering Mechanics: Dynamics. 5th ed. USA, SI ver. Wiley, 2003.

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, Identifuing Sumbols, Hidden Surface and Edges, Inclined Surface, Circular Features, Obligue 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

- 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.
- Boundy, A. W., Albert William, (2002). Engineering drawing. Boston: McGraw-Hill.



 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 crustalline and non crustalline materials and their applications; comprehensive quide 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 propertu. 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 -

References

 William D. Callister and David G. Rethwisch (2013). Materials Science and Engineering: An Introduction. 9th Ed. New York: John Wiley.

laser, fibre optic in communication.

- 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.
- Donald R. Askeland & Pradeep P. Phule, (2003). The Science and ngineering of Materials. 4th Ed. Thomson Brooks/Cole.

- Brick R.M. et al. (1977). Structure and Properties of Engineering Materials. Singapore: McGraw-Hill.
- 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 ledge and screw dislocation. plastic and elastic deformation). Slip: concept of slip, dislocations, twins, and their role in plastic deformation of single crystal.

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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, recrustallization and arain 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.

References

- John E. Neely, Thomas J. Bertone, (2000). Practical Metallurgy and Materials for Industry.
- 2. L. Carl Love. (1985). Principles of Metallurgy. Reston.
- Verhoeven J.D. (1975).
 Fundamentals of Physical Metallurgy. New York: Wiley
- 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 dunamic 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.

- Hibbler R. C., 2010. Engineering Mechanics- Dynamics, 12th ed. Prentice Hall.
- Meriam J. L. & Kraige L.G., 2008. Engineering Mechanics, Dynamics, 6th ed. in SI Version, John Wiley & Sons, Inc.
- 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), sizina scales. Industrial sizina: tupe of industrial screening, screening efficiency. Gravity concentration: aravity concentration methods (heavy medium separation, jigging, sluicing). Magnetic and Electrostatic Separation: Principles, tupe 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.

References

- 1. A.R. Burkin, (2001). Chemical Hydrometallurgy :Theory and principle. London Imperial College Press.
- 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.
- Chiranjib Kumar Gupta, (2003). Chemical Metallurgy. Wiley-VCH.
- 5. Rosenqvist T. (2004). Principles of Extractive Metallurgy. 2nd Ed. Trondheim: Tapir Academic Press.

EBT 222/4 FUNDAMENTALS OF CERAMICS

Course Synopsis

Student will be exposed wiht history of ceramic. Crystal structure of ceramic including

silicate structure. Properties of Ceramic Structure - Porosity, voids content, tensile and compression strength. Raw Material - Basic concept of raw materials properties and production naturally or sunthetically that normally used in ceramic industry. Preparation and production of clay and characterization of clay including plasticity and heat applied. Preparation of synthetic alumina powder by Bayer process and magnesium oxide from seawater. Formina Techniaue - Fundamental concept. Powder pressing forming including isostatic, hot isostatic and cold isostatic pressing. Plastic forming including extrusion and injection molding technique. Slip casting and tape casting forming technique. Factors that influence the properties of green body of ceramic after forming. Druing and Firing Process - Effect of heat to the vitrification and microstructure of ceramic body. Types of kiln including periodic and continuous kiln. Shrinkage and defect after drying and firing. Theory and mechanism of sintering. Types of sintering including solid state and liquid state sintering. Solidstate sintering and microstructure changes in initial, intermediate and final stages of sintering.





References

- Michel Barsoum, (2002). Fundamentals of Ceramics (Series in Material Science and Engineering). Taylor & Francis.
- James S. Reed, (1995). Principles of Ceramics Processing, 2nd ed. John Wiley and Son Inc New York.
- 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.

References

- Wood, P.R., 'Mixing of Vulcanisable Rubbers and and Thermoplastic Elastomers', Rapra Technology, 2004.
- 2. Ciesielski, A., 'An Introduction To Rubber Technology', Rapra Technology Ltd., 2001.
- Crompton, Roy, 'Determination of Additives in Polymers and Rubbers', Rapra Technology, 2007.
- McKeen, Laurence W. Permeability Properties of Plastics and Elastomers (3rd Edition) 2012, 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, the use of chemical structures and reaction schemes. Familarity with mechanistic concepts. Uderstanding the theorectical and conceptual background of synthesis polymer.

References

- Braun, D., Chandra, H. Ritter, H., 'Polymer Synthetic, Theory and Practice', 3rd ed. 2001, Germany.
- Harry R.A. Frederic K.W.L, James E.M., 'Contempory Polymer Chemistry', 3rd ed., Person Education, 2003.
- Braun, D., Cherdron, H., Ritter, H., 'Polymer Synthesis: Theory and Practice: Fundamentals. Methods, Experiments', 4th ed., Springer, 2005.
- Odian G. 2004. Principle of Polymerization, 4th ed. City University of New York. Wiley-Inter Science

EBT 233/4 PLASTIC MATERIALS

Course Synopsis

This course is offered to introduce some basics of plastic materials: promote an understanding on structure/property relationship of plastic materials and provide some ideas on plastic material selection principles, testing and characterization

References

 Domininghaus, H.,'Plastic for Engineers: Materials, Properties, Applications', Hanser Pub., 2003.



- 2. Henry, S. Pascault, P. C., 'Thermosetting Polymers', Marcel Dekker, Inc., 2003.
- Charles, A. H., 'Modern Plastic Handbook', Mc Graw Hill, Inc., 2000.
- Sidney H. Goodman, 'Handbook of Thermoset Plastics', 2nd ed., RAPRA Tech., 2003.

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

References

- 1. Gottfried, W. E., 'Polymeric Material: Structure-Properties-Applications', Carl Hanser Verlag, 2001.
- 2. Sperling, L.H., 'Introduction to Physical Polymer Science', John Wiley and Sons, Inc., 2001.
- Allcock, H.R., Lampe, F.W.and Mark, J.E., 'Contemporary Polymer Chemistry', 3rd ed., Pearson Education, Inc.: Prentice Hall, 2003.

4. Gnanou, Yves, 'Organic and Physical Chemistry of Polymers', Wiley Interscience, 2008.

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.

References

- Sperling, L. H., 'Introduction to Physical Polymer Science', 4th ed., Wiley-Interscience, 2006.
- 2. Gnanou, Yves, 'Organic and Physical Chemistry of Polymers', Wiley Interscience, 2008.
- 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.

References

- 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., 'Polymer Blends', Rapra Technology, 2002.
- Rao, Natti S.; Schumacher, Gunter (2004) Design Formulas for Plastics Engineers (2nd Edition), Hanser Publishers

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 velocitu constant of reaction, effect of temperature for reaction, theory of absolute reaction rates for catalyst, diffusion in solid state. Electrochemistry - Electrolutes, electrolutic 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.

References

- 1. Azizan Aziz dan Kamarudin Hussin. (2000). *Pengenalan Kimia Metalurgi*. Pulau Pinang: Penerbit USM.
- Moore, J.J. (1998). Chemical Metallurgy. 2nd Edition. London: Butterworths.
- Fahlman B.D. (2011). Materials Chemistry. 2nd Ed. New York: Springer.

- 4. Allcock H.R. (2008).Introduction to Materials Chemistry. New York: Wiley.
- 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 analusis, 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 strenath and tensile strenath). welding, and connection analysis.

References

- Ferdinand Beer, Jr., E. Russell Johnston, John DeWolf and David Mazurek (2014). Mechanics of Materials. 7th, McGraw Hill.
- Hibbeler, R. C. (2013). Mechanics of Materials. 9th Edition, Prentice Hall.
- Megson, T. H. G. (2014). Structural and Stress Analysis.
 3rd Edition. Butterworth: Heinemann.
- Shackelford, J.F. (2008). Introduction to Materials Science for Engineers. 7th Ed. New York: Prentice Hall.
- 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

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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.

References

- Christian, Gary. D., (2013). Analytical Chemistry, 7th Edition. John Wiley & Sons.
- Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch (2013). Fundamentals of Analytical Chemistry, 9th Edition. Cengage Learning.
- Higson, Seamus. P. J., (2004). Analytical Chemistry. Oxford University: Oxford University Press.
- 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, aray 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.

Academic Guide Book

transportation in gas phase and diffusion as control factor, silicon oxidation, alloys vaporizing during melting.

References

- 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.
- 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.

References

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- 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.
- 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-cucle

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.

- John E. Neely, Thomas J. Bertone, (2003). Practical Metallurgy and Materials for Industry. 6th Edition. Prentice Hall.
- Schaffer, Saxena, Antolovich, Sanders & Warner, (1999). The Science and Design of Engineering Materials. 2nd Edition. Mc Graw Hill.
- 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 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 sustem 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.

References

- Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John A. Roberson (2012). Engineering fluid Mechanics. 10th Edition. Wiley.
- James R. Welty, Charles E. Wick, Robert E. Wilson, Gregory Rorrer. (2001). Fundamental of momentum, heat transfer, and mass transfer. 4th edition. John Wiley.
- Munson B.R. et al. (2009). Fundamentals of Fluid Mechanics. New York: Wiley.

- Fox R.W. et al. (2008). Introduction to Fluid Mechanics. New York: Wiley.
- Mott R.L. (2005). Applied Fluid Mechanics. 6th Edition. New York: Prentice Hall.

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.

References

- 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.
- Marc De Graef (2003). Introduction to conventional transmission electron microscopy. Cambridge University Press.

 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 thermodunamics. 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 oxugen 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 auantities. Electrochemistru -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.

References

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- 1. Ahindra Ghosh, (2004). *Textbook* of Materials & Metallurgical *Thermodynamics*. Prentice Hall of India.
- R.H. Tupkary, (1995). Metallurgical Thermodynamics. TU Publishers, Nagpur.
- 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 315/2 SURFACE ENGINEERING

Course Synopsis

This course is designed to provide an understanding of the role that surfaces play in materials behavior and to introduce the

concepts of surface engineering and how surface engineering may be used to optimize a components performance and to introduce suitable techniques used to evaluate and characterize surfaces. Students will be exposed to a wide variety of topics such as common surface initiated engineering failures, physical and chemical techniques of surface protection, scope and application of conventional surface engineering techniques in engineering materials, advantages and limitation of conventional processes and testing/evaluation of surface properties.

References

- 1. Roberge P. (2008). Corrosion Engineering: Principles and Practice. Singapore: McGraw-Hill.
- Jones D.A. (1995). Principles and Prevention of Corrosion. 2nd Ed. New York: Prentice Hall.
- A.W. Batchelor, Loh Nee Lam, Andrew William Batchelor & Margam Chandrasekaran, (2000).Materials Degradation and Its Control by Surface Engineering. Publisher: Imperial College Press.
- 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 316/3 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 prioritu. 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, decisionmaking, 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.

- 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.

- 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.
- 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 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.

References

- 1. Hammond, C (1998).The Basic of Crystallography and Diffraction, Oxford University Press,.
- Douglas A. Skoog & James J. Leary. (1992). Principles of Instrumental Analysis, 4th Ed. Sounders College Publishing.

- Larry, G., Harges (1988). Analytical Chemistry: Principles and Techniques, Prentice Hall.
- 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.

References

- Boris S. Bokstein, Mikhail

 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.
- 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.

- 1. Gottfried W.E. (2001). Polymeric Materials – Structure-Properties-Application. Hanser Gardner.
- William D. Callister, David G. Rethwisch (2013). Materials Science and Engineering: An Introduction. 9th Edition. Wiley.



- . Vishu Shah. (2007). Handbook of Plastics Testing and Failure Analysis 3rd Edition. Wiley-Interscience.
- 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.

References

- A. Brent Strong (2006). Plastics Materials and Processing. 3rd Edition. Pearson Prentice Hall, New Jersey.
- Sperling L. H (2005). Introduction to physical Science Polymer Science 3rd Edition. Wiley-Interscience, New York.

- 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.

References

1. Gent, A. N., 'Engineering with Rubber: How to Design Rubber Components', 2nd ed. Hanser Publishers, 2001.

- Mark, J. E.,' The Science and Technology of Rubber', 3rd ed.,Elsevier Inc., 2005.
- Brown, R.,' Physical Testing of Rubber', 4th ed., Springer, 2006.
- Rodgers, B., 'Rubber Compounding: Chemistry and Applications', Marcel Dekker, 2004.

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.

- 1. Ghottfried W. Ehrenstein, Gabriela Riedel, Pia Trawiel, 'Thermal Analysis of Plastic', Hanser, 2004.
- 2. Naranjo, Noriega, Osswald, Roland-Alteza, Sierra. Plastic Testing and Characterization. Hanser, Germany
- 3. Grellmann, Wolfgang; Seidler, Sabine, Polymer Testing, 2007, Hanser Publishers



4. Biron, Michel, Thermoplastics and Thermoplastic Composites (2nd Edition), 2013, Elsevier.

EBT 335/4 POLYMER BLENDS

Course Synopsis

To introduce the knowledge of polymer blend and alloys. Promote an understanding on their properties relationship and provide knowledge on characterization, selection principles and application of polymer blend and alloys.

References

- Paul, D. R & Bucknall, C. B., 'Polymers Blends', John Wiley and Sons, Inc., 2000.
- Kulshreshtha, A.K.; Vasile, C. Handbook of Polymer Blends and Composites, Volumes 1-4, 2002, Smithers Rapra Technology
- Vasile, C.,Kulshrestha, A. K., 'Blends and Composites', Rapra Publisher, 2003
- 4. Utracki, L.A., 'Polymer Blends', Rapra Technology, 2002.
- Long, Yu, 'Biodegradable Polymer Blends and Composites From Renewable Resources', Wiley, 2008.

EBT 336/4 PLASTIC PROCESSING

Course Synopsis

This course is to provide a detailed introduction to the processing variety of materials polymer; rheology and flow melt in polymer, equipment and the important method of polymer processing, influence of factor-factor in polymer processing, defect in current processing and solve problem.

References

- Baird D. G, Collias D. I., 'Polymer Processing-Principles and Design', John Wiley & Sons, Inc., 1998.
- Andrew Ciesielski, 'An introduction to rubber Technology', Rapra Technology Ltd, 1999.
- Tim A. Osswald, 'Polymer Proccesing Fudamentals', Hanser Publishers, 1998.
- Strong, A. Brent, 'Plastics: Materials and Processing', 2nd ed., Prentice Hall, 2000.
- Shenoy, A.V., Saini, D.R., 'Thermopalstic Melt Rheology and Processing', Marcel Dekker, 1996.

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.

- James R. Welty *et all* (2007) Fundamental of momentum, Heat, and Mass Transfer, 5th Edition, Jhon Wiley & Son, Inc. USA.
- 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).



- 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
- 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

To develop the basic knowledge and principles of latex technology, properties due to compounding, characterization and their application. This course is focus on latex compounding, production of latex concentrate and latex processing techniques.

References

- Blackley, D. C., 'Polymer Latices: Science and Technology', 2nd Edition, Vol. 1 – 3, Chapman & Hall, 1997.
- Warson, H. and Finch, C. A., 'Application of Synthetic Resin Latices: Fundamental Chemistry of Latices and Applications in Adhesives', John Wiley & Sons, Ltd., 2001.
- Dunn, David J., 'Natural and Synthetic Latex Polymers: Market report', Rapra Technology, 2002.
- Vikas Mittal, 'Advances in Polymer Latex Technology', Nova Science Publishers, 2009.
- Gad, Shayne C., 'Safety Evaluation of Medical Devices (Electronic Resources)', 2nd ed., Marcel Dekker, 2002.

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.

References

- 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,.
- Gardner, Julian W. (2001). Microsensors MEMS and Smart Devices, Wiley.
- 4. Harper C. (2009). Electronic Materials and Processes Handbook. Singapore: McGraw-Hill.
- 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 be learned electrochemistry, corrosion type, corrosion problems in industries. Electrochemistry principles, corrosion tyes, 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.

References

- 1. Roberge P. (2008). Corrosion Engineering: Principles and Practice. Singapore: McGraw-Hill.
- Jones D.A. (1995). Principles and Prevention of Corrosion. 2nd Ed. New York: Prentice Hall.
- A.W. Batchelor, Loh Nee Lam, Andrew William Batchelor & Margam Chandrasekaran, (2000).Materials Degradation and Its Control by Surface Engineering. Publisher: Imperial College Press.
- 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 a material's internal part.

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 offered several topics which is covering the general NDT methods that are normally used in engineering field such as liquid penetrant, magnetic particle, eddu current, ultrasonic, and radiography technique.

References

- B. Raj, T. Jay Kumar & M. Thavasimuthu. (2007). Practical Non-Destructive Testing 3rd Edition. Alpha Science Int'l Ltd.
- J. S. Peter. (2002). Nondestructive Evaluation: Theory, Techniques and Applications. Marcel Dekker Incorporation, New York: USA.
- F. Kojima, T. Takagi, S.S. Udpa and J. Pavo. (2002). Electromagnetic Nondestructive 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,

Sidang Akademik 2014/2015 - Academic Session 2014/2015

manufacturing, and service, CRC Press Incorporation, Boca Raton: Florida.

EBT 411/3 ENGINEERING ALLOYS

Course Synopsis

This course was 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.

- 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.
- 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 412/3 APPLIED METALLURGY

Course Synopsis

This course is to introduce the students fundamental of metal casting. Casting technology, heating and pouring. Solidification and cooling. Fluidity and fluid flow phenomena in casting processes. Casting guality 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.

References

- Peter Beeley. (2001). *Foundry Technology*. 2nd Ed. Oxford:Butterworth/ Heinemann.
- 2. John E. Neely, Thomas J. Bertone. (2000). Practical Metallurgy and materials for Industry.

- J. Beddoes, M. Bibby.
 (1999). Principle of Metal Manufacturing Process.
 Butterworth- Heinemann.
- Serope Kalpakjian. (1991). Manufacturing processes for Engineering Materials. Addison Wesley.
- 5. Degarmo, Black and Koser. (1988). Material and Processes in Manufacturing.

EBT 413/3 WELDING METALLURGY

Course Synopsis

This course is designed to introduce the students welding metallurgy principles and influencing factor in welding metallurgy selected. Therefore, students will exposure welding principle, metallurgical welding, welding types and welding mechanism, welding problems in varies industries and welding solutions.

References

- Lancaster J.F. (1999). Metallurgy of Welding. 6th Ed. UK: Abington Publishing.
- 2. Easterling. K, (1993). Introduction to Physical Metallurgy of Welding. Butterworth: Heinemann.
- Granjon H. (1991). Fundamentals of Welding Metallurgy. UK: Abington Publishing.

- 4. Kou. S.(1987). *Welding Metallurgy*. John Wiley & Sons.
- Linnert G.E. (1965) Welding metallurgy;: Carbon and alloy steels. Volume 1: fundamentals. 3rd Ed. USA: American Welding Society.

EBT 414/3 ELECTRONIC METALLURGY

Course Synopsis

This course is design 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 solderabilitu. Solder joint and intermetallic formation. Reliability and failure mechanisms. Applications and metallization in flip chip technology and tapeautomated bonding. Processing

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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. Metalto-metal joining process. **Package Construction** - Application of metals in base, lead frames and lids construction.

References

- Harper C. (2009). Electronic Materials and Processes Handbook. Singapore: McGraw-Hill.
- Kasap S. (2005). Principles of Electronic Materials and Devices. 3rd Ed. Singapore: McGraw-Hill.
- 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.
- Mayer J.W. and Lau S.S. (1989). Electronic Materials Science: For Integrated Circuits in SI and GaAs. New York: Prentice Hall.

EBT 415/3 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.

References

- 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
- McEvily, A.J., (2002). Metal Failures: Mechanisms, Analysis, Prevention. John Wiley & Sons. New York

- Mobley, R. K., (1999). Root Cause Failure Analysis. Butterworth-Heinemann. Woburn
- Tawancy, H.M., Nureddin., A. U. Abbas. M., (2004). Practical Engineering Failure Analysis. Taylor & Francis. New York

EBT 417/3 EXTRACTIVE METALLURGY II

Course Synopsis

This course is design 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 explain. 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.

- 1. Chiranjib Kumar Gupta, "Chemical Metallurgy", Wiley-VCH, ISBN 3527303766 (2003).
- 2. Fathi Habashi, "Textbook of Pyrometallurgy" Métallurgie Extractive Québec, ISBN 2922686051 (2002)
- Samsul Bahar Sadli, "Asas Proses Metalurgi", Dewan Bahasa dan Pustaka, ISBN 9836256350 (1998).



- 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 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.

References

- 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,

- 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 429/3 COMPOSITE MATERIALS

Course Synopsis

This course is focusing on the three major tupes 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, interphase 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.

References

- 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.
- Krishan K. Chawla (2012). Composite Materials: Science and Engineering", Springer.
- 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 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.

References

- 1. Mahyudin Ramli, Teknologi Konkrit dan Pembinaan, Dewan Bahasa & Pustaka, 1991
- 2. R.K. Rajput (2000). Engineering Material, S. Chand & Company Ltd.
- J. Newman, Advanced Concrete Technology: Constituent Materials, Butterworth, Heinemann, 2004.
- 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 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 technologu (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.

References

- S.O Kasap. (2002). Principles of Electronic Materials and Devices. 2nd Edition. Publisher: McGraw-Hill.
- Ken Gilleo. (2001). Area Array Packaging Handbook. 1st Edition. Publisher: McGraw-Hill.
- Charles A. Harper. (2000). Electronic Packaging and Interconnection Handbook. 3rd Edition.Publisher: McGraw-Hill.
- John H. Lau. (2000). Low Cost Flip Chip Technologies for DCA, WLCSP, and PBGA Assemblies. Publisher: McGraw-Hill.
- John Lau, S.W. Ricky Lee. (1999). Chip Scale Package – Design, Materials, Process, Reliability, and Applications. Publisher: McGraw-Hill.

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.

References

- 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.
- 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 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.

References

- S. O. Kasap, 'Principles of Electronic Materials and Devices', 2nd ed., Mc Graw Hill, 2002.
- Charles A. Harper, 'Electronic Packaging and Interconnection Handbook', 4th ed., Mc Graw Hill, 2005.
- Manas Chandra, 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.

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References

- Deborah, D. L. Chung, 'Composites Materials: Science and Application', Springer-Verlag, Ltd, 2003.
- Avokali, G., 'Handbook of Composite Fabrication', Rapra Technology Limited, 2001.
- 3. Barbara H. Stuart, 'Polymer Analysis', John Wiley & Sons, Ltd., 2000.

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.

References

 M. S. Peters and K. D. Timmerhaus, Plant Design and Economics for Chemical Engineers, 4th Edition, McGraw-Hill Book Company, New York (1991).

- 2. Perry's Chemical Engineer's Handbook, 7th Edition, McGraw-Hill Book Company, New York (1997).
- H. F. Rase, Chemical Reactor Design for Process Plants, Volumes I & II, J. Wiley & Sons, Inc., New York (1977).
- 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
- Rosato, D.V, Rosato, D.V, Rosato, M.G (2000) Plastic design handbook. Massachusetts: Kluwer Academic Publishers.
- 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).

References

- 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
- 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

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EBT 445/2 & EBT 446/4 FINAL YEAR PROJECT

Course Outcomes

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- Able to plan and manage research project.
- Ability to apply theory that had been studied in research project.
- Able to write a technical report professionally.
- Able to present a research project professionally.

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.

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).

References

- 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

 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.

- 1. Mittal, K. L., Pizzi, A., 'Handbook of Adhesive Technology', Marcel Dekker. Inc., 2003.
- 2. Souheng, Wu, 'Polymer Interface and Adhesion', Marcel Dekker. Inc., 1982.
- Pillard, D. A., Pocius, A. V., 'Adhesion Science and Engineering', vol. 1-2, Elsevier, 2002.
- Raymond H. Fernando, Lipiin Sung, 'Nanotechnology Applications in Coatings', American Chemical Society, 2009.



 Walter Brockmann, Paul Ludwiq Geil, Jurgen Klingen, K. Bernhard Schroder, Bettina Mikhail, 'Adhesive Bonding: Materials, Applications and Technology', Wiley-VCH, 2009.

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.

- Francesco La Mantia, 'Handbook of Plastics Recycling', Rapra Technology Limited, Shawbury, 2002.
- 2. Catia Bastioli, 'Handbook of Biodegradable Polymers', Rapra Technology limited, Shawbury, 2005.
- 3. Jhonson R.M. 2003. Biopolymer. Sithers Rapra, Vol 14. U.K.

School of Materials Engineering



Job Opportunities

Graduates with a Bachelor of Engineering (Materials Engineering), (Metallurgical Engineering) and (Polymer Engineering) have a broad employment prospects either in the private sector/industry, departments in government and also statutory bodies. Sectors that offer employment opportunities are as follow;

- Metal Industry.
- Polymer Industry.
- Electronic Packaging Industry.
- Materials Processing Industry.
- Automotive Industry.
- Service and Maintenance Industry.
- Engineering Fabrication Industry.
- Manufacturing 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 programs are as follows;

- 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.
- 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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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 field 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 mathematics. biology and of 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 endproduct and microorganism cellularbased 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 "applies and integrates knowledge in sciences, applied biological, mathematics. agricultural environmental and sciences, and engineering to solve problems and innovate solutions involving biological systems". 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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347



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Bachelor of Engineering (Honours) (Bioprocess Engineering)

Programme Educational Objectives (PEO)

PEO 01

Graduates who are leaders in the field of chemical engineering in bioprocess or chosen field as demonstrated via career advancement.

PEO 02

Graduates who are members of and contribute to professional society.

PEO 03

Graduates who engage in life-long learning or continuous education opportunities.

PEO 04

Graduates who contribute towards research and development.

PEO 05

Graduates who are entrepreneurial engineers.

Programme Outcomes (PO)

PO 1

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.

PO 2

Ability to identify, formulate and solve complex engineering problems.

PO 3

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

PO 4

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

PO 5

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

PO 6

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

PO 7

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

PO 8

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

PO 9

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.

Curriculum Structure for Bachelor of Engineering (Honours) (Bioprocess Engineering)

YEAR	FIF	ST	SECO	DND	THIRD			FOURTH	
SEMESTER	I	Ш	III	IV	v	VI		VII	VIII
	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
gineering Core (87)		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
ш					ERT 319/3 Industrial Waste Treatment	ERT 322/3 Safety & Loss Prevention		#ERT 4XX/3 Elective I	
						ERT 323/2 Simulation for Bioprocess Engineering	Training		
	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II	ERT207/4 Analytical Chemistry	EQT 271/3 Engineering Statistics			ndustrial ⁻	EUT443/2 Engineering Management	EUT 440/3 Engineers in Society
Non Engineering (33)	ERT 106/3 Biochemistry	ERT107/3 Microbiology for Bioprocess Engineering					EIT 302/4 I		
	ERT 102/4 Organic Chemistry	ERT 108/3 Physical Chemistry							
		EUT 122/2 Skills & Technology in Communication							
University Required (17)	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		UUW 233/2 Islamic & Asian Civilizations	UUW XXX/2 Option Subjects	UUW 235/2 Ethnic Relation				
		UZW XXX/1 Co-Curricular Activity	UZW XXX/1 Co-Curricular Activity						
137	16	19	19	18	18	16	4	13	14
University Required	ity ad University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject								
1	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

School of Bioprocess Engineering

Bachelor of Engineering (Honours) (Biosystems Engineering)

Programme Educational Objectives (PEO)

PEO 1

Graduates who are leaders in the field of agricultural/ biosystems engineering or chosen field as demonstrated via career advancement

PEO 2

Graduates who are members of and contribute to professional society

PEO 3

Graduates who engage in life-long learning or continuous education opportunities.

PEO 4

Graduates who contribute towards research and development

PEO 5

Graduates who are entrepreneurial engineers

Program Outcomes (PO)

PO 1

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.

PO 2

Ability to identify, formulate and solve complex agricultural/biosystems engineering problems.

PO 3

Ability to design solutions for complex engineering problems and systems, component or process to meet desired needs.

PO 4

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

PO 5

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

PO 6

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

PO 7

In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO 8

Understanding of professional and ethical responsibilities and commitment to the community.

PO 9

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles.



Curriculum Structure for Bachelor of Engineering (Honours) (Biosystems Engineering)

YEAR	FIF	ST	SEC	OND	THIRD			FOURTH	
SEMESTER	I	Ш	I.	Ш	I	Ш		I	Ш
	ERT147/3 Fundamental of Biosystems Engineering	ERT150/2 Static	ERT205/4 Fluid Mechanics Engineering	ERT246/4 Hydrology And Water Resources Engineering	ERT354/3 Soil Engineering	ERT351/3 Sustainable Agrosystems Engineering	-	ERT 445/2 Final Year Project 1	ERT446/4 Final Year Project 2
	ERT148/2 Computer Aided Engineering Design for Biosystems Engineering		ERT250/2 Dynamic	ERT254/3 Thermodynamics for Biosystems Engineering	ERT245/4 Heat And Mass Transfer in Biological Systems	ERT355/2 Biosystems Modelling and Simulation		ERT461/3 Biosystems Engineering Design 1	ERT462/3 Biosystems Engineering Design 2
Engineering Core (92)			ERT251/2 Strength of Materials	ERT255/3 Engineering Properties of Biological Materials	ERT350/3 Instrumentation, Measurement & Control in Biosystems	ERT457/3 Design of Automation Systems		ERT464/3 Design of Machine & Systems	EUT440/3 Engineers in Society
			ERT252/3 Geomatic Engineering	ERT256/2 Theory of Structures	ERT353/3 Energy And Power in Biosystems	ERT356/3 Unit Operations		ERT460/3 Controlled Environment Engineering	ERT4XX/3 Elective 2
			ERT253/3 Electrical & Electronics Technology	EQT 271/3 Engineering Statistics	ERT352/3 Farm Structures		Training	EUT443/2 Engineering Management	
							trial	ERT4XX/3 Elective 1	
n-Engineering Core (24)	ERT149/4 Applied Biology for Biosystems Engineering	ERT101/3 Biochemistry					-302/4 Indus		
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III				EIT		
		EKT150/3 Introduction to Computer Programming							
NG		ECT 112/3 Engineering Skills							
		UUT122/2 Skills & Technology in Communication							
versity Required (17)	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			UUWXXX/2 Option
	UVW 410/2 University Malay Language					UUW 235/2 Ethnic Relations			
Uni	UUW233/2 Islamic & Asian Civilizations								
137	17	17	18	17	18	15	4	16	15

Elective courses:

	Waste-to-Wealth Engineering	Soil & Water Resources Engineering	Agro Processing & Production		
Elective 1 (Semester 1)	ERT466/3 Waste Management	ERT468/3 Surface Water Management	ERT456/3 Post Harvest Engineering		
Elective 2 (Semester 2)	ERT467/3 Biomass Conversion Technology	ERT469/3 Groundwater Engineering	ERT470/3 Bio-products Manufacturing		

School of Bioprocess Engineering



Course Syllabus for Bachelor of Engineering (Honours) (Bioprocess Engineering)

ERT 102/4 ORGANIC CHEMISTRY

Course Synopsis

This course introduces the fundamental theories (atomic orbital, molecular orbital and hubridization 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 alkulhalides. The course also covers on physical and chemical properties, and chemical reactions involving alcohol and ester. aldehude and ketone, carboxulic 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.
- 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. 4^{th.} Edition. Prentice Hall.
- McMurry, J. 2000. Organic Chemistry 5th Edition, Brooks/ Cole.
- Solomons, T.W.G. and Fryhle, C.B. .2008. Organic Chemistry. 9th Ed. John Wiley.
- 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

- Boylestad, Robert L. 2007. Introductory Circuit Analysis, 11th Edition, Prentice Hall.
- 2. Hughes, 2005. Electrical and Electronic Technology, 9th Edition, Prentice Hall.
- Richard J. F. 2008. Electricity Principles and Applications, 7th Edition, Mc Graw Hill.
- Charles K. A. and Matthew N.O.Sadiku. International Third Editions. Fundamentals of Electric Circuits, McGraw-Hill.
- 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 cucle 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 differentiate the role of proteins in biochemistry and purification of proteins. To introduce enzymes.
- 4. Ability to evaluate electron transportation, citric acid cycle and photosynthesis in biological processes.

References

- McKee, T. & McKee, J. 2003. Biochemistry, 3rd Edition, McGraw Hill. New York.
- Voet D. & Voet, J.G. 2004. Biochemistry 3rd Edition, Wiley International Edition, New York.
- Elliott, W.H. & Elliott, D.C. 2005. Biochemistry 3rd Edition. Oxford University Press
- 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.
- Ability to demonstrate practices in microscopy, staining, sterilization, isolation and identification of bacteria and fungi.
- Ability to apply microbial growth in fermentation and biological process.

References

- 1. Prescott, L. M., Harley, J. S & A. Klein, D. A. 2005. *Microbiology*. McGraw Hill.
- Bauman, R. 2006. Microbiology with diseases by taxonomy 2nd Edition. Pearson Education, Prentice Hall.

School of Bioprocess Engineering

- Cowan, M.K. 2006. Microbiology: a systems approach 1st edition. McGraw-Hill Higher Education.
- 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 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 evaluate various fundamental laws in physical chemistry.

References

 Atkins, P and de Paula, Julia. 2006. *Physical Chemistry*. Oxford University Press, 8th Edition.

- 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.
- Levine I. N. , 2002. Physical Chemistry, McGraw Hill, 5th Edition.
- 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 the fundamentals properties of thermodynamics and apply the law of thermodynamics in engineering systems.
- Ability to calculate heat, work and other thermodynamics properties ideal fluid and manage to solve problems for real fluids using volumetric equations of state.
- Ability to evaluate 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.

- 1. Smith, J.M., Van Ness, H.C. and Abbort, M.M. 2005. Introduction to Chemical Engineering Thermodynamics, Seventh Edition, McGraw-Hill.
- Cengel, Y.A. and Boles, M.A. 2007. Thermodynamics-An engineering Approach, 6th edition, McGraw-Hill.
- Iynkaran, K., David, J. and Tandy. 2004. Basic Thermodynamics – Applications and Pollution Control, 2nd edition, Pearson Prentice Hall.
- Daubert, Thomas, E. 1985.
 Chemical engineering Thermodynamics, McGraw-Hill.



(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

- Christian, G. D. 2004. Analytical chemistry. 6th ed. John Wiley & Sons, Inc.
- 2. Harvey, D. 2000. Modern Analytical Chemistry. McGraw-Hill.
- Keeley, D and Haines, P. J. 2002. Analytical Chemistry. Oxford: Bios Scientific
- 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.
- 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

- Ability to illustrate the function of different types of valves; describe and discuss the operational aspects of the valves.
- 2. Ability to analyze the ISA Symbology for the Process Flow Diagram; apply appropriate symbols and sketch the Process Flow Diagram.
- 3. Ability to propose the ISA Symbology for the Process Flow Diagram; apply appropriate symbols and develop the Process Flow Diagram.
- Ability to evaluate the ISA Symbology for the Piping & Instrumentation Diagram; apply appropriate symbols and sketch the Piping & Instrumentation Diagram.

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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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

 Ability to analyze the essential parameters describing a fluid system and recognize



the common devices used in measuring pressure and flow rates, and turbo machineries.

- Ability to calculate pressures, forces, and stability in static fluid systems and identify whether a flow is steady or unsteady, uniform or nonuniform, laminar of turbulent and flow rate in dynamic fluid system and distinguish the link between conserved quantities and the equations of fluid mechanics.
- Ability to evaluate appropriate control volumes and surfaces for developing the equations of fluid mechanics.

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.
- 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.
- 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.
- 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.
- 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.
- Shuler, M. L. and Kargi, F. 2001. Bioprocess Engineering: Basic Concepts. 2nd Ed. Upper Saddle River, NJ: Prentice Hall PTR.
- Asenjo, J. A. and Merchuk, J. A. 1995. Bioreactor System Design. New York: Marcel Dekker Inc.
- 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.
- Scragg, A. H. 1992. Bioreactors in Biotechnology: A Practical Approach. Ellis Horwood.
- 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

- 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.
- Ability to develop conversion and sizing for chemical reactors and to explain steady-state isothermal reactor.
- 4. Ability to evaluate catalysis and catalytic reactions.

References

 Fogler, H. S. 2006. Elements of Chemical Reaction Engineering. 4th ed. Prentice Hall Inc. U.S.

- Levenspiel, O. 2001.Chemical Reaction Engineering. 3rd ed. John-Wiley. U.S.
- Davis, M. E and Davis, R. J. 2002 Fundamentals of Chemical Reaction Engineering. 1sted. Mc Graw Hilll, U.S.
- Fogler, H. S. 2010. Essentials of Chemical Reaction Engineering. 1sted. 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 explain the concepts and differentiate types of enzymes and calculate the kinetics in enzymatic processes.
- 2. Ability to evaluate the metabolic pathways in microorganisms and calculate the kinetics in both batch and continuous reactors.
- 3. Ability to analyze the usage and methods for cultivating plant and animal cell culture.
- 4. Ability to propose the bioconversion technologies for production of organic chemicals and biofuel from agricultural biomass.

References

- 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.
- Katoh, S. and Yoshida, F. 2009. Biochemical Engineering: A Textbook for Engineers Chemists and Biologists. Weinheim: Wiley-VCH Verlag GmbH & Co.
- 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 multipleeffect evaporators, packed cooling towers.
- 2. Ability to develop and evaluate a basic design for gas-liquid separation and vapour-liquid separation equipment.
- Ability to characterize solid particle, identify different types of size reduction equipment, and to apply equation for onedimensional 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.
- 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

- Ability to calculate the physical, chemical, and biological properties of waste material and describe its toxicology.
- 2. Ability to design the basic structure of waste treatment unit operations.
- Ability to interpret compare, and choose the correct method for a particular waste for treatment.
- 4. Ability to propose the common waste management practice in industry and describe the legal framework structure.

References

- Metcalf and Eddy. 2003. Wastewater Engineering: Treatment and Reuse, Inc, 4th Ed. (or latest edition) Mc Graw-Hill.
- Davis, M.L. and Cornwell, D.A. 1998. Introduction to Environmental Engineering, 3rd Ed., Mc Graw-Hill.
- Paul T. W. 2005. Waste Treatment and Disposal, 2nd Ed., John Wiley.
- Droste, R.L. 1997. Theory and Practice of water and wastewater treatment, John Wiley.

- Nelson, L. N. 2006. Industrial Waste Treatment, Elsevier Science & Technology Books.
- 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 sunthesized 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.
- Ability to evaluate process and important parameters involved in purification and polishing steps of bioproducts for selected bioseparation units.

 Ability to propose bioseparation techniques/processes and RIPP (Recovery, Isolation, Purification and Polishing) scheme.

- 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.
- Sabramanian Ganapathy. 1998. Bioseparation and Bioprocessing. A handbook, 2nd Edition, Wiley.
- 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

- 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.
- 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.
- 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.
- 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.
- 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.
- Crowl, D. A., Louvar, J. F. 2002. Chemical Process Safety; Fundamentals with Applications. 2nd edition, Prentice Hall, New Jersey.
- 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.

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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 analyze Modelling and Simulation of Bioprocess: Batch process modeling.
- 2. Ability to analyze Modeling and Simulation of Bioprocess: Process Scheduling and Project economic evaluation.
- Ability to evaluate Modeling and Simulation of Bioprocess: Biochemical Case Study – Chromatographic and filtration processes involving bio-based product.

- Ability to develop Modeling and Simulation of Bioprocess: Throughput Analysis and debottlenecking Strategies.
- 5. Ability to develop Sustainability Assessment.

References

- Heinzle, E. Biwer, A. P. and Cooney C. L. 2007. Development of Sustainable Bioprocesses: Modelling and Assessment. Wiley.
- 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.
- Shuler, M.L. 2001. Bioprocess Engineering: Basic Concepts. 2nd Edition. Prentice-Hall.

ERT 424/3 BIOPROCESS PLANT DESIGN 1

Course Synopsis

This course contains the preliminary design of bioprocess plant. It focuses on process creation, simulation to assist in process reation and heuristic for process analysis, synthesis of process equipment design. Simulation Software will be the main feature and implemented through out the course in the process flow sheeting and equipment design.

Course Outcomes

- 1. Ability to apply engineering principles like reaction engineering rules, bioreaction stoichiometry, thermodynamics, kinetics, unit operations and unit procedures and also develop the bioprocess plant system.
- Ability to design a suitable unit operation in a bioprocess plant based on bioprocess system involved.
- Ability to develop and solve unit operation design using modern simulation and create the Process Flow Diagram (PFD) for bioprocess plant.

- Seider, W.D., Seader, J.D. and Lewin, D.R. Process Design Principles: Synthesis, Analysis and Evaluation', New York (Latest)
- 2. Douglas, J.M., The Conceptual Design of Chemical Processes, New York, McGraw-Hill (Latest).
- Coulson, J.M.(John Metcalfe), Richardson, Jon Francis and Sinnott, R.K. 1999. Chemical Engineering Design, Vol.6, 3rd Edition, Butterworth-Heinemann.





- Peters, M.S. and Timmerhaus, K.D. 2002. Plant Design And Economics For Chemical Engineers, 5th Edition, New York, McGraw-Hill.
- Turton, Richard, Bailie, Richard C., Whiting Wallace B. and Shaeiwitz, Joseph A. 1997. Analysis, Synthesis And Design Of Chemical Processes, Prentice Hall.
- Biegler, Lorenz T., Grossmann, Ignacio E., Westerberg, Arthur W. Systematic Methods Of Chemical.

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.
- 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 scienceswhich 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 interpret ingredients and nutrition in food.
- 2. Ability to differentiate the principle of food engineering operation.
- Ability to evaluate the problem that involved in food engineering operation.

- 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.



- Barbosa-Cánovas, Gustavo V. Schmidt, Shelly Fontana, Anthony. 2008. Water Activity in Foods: Fundamentals and Applications, Wiley-Blackwell.
- 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.
- Ability to design for fitting first order and second order model using Response Surface Methodology.

References

- Douglas C.Montgomery. 2012. Design and analysis of experiments, 8th Edition", Wiley and Sons Inc.
- Douglas C. Montgomery, George C.Runger. 2011. Applied Statistics and probability for engineers 5th edition", John Wiley and Sons Inc.
- Douglas C.Montgomery. 2012. Design and analysis of experiments, International Student Version, 8th Edition", Wiley and Sons Inc.
- 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 encompasses modern strategies for the design of bioprocess plants including piping and instrumentation diagram (P&ID), control strategies, economic analysis, costing and profitability analysis. Students will be exposed to the software application using simulation software to simulate and analyze the designed processes. Students are to present their design project in group.

Course Outcomes

- 1. Ability to classify and recommend safety and risk assessment on the bioprocess plant system.
- 2. Ability to design the typical control strategies for the safe plant operation and recommend the waste management for any visual impact from the process effluent to meet the environmental friendliness of the products.
- 3. Ability to propose the technique used for estimation of plant economics and compare economic feasibility of the process plant for project evaluation and process optimization.



References

- Coulson, J.M. (John Metcalfe), Richardson, Jon Francis and Sinnott, R.K. Chemical Engineering Design, Vol.6, 3rd Edition, Butterworth-Heinemann, (Latest).
- Seider, W.D., Seader, J.D. and Lewin, D.R. Process Design Principles: Synthesis, Analysis and Evaluation, New York, (Latest).
- Douglas, J.M., The Conceptual Design of Chemical Processes, New York, McGraw-Hill (Latest).
- 4. Peters, M.S. and Timmerhaus, K.D. 2002. Plant Design And Economics For Chemical Engineers', 5th Edition, New York, McGraw-Hill.

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.
- Ability to propose a biofuel production process from potential biological feedstocks.

References

- Cheng, J. 2010. Biomass to Renewable Energy Processes. CRC Press.
- 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

- Bennet, B. and Cole, G. Pharmaceutical Production: An Engineering Guide. Warwickshire: Institution of Chemical Engineers (IChemE)., 2003.
- Aulton M. E., Pharmaceutics. The science of dosage form design. 2nd Edition. London: Churchill Livingstone., 2002.

School of Bioprocess Engineering



- David J. am Ende, Chemical Engineering in the Pharmaceutical Industry: R&D to Manufacturing, New Jersey, USA: John Wiley & Sons, Inc., 2011.
- Blacker A. John, Williams Mike T., Pharmaceutical Process Development - Current Chemical and Engineering Challenges, Royal Society of Chemistry, UK: Cambridge., 2011.
- Anthony J. Hickey, David Ganderton. Pharmaceutical Process Engineering: 2nd Edition. New York: Informa Healthcare., 2009
- 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

- 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

- Donald, H. McBurney and Theresa, L. White. 2007. Research Methods, 7th Edition, Thomson Wadsworth.
- 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.

- 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.



- Ability to use techniques and modern tools to solve research problems.
- 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

- Donald, H. McBurney and Theresa, L. White. 2007. Research Methods, 7th Edition, Thomson Wadsworth.
- 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.
- Daniel Holtom and Elizabeth Fisher. 1999. Enjoy Writing Your Science Thesis or Dissertation, Imperial College Press.
- 8. Academic journals.

Course Syllabus for Bachelor of Engineering (Honours) (Biosystems Engineering)

ERT 147/3 FUNDAMENTAL OF BIOSYSTEMS ENGINEERING

Course Synopsis

This course introduces concepts of biosystems engineering and its applications in the biosphere, the ecosystem and the biological systems involving microbes, plants and animals. The course covers systems methodologies, life cycle assessment, growth and feedback, biological models and data measurement and analysis with applications of conservation of mass and energy in determining the input , process and output components in agrosystems.

Course Outcomes

- 1. Ability to explain the scope of Biosystems engineering and its relevance to sustainable development.
- 2. Ability to illustrate systemic properties of biological systems; apply the system methodologies and engineering principles to the productivity of the biosystems.

- Ability to analyze the physical and biological information for engineering analytical framework.
- Ability to analyze the interfacing effect of bio and physical systems in term of efficiency of production.

- 1. Alocilja, E. C. 2000. Principle of Biosystems Engineering. Erndition Books. MN. ISBN 15-8692098-7
- 2. Saterbak, K. Y. Sen; L. V. McIntire. 2007. *Bioengineering Fundamentals*.
- 3. K. Konopka. 2007. System Biology. ISBN 0824725204
- Gardiner, D.T, Miller, R.W. 2008. Soils in Our Environment. 11th edition. Pearson Education, Inc., Upper Saddle River, New Jersey.
- 5. Lynch, Daniel R. 2009. Sustainable natural resource management for scientists and engineers, Cambridge University Press, New York

ERT 148/2 COMPUTER AIDED ENGINEERING DESIGN FOR BIOSYSTEMS ENGINEERING

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 Geometric construction techniques to create engineering drawings using CAD.
- Ability to create completes 2-D and 3-D drawings pertaining to geometric transformations, projections and multiple views.
- 3. Ability to create curve, surfaces and geometric models.
- 4. Ability to design and investigate the behavior of parts and assemblies under load.

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.
- 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.
- Hannah, B. Becoming a Product Designer. John Wiley and Sons. New York. 2004.

ERT 149/4 APPLIED BIOLOGY FOR BIOSYSTEMS

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 bioproducts 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 include application of microbiology in food & agriculture products enhancement.

Course Outcomes

- 1. Ability to illustrate and explain the cell and biological diversity.
- 2. Ability to differentiate plant and animal form and function.
- 3. Ability to categorize the role of microbes in agriculture and related industries.

References

- 1. Campbell, N.A., Reece, J.B. Campbell Biology, 9th Edition, Pearson Education, Inc., San Francisco.CA 94111., 2011
- Belk C and Maier V B , Biology, Science for life with Physiology, 4th Edition, Pearson Education, Inc.,San Francisco, CA 94111., 2013
- Gunstream S E.Explorations in basic biology 12th edition, Pearson Benjamin Cummings, , San Francisco, California 94111, 2012
- Kratz R F and Siegfried D R, Biology For Dummies ® 2nd Edition, Wiley Publishing, Inc. 2010

School of Bioprocess Engineering





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 STATIC

Course Synopsis

The objective of this 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 inertia of an area.

ERT 101/3 BIOCHEMISTRY

Course Synopsis

The topics covered in this course include the structure of prokaryotes and eukaryotes cells. It also covers the analytical chemistry including stoichiometry, solutions, material balance and pH. It also covers the properties of water and structure, classification and function of biomolecules such as carbohydrates, lipids, protein, amino acids, enzymes and phytochemistry.

ERT 205/4 FLUID MECHANICS ENGINEERING

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 recognize the common devices used in

measuring pressure and flow rates, and turbo machineries.

- Ability to calculate pressures, forces, and stability in static fluid systems and identify whether a flow is steady or unsteady, uniform or nonuniform, 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 analyze appropriate control volumes and surfaces for developing the equations of fluid mechanics.

- 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
- 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 245/4 HEAT AND MASS TRANSFER IN BIOLOGICAL SYSTEMS

Course Synopsis

This course elaborates and analyzes mechanisms by which heat is transferred from one body to another. The course covers steady state and transient heat conduction, convection, radiation, heat exchangers, and also mass transfer with special address on biological systems. Emphases are on formulation and application of respective mathematical models of heat and mass transfer across both physical and biological bodies.

Course Outcomes

- 1. Ability to differentiate and understanding of different modes of heat transfer and mass transfer.
- Ability to understand and apply the principles and basic calculations of heat transfer by conduction, convection and radiation are featured.
- Ability to apply the heat exchange equipment such as heat exchangers and single and multiple effect evaporators are also included.

References

- Yunus A. Cengel. 2006. Heat and Mass Transfer: A Practical Approach, 3rd Ed. McGraw Hill, New York,
- 2. Truskey, F.A. 2004, Transport Phenomena in Biological Systems. McGraw Hill, New York.
- Holman, J.P. 2002. Heat Transfer, 9th Ed., McGraw Hill, New York.
- Incropera, F.P. 2002. Introduction to Heat and Mass Transfer, 4th Ed., John Wiley and Sons, New York.
- Kreith, F. And Bohn, M.S. 2000. Principles of Heat Transfer, 6th Ed., Brooks and Cole.

ERT 246/4 HYDROLOGY AND WATER RESOURCES ENGINEERING

Course Synopsis

This course introduces principles of surface and ground 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 analysis with respect to basic design procedures for on-farm water management practices.

Course Outcomes

1. Ability to apply the principles of hydrology, engineering analysis and design of water resources and implication to biosystems.

- 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. Subramaya K.2008,Engineering Hydrology, 3rd Ed. McGraw Hill, New York, N.Y
- DID. 2000, Urban Stormwater Management Manual for Malaysia, DID, Malaysia
- 4. Mays, L.W 2001,Water Resources Engineering,John Wiley & Sons,New York,N.Y
- Ward, A.D. and Trimble, S.W. 2004, Environmental Hydrology, 2nd Ed., Lewis Publisher.

ERT 250/2 DYNAMIC

Course Synopsis

The objective of this course is to enable students to evaluate problems related to mechanics concepts in dynamic condition. This 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.

ERT 251/2 STRENGTH OF MATERIALS

Course Synopsis

This course covers the fundamental and behaviour of solid objects subject to mechanical forces. Topic to be covered includes analysis of stress-strain diagram, fracture at low stresses, fatique, creep and hardness. The deformation deflection, torsion, impact and plastic design will be covered in this course.

ERT 252/3 GEOMATIC ENGINEERING

Course Synopsis

This course covers geodetic, 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, tacheometry, mapping, calculation of areas and volumes, GIS, GPS, remote sensing and topographic survey.

Course Outcomes

- Ability to understand the comprehensive guide to basic principles and technologies in the application of Remote Sensing Technology and geographic imformation system (GIS).
- 2. Ability to *interphasing* between electronics, ICT and biological systems.
- 3. Ability to apply computer programming in the study of biosystems such managing natural resources and productivity of farmland.

- Kavanagh, B.F. 2009, Surveying: Principles and applications, 8th Ed. Prentice Hall, New York, NY.
- 2. Lillesand, T.M. 2007, Remote Sensing and Image Interpretations, John Wiley and Sons, New York
- McCormack, J. 2004, Surveying, 5th Ed., John Wiley and Sons, New York, NY.
- 4. Bannister, A. 1992, Surveying, 6th Ed. Longman Scientific.
- 5. Chandra, A.M. and Ghosh, S.K. 2006, Remote Sensing and Geographical Information Systems, Alpha Science International



ERT 253/3 ELECTRICAL & ELECTRONICS TECHNOLOGY

Course Synopsis

This course covers the foundation of electricity (Ohm's law and Coulomb law) and electronic (Kirchhoff law) which including the concepts of electric and power, series and parallel wiring. Additional coverage includes the introduction of the electronic components and the application.

ERT 254/3 THERMODYNAMICS FOR BIOSYSTEMS ENGINEERING

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. In this course, students will be studying the terminology, principles, theory, and practical application of the First and Second Law of engineering thermodynamics.

Course Outcomes

- 1. Ability to recognise the laws of thermodynamics for processes
- 2. Ability to manipulate and calculate the properties of pure substances and mixtures
- Ability to apply the Clapeyron equation to pure substances using an analytical equation of state
- 4. Ability to perform phase equilibrium calculations using software and ability to perform reaction equilibrium calculations

References

- 1. Cengel, Y.A. and M.A.Boles, Thermodynamics-An engineering Approach, 36th edition, McGraw-Hill, 2007.
- Smith, J.M., Van Ness, H.C., Abbott, M. M. 2005. "Introduction to Chemical Engineering Thermodynamics", 7th Edition,McGraw - Hill
- Sandler, S., Chemical, Biochemical, and Engineering Thermodynamics, Wiley, 2006
- Wark, K.,and Richards, D.E., 1999, Thermodynamics, 6th Edition., McGraw-Hill.
- Eastop, T.D. and McConkey, A. 2000, Applied Thermodynamics for Engineering Technologist, 4th Ed., Longman

ERT 255/3 ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS

Course Synopsis

The course is designed to introduce the properties of biological materials and to encourage students to be able to identify physical properties of materials required for analysis and design of agricultural, food and biological systems. Upon completion of the course, the student will be able to determine (measure, search, calculate, estimate) the value of a particular engineering property based on available data or experimentally measure the property based on existing methods and theories.

Course Outcomes

- 1. Ability to identify physical attributes of materials required for analysis and design of agricultural, food and biological systems.
- Ability to repeat and discuss concept, techniques and calculation of thermal and rheological properties of biological materials.
- 3. Ability to repeat demonstrate and calculate thermal and electromagnetic properties of biological materials.



Ability to apply and illustrate concepts and principles of water activity, handling, strorage and moisture management of biological materials.

References

- 1. Sahin,S and Sumnu,S.G. 2006. *Physical Properties of Foods.* Springer Science.
- 2. Barbosa-Canovas G.V., Juliano.P. and Peleg, M. 2008. Engineering Properties of Foods, in Encyclopedia of Life Support System. (EOLSS) UNESCO.
- 3. Jose M.Aguilera and Peter J.Lilliford. 2008. *Food Materials Science*. Springer Verlag Berlin Heidelberg.
- 4. Ludger O.Figura and Arthur A.Teixera. 2007. Food Physics : Physical Properties-Measurement and Applications. Springer –Verlag Berlin Heidelberg.
- 5. Stroshine, R. 2000. Physical Properties of Agricultural Materials and Food Products, Purdue University, West Lafayette, IN.

ERT 256/3 THEORY OF STRCUTURES

Course Synopsis

This course covers functions of structures, design loads, reactions and forces systems, analysis of statically determinate structures including beams, trusses, and arches; energy methods of determining deflections of structures, influence lines and criteria for moving loads, analysis of statically indeterminate structures including continuous beams and frames. Also introduces finite element analysis for analysis of structures.

ERT 350/3 INSTRUMENTATION, MEASUREMENT AND CONTROL IN BIOSYSTEMS

Course Synopsis

The course covers the general concept of instrumentation, various measuring devices, and the manipulation, transmission, and recording of data. Reference to instrumentation use in biosystems engineering made where applicable. Students will be able to comprehend measurement standards, data analysis and calibration methods which are essential features of any measurement programme.

Course Outcomes

- 1. Ability to identify and differentiate and illustrate main components in instrumentation, their integration and working principle of various measurement devices.
- 2. Ability to differentiate and illustrate roles and features of appropriate instruments for various biosystems engineering application.
- 3. Ability to demonstrate the interphasing of different instrumentation and design the integration or connectivity

- Nakra, B.C. and Chaudhry, K.K., Instrumentation, Measurement and Analysis, Second Edition, Tata McGraw Hill, 2004. (3rd edition in print)
- Singh, S.K. Industrial Instrumentation and Control, Third Edition, Tata McGraw Hill, 2009.
- 3. Doebelin, E.O. Measurement Systems – Application and Design, McGraw Hill, 2004.
- Morris, A.S. 2001. Measurements and Instrumentation Principles, 3rd Ed., Butterworth-Heinemann.
- Figliola, R.S. and Beasley, D.E. 2005, Theory and Design for Mechanical Measurement, 4th Ed., John Wiley and Sons.

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 which include soil, water, biomass and waste.
- 2. Ability to apply and formulate mathematical model for sustainable agrosystems
- Ability to design components and processes of sustainable agrosystems

References

- 1. Lynch, Daniel R., Sustainable natural resource management for scientists and engineers, Cambridge University Press, New York, 2009.
- 2. Michel De Lara and Luc Doyen, Sustainable management of natural resources: Mathematical models and method, Springer-Verlag Berlin Heidelberg, 2008.
- Mason. J., Sustainable agriculture. 2nd ed., Landlinks Press, Collingwood Vic. Australia, 2003.
- Gliessman, Stephen R., Agroecosystem sustainability : developing practical strategies, CRC Press, Washington, 2001.
- 5. Pretty. J. 2008. Sustainable Agriculture and Food, Earthscan, London, UK.

ERT 352/3 FARM STRUCTURES

Course Synopsis

This course covers planning, engineering analysis and design; and cost estimating of biosystems engineering related structures elements for agricultural buildings, greenhouses, and structures for livestocks husbandry. The student will exposed to structural design using timber, reinforce concrete, and steel.

Course Synopsis

- 1. Ability to plan biosystems structures layout and materials for structural elements.
- Ability to design structural members in tension, compression, and bending.
- Ability to estimate cost of construction of the biosystems agricultural structures.

- 1. McKenzie, W.M.C 2013. Design of Structural Elements 2nd edition. Palarave McMillan, UK
- Seward,D. 2009. Understanding Structures: Analysis, Materials, Design 4th Edition, Palgrave McMillan, UK
- Arya, C. 2009. Design of Structural Elements: Concrete Steelwork Masonry and Timber Designs to British Standards and Eurocodes 3rd Edition. Taylor & Francis.
- Mosley, B. 2006. Reinforced Concrete Design to Eurocode 2. Palgrave McMillan, UK
- Lindley, J.A and Whitaker, J.H. 1995. Agricultural Buildings and Structures, ASAE



ERT353/3 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, bioethanol and biohydrogen are also discussed..

Course Outcomes

- 1. Ability to illustrate the working principles of the internal combustion engines.
- 2. Ability to analyze the performance and efficiency of different types of engines, solid and liquid mover's devices.
- Ability to illustrate different types of renewable energy sources suitable for production and processing of biological materials.
- Ability to differentiate biofuels, biodiesel and biogas for production and processing of biological materials.

References

- 1. Ayhan D. 2009 "Green Energy and Technology" Springer, Verlag London.
- 2. Aldo Viera R. 2009. "Fundamentals of Renewable Energy"Elsevier Inc. UK
- Grupta H.N. .2006.
 "Fundamentals of Internal Combustion Engines" Prentice Hall of India
- 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 354/3 SOIL ENGINEERING

Course Synopsis

This course covers the engineering properties of soil and water and it application in soil-water-plant relationshinp for on-farm irrigation and drainage and soil and water management practices. It include design of surface, subsurface, sprinkler and micro-irrigation systems for various crop production system and hydraulic structures for soil and water conservation practices.

Course Outcomes

- 1. Ability to analyze soil and water relation in biosystems production.
- Ability to design drainage size and requirement for on farm irrigation and drainage for surface and subsurface system.
- Ability to analyze soil and water management system in erosion control and water conservation.
- Ability to design microirrigation system and determine it efficiencies for various crops production system.

References

- Fangmeier,D.D., Elliot,W.J., Workman, S.R,Huffman, R.L,Schwab, G.O.2006. Soil and Water Conservation Engineering 5th Edition.Thomson Delmar Learning. United State of America.
- Gardiner,D.T, Miller, R.W. 2008. Soils in Our Environment. 11th edition. Pearson Education, Inc., Upper Saddle River, New Jersey 07458
- Subramaya,K. 2000. Flow in Open Channel. 2nd edition. Tata McGraw Hill, Delhi, India.
- Plaster, E.J. 2009. Soils Science and Management, 5th Ed., Delmar Cengage Learning.
- 5. Liu, C and Evett, J.B. 2004. Soils and Foundation, Pearson Education.

School of Bioprocess Engineering



ERT 355/3 BIOSYSTEMS MODELLING AND SIMULATION

Course Synopsis

The course exposes students to basic concepts of sustems analysis, modeling and computer simulation of agricultural and biological systems. Students will develop ability to work on and develop dynamic models, sensitivity analysis, parameter estimation and model evaluation. An overview of applications of models in agricultural and biological systems will be given including but not limited to Decision Support Systems for Agrotechnology Transfer (DSSAT), a software application program that simulates growth, development and yield as a function of the soil-plantatmosphere dunamics. Students will also be exposed to and develop arowth models for fish as well as animals, and are required to write and present computer models in the form of group projects using Visual Basic Application (VBA) for Microsoft Fxcel

ERT 356/3 UNIT OPERATIONS

Course Synopsis

This course systematically presents the basic information necessary to design agricultural/food processes and the equipments needed to carry them out. It covers the most common agricultural/food engineering unit operations in detail including to obtain the desired product from the starting materials or feedstocks.

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

- 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 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. 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 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.
- 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. 200). 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 456/3 POST HARVEST ENGINEERING

Course Synopsis

This course covers moisture content in agricultural product 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 druing and dehudration of agricultural products. The course also covers types and causes of spoilage in storage, conditions for storage of perishable products, functional requirements of storage, control of temperature and relative humidities inside storage, and calculation of refrigeration load, designing conditioning of environment inside storage through natural and mechanical ventilation.

Course Outcomes

- 1. Ability to apply the principle of engineering in the processes involved in conveying, storing, drying, cleaning and sorting agricultural products.
- 2. Ability to analyse and design machines used for conveying bulk solids and liquids.

 Ability to understand the theory and practice of drying for grain and forage crops. Moisture and quality control in storage and transport.

References

- 1. J. De Vries. 2001. Securing the Harvest. ISBN 10:0851995640.
- 2. K. Rajasekaran. 2002. Crop Biotechnology. ISBN 10:0841237662.
- 3. Sarah J. Risch. 2000. Food Packaging. 10:0841236178.
- 4. Stanley P. Burg. 2004 Postharvest Physiology and Hypobaric Storage of Fresh Produce. ISBN 10:0851998011.

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 PIC microcontroller are also discussed.

Course Outcomes

- 1. Ability to apply principle of automation and sensor technology in agricultural and biological systems.
- 2. Ability to analyze the actuator component and application of an automation system in Biosystems Engineering
- Ability to evaluate control engineering application in agricultural and biological system.
- Ability to design automation system for agricultural and biological production systems.

References

- Bolton, W. 2003. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering. 3rd edition. Prentice Hall.
- 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.
- 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 460/3 CONTROLLED ENVIRONMENT ENGINEERING

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 psychrometrics, 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.

 Ability to appraise and value the existing designs and safety aspect of plant, animals and aquaculture structures through groupwork project.

References

- Albright, L.D. 2005. Environmental Control for Plants and Animals. American Society of Agricultural and Biological Engineers, St. Joseph, MI.
- Incropera, F.P. 2002. Introduction to Heat and Mass Transfer, 4th ed., John Wiley and Sons, New York.
- Bartok, J. W. 2001. Energy Conservation for Commercial Greenhouses. NRAES. New York.
- 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 461/3 BIOSYSTEMS ENGINEERING DESIGN 1

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.
- 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.
- 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.
- 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.
- 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 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 technologu, 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 openend 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 identifu, solve, and design solution for complex engineering problems.

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Course Outcomes

- 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.
- Ability to design component, equipment, process, plant and systems in biosystems engineering using engineering tools and design softwares for optimum performance.
- 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.
- 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.
- Shigley J. E., Mischke, C. R., Brwon Jr. T. H. 2004. Standard Handbook of Machine Design, 3rd Edition, The McGraw-Hill Co. Inc.
- Walsh R. A., 2007. Handbook of Environmental Engineering Calculations, 2nd Edition, The McGraw-Hill Co. Inc.

ERT 464/3 DESIGN OF MACHINE & 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
- Ability to compare machine components in a variety of situations and select machines for specific operations in biosystems engineering.

- 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 466/3 WASTE MANAGEMENT

Course Synopsis

This course covers the sources and properties of agricultural farm and agricultural related industries waste and wastewater, and their effect on the environment. Also the physical, chemical and biological waste and wastewater treatment, disposal, utilization systems and technologies include biogas, composting and land application in relation to pollution control.

Course Outcomes

- 1. Ability to analyze the properties of wastes and their impact on the environment.
- Ability to design physical, chemical and biological treatment systems of agricultural related industrial waste and wastewater
- Ability to proposed the suitable utilization technique for environment sustainable

References

- 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. Liu, S.X. 2007. Food and Agricultural Wastewater Utilization and Treatment. Blackwell Publishing
- Hammer, M.J and Hammer M.J. 2005. Water and Wastewater Technology, Pearson Prentice Hall
- 4. Salah, M. E. 2007. Sustainable Industrial Design and Waste Management Cradle-to-cradle for Sustainable Development. Academic Press
- 5. Sperling, M.V. and Chernicharo CA.L. 2005. Biological Wastewater Treatment in Warm Climate Regions. IWA Publishing.

ERT 467/3 BIOMASS CONSERVATION TECHNOLOGY

Course Synopsis

The course covers the technology and engineering principle of various renewable energy sources namely biomass, hydro, wind, solar, geothermal, and marine energy sources with particular focus on bio-based energy. Various type of bio-based energy are discussed in detail including bioethanol, biodiesel, biogas and biohydrogen. Several aspects namely type of raw material, type of microbes involved, production process, type of bioenergy products, together with "Biofuel Economy and Biofuel Policy" as well as current status and future prospects of renewable energy in Malaysias are also discussed

ERT 470/3 BIO-PRODUCTS MANUFACTURING

Course Synopsis

The course discusses components and facilities required for manufacturing and production of biological products. The course also covers process development and pilot plant facilities as well as the application of software for modeling and simulating of biological products production process. At the end of the course, student will have the capability to plan, design, simulate and propose scaling-up process for the development and manufacture of biological (food and agricultural) products.

Course Outcomes

- 1. Ability to identify and distinguish components and facilities required for the production and manufacturing of various food and agricultural products
- 2. Ability to plan, calculate and design processes for the manufacturing and production of food and agricultural products with emphasize on fermented products.
- 3. Ability to formulate and propose primary / secondary processing, and up-scaling facilities for bio products manufacturing in accordance with Good Manufacturing Practices (GMP)

- McNeil, B. Practical fermentation technology, John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, England, 2008
- 2. José M. Aguilera and Peter J. Lillford, Food Materials Science, Springer Science+Business Media, LLC 2008
- Wesselingh, J. A. Design and Development of Biological, Chemical, Food and Pharmaceutical Products, John Wiley & Sons Ltd, West Sussex, England, 2007

- 4. Hui., Y.H., Handbook of Food Products Manufacturing, Wiley & Sons, Inc., Hoboken, New Jersey, 2007
- Quality assurance of pharmaceuticals: a compendium of guidelines and related materials.Vol. 2, Good manufacturing practices and inspection. – 2nd ed., WHO, 2007





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



School of Environmental Engineering

Programme Offered

- Bachelor of Engineering (Hon.) (Environmental Engineering)
 - Bachelor of Engineering (Hon.) (Civil Engineering)
 - M.Sc (Environmental Engineering)
 - M.Sc (Building Engineering)
 - M.Sc (Civil Engineering)
 - PhD (Environmental Engineering)
 - PhD (Building Engineering)
 - PhD (Civil Engineering)

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Introduction

School of Environmental The is the Engineering seventh 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 (Hon.) (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, laws, safety and health, environmental and project management.

Bachelor of Engineering (Hon.) (Civil Engineering) RK01

This program is accredited by the Board of Engineers Malaysia (BEM) under Civil Engineering disciplines (Ref. No: BEM/041/0100/M (001)). Students who follow this program will be exposed to various fields of knowledge in Civil Engineering including designing structures, concrete and steel, hydrology and hydraulic, geomatic, construction project management, IBS and materials.

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 (Building Engineering)
- M.Sc (Civil Engineering)
- PhD (Environmental Engineering)
- PhD (Building Engineering)
- PhD (Civil 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:

- Chemical lab
- Air quality lab
- Hydro lab
- Chemical engineering lab
- Heavy and light structure lab
- Geotechnic lab
- Concrete and material 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 compression)
- Chemical (e.g. Waste water, surface water, drinking water, groundwater)



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School of Environmental Engineering



Bachelor Of Engineering (Honours) (Environmental Engineering)

PROGRAMME OBJECTIVES

PEO 1

Graduates who are leaders in the field of environmental engineering or chosen field as demonstrated through career advancement

PEO 2

Graduates who are members and contribute to professional society

PEO 3

Graduates who pursue continuous education opportunities

PEO 4

Graduates who contribute through research and development

PEO 5

Graduates who are engineers and demonstrate entrepreneurial skills

PROGRAMME OUTCOMES

PO 1

School of Environmental Engineering

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.

PO 2

Ability to identify, formulate and solve complex engineering problems.

PO 3

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

PO 4

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

PO 5

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.

PO 6

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

PO 7

Ability to understanding entrepreneurship, the process of innovation and the need for sustainable development.

PO 8

Understanding of professional and ethical responsibilities and commitment to the community.

PO 9

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles



Bachelor Of Engineering (Honors) (Environmental Engineering) Academic Session (2014/2015)

VEAD	FIF	FIRST SECOND THIRD			FOURTH					
YEAK	I	II		III	IV	v	VI		VII	VIII
	EAT 105/4 Fundamental of Electrical Engineering	EKT 120/4 Computer Programming		EAT 213/4 Fluid Mechanics and Hydraulics	EAT 237/3 Water Supply Engineering	EAT 301/4 Air Pollution Engineering	EAT 342/3 Noise Pollution Engineering		EAT XXX/3 Elective I	EAT 433/3 Environmental Engineering Design
Core	EAT 131/4 Environmental Chemistry	EAT 101/4 Basic Ecology		EAT 231/3 Thermodynamics *	EAT 208/3 Environmental Law, Health and Safety	EAT 303/4 Wastewater Engineering	EAT 343/3 Public Health and Occupational Hygiene		EAT XXX/3 Elective II	EAT 462/4 Final Year Project II
Engineering ((100)	EAT 102/4 Mechanics and Material Engineering	EAT 104/4 Fundamental of Chemical Eng Processes	0	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	aining	EAT 441/3 Environmental Remediation	EAT442/3 Engineering Management
		ECT 112/3 Engineering Skills	ological Camp	EAT 233/3 Environmental Engineering Skills*		EAT 332/3 Environmental Impact Assessment	EAT 345/3 Hydrology	Industrial Tr	EAT461/2 Final Year Project I	EAT465/2 Engineers in Society
			Eco				EAT 347/4 Mass Transfer **	T302/4		
ieering	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II		EQT 203/3 Engineering Mathematics III	EQT 271/3 Engineering Statistics			EI		
Non Engir (16	UUT 122/2 Skills and Technology in Communication									
versity irement 17)	UZW XXX/1 Co-curriculum	UZW XXX/1 Co-curriculum		EUW 224/2 Engineering Entrepreneurship	UVW 312/2 English for Technical Communication	UUW 233/2 Islamic and Asian Civilizations	UUW 322/2 Thinking Skills		UUW XXX/2 Option Subject	UUW 235/2 Ethnic Relations
Uni Requ					UVW 410/2 University Malay Language	UZW XXX/1 Co-curriculum				
133	18	19		18	16	17	18	4	13	14
TOTAL UNITS FOR GRADUATION IS 137										

ELECTIVES COURSES:

		- C.			
EAT XXX	COURSES WITH LAB				
EATXXX	COURSES WITHOUT LAB	\sim		\geq	
	COURSE * IS A PRE-REQUISITE TO COURSE	**	/	\sum	

EAT 447/3 Environmental Informatics, EAT 443/3 Built Environment, EAT 449/3 Environmental Process Control & Instrumentation, EAT 445/3 Remote Sensing **



Bachelor Of Engineering (Honours) (Civil Engineering)

Programme Objectives

PEO 1

Graduates are leaders in the field of civil engineering or chosen field as demonstrated through career advancement.

PEO 2

Graduates who are members and contribute to professional society.

PEO 3

Graduates pursue continuing education opportunities.

PEO 4

Graduates who contribute through research and development.

PEO 5

Graduates who are engineers and demonstrate entrepreneurial skills.

Programme Outcomes

PO 1

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.

PO 2

Ability to identify, formulate and solve complex engineering problems.

PO 3

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

PO 4

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

PO 5

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.

PO 6

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

PO 7

Ability to understanding entrepreneurship, the process of innovation and the need for sustainable development.

PO 8

Understanding of professional and ethical responsibilities and commitment to the community.

PO 9

Ability to function on multi-disciplinary teams.

PO 10

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

PO 11

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

PO 12

Demonstrate understanding of project management and finance principles



Bachelor Of Engineering (Honors) (Civil Engineering) Academic Session (2014/2015)

VEAD	FIF	RST		SEC	OND	THIRD			FOURTH	
YEAK	I	II		Ш	IV	V	VI		VII	VIII
	EAT 105/4 Fundamental of Electrical Engineering	EKT 120/4 Computer Programming		EAT 251/3 Structural Theory *	EAT258/3 Building Material Engineering	EAT 314/4 Geotechnical Engineering **	EAT 360/4 Highway & Transportation Engineering		Elective I EAT XXX/3	EAT 451/4 Integrated Project Design
Core	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 351/3 Concrete Building Design I	EAT 354/3 Steel Building Design		EAT461/2 Final Year Project I	EAT 462/4 Final Year Project II
gineering (100)	EAT152/2 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 359/3 Water Resources Engineering		EAT 455/3 Industrialized Building System	Elective II EAT XXX/3
Ë		ECT 112/3 Engineering Skills	du	EAT 250/3 Engineering Drawing	EAT 259/3 Hydraulics	EAT 356/4 Water & Wastewater Engineering	EAT 352/3 Concrete Building Design II	l Training		EAT465/2 Engineers in Society
			omatic Ca			EAT 357/3 Construction Management		4 Industria		
eering	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II	Ge	EQT 203/3 Engineering Mathematics III	EQT 271/3 Engineering Statistics			EIT302/4		
Non Engine (16)	UUT 122/2 Skills and Technology in Communication									
ty ent	UZW XXX/1 Co-curriculum	UZW XXX/1 Co-curriculum			UVW 312/2 English for Technical Communication	UUW XXX/1 Co-curriculum	UUW 322/2 Thinking Skills		UUW 233/2 Islamic and Asian Civilizations	UUW 235/2 Ethnic Relations
Universi Requirem (17)							UVW 410/2 University Malay Language		UUW XXX/2 Option Subject	
									UUW 224/2 Engineering Entrepreneurship	
133	16	19		17	17	18	17	4	14	15
				TOTAL U	JNITS FOR GRADUA	TION IS 137		\sum		11

ELECTIVES COURSES:

EAT XXX	COURSES WITH LAB
EATXXX	COURSES WITHOUT LAB
COU	RSE * IS A PRE-REQUISITE TO COURSE **

EAT 411/3 Advanced Concrete Building Design, EAT 413/3 Construction Engineering, EAT 415/3 Advanced Steel Building Design, EAT 453/3 Advanced Structural Analysis,

EAT 454/3 Timber and Masonry Design, EAT 456/3 Foundation Engineering,

EAT 459/3 Building Automation Systems, EAT 463/3 Environmental Law, Health & Safety, EAT 464/3 Building Services Engineering



Course Syllabus

ENVIRONMENTAL ENGINEERING PROGRAMME (RK07)

EAT101/4 BASIC ECOLOGY

Course Synopsis

The study of basic ecology in understanding nature and environment and the relationship between the organism and the 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

- **CO1:** Ability to define and describe basic concept of ecology and environment.
- **CO2:** Ability to define and describe the energy flow in ecosystems.
- **CO3:** Ability to define and describe the relationship among the organism in ecosystems.
- **CO4:** Ability to describe the basic concepts of soil composition, biochemistry and metabolism pathways of microorganisms in soil, water and wastewater treatment.

References

- 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.
- 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

- **CO1:** Ability to construct free body diagram and ability to solve equilibrium problems using equilibrium theory.
- **CO2:** Ability to determine friction and properties of sections.
- **CO3:** Ability to solve problems which relate to kinematics and kinetics of a particle.
- **CO4:** Ability to explain basic concepts of material strength as well as their mechanic properties.

References

- Hibbeler, R.C. (2010) Engineering Mechanics Statics. 12th Ed. , Prentice Hall.
- Hibbeler, R.C. (2010) Engineering Mechanics Dynamics. 12th Ed., Prentice Hall.
- Peter Schiavone, Hibbeler, R.C. (2010) Engineering Mechanics Statics Study Pack. 12th Ed. Prentice Hall.

EAT104/4 FUNDAMENTAL OF CHEMICAL ENGINEERING PROCESSES

Course Synopsis

This course focuses on basic chemical engineering fundamental processes that include mass balances, energy balances and heat transfer. Firstly, the introduction of
chemical engineering calculation will be taught. Then, the concept of mass balances and solving problem will be imparted. Furthermore, the theory of energy balances and solving problem will be covered. Finally, the theory of heat transfer and related problem solving is also incorporated.

Course Outcomes:

- **CO1:** Ability to understand, and solve problems related to chemical engineering calculation.
- **CO2:** Ability to solve problems on material balances.
- **CO3:** Ability to solve calculation on energy balances.
- **CO4:** Ability to solve calculation on heat transfer.

References

- 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.
- Himmelblau, D.M., and Riggs, J.B., Basic Principles and Calculations in Chemical Engineering, 7th Ed., Prentice Hall.

EAT105/4 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:

- **CO1:** Ability to analyse the DC and AC circuits by using Ohm's Law, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Source Transformation and Thevenin's theorem.
- **CO2:** Ability to calculate and analyse parameters of three phase AC system for Wye and Delta connection.
- **CO3:** Ability to explain and apply the basic concept of magnetism and electromagnetism in DC and AC machines.

References

- Richard, J. Fowler. (2008) Electricity Principles and Applications, 7th Ed., McGraw Hill.
- Boylestad, R.L. (2007) Introductory Circuit Analysis, 11th Ed., Prentice Hall.
- 3. Hughes (2005) Electronic Technology, 9th Ed., Prentice Hall.
- Charles, K.A. and Matthew N.O.S. Fundamentals of Electric Circuits. International 3rd Ed., McGraw Hill.
- Nilsson, J.W. and Riedel S.A. (2005) Electric Circuits, 7th Ed., Pearson Prentice Hall.

EAT131/4 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

- **CO1:** Ability to explain basic concepts of fundamental chemistry.
- **CO2:** Ability to define and discuss the chemical principles of water and wastewater pollution or treatment.
- **CO3:** Ability to describe and calculate soil chemistry and chemical reactions involved.
- **CO4:** Ability to discuss the chemistry, photochemistry and cyclic processes in atmospheres.

References

- Sawyer C.N., Mc Carty P.L. and Perkin G.F. (2003) Chemistry for Environmental Engineering and Science, 5th Ed., McGraw-Hill.
- Manahan, Stanley E. (2005) Environmental Chemistry, 8th Ed., Boca Raton, Fla.; London : CRC Press.
- Andrews, J. E. (2004) An Introduction to Environmental Chemistry, 2nd Ed., Malden, MA, Blackwell Science.

EAT208/3 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

- **CO1:** Ability to comprehend and explain the legal requirement of environmental, safety and health laws and regulations.
- **CO2:** Ability to describe and evaluate hazards in the workplace.
- **CO3:** Ability to describe and evaluate the magnitude of risks on humans associated with the hazards in the workplace.
- **CO4:** Ability to outline the management plan in managing the hazards and risks in the work place.

References

- 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.

 Environmental Quality Act & Regulations, 2006 (amended up to April), MDC Publishers Sdn. Bhd., Malaysia.

EAT213/3 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.

- **CO1:** Ability to define and describe the properties of fluids.
- **CO2:** Ability to identify and analyse some fluid static and fluid dynamic theories and applications.



- **CO3:** Ability to describe and solve problems related to fluid flow in pipeline system.
- **CO4:** 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.
- Young, D.F., Munson, B.R., Okiishi, T.H. & Huebsch, W.W. (2007) A Brief Introduction to Fluid Mechanics. Wiley Interscience.
- Landau L.D & Lifshitz, E.M. (2004) Fluid Mechanics. Elsevier.

EAT231/3 THERMODYNAMICS

Course Synopsis

Introduction to the concept of energy and the laws governing the transfers and transformations of energy. Emphasis on thermodynamic properties and the first and second law analysis of systems and control volumes. Analysis on exergy for closed systems and control volumes.

Course Outcomes

- **CO1:** Ability to determine pure substance behaviour and its properties at any given states.
- **CO2:** Ability to demonstrate basic principles of thermodynamics, concepts of work interaction and heat transfer.
- **CO3:** Ability to solve engineering problems in thermodynamics involving closed and open systems for both steady state and transient processes.
- **CO4:** Ability to apply second law analysis methods for thermodynamic systems.

References

- Cengel, Y.A., Boles, M.A. (2006) Thermodynamics: An Engineering Approach, McGraw-Hill Higher Education.
- Borgnakke, C., Sonntag,R.
 E. (2009) Fundamentals of Thermodynamics, 7th Edition John Wiley & Sons.
- Rajput, R.K. (2010) Engineering Thermodynamics, 3rd Edition, Jones & Bartlett Learning.

EAT232/3 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.

- **CO1:** Capability of using a mass balance approach to analyze and solve environmental problems and ability to understand basic water chemistry and to describe the fundamental components of water and wastewater treatment systems in industrial and domestic sewage and related legislation.
- **CO2:** Ability to describe or calculate solid and hazardous waste generations, characteristics and to explain how is managed and related legislation.



- **CO3:** Ability to describe or calculate classification of pollutant and particulate, the effect of pollutants as well as global atmosphere change and related legislation.
- **CO4:** Ability to describe or calculate the physical properties of sound, noise measurement and control and related legislation.

References

- 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.
- Peavy H. S., Rowe D.R. (1985) Tchobanoglous G., Environmental Engineering. McGraw-Hill.

EAT233/3 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

- **CO1:** Ability to provide knowledge and perform surveying task and procedure.
- **CO2:** Ability to provide knowledge and practice AutoCAD and MATLAB software package.
- **CO3:** Able to produce mapping 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.

EAT235/3 GEOENVIRONMENTAL ENGINEERING

Course Synopsis

This course presents the principles of geo-environmental engineering. It covers the chemical and geochemistry 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.

- **CO1:** Ability to discuss and apply the component, concept and principle available in soil composition and properties.
- **CO2:** Ability to utilizes and apply the knowledge of groundwater flow and transportation process in porous media.
- **CO3:** Ability to discuss and apply the knowledge of the processes affecting the fate and transport of contaminants.
- **CO4:** Ability to identify and utilizes the basic principles and remediation technologies available in subsurface contamination.

CO5: 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.
- Kavanagh, B. F. (1996) Surveying Principles and Application, 4th Edition, Prentice Hall.

EAT237/3 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

- **CO1:** Ability to identify water sources, water quality and consumption, and to forecast water demand.
- **CO2:** Ability to identify the technology of water treatment processes.
- **CO3:** Ability to design water treatment unit.
- **CO4:** 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.
- The Malaysian Water Association (2000). MWA Design Guidelines for Water supply Systems, published by MWA.

EAT301/4 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

- **CO1:** Ability to discuss and analyse the behaviour of meteorological condition and their effect on air pollutant dispersion.
- **CO2:** Ability to predict the dispersion of air pollutant/s and suggest mitigation measures.
- **CO3:** Ability to discuss the general ideas in air pollution control.
- **CO4:** Ability to identify and design suitable air pollution control device.

- 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.



Wayne T. Davis (2000) Air pollution engineering manual / Air & Waste Management Association, Wiley.

EAT303/4 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

- **CO1:** Ability to identify and analyze the preliminary and primary unit processes applied in wastewater treatment.
- **CO2:** Ability to identify and analyze the secondary unit processes applied in wastewater treatment.
- **CO3:** Ability to identify and analyze the tertiary unit processes applied in wastewater treatment.
- **CO4:** Ability to design preliminary, primary, secondary and tertiary unit processes applied in wastewater treatment.

References

- 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 mitiaation 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

- **CO1:** Ability to explain and analyze the EIA process, and compare with legal requirements in Malaysia.
- **CO2:** Ability to outline the terms of reference in conducting Environmental Impact Assessment (EIA) and evaluate the potential impacts to the environment and society.



- **CO3:** Ability to assess the severity of adverse effects and suggest mitigation measures and monitoring plan.
- **CO4:** 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.
- 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

- **CO1:** Ability to define and differentiate sources, composition and properties of waste and hazardous waste.
- **CO2:** Ability to design a complete flow of waste management system.
- **CO3:** Ability to distinguish the hazard of hazardous waste and elaborate the concept of risk assessment for hazardous waste.
- **CO4:** 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.

- LaGrega, Buckingham & Evans (2001) Hazardous Waste Management, 2nd Edition, McGraw-Hill.
- Cheremisinoff and Wu (1994) Hazardous Waste Management Handbook, Technology, Perception and Recycling. PTR Prentice Hall.
- Pfeffer (1992) Solid Waste Management Engineering. Prentice Hall.
- 5. Vesilind P.A., Worrell W., Reinhart (2002) Solid waste engineering. Brooks/Cole.

EAT342/3 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

- **CO1:** Ability to differentiate between noise and sound, able to explain and discuss the sources and effects of noise pollution.
- **CO2:** Ability of defining the properties of sound, quantifying the noise levels and decibel as well as to characterize the noise.
- **CO3:** 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

- 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.
- 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.

EAT343/3 PUBLIC HEALTH AND OCCUPATIONAL HYGIENE

Course Synopsis

Public health and occupational hugiene 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, guality, health and safety management.

Course Outcomes

- **CO1:** Ability to discuss environmental health in the tropics and relate to water supply, sanitation and social practices.
- **CO2:** Ability to asses various pollutants and other hazards in nature and indoors and identify measures to reduce pollution.

- **CO3:** Ability to identify, evaluate and control occupational hazards.
- **CO4:** Ability to apply OSHA information standards for safety and environmental management.

References

- Mary-Jane Schneider (2003) *"Introduction to Public Health"* 1st edition, Jones & Bartlett Publishers, 2003.
- 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

- **CO1:** Ability to explain the environmental management and the requirements on ISO 14001 (environmental management system).
- **CO2:** Ability to distinguish and articulate the aspect and impact of a human work processes that may resulted to adverse effect.
- **CO3:** Ability to suggest mitigation measure and establish environmental policy in conserving the environment.
- **CO4:** Ability to carry out environmental reporting.

References

- 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.

- Barrow C.J. (2006) Environmental Management for Sustainable Development, 2nd Edition, Routledge, New York.
- SIRIM (2005) Environmental management systems – Requirements with guidance for use (First revision) (ISO 14001:2004, IDT). SIRIM.
- Whitelaw K. (2004) ISO 14001: environmental system handbook. 2nd Edition, Elsevier Butterworth-Heineman, Amsterdam.

EAT 345/3 HYDROLOGY

Course Synopsis

Introduces the fundamental of hydrological process such as hudrologic cucle, atmospheric circulation, precipitation, evaporation, evapotranspiration and infiltration. Students will be introduced to equations to calculate, and equipments to measure many important hydrologic data including rainfall amount, evaporation rate and infiltration rate. Analusis 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

- **CO1:** Ability to discuss and perform the computation for hydrological process.
- **CO2:** Ability to compute the flood hydrographs using various hydrograph methods.
- **CO3:** Ability to analyze and apply the frequency analysis in hydrology.
- **CO4:** Ability to compute the flood routing.

References

- 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.
- 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.

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EAT347/4 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 sustems. 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

- **CO1:** Ability to utilize the understanding of the principle of mass transfer concepts.
- **CO2:** Ability to utilize the understanding of mass transfer operation systems.

- **CO3:** Ability to utilize transport processes in the design of emission-control systems.
- **CO4:** Ability to utilize the understanding of the sources, fate and transport, and the impact of chemical substances.

References

- Warren Lee McCabe, Julian Cleveland Smith, Peter Harriott. (2005) Unit operations of chemical engineering, 7th Edition. McGraw Hill International Series.
- Christie John Geankoplis (2014) Transport Processes & Saperation Process Principles (Includes Unit Operations, 4th Edition. Pearson.
- Louis J. Thibodeaux (1996) Environmental chemodynamics: movement of chemicals in air, water, and soil. 2nd Edition. John Wiley & Sons.

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:

- **CO1:** Ability to recognize the design concept and requirement in Environmental Engineering field.
- **CO2:** Ability to apply the design concept and requirement for the selected project in Environmental Engineering field.
- **CO3:** Ability to design and evaluate the specific unit process and unit operation in Environmental Engineering field.
- **CO4:** Ability to conduct economic evaluation of the selected project in Environmental Engineering field.

- 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.

 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

- **CO1:** Ability to illustrate the concepts of bioremediation in soil, groundwater and contaminated site treatment.
- **CO2:** Ability to describe and analyse the characteristics of contaminants.
- **CO3:** Ability to identify and construct appropriate strategies to remediate contaminated soil.
- **CO4:** Ability to identify and construct appropriate strategies to remediate contaminated water.

References

- 1. Hari D. Sharma and Krishna R. Reddy (2004) Geoenvironmental Engineering. Wiley.
- Pedro J.J. Alvarez and Walter A. Illman (2006) Bioremediation and natural attenuation. Wiley.
- Mukesh Doble and Anil Kumar (2005) Bio-treatment of industrial effluents. Elsevier.

EAT 442/3 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

CO1: Ability to analyze and evaluate the process of project management, develop work plans, do cost estimation and perform project evaluation.

CO2: Ability to analyze and evaluate economic scenarios and apply decision making process to engineering project and business venture.

References

- 1. O'Sullivan / Sheffin (2001), Economics: Principles and Tools, Prentice Hall.
- R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, Engineers in Society, 2nd Ed., Mc Graw Hill.
- S. Park Chan (2008), Fundamentals Engineering Economics, 2nd Ed., Prentice-Hall.
- 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 443/3 BUILT ENVIRONMENT

Course Synopsis

Introduction to knowledge and skills in elements and principles of building design that pervade the environment and therefore promoting sustainable design. Subsequently, it leads to the undertaking of a detailed and systematic exploration of the

designs of energy efficient buildings; incorporating thermal control, thermal dunamics, green architecture, thermal insulation. ventilation, air-conditioning and lighting. Students will be exposed to the passive building design strategies which supporting in understanding the practical approach related to standard and GBI assessment tools. Mini project is 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 promote sustainable development.

Course Outcomes

- **CO1:** Ability to describe and analyze the concepts of thermal control through the building envelope adopted in Environmental Science.
- **CO2:** Ability to analyze heat exchange mechanisms and evaluate the thermal interactions in building.
- **CO3:** Ability to construct skills in designing a building with respect to the energy efficiency and sustainability.
- **CO4:** Ability to select and evaluate the methods of active and passive design approaches in a physical building environment.

References

- Norazian Mohamed Noor et al. (2009) Introduction to Environmental Engineering, 1st Ed., Penerbit UniMAP.
- Davis M.L. and Cornwell D.A. (2008) Introduction to Environmental Engineering, 4th Ed., McGraw-Hill.
- 3. MS1525:2007 Code of Practice of Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings (First Revision).
- GBI Design Reference Guide (GBI Malaysia) for IEB and INC for Non-Residential Buildings.

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

- **CO1:** Ability to understand basic concept of remote sensing.
- **CO2:** Ability to convert and analyze environmental data by using digital image processing software.
- **CO3:** Ability to characterized and utilizes the various system of remote sensing.

References

- Lilesand, T.M., Keifer, R.W. & Chipman, J.W (2007) Remote Sensing and Image Interpretation, 6th Edition, John Wiley & Sons.
- 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.
- Mather, Paul M. (2004), Computer processing of Remotely-Sensed Images, Wiley.

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EAT 447/3 ENVIRONMENTAL INFORMATICS

Course Synopsis

Environmental informatics plaus 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, knowledgebased 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

CO1: To provide knowledge and understanding of concerns of environmental pollutants and monitoring systems

- **CO2:** To provide knowledge on database management and technique to evaluate and collate raw data
- **CO3:** Able to transform environmental data into decision making information by using statistical analysis and simulation modelling tools
- **CO4:** To raise awareness of the students to the existing environmental risk problems.

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

- **CO1:** Ability to understand the concept of process control and instrumentation.
- **CO2:** Ability to develop and solve dynamics model of chemical and biological processes related to environmental engineering.
- **CO3:** Ability to analyze and design the control system for chemical and biological processes related to environmental engineering.



School of Environmental Engineering

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CO4: Ability to apply the

process control strategies of typical chemical and biological process related to environmental engineering.

References

- 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

- **CO1:** Ability to modulate and utilize academic knowledge and practical experience in conducting an academic project.
- **CO2:** Ability to think objectively, analytically and critically in identifying and solving problem in systematic manner. Ability to create innovative/ commercialization.
- **CO3:** Ability to work independently in conducting and completing an academic project.
- **CO4:** Ability to present the proposal and final product orally and graphically.

References

- 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.
- Leo Finkelstein, Jr., (2008). Pocket ook og 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 Syllabus

CIVIL ENGINEERING PROGRAMME (RK82)

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

- **CO1:** Ability to construct free body diagram and ability to solve equilibrium problems using equilibrium theory.
- **CO2:** Ability to determine friction and properties of sections.
- **CO3:** Ability to solve problems which relate to kinematics and kinetics of a particle.
- **CO4:** Ability to explain basic concepts of material strength as well as their mechanic properties.

References

- Hibbeler, R.C. (2010) Engineering Mechanics Statics. 12th Ed. , Prentice Hall.
- Hibbeler, R.C. (2010) Engineering Mechanics Dynamics. 12th Ed., Prentice Hall.
- Peter Schiavone, Hibbeler, R.C. (2010) Engineering Mechanics Statics Study Pack. 12th Ed. Prentice Hall.

EAT105/4 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:

- **C01:** Ability to analyse the DC and AC circuits by using Ohm's Law, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Source Transformation and Thevenin's theorem.
- **CO2:** Ability to calculate and analyse parameters of three phase AC system for Wye and Delta connection.
- **CO3:** Ability to explain and apply the basic concept of magnetism and electromagnetism in DC and AC machines.

References

- Richard, J. Fowler. (2008) Electricity Principles and Applications, 7th Ed., McGraw Hill.
- Boylestad, R.L. (2007) Introductory Circuit Analysis, 11th Ed., Prentice Hall.
- 3. Hughes (2005) Electronic Technology, 9th Ed., Prentice Hall.
- Charles, K.A. and Matthew N.O.S. Fundamentals of Electric Circuits. International 3rd Ed., McGraw Hill.
- Nilsson, J.W. and Riedel S.A. (2005) Electric Circuits, 7th Ed., Pearson Prentice Hall.

EAT112/4 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

- **CO1:** Ability to understand basic concept of geomatic.
- **CO2:** Ability to perform surveying task and procedures.
- **CO3:** Ability to provide knowledge and practice with the latest geomatic engineering equipments.

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.

EAT115/4 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

- **CO1:** Ability to determine the stresses, strains and deformation of members in simple one-dimensional elastic system.
- **CO2:** Ability to analyze torqueloaded member and evaluate the values and distribution of bending and shear stresses in beam section.
- **CO3:** Ability to apply stress caused by combined loadings and buckling of column.
- **CO4:** Ability to calculate stresses on inclined plane using Mohr's Circle.

References

- 1. R.C Hibbeler' (2014) "Mechanics of Materials" ,9th Ed, Prentice Hall.
- Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf. (2004) "Mechanics of Materials".
 3rd Edition. McGraw Hill.
- Megson, T.H.G.(2002)
 "Structural and Stress Analysis", Butterworth: Heinemann.

EAT152/3 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.

- **CO1:** Ability to discuss the principles of engineering geology and differentiate the types of rock.
- **CO2:** Ability to describe weathering process in rock mass and geological structures including its discontinuities.
- **CO3:** Ability to discuss and evaluate the strength of rock mass. Ability to describe the state of stresses in rock mass.
- **CO4:** Ability to discuss ground investigation and recommend stabilization method for rock mass.

References

- C. W. W. Ng, N. Simons and B. Menzies (2008) 'A Short Course in Geology for Civil Engineers', Thomas Telford Publishing.
- 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.

EAT212/4 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 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

- **CO1:** Ability to identify, classify and differentiate the different types of soil and rock including their properties.
- **CO2:** Ability to discuss the seepage and permeability concept and solve problem involving flow nets.
- **CO3:** Ability to solve calculation problem using mechanics involving physical properties, compaction and effective stress.
- **CO4:** Ability to employ the shear strength theory to determine shear strength parameters of soils.
- **CO5:** Ability to explain the process of consolidation and solving problems using onedimensional consolidation theory.

References

- 1. R. F. Craig (1997) 'Soil Mechanics', E & FN Spon.
- 2. M. Budhu (1999) 'Soil Mechanics & Foundations', Wiley.
- J.H Atkinson (1993) 'An introduction to the mechanics of soils and foundation, through critical state soil mechanics', McGraw Hill.

EAT 250/3 BUILDING ENGINEERING DRAWING

Course Synopsis

The course equips students with the basic computer-aided drawing skill for general engineering drawing, and especially the drawing for Building 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 handson 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 building engineering profession will be integrated through a series of these hand-on sessions. Moreover. students will learn about bill of quantity through drawing from industry.

- **CO1:** Ability to convey with sketching, manual and computer-aid-drawing application.
- **CO2:** Ability to interpret architectural drawing and construct into structural drawing propose; to identify structural layout.



- **CO3:** Ability to relate the basic engineering drafting to the actual construction via graphical presentation.
- **CO4:** Ability to calculate bill of quantity that used in tendering in construction industry.

References

- 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.
- Shawna Lockhart (2005) A tutorial Guide to AutoCAD 2005, Prentice Hall.

EAT251/3 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. Beside 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

- **CO1:** Ability to identify the statically determinate and indeterminate structures.
- **CO2:** Ability to analyze and illustrate the support and internal loading developed in determinate structure.
- **CO3:** Ability to analyze the internal forces in cable and arch.
- **CO4:** Ability 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.
- Hibbeler, R.C., Reddy C.S. (2005), "Mechanics of Material", Prentice-Hall.

EAT252/4 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, Multiple pipe systems.

Course Outcomes

- **CO1:** Ability to understand and analyze the basic characteristics of fluid mechanics and fluid statics.
- **CO2:** Ability to analyze the hydrostatics and basic hydrodynamics in fluid.
- **CO3:** Ability to analyze the flow in pipe and flow in open channels.
- **CO4:** Ability to analyze Darcy-Weisbach equation, Moody diagram, Energy losses in pipelines, Minor losses, Multiple pipe systems.

- Duncan, W.J., Thom, A.S. & A.D. Young. (1970) Mechanic of fluids, 2nd Edition. London.
- Yunus A. Cengel & John M. Cimbala (2010) Fluid Mechanics: Fundamental and Applications. 2nd Edition. McGraw Hill.
- Frank M. White (2003) Fluid Mechanics. 5th Edition. McGraw Hill.

- Bruce R Munson, Donald F Young, Theodore H Okiishi (2002) Fundamentals of Fluid Mechanics. 4th Edition. John Wiley & Sons.
- Robert, L.M. (2000) Applied Fluid Mechanics. 5th Edition. Prentice Hall.

EAT237/3 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

- **CO1:** Ability to identify water sources, water quality and consumption, and to forecast water demand.
- **CO2:** Ability to identify the technology of water treatment processes.
- **CO3:** Ability to design water treatment unit.

CO4: 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.
- The Malaysian Water Association (2000). MWA Design Guidelines for Water supply Systems, published by MWA.

EAT253/3 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

- **CO1:** Ability to analyze of statically determine structures for beam, trusses and frame using influence line method.
- **CO2:** Ability to analyze of statically indeterminate structures for beam, trusses and frame using approximate analysis.
- **CO3:** Ability to analyze structures using the displacement method of analysis by developing the slope deflection equation.
- **CO4:** Ability to analyze structures using the displacement method of analysis by applying the method of moment distribution.

- 1. Hibbeler, R.C. (2009) "Structural Analysis", Seventh Edition, Prentice-Hall.
- Kenneth, M. Leet. (2008) "Fundamentals of Structural Analysis". Third Edition. McGraw-Hill.
- Reddy C.S. (1996), "Basic Structural Analysis", Tata McGraw Hill Publishing Co.

EAT258/3 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

- **CO1:** Ability to identify and differentiate the different types of engineering material.
- **CO2:** Ability to explain the basic science and engineering fundamentals pertaining to characteristic of the constituents of concrete and its influence to fresh and hardened concrete properties.
- **CO3:** Ability to analyze the basic science and engineering fundamentals pertaining to other construction material namely steel, timber, bricks and bitumen and differentiate its influence to their properties.

CO4: Ability 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

- 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.
- 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

- **CO1:** Ability to analyze and design the steady flow in pipeline.
- **CO2:** Ability to analyze and design steady flow in open channel.
- **CO3:** Ability to analyze and design hydraulics machine systems and/or undertake a dimensional analysis of a physical system incorporating many variables.

- Marriott, M. (2009) Civil Engineering Hydraulics, 5th Edition, Wiley Blackwell.
- Chadwick, A., Morfett, J. and Borthwick, M. (2013) Hydraulics in Civil and Environmental Engineering, 5th Edition, CRC Press, New York
- Kay, M. (2006) Practical Hydraulics. 2nd Edition. E & FN Spon, London.
- 4. Chow, V.T. (2009) Open-Channel Hydraulics, The Blackburn Press.
- 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

- **CO1:** Ability to discuss issues in geotechnical engineering and explain site investigation methods.
- **CO2:** Ability to analyze soil bearing capacity and design for shallow foundations and pile foundations.
- **CO3:** Ability to analyze active and passive pressure according to Rankine's and Coulomb's theories.
- **CO4:** Ability to analyze the stability of the slope in term of factor of safety.

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.

EAT351/3 CONCRETE BUILDING DESIGN I

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

- **CO1:** Ability to calculate limit state design concept and analysis of sections for bending.
- **CO2:** Ability to design and predict reinforcement bar for simply supported and continuous beam and illustrate beam detailing.
- **CO3:** Ability to design reinforced concrete slab for one way and two way slab and illustrate slab detailing.
- **CO4:** Ability to design reinforced concrete column and illustrate column detailing.

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 (1985). Manual for the Design of Reinforced Concrete Building Structures. The Institution of Structural Engineer.

EAT353/3 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

- **CO1:** Ability to analyze the statically indeterminate beam, trusses and frame by applying the force or flexibility method.
- **CO2:** Ability to analyze and solve indeterminate structural problems for prismatic and non- prismatic members.
- **CO3:** Ability to analyze the statically indeterminate beam, trusses and frame by using the stiffness method.
- **CO4:** 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.
- Liu, G.R. and Quek S.S. (2003) The Finite Element Method: A Practical Course, Butterworth-Heinemann.
- Kenneth, M. Leet. (2008) "Fundamentals of Structural Analysis". Third Edition. McGraw-Hill.

EAT356/4 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 and drinking water are discussed, as well as reactor theory, process kinetics. and models. 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

- **CO1:** Ability to describe and analyse the theory and concept in water processing, and solve the problems related to the process involved.
- **CO2:** Ability to analyse and design the process/systems process of drinking water processing.
- **CO3:** Ability to describe and analyse the theory and concept in wastewater treatment and solve the problems related to the treatment involved.
- **CO4:** Ability to analyse and design the process/ systems of wastewater treatment.

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.
- 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 knowledae 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.

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Course Outcomes

- **CO1:** Ability to discuss and describe the general project management principles of construction industry.
- **CO2:** Ability to describe three major components in project management (planning, execution and project evaluation).
- **CO3:** Ability to use project planning and scheduling technique available in construction management.
- **CO4:** Ability to analyze the project cash flow requirements, project monitoring, and control.

References

- 1. Kraig K., Clifford J. S., Christine M. F., & Richard E. M. (2009) "Construction Management Fundamentals", Second Edition, McGraw Hill Construction.
- Gido & Clements. (2003) "Successful Project Management", Second Edition. Thomson, South-Western.
- Jack R. Meredith & Samuel J. Mantel, Jr. (2000), "Project Management: A Managerial Approach", Fourth Edition. John Wiley.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

EAT352/3 CONCRETE BUILDING 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 pre-stressed concrete, foundation, reinforce concrete frame and retaining wall.

Course Outcomes

- **CO1:** Ability to design prestressed concrete and illustrate the detailing.
- **CO2:** Ability to design and predict reinforcement bar for foundation and illustrate foundation detailing.
- **CO3:** Ability to design retaining wall and illustrate retaining wall detailing.
- **CO4:** Ability to design and analysis reinforced concrete frame.

References

 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.
- IStructE (19850 Manual for the Design of Reinforced Concrete Building Structures. The Institution of Structural Engineer.

EAT354/3 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 bucklina 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 and 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

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- **CO1:** Ability to design axially loaded member without and/or with associate combination axial load and bending.
- **CO2:** Ability to design flexural members.
- **CO3:** Ability to design steel structures joints.

References

- Trahair, N.S., Bradford, M.A., Nethercot, D.A., and Gardner, L. (2008) "The Behaviour and Design of Steel Structures to EC3", Taylor & Francis.
- Martin, L.H., and Purkiss, J.A (2008) "Structural Design of Steelwork to EN 1993 and EN 1994" 3rd Edition, Butterworth-Heinemann.
- 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.
- Wald, F., Tan, K.H., and Chiew, S.P. (2011) "Design of Steel Structures with Worked Examples" Research Publishing.

EAT 359/3 WATER RESOURCES ENGINEERING

Course Synopsis

This course is designed to expose students the engineering principles involved in analyzing and managing the quantity and quality of water in natural and developed systems. The student is exposed to the different phases in Water Resources viz planning, collection of relevant data on water resources and also on National Water Policy. Reservoir planning, management and economic analysis aspects are covered in detail.

Course Outcomes

- **CO1:** Ability to evaluate and costruct design of water resources systems utilizing the basic principles of the hydrologic cycle and the watershed.
- **CO2:** Ability evaluate surface water and groundwater flow for applications in water well development.
- **CO3:** Ability to measure water resources needs for further basin development plan, reservoir and stream flow routing.
- **CO4:** Ability to evaluate the design of stormwater management and pollutant loads for watershed and water quality analysis.

References

- 1. Larry W. M. (2005) "Water Resources Engineering", John Wiley & Sons, NJ.
- 2. Linsley R.K. and Franzini J.B. (2000) "Water Resources Engineering", McGraw-Hill Inc.
- Philip B. B., Wayne C.H., Baxter, E.V. (2013) "Hydrology and Floodplain Analysis", Pearson, England

EAT 355/3 HIGHWAY & TRANSPORTATION ENGINEERING

Course Synopsis

The goal of this course is to aive 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

- **CO1:** Ability to understand traffic flow fundamentals and relationship between volume, speed and density.
- **CO2:** Ability to understand the transportation planning process, forecast travel demand and design highway drainage structures.
- **CO3:** Ability to understand soil bearing test, material used in pavement, and design flexible pavement.
- **CO4:** 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
- AASHTO Guide For Design Of Pavement Structures, 1993, American Association Of State Highway And Transportation Officials

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

- **CO1:** Ability to classify the concept of IBS modern construction technology.
- **CO2:** Ability to evaluate the Principle of Score calculation and its submissions.
- **CO3:** Ability to decide Concept of Modular Coordination in IBS, Joints and Tolerances.
- **CO4:** Ability to discusss precast concrete building design.

References

 Sarja (2010) "Open and Industrialized Building". Taylor & Francis.

- Abraham Warzaski (2005) "Industralised and Automated Building Systems: A Managerial Approach". Second Edition. Tylor & Francis Group.
- Albert G. H. Dietz (1971) "Industrialized Building Systems for Housing". The MIT Press.

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.

- **CO1:** Ability to acquire and apply knowledge of mathematics, science, engineering and an indepth technical competence in civil engineering discipline.
- **CO2:** Ability to identify, formulate and solve civil engineering problems.





- **CO3:** Ability to design sub-structure, structure and infra-structure to meet desired needs.
- **CO4:** Ability to investigate and interpret raw data, borelog, topographic map, architectural drawing, etc.
- **CO5:** Ability to use techniques, skills and modern engineering tools necessary for engineering practices.
- **CO6:** Ability to demonstrate/ understand the social, cultural, global and civil responsibilities of a professional engineer.
- **CO7:** Ability to demonstrate/ understand entrepreneurship, the process of innovation and the need for sustainable development of the environment.
- **CO8:** Ability to understand the professional and ethical responsibilities and commitment to the society.
- **CO9:** Ability to function on multidisciplinary teams.
- **CO10:** Ability to communicate effectively.
- **CO11:** Ability to understand the need for, and engage in lifelong learning.
- **C012:** 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.
- Reynolds, C.E. and Steedman J.C., and Threlfall, A.J. (2008) "Reinforced Concrete Designer's Handbook". 11th Ed., E & FN Spoon.
- Reynolds, C.E. and Steedman J.C. (1992) "Examples of the Design of Reinforced Concrete Buildings to BS8110", 4th Ed., E & FN Spoon.
- Department of Irrigation and Drainage Malaysia (2000) "Urban Stromwater Management Manual for Malaysia" Department of Irrigation and Drainage Malaysia.
- Bowles, J.E. (1996) "Foundation Analysis and Design", 5th Ed, McGraw-Hill.
- 7. Nunnally, S.W. (2007) "Construction method and management", Pearson Prentice Hall.
- Riley, M and Cotgrave, A. (2004) "Construction Technology 2: Industrial and Commercial Building", Palgrave Macmillan.

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.

- **CO1:** Ability to modulate and utilize academic knowledge and practical experience in conducting an academic project.
- **CO2:** Ability to think objectively, analytically and critically in identifying and solving problem in systematic manner. Ability to create innovative/ commercialization.
- **CO3:** Ability to work independently in conducting and completing an academic project.
- **CO4:** Ability to present the proposal and final product orally and graphically.

References

- 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.
- Leo Finkelstein, Jr., (2008). Pocket ook og 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.

EAT 411/3 ADVANCED CONCRETE BUILDING 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

- **CO1:** Ability to analysis and design ribbed, waffle or flat slabs.
- **CO2:** Ability to analyze and design torsion members.
- **CO3:** Ability to analyze and design water retaining structures.
- **CO4:** Ability to analyze and design raft foundation and deflections checking.

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.

 Kenneth, M. Leet. (2008) "Fundamentals of Structural Analysis". Third Edition. McGraw-Hill.

EAT 413/3 CONSTRUCTION ENGINEERING

Course Synopsis

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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 hudroelectric 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

 CO1: Ability to discuss and describe the general project construction principles.
 CO2: Ability to describe major components in project construction.







- **CO3:** Ability to describe of the techniques of construction operations, planning and management.
- **CO4:** Ability to understanding & describe of the design, construction and maintenance of buildings and built facilities and the management techniques used for these processes.

References

- Peurifoy, RL, Schexnayder, CJ & Shapira, A (2006), Construction planning, equipment and methods, 7th edn, McGraw Hill, Boston.
- 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 415/3 ADVANCED STEEL BUILDING DESIGN

Course Synopsis

This course provides additional knowledge on the aspect of steel structural elements. As a continuation to the Steel Building Design, the topics discussed include design of plated structures and composite structures. Portal Frame analysis and design also covered. And also design consideration and design concept of cold-formed steel structures.

Course Outcomes

- **CO1:** Ability to analyze and design plated structures.
- **CO2:** Ability to analyze and design composite structures.
- **CO3:** Ability to analyze and design portal frame.
- **CO4:** Ability to analyze and 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.
- Trahair, NS, Bradford, MA, Nethercot, DA, Gardner L. (2008) The Behaviour and Design of Steel Structures to EC3. Fourth Edition. Taylor & Francais.
- Lam ,D, Ang, TC, Chiew, SP (2004) Structural Steelwork. Design to limit state theory. Third Edition. Elsevier.

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 dunamic. 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.

- **CO1:** Ability to derive finite element equation.
- **CO2:** Ability to analyze the 2 dimensional solid model using finite element method.
- **CO3:** Ability to analyze moment capacity for the structural member.
- **CO4:** Ability to derive the equation of motion for single degree of freedom system.



References

- 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.
- 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 provide 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

CO1: Ability to design wood columns and bending members.

- **CO2:** Ability to design timber joint using nail and other mechanical fasteners.
- **CO3:** Ability to design unreinforced and reinforced masonry structural elements and structures.
- **CO4:** 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, - Technoloau & Engineering
- Jack Porteous, Abdy Kermani (2007) 'Structural Timber Design', John Wiley And Sons.

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

- **CO1:** Ability to calculate soil bearing capacity and design for mat and drilled-shaft foundations.
- **CO2:** Ability to analyze the stability and design of retaining walls.
- **CO3:** Ability to discuss and analyze foundations on difficult soils for collapsible and expansive soils.
- **CO4:** Explain soil improvement method.

References

- 1. Das, B.M. (2011) 'Principles of Foundation Engineering', Cengage Learning.
- 2. Das, B.M. (2007) 'Principles of Geotechnical Engineering', Thomson.
- 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

- **CO1:** Ability to analyze building automation system communication standards.
- **CO2:** Ability to evaluate internet technologies and their applications in BAS.
- **CO3:** Ability to evaluate control and optimization of airconditioning systems control and optimization of central chilling systems.
- **CO4:** 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.

 Gopal, M. (2002) "Control Systems: Principles and Design", 2nd Ed. Tata McGraw-Hill.

EAT463/3 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

- **CO1:** Ability to comprehend and explain the legal requirement of environmental, safety and health laws and regulations.
- **CO2:** Ability to describe and evaluate hazards in the workplace.
- **CO3:** Ability to describe and evaluate the magnitude of risks on humans associated with the hazards in the workplace.

CO4: 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.
- Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders, 2007 (amended at 5th April), International Law Book Services, Malaysia.
- Environmental Quality Act & Regulations, 2006 (amended up to April), MDC Publishers Sdn. Bhd., Malaysia.

EAT464/3 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

- **CO1:** Ability to describe and discuss the importance of building services in building design with respect to sustainability in modern buildings.
- **CO2:** Ability to evaluate the choice of building services components and approach for better buildings design and operational during building life cycle.
- **CO3:** Ability to evaluate the Mechanical & Electrical distribution systems in modern buildings and problems related to design, operation and maintenance.

References

 Chatterton, David V. (2007) Building Services Engineering, Hardback, Publisher Taylor & Francis Ltd.

- David, V. Chatterton (2000) Building Services Engineering, Taylor & Francis.
- MS1525:2007 Code Of Practice On Energy Efficiency And Use Of Renewable Energy For Non-Residential Buildings (First Revision).
- MS IEC 60364-1:2007: Low Voltage Electrical Installation. LS-1 Electrical Installation Standard, Public Works Department, Malaysia.



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 waste water industries
- Solid waste and hazardous waste industries
- Processing and manufacturing industries
- Research & development institution
- Environmental and civil consultation group
- Government agencies such as Jabatan Alam Sekitar, Jabatan Pengairan dan Saliran and Jabatan Kerja Raya
- Building / construction industry
- Education and training institution
- Non-governmental organization (NGOs)

Main career to this programme graduate were as follows:

- Environmental engineer
- Civil engineer
- Structural engineer
- Site engineer
- Environmental research officer / executive
- Process engineer
- Occupational safety, health and environmental engineer
- Sales engineer
- QA/QC engineer
- Pollution control engineer
- Process / production engineer



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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Bachelor of New Media Communication (Hons) RA72

Programme Objectives (PEO)

PEO

The goal of the program offering a Bachelor of New Media Communication (Hons) is to produce graduates with knowledge and skills in communication, new media, management and competitive entrepreneurial, innovative, creative and consistent with the needs of industry.

Programme Outcomes (PO)

PO 01

Able to master the knowledge in the field of communication, new media, and organizational management.

PO 02

To master practical skills and technical knowledge related to communication and media.

PO 03

Able to practice the values of an ethical life, integrity, and social accountability.

PO 04

Able to practice the values, attitudes, and behaviors that conform to the characteristics of professionalism.

PO 05

Able to work and practice effective communication within the team.

PO 06

Ability to think critically and creatively to solve actual problems scientifically.

PO 07

Managerial skills by practicing entrepreneurial characteristics.

PO 08

Ability to manage information and practice of lifelong learning.

PO 09

To have killed practice characteristics of good leadership.



Curriculum Structure Bachelor of New Media Communication (Hons.) (RA72)

YEAR	FIF	RST	SECOND		THIRD		
SEMESTER	I	Ш	ш	IV	v	VI	
	KUW101/3 Introduction to Communication Theory	KUW 102/3 Interpersonal Communication in New Media	KUW 201/3 Small Group Communication	KUW 301/3 New Media and Cross Cultural Communication	KUW 401/3 Public Relations and New Media	KUW 403/3 Event Management	
	KUW111/3 Writing for New Media	KUW 103/3 Public Speaking	KUW 211/3 Digital Photography	KUW 302/3 Integrated Marketing Communication	KUW 402/3 Managerial Communication	KUW 404/3 Ethics and Law in New Media Communication	
Discipline Core	KUW 112/3 Principles of Communication Network	KUW 114/3 New Media and Society	KUW 212/3 Graphic Design for New Media	KUW 311/3 Digital Video Production	KUW 411/3 Digital Media Production	KUW 405/3 Seminar on New Media Communication	
	KUW 113/3 Introduction to New Media	KUW 115/3 Visual Communication		KUW 312/3 Web Design and Development	KUW 412/3 Animation for Integrated Media		Industrial Training
		KUW 116/3 Principles of Human Computer Interface					
Common Core			KUT 301/3 Research Method	KUT 302/3 Data Reasoning		KUT 441/4 Final Year Project	
			SUT 319/3 Social Psychology				
Core		KUW 121/3 Innovative and Creative Skills	KUW 221/3 New Era Management	KUW 321/3 Invention Skills	KUW 322/3 Electronic Entrepreneurship		
Elective					KUW 421/3 Strategic and Performance Management		
University Required	UVW 313/2 English for Academic Purposes	UUW 235/2 Ethnic Relations	UUW 322/2 Thinking Skills		UUW 3XX/2 Foreign Language	UUW 4XX/2 Foreign Language	
	UUW 410/3 Bahasa Melayu Universiti	UZW 1XX/1 KO-K	UZW 1XX/1 KO-K				
	UZW 1XX/1 KO-K						
	UUW 233/2 Tamadun Islam dan Tamadun Asia						
120	19	21	21	18	20	15	6
	TOTAL UNITS FOR GRADUATION 120						

Course Syllabus

KUW 101/3 INTRODUCTION TO COMMUNICATION THEORY

Course Synopsis

The course aims to give students an understanding of the theory of communication. The focus is on the development and progression of theories and concepts of communication. Apart from discussing the various types of basic theories of communication, the focus will also be given to the theories of communication: interpersonal, group, organization, society and technology. Overall this course exposes students to the formation, evolution and expansion theory communication theories.

References

- 1. Griffin, E. (2011) A First Look at Communication Theory. 8th ed. New York: McGraw Hill
- Baran, J.B. & Davis, D.K. (2010) Mass Communication Theory: Foundations, Fermentand Future. 6th ed. Singapore: Wardsworth Cencage Learning
- Bryant, J. & Zillman, D. () Media Effects: Advances in Theory and Research. Mahwah,New Jersey: Lawrence Erlbaum Associates

- Holmes, D. (2005) Communication Theory: Media, Technology and Society. Thousand Oaks: SAGE
- 5. Woods, J.T. (2011) Communication Mosaics: An Introduction to the Field of Communication. Singapore: Wardsworth Cencage Learning

KUW 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 identify difference interactive writing online with traditional writing methods. This course will help improve the ability of students to understand the concepts related to new media writing methods that can be used in the context of the organization

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

- 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

KUW 112/3 PRINCIPLES OF COMMUNICATION NETWORKS

Course Synopsis

This course provides an introduction to an 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

References

- 1. Data and Computer Communications (8th Edition), William Stallings, Prentice Hall (0132433109)
- Peterson and Bruce S. Davie "Computer Networks: A systems approach (4th ed)", Morgan Kaufmann, 2007
- S. Tanenbaum, Computer Networks (3rd ed), Prentice-Hall International, 1996.

KUW 113/3 INTRODUCTION TO NEW MEDIA

Course Synopsis

This course provides a survey of modern cuber 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.

Main references supporting the course

- Option A: Flash CS3 [Computer software]. (2007). Adobe. (\$249 student/teacher version through Adobe website)
- Option B: 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.

KUW 102/3 INTERPERSONAL COMMUNICATION IN NEW MEDIA

Course Synopsis

This course aims to expose students to the skills of interpersonal communication. This course helps students to improve the ability to understand concepts related to interpersonal communication that can be used in the context of the organization, and a small collection of Dyad rankings. Students also were exposed to conflict obtaining proficiency in the context of interpersonal nexus.

References

- Steven. A. Beebe & Susan J. Beebe. (2011). Interpersonal Communication: Realting to others (sixth edition) Allyn and Bacon (Pearson, Education Inc.)
- 2. Owen Hargie and David Dickson. (2011). Skilled Interpersonal Communication: Research, Theory, And Practice; (Fifth edition); Routledge is an imprint of the Taylor & Francis Group
- Julia T. Wood .(2009). Communication in Our Lives; fifth edition Wadsworth Cengage Learning
- Michael Tomasello.
 (2008). Origins of human communication; Massachusetts Institute of Technology, London england
- 5. Richard Ellis (2009) Communication Skills Stepladders to Success for the Professional Second Edition; Gutenberg Press, Malta.

KUW 103/3 PUBLIC SPEAKING

Course synopsis

This course aims to provide interfaith understanding and skills to the students about the concepts and the process of providing perucapan lay speech. In general,





this course touches aspects perucapan lay principle, speech provision, offering a greeting and other types of speech.

References

- 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.
- Dr. Gary Rodriguez (2010) Purpose Centered Public Speaking. USA: LeaderMetrix, Incorporated.
- Clella Iles Jaffe (2013). Public Speaking: Concepts & Skills for a Diverse Society (Seventh Edition). Boston, MA, USA: Wadsworth, Cengage Learning.
- Steven A. Beebe dan Susan J. Beebe (2012). Public Speaking: An Audience-Centered Approach (8th Edition). Boston, MA: Pearson Education, Inc..

KUW 114/3 NEW MEDIA AND SOCIETY

Course Synopsis

This course aims to increase interfaith understanding and knowledge of students about the philosophy of communication and media development Baharu in society. Conversation is concentrated to the role and function of media in influencing people's lives Baharu. Students will also Baharu were exposed how the media sought to convey to the public announcement.

References

- Vivian, J. (2002). The Media of Mass Communication. London: Allyn & Bacon.
- 2. Biagi, S. (2009). Media Impact: An Introduction to Mass Media. London: Wadsworth.
- Dominick, J. R. (2010). The Dynamics of Mass Communication Media in Transition. NewYork: McGraw-Hill.
- Rosenberry, J & Vicker, L.
 A. (2009). Applied Mass Communication Theory A Guide For Media Practitioners. Boston: Pearson/ Allyn and Bacon.
- Stanley, J.B. & Dennis, K.D. (2009). Mass Communication Theory: Foundations, Ferment and Future (2nd Ed.). Belmont: Wadsworth.

KUW 115/3 VISUAL COMMUNICATION

Course Synopsis

This course guides the student to understand the principles of principles of visual communication and connection with the issuance of the same product in printed form or move. The course also explains the interest of visual communication in the same life there as an ordinary human being or employees. This course will auide students produce projects that are more visually make sense. Students will be guided in understanding the various perspectives see the concept of visual. visual communication and development history, its importance from the perspective of various cultures and their application in publishing something. This course helps students become more critical and sensitive to the use of color, layout, form and selection tona in attracting attention and leave the meaning to the audience.

- 1. Jamieson, H. (2007). Visual Communication. More than Meets the Eyes.Bristol, United Kingdom.
- 2. Martin, P., Ross, S.D. (2003) Images that Injure. Pictorial Stereotypes in the Media. Praeger: Westport Connecticut



 Smith, K.L., Moriarty, K., Barbatsis, G., & Kenny, K. (Penyt.) (2010). Handbook of Visual Communication: Theory, Methods, and Media. Routledge: Mahwah New Jersey.

KUW 116/3 PRINCIPLES OF HUMAN COMPUTER INTERFACE

Course Synopsis

This course guides the student to understand the principles of principles of visual communication and connection with the issuance of the same product in printed form mahupun move. The course also explains the interest of visual communication in the same life there as an ordinary human being or employees. This course will guide students produce projects that are more visually make sense. Students will be guided in understanding the various perspectives see the concept of visual. visual communication and pembangunanya history, its importance from the perspective of various cultures and their application in publishing something. This course helps students become more critical and sensitive to the use of color, layout, form and selection tona in attracting attention and leave the meaning to the audience

References

- 1. Jamieson, H. (2007). Visual Communication. More than Meets the Eyes. Bristol, United Kingdom.
- Martin, P., Ross, S.D. (2003) Images that Injure. Pictorial Stereotypes in the Media. Praeger: Westport Connecticut
- Smith, K.L., Moriarty, K., Barbatsis, G., & Kenny, K. (Penyt.) (2010). Handbook of Visual Communication: Theory, Methods, and Media. Routledge: Mahwah New Jersey.

KUW 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.

References

- 1. Tom Kelleys. The Ten Faces of Innovation. Doubleday (2005)
- 2. Tom Kelleys. The Art of Innovation. Doubleday (2001)

KUW 201/3 SMALL GROUP COMMUNICATION

Course Synopsis

The course aims to give students an understanding of the concepts and theories of small group communication. Our focus is on the core skills of communicatina in small groups, build problemsolving groups, build interpersonal relationships in small groups, lead small groups, and handling conflict in small groups. Overall this course introduces students to the knowledge and skills related to the formation, operation and problem-solving in small groups to use communication skills in small groups.

- 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.
- 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..



- 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..
- R. Scott Tindale et. Al. (Editors) (2002). Theory and Research on Small Groups. New York: Kluwer Academic Publishers

KUW 211/3 DIGITAL PHOTOGRAPHY

Course Synopsis

The course is offered as a compulsory course with aims to take and compose photographs using Single Lens Reflects (SLR) cameras and later edit and manipulate them in digital form. It is a practical learning course (i.e. taking, and manipulating images). Photo editing software such as Adobe Photoshop are taught to the students.

References

- 1. Dave Huss, (2004). How to do Everything with Digital Photography. McGraw Hill.
- 2. Gus Wylie, (1990). The Complete Photographer. Pyramid Books, London: Octopus Publishing Group.
- Dennis P. Curtain, (2006). A short course in using your digital camera. http://www. shortcourses.com.

KUW 212/3 GRAPHIC DESIGN FOR NEW MEDIA

Synopsis

This course introduces students to the fundamentals of graphic design by participating in lectures and critiques, completing design projects homework and class assignment. In this course, student will exposed with design strategies and graphics software to make sure student capable to solving design problems with creative process and be able to produce highly creative project.

References

1. Graphic Dsign Essentials: Skills, Software and Creative Strategies, Joyce Walsh Macario, 2009.

- 2. Color Messages and Meanings, Leatrice Eiseman, Graphix Press, 2006.
- Graphic Design: A User's Manual, Adrain Shaughnessey, 2009.

KUT 301/3 RESEARCH METHODOLOGY

Course Synopsis

This course aims to expose students to research methods in the social sciences. This course will help improve the ability of students to understand the concepts related to research methodology that can be used in scientific training.

- Ranjit Kumar .(2010). Research Methodology: A Step-by-Step Guide for Beginners; Sage Publications Ltd; Third Edition.
- John W. Creswell .(2008). Research Design: Qualitative, Quantitative, and Mixed Methods Approache; Sage Publications Ltd; Third Edition.
- Uwe Flick (2011). Introducing Research Methodology: A Beginner's Guide to Doing a Research Project; Sage Publications Ltd.

 William Lawrence Neuman (2006) Basics of Social Research: Qualitative and Quantitative Approaches (Allyn & Bacon; 2 Edition.

SUT 319/3 SOCIAL PSYCHOLOGY

Course Synopsis

This course focuses on social psychology and its use in helping the community. The scope of this course is more geared towards the use of social psychology in the development of society.

References

- 1. Aronson, E, Wilson, T.D. and Arkert, R.M. (1997) Social Psychology. Longman
- 2. Baron, R.A., Byrne, D and Johnson, B.T (1998) Exploring Social Psychology. Allyn and Bacon.
- Hogg, M.A. and Vaughn, G.M. (1998) Social Psychology. Prentice Hall.
- 4. Penington, D. C., Gillen, K. and Hill, P. (1999) Social Psychology. Arnold.
- 5. Lesko, W. A. (2000) Readings in Social Psychology. Allyn and Bacon

KUW 221/3 NEW ERA MANAGEMENT

Course Synopsis

This course aims to provide interfaith understanding to students about the concepts and principles proficiency to take care of the organization. In general this course focuses on the management of environmental recognition, design, management, lead and oversees and monitors the organization.

References

- Daft, Richard L. (2012). New Era Management (10th Edition). Mason, OH, USA: South-Western, Cengage Learning.
- 2. Chuck Williams (2011). Management. Mason, OH, USA: South-Western, Cengage Learning.
- Ricky W. Griffin (2012). Fundamentals of Management (6th Edition). Mason, OH, USA: South-Western, Cengage Learning.
- John R. Schermerhorn (2011). Management (11th Edition). Hoboken, New Jersey: John Wiley & Sons, Inc.
- Thomas S.Bateman dan Scott A. Snell (2004). Management: The New Competitive Landscape (6th Edition). New York: McGraw-Hill Companies, Inc.

 Jeffrey A Miles (2012). Management and Organization. San Francisco, CA: Jossey-Bass.

KUW 301/3 NEW MEDIA AND CROSS CULTURAL COMMUNICATION

Course synopsis

Sidang Akademik 2014/2015 - Academic Session 2014/2015

This course aims to expose students to cross-cultural communication skills. This course will help improve the ability of students to understand the concepts associated with cross-cultural communication that can be used in the context of organizations, small group and dyad level. Students will be exposed to strategies to improve cross-cultural communication competence.

- 1. Judith Martin, Thomas Nakayama. (2009);Intercultural Communication in Contexts; McGraw-Hill Humanities/Social Sciences/Languages; 5 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



- James William Neuliep.(2011). Intercultural Communication: A Contextual Approach; Sage Publications, Inc; Fifth Edition edition
- 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

KUW 302/3 INTEGRATED MARKETING COMMUNICATION

Course Synopsis

This course emphasizes the principles of management in planning and implementation, control strategies of corporate communications and public organizations of their marketing communications efforts. Marketing goods and services of the organization is seen in a broad context. The course focused on the integration of all elements. of marketing communication view this practice as a separate and independent. The ability of a computer-based information technology, software applications

and interactive media were also emphasized. At the end of the course students will be able to achieve the objectives of marketing communications organization through a systematic planning concept of brand management and integrated marketing communications strategy.

References

- 1. Tuckwell, K.J. (2011). Integrated Marketing Communication: Strategic Planning Perspectives. Canada: Pearson.
- Kenneth E. C. & Baack, D. (2011). Integrated Advertising, Promotion & Marketing Communications (5th ed.). Prentice Hall
- Biagi, S. (2009). Media Impact: An Introduction to Mass Media. London: Wadsworth.
- Dominick, J. R. (2010). The Dynamics of Mass Communication Media in Transition. NewYork: McGraw-Hill.
- Rosenberry, J & Vicker, L. A. (2009). Applied Mass Communication Theory A Guide For Media Practitioners. Boston: Pearson/ Allyn and Bacon.
- Stanley, J.B. & Dennis, K.D. (2009). Mass Communication Theory: Foundations, Ferment and Future (2nd Ed.). Belmont: Wadsworth.

KUW 311/3 DIGITAL VIDEO PRODUCTION

Course Synopsis

This course focuses on the principles, processes and methods of single-camera digital video production. Lectures will focus on the terms and concepts related to the management of the production and publication process. The lecture will explain the research methodology in publishing, publishing proposal preparation methods, format and method of writing the script and every method of digital video production process including aspects of filming, editing and final mix of the various elements to be included in the publication. At the end of the course students can produce a short publication in the genre of documentaries, public service announcements and advertisements.

- 1. Linaschke, J. (2011) Introducing Final Cut Pro X: Learn by Video. Format: DVD-ROM (48 pages). http://www. Campus books. com/books/books/specialty.
- 2. Rabiger, M. (2005). Directing the Documentary. (Ed.5). Focal Press: Berlington MA

- 3. Tomaric, J. (2007). The Power Filmmaking Kit: Make Your Professional Movie on a Next-to-Nothing Budget. The Textbooks.Com
- 4. Wise, M. (1989). Film and Video Financing. California: Michael Wiese Productions

KUW 312/3 WEB DESIGN AND DEVELOPMENT

Course Synopsis

This course explores alternative methods of web design, including typography, imaging, and advanced asset management. Upon completion of this course, students use the web page user interface program to effectively create pages with well-structured HTML content. Emphasis is placed on the design of multi page layout for various types of web sites. Through hands-on projects, the student learns to navigate through the program, while understanding complex issues.

References

- Web Development and Design Foundations with HTML5, 6/E Terry Felke-Morris, Harper College, 2012.
- 2. Basics of Web Design: HTML5 & CSS3 Terry Felke-Morris, Harper College, 2011.

- 3. Writing for the Web: Creating Compelling Web Content Using Words, Pictures, and Sound, Lynda Felder, 2011.
- 4. Programming the World Wide Web, 7/E, Robert W. Sebesta, University of Colorado, Colorado Springs, 2012.
- 5. From Idea to Web Start-up in 21 Days: Creating bacn. com, Jason Glaspey and Scott Kveton. 2010.

KUT 302/3 DATA REASONING

Course Synopsis

This course aims to expose students to the method of data analysis. This course will help improve students' ability to summarize interpretation, analyze and manipulate data, particularly in the context of the social sciences in general, and communication and new media in particular.

References

- 1. Arthur Aron, Elaine N. Aron and Elliot Coups .(2010). Statistics for The Behavioral and Social Sciences: A Brief Course (5th Edition) Prentice Hall
- Perry R. Hinton (2004) Statistics Explained: A Guide for Social Science Students, 2nd Edition; Routledge

- Alan Agresti and Barbara Finlay (2008) Statistical Methods for the Social Sciences (4th Edition) Prentice Hall
- Frederick J. Gravetter & Larry B. Wallnau. (2012). Statistics for the Behavioral Sciences; 9 edition Wadsworth Publishing;
- Paul D. Allison .(1998). Multiple Regression : A Primer (Undergraduate Research Methods & Statistics in the Social Sciences) Sage Publications

KUW 321/3 INVENTION SKILLS

Course Synopsis

This course focuses on the management of creativity and innovation in business today. Students will be exposed to the concepts and processes of creativity and innovation. Students will also be exposed to the opportunities and challenges in creating ideas, products and services in a creative and innovation in line with today's business challenges. The approach will be used including lectures, self-assessment, preparation and presentation projects. kadem



References

- 1. Tom Kelleys. The Ten Faces of Innovation. Doubleday (2005)
- 2. Harvard Business Review Staff, Managing Creativity and Innovation. (2009). United Kingdom: Harvard Business Review Press.
- Ceserani, J. and Greatwood, P. (1995). Innovation and creativity. London: Kogan Page.
- 4. Frederick, H.H., Kuratko, D.F, & Hodgetts, R.M. (2007). Entrepreneurship: Theory, process & practice. Australia: Thomson Publication.
- Hisrich, R.D., Peters, M.P., & Shepherd, D.A. (2008). Entrepreneurship, 7th edition. Singapore: Mc Graw Hill Companies.

KUW401/3 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.

References

- Seitel, Frasier (2011). The Practice of Public Relations (11th ed.). Upper Saddle, New Jersey: Pearson.
- Newsom, D., Turk, J.V. and Kruckerberg, D. (2010). This is PR: The Realities of Public Relations (9th ed.). Belmont, CA: Wadsworth.
- Cutlip, M.S., Center, H.A. and Broom, M.G. (2009). Effective Public Relations (10th ed). New Jersey: Prentice Hall.
- Breakenridge, D., (2008). PR 2.0
 New Media, New Tools, New Audiences. Pearson Education. United States of America.
- Kelleher, T. (2007)., Public Relations Online (1st ed.). Sage Publication, Inc.

KUW 402/3 MANAGERIAL COMMUNICATION

Course Synopsis

This course aims to expose students to the communication skills of management. This course will help improve the ability of students to understand the concepts associated with the management of communication that can be used in the context of organizations, small group and dyad level. Students are exposed to conflict management skills, problem solving and decision making in the context of the organization

- 1. Geraldine Hynes. (2010). Managerial Communication: Strategies and Applications; McGraw-Hill/Irwin: 5 edition
- 2. Mary M. Munter. (2011). Guide to Managerial Communication (9th Edition) Prentice Hall
- Raman, Meenakshi and Prakash Singh, Business communication, Oxford University Press, 2006.
- Raman Meenakshi and Sangeeta Sharma. 2004. Technical Communication. New Delhi: Oxford University Press.
- 5. Ober Scot. 2004. Contemporary Business Communication, Fifth Edition. New Delhi: Biztantra

KUW 411/3 DIGITAL MEDIA PRODUCTION

Course Synopsis

This course introduces students to the fundamentals of digital multimedia design and production, animated graphics, interactivity and digital imaging. In this course, learning computer applications and being creative within the field are equally important. It is significant to understand how conceptual studies and technical solutions will support each other during digital media production processes.

References

- 1. William G. Nickels (2008) Understanding Business. Edition 6. Irwin McGraw-Hill.
- 2. AB Aziz Yusof (2011). Engineering Entrepreneurship, Selangor, Malaysia: Pearson
- 2. AB Aziz Yusof (2000). Usahawan dan Pengukuhan Jaringan Rakan Niaga, Kedah, Malaysia: Penerbit UUM.
- Barringger, Bruce R & Ireland, R. Duane (2008).
 Entrepreneurship: Succesfully Launching New Ventures, 2nd edn, New Jersey: Prentice Hall.
- Kuratko, Donald F (2009). Introduction to Entrepreneurship, 8th edn, Canada: South Western.

 Khalidah Khalid, Business Management: A Malaysian Perspective, 1st edn, Shah Alam: Oxford Fajar Sdn. Bhd.

KUW 412/3 ANIMATION FOR INTEGRATED MEDIA

Course Synopsis

This course provides the students with the familiarization of the Macromedia Flash. It also will cover the fundamental programming concepts in addition the flash environment. The course also covers principles of interface design, measurement as it applies to embedded items, and requires the writing of an instructional design document. Students finishing this course will have at least one completed fully functional Flash project for their portfolios demonstrating a strong knowledge of the tool and a good foundation in the Action Script language as the tools and the language apply to instructional design.

References

 Option A: Flash CS3 [Computer software]. (2007). Adobe.
 (\$249 student/teacher version through Adobe website) Option B: 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.

KUW 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.

References

- 1. William G. Nickels (2008) Understanding Business. Edition 6. Irwin McGraw-Hill.
- 2. AB Aziz Yusof (2011). Engineering Entrepreneurship, Selangor, Malaysia: Pearson

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- ABAziz Yusof (2000). Usahawan dan Pengukuhan Jaringan Rakan Niaga, Kedah, Malaysia: Penerbit UUM.
- Barringger, Bruce R & Ireland, R. Duane (2008).
 Entrepreneurship: Succesfully Launching New Ventures, 2nd edn, New Jersey: Prentice Hall.
- Kuratko, Donald F (2009). Introduction to Entrepreneurship, 8th edn, Canada: South Western.
- Khalidah Khalid, Business Management: A Malaysian Perspective, 1st edn, Shah Alam: Oxford Fajar Sdn. Bhd.

KUW 421/3 STRATEGIC 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.

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.
- Harvard Business School (2005). Strategy: Create and Implement the Best Strategy for Your Business. Boston, Massachusetts: Harvard Business School Publishing Corporation.
- 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 Strateghy 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.

KUW 403/3 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.

- 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.
- Goldblatt, J. (2005). Special Events: Twenty-First Century Global Event Management. (5th ed.) Wiley Publication

 Allen, J. et.al (2005). Festival and Special Event Management (3rd ed.) Wiley Publication

KUW 404/3 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.

References

- 1. Suhaini Muda dan Ahmad Shamsul Abd Aziz, (2007). Undang-undang Komunikasi.
- 2. Kuala Lumpur: Pearson Prentice Hall.
- Cyber laws of Malaysia. Petaling Jaya: International Law Book Services.
- Abdul Aziz Bahri. (2008). Perlembagaan Malaysia teori & praktis. Shah Alam: Arah Pendidikan.
- 5. Aun, W. M. (2005). The Malaysian Legal System. Petaling Jaya: Pearson.

- Kamal Halili Hassan. (1990). Penulis dan Undang-undang. Dewan Bahasa dan Pustaka. Kuala Lumpur.
- Mohd Safar Hasim, (2002). Mengenali Undang-undang Media dan Siber. Kuala Lumpur: Utusan Publications & Distributors Sdn. Bhd.
- 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.

KUW 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.

References

- Leah A Lievrouw & Sonia Livingstone (2006) Handbook of New Media: Student Edition; Sage Publications Ltd.
- Martin Lister, Jon Dovey, Seth Giddings, Iain Grant, Kieran Kelly; (2009); New Media: A Critical Introduction; Routledge; 2 edition.
- Nicholas Gane and David Beer (Oct 28, 2008) New Media: The Key Concepts; Berg Publishers; English Ed edition
- 4. Robert I. Berkman and Christopher A. Shumway (2003) Digital Dilemmas: Ethical Issues for Online Media Professionals (Media and Technology); Wiley-Blackwell
- John V. Pavlik & Shawn McIntosh (2010) Converging Media: A New Introduction to Mass Communication; Oxford University Press, USA; 2 edition.

KUT 441/4 FINAL YEAR PROJECT

Course synopsis

This course aims to explain issues related to the field of communications, new media and entrepreneurship. Through this course the student is able to contribute their knowledge related to the field. Scope for each selected



topic will increase further the understanding and development of something that science and specific methodologies related fields studied. The investigation is controlled by students and supervised by the central lecturer this study.

References

- Alan Agresti and Barbara Finlay (2008) Statistical Methods for the Social Sciences (4th Edition) Prentice Hall
- Arthur Aron, Elaine N. Aron and Elliot Coups .(2010). Statistics for The Behavioral and Social Sciences: A Brief Course (5th Edition) Prentice Hall
- Earl R. Babbie (2010). The Basics of Social Research; Wadsworth
 Publishing; 5 edition.
- Frederick J. Gravetter & Larry B. Wallnau. (2012). Statistics for the Behavioral Sciences; 9 edition Wadsworth Publishing;
- 5. John W. Creswell .(2008). Research Design: Qualitative, Quantitative, and Mixed Methods Approache; Sage Publications Ltd; Third Edition.
- Paul D. Allison. (1998). Multiple Regression: A Primer (Undergraduate Research Methods & Statistics in the Social Sciences) Sage Publications

- Perry R. Hinton (2004) Statistics Explained: A Guide for Social Science Students, 2nd Edition; Routledge
- 8. Ranjit Kumar. (2010). Research Methodology: A Step-by-Step Guide for Beginners; Sage Publications Ltd; Third Edition.
- 9. Uwe Flick (2011). Introducing Research Methodology: A Beginner's Guide to Doing a Research Project; Sage Publications Ltd.
- William Lawrence Neuman (2006) Basics of Social Research: Qualitative and Quantitative Approaches (Allyn & Bacon; 2 Edition.

EIT 302/4 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.

References

- 1. UniMAP Industrial Training Guideline
- 2. UniMAP Industrial Training Log Book

JOB OPPURTUNITIES

- 1. Public Relations Executives/ MarComm
- 2. Corporate Communications Executives
- 3. Interactive Designer
- 4. Event Manager

University Courses

UUW224/2 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.

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.
- Peggy A, Lambing and Charles R. Kuehl, 'Entrepreneurship', 4th Edition, Pearson, 2007.
- Rosli Mahmood, et. all, 'Prinsipprinsip Keusahawanan: Pendekatan Gunaan', 2nd Edition, Cengage Learning, 2010.
- William G. Sullivan, Elin M. Wicks and James T. Luxhoj, 'Engineering Economics', 13th Edition, Pearson, 2006.

Offering Schedule

Semester	Year 1	Year 2	
Semester 1	PPIPT (International Business)	PPK Bioproses PPK Alam Sekitar PPK Mikro-Elektronik PPK Mekatronik	
Semester 2 PPIPT (Engineering Entrepreneurship)		PPK Bahan PPK Sistem Elektrik PPK Komputer & Perhubungan PPK Pembuatan	

* 1 class : 60 students

UUW233/2 ISLAMIC & ASIAN CIVILIZATIONS

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.

References

- Shuhairimi Abdullah, Abdul Jalil Ramli, Noor Salwani Hussin, Siti Aisyah Mohd Nor, Maskor Bajuri, Mohd Mizan Mohammad Aslam, Ku Halim Ku Ariffin. (2011). Tamadun Islam dan Tamadun Asia, Pearson Malaysia Sdn. Bhd., Selangor.
- 2. Azizan Baharuddin, Osman Bakar, Zaid Ahmad. (2009). *Modul Pengajian Tamadun Islam & Tamadun Asia*, Penerbit Universiti Malaya: Kuala Lumpur
- 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.

 Zaid Ahmad. (2005) "Ibnu Khaldun's Approach in Civilizational Studies in Massino Companini, Studies on Ibn Khaldun, Corso Milano Italy: Polimetrica International Scientific Publisher.

UUW235/2 ETHNIC RELATIONS

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.

- 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.

- Wan Mohd Nor Wan Daud. (2001). Pembangunan di Malaysia. Kuala Lumpur ISTAC
- 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

UUW322/2 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.

References

- 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.
- De Bono, Edward,' Pemikiran Lateral untuk Pengurusan. Kuala Lumpur', Golden Book Sdn. Bhd, 2001.
- Mohd, Ainon & Hassan, Abdullah., 'Belajar Berfikir'. Pahana: PTS Publication, 2003.
- Wright, Larry., 'Critical Thinking: An Introduction to Analytical Reading and Reasoning'. USA:Oxford University Press, 2001.

UUT122/ BUW122/2 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.

- 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.
- Pearson, J. Nelson, p. Titsworth, S. Harter, L.,' Human Communication 2nd Edition',New York: McGraw Hill, 2006.
- Wood, J.T., 'Communication Mosaics: An introduction to the field of communication. 3rd Ed. Wadsworth', Thomson Learning, 2004.
- 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.

Offering Schedule

Semester	Year 1
Semester 1	PPIPT (Engineering Entrepreneurship) PPK Alam Sekitar PPK Bahan PPK Komputer & Perhubungan PPK Mekatronik
Semester 2	PPIPT (International Business) PPK Bioproses PPK Mikro-elektronik PPK Sistem Elektrik PPK Pembuatan

*1 class : 60 students

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 alobal 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.

References

- Bovee, C. and V. Thill, J., 'Business Communication Essentials', 4th Edition,) Prentice Hall; 4th Edition, 2009.
- Krizan, Merrier, Logan, Williams, 'Business Communication'. Thomson - South Western, 2009.
- 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
- Marry Ellen Guffey, 'Business Communication: Process and Product', South-Western College Pub; 6th Edition, 2007.

Offering Schedule

Semester	Year 1	Year 2
Semester 2	PPIPT (Engineering Entrepreneurship)	
Semester 1		PPIPT (International Business)

EUT442/2 PROFESSIONAL ENGINEERS (FOR ENGINEERING STUDENTS ONLY)

Course Synopsis

This course aims to explain the main concept in engineering ethics, risk management and occupational safety and health as well as to expose the student to the basics of law in the engineering context. The materials will be of introductoru nature to enable engineers to appreciate factors that has to be taken into consideration 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 requirement related to engineering field.

- 1. Charles B. Fledderman, Engineering Ethics, E Source Prentice Hall 3rd Edition
- 2. Lee Mei Pheng, 'General Principles Of Malaysian Law, Third Edition',Penerbit Fajar Bakti, Shah Alam, 1998.
- 3. Mike W. Martin, Roland Schinzinger, 'Ethics In Engineering', McGraw Hill, 2005.



- Registration Of Engineering Act 1976 and Registration Of Engineer Regulation, 1990.
- R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, 'Engineers In Society', Mc Graw Hill 2nd Edition.

EUT444/3 MANAGEMENT FOR ENGINEERS (FOR ENGINEERING STUDENTS ONLY)

Course Synopsis

This course aims to teach students on how to apply project management skills when undertaking 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.

References

 Stanley E.P., Samuel J.M, Jack R. M, Scot M.S and Margaret M.S, "Project Management: Planning, Scheduling, and Controlling Project", John Wiley & Sons, 2008.

- William G. Sullivan, Elin M. Wicks and James Luxhoj, "Engineering Economy", Prentice Hall, 2005
- 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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Introduction

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, Russian 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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459



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461

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.

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.
- 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.
- 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

- NIL

- 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.
- Dewan Bahasa dan Pustaka.
 (2005). Kamus Dewan (edisi ke-4). Kuala Lumpur: Dewan Bahasa dan Pustaka.
- 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.
- Sulaiman Masri, Abdullah Yusof & Mohd Ra'in Shaari. (2007). Bahasa Melayu: Dimensi pengajaran dan pembelajaran. Kuala Lumpur: Utusan Publications & Distributors 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 sunthesizing 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) Pass Foundation English with minimum grade C
- b) Obtained at least a MUET Band 4
- c) Obtained TOEFL 525 / IELTS 5.5 and above
- d) UniMAP Diploma graduates who have passed Diploma English 1 and 2 with minimum grade C

References

- 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.
- Lannon, J. M., & Gurak,
 L. J. (2011). Technical
 Communication (12th Ed.).
 United States: Pearson.
- 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.

 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) Pass Foundation English with minimum grade C
- b) Obtained at least a MUET Band 4
- c) Obtained TOEFL 525 / IELTS 5.5 and above
- d) UniMAP Diploma graduates who have passed Diploma English 1 and 2 with minimum grade C

References

- 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
- Chin, P., Koizumi, Y., Reid, S., Sean Wray, & Yamazaki, Y. (2011). Academic writing skills:
- 5. Student's book 1. Cambridge, UK: Cambridge University Press.
- 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.
- 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.

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.
- Fuchs, M., Bonner, M., & Westheimer, M. (2000). Focus on grammar: An intermediate course reference and practice. (2nd Edition). New York: Longman.
- Langan, J. (2008). College writing skills (7th Edition). Singapore: McGraw Hill.
- Macmillan English dictionary for advanced learners. (2011) (2nd ed.). Oxford, United Kingdom: Macmillan Publishers Limited. (Original work published 2002).
- 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.

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.
- 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.

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.

- Zhu, X. K. (2009). Dr.Zhou's rhymes for learning Chinese-Book2, Beijing: Peking University Press.
- 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.

- 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.





- Liu, M. (2007). BBC basic business Chinese. Beijing: Peking University Press.
- Qin, H. (2011). A dictionary of everyday English metaphors (English-Chinese). Beijing: Peking University Press.
- 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.

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.
- Liu, M. (2007). BBC Basic Business Chinese. Beijing: Peking University Press.
- 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.

References

- 1. Becker, B. 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.
- 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.

References

- 1. Becker, B. 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.

References

- 1. Becker, B. P. (2003).*Thai for Beginners*. Bangkok: Paiboon Publishing.
- 2. Ponmanee, S, (2000). *Learn to Read Thai*. Chiangmai: Thaigreat.
- Becker, B.P. (2003). Improving Your Thai Pronounciation.
 Bangkok: Paiboon Publishing.
- 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.

- 1. Becker, B. 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.

References

- 1. Abdullah Sulaiman Al-Jarbuk, Tammam Hassan Umar, Mahmud Kamil al-Nagah,
- 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.

- Muhammad Roihan Hasbullah M.A (Hj.) (2002). Perbualan bahasa Arab untuk peringkat rendah dan menengah. Kuala Lumpur: Pustaka Syuhada.
- Sekumpulan guru-guru Bahasa Arab (1987). Al-Jadid al-Lughati al-Araabiyyah Li al-Sanah al-Ula al-Ikdadiyah. Gombak Utara Selangor: Pustaka Markiland.
- Bahasa Arab 1 (2002).
 Bahagian Bahasa Arab, Universiti Sains Malaysia (Pusat Bahasa & Terjemahan).
- Zaid Al-Hamid (2001). Pelajaran bahasa Arab untuk semua. Kuala Lumpur: Speedy Self Study System.
- 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.

- H. Ridlo. Masduki (Prof.Dr.), H.Chatibul Umam (Prof. Dr.) H. Moh. Matsna (Dr.) (2000). العربية Kuala Lumpur: Darul Ulum Press.
- Nuhammad Akram Saaduddin (at all), (1990). : العربية الفصيحة القلم للناطقين بغير ها وبها Fajar Ulung Sdn. Bhd. L.B.C. Publishers International Book Centre.
- Ishak Mohd. Rejab (Prof. Madya Dr.) (1987). Kursus bahasa Arab (Bahagian 11). Kuala Lumpur: Yayasan Dakwah Islamiah Malaysia (YADIM).
- Ali al-Jarim, Mustafa Amin (1966), , النحو الواضح في قواعد اللغة العربية Mesir.
- Elias A. Elias & Ed. E. Elias (n.d.) , القاموس العصري , عربي - انكليزي Mesir.
- 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.
- Sono Cairo Audio, VIDEO CD, (t.t.), تعليم اللغة العربية للمتحدثين بالانجليزية , Cairo Egypt.
- 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 Bahasa Moden dan Komunikasi.
- 11. Mustaffa Abdullah (terjemahan oleh Siti Rohaya Sarnap & Siti Sujinah Sarnap (2000). Cara mudah belajar bahasa Arab. Sinagpore: JAHABERSA & CD.
- Al-said Muhmmad Badawi (Dr.), (1983), تعليم اللغة العربية لغير الناطقين بها Tunisia.
- 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.

References

- 1. Mahmud Ismail As-sini (Dr.) (1993). العربية للناشئين : منهج متكامل لغير Arab Saudi: Darul الناطقين بالعربية Ma'arif Mamlakah.
- Nuhammad Akram Saaduddin (et al.) (1990). : العربية الفصيحة القلم . Kuala Lumpur: Fajar Ulung Sdn. Bhd. L.B.C. Publishers International Book Centre.
- Ishak Mohd. Rejab (Prof. Madya Dr.). (1987). Kursus Bahasa Arab (Bahagian 11). Kuala Lumpur: Yayasan Dakwah Islamiah Malaysia (YADIM).
- Ali al-Jarim, Mustafa Amin (1966). النحو الواضح في قواعد اللغة العربية. Mesir.
- 5. Linguaphone: Rakaman kaset dan buku panduan (1990). London: Linguaphone Institute Limited, St. Giles House.
- Sohair Abdul Moneim Sery (1997). Kursus Bahasa Arab (Arabtone). Selangor: Anglophone (Malaysia). Sdn. Bhd.

- Sidang Akademik 2014/2015 Academic Session 2014/2015
 - 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.

- 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
- Abdul Rahman Al-Barquni (1979). Darul Kitab, Beirut شرح ديوان المتنبي. يبروت : دار الكتاب





- 4. Syauqi Dhaif (n.d.). البارودی رائد الشعر الحديث , Darul Ma'arif, Kaherah, Mesir.
- Subhi Soleh (1960). دراسات في فقه اللغة Darul 'Ilmi Malayin, Beirut.
- 6. Ali Abdul Wahid Wafi (1945). فقه اللغة Darul Nahdhah, Mesir.
- 7. Imil Badi' Ya'kub (1982). العربية Darul 'Ilmi وخصائصها فقه 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, practising 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.

References

- 1. Ku Mohd Nabil. (2010). *Modul Bahasa Jepun II*. Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis.
- 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).
- Hirai, E. & Miwa, S.(2000). Minna no Nihongo 1 BunkeiRenshuuTyou, Tokyou : 3A Corporation.
- 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.

- 1. Ku Mohd Nabil. (2010). *Modul Bahasa Jepun II*. Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis.
- Hirai, E. & Miwa, S.(2000). Minna no Nihongo 1BunkeiRenshuuTyou, 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.

References

- 1. Ku Mohd Nabil. (2010). *Modul Bahasa Jepun II*. Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis.
- 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).
- Hirai, E. & Miwa, S.(2000).
 Minna no Nihongo
 1BunkeiRenshuuTyou, 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.

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).
- Hirai, E. & Miwa, S. (2000). Minna no Nihongo 1BunkeiRenshuuTyou, Tokyo: 3A Corporation.

5. Miyagi, S. & Mitsui, A.(1997). Everyday Listening in 50 days: Tokyo: Bonjinsha Corporation

UVW118/2 GERMAN I

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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.

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.
- Dieter Maenner.
 (2006),Eurolingua Deutsch 1, Berlin, Cornelsen Verlag.
- Ulrike Albrecht, Dorothea Dane.(2005),Passwort Deutsch 1 & 2, Stuttgart, Ernst Klett International GmbH.
- 6. Hanns-Josef Ortheil. (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.

References

- 47 Korean pronunciation for foreigners. (2009). Seoul University, Korea: Language Education Centre.
- 2. Easy to learn Korean. (2011). Korea, Seoul: Sungkyun Language Institute.
- 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.
- 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.

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.

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- 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.
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- 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.

References

- 47 Korean pronunciation for foreigners. (2009). Seoul University, Korea: Language Education Centre.
- 2. Easy to learn Korean. (2011). Korea, Seoul: Sungkyun Language Institute.
- 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.
- 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.
- 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.

- 1. 47 Korean pronunciation for foreigners. (2009). Seoul University, Korea: Language Education Centre.
- 2. Easy to learn Korean. (2011). Korea, Seoul: Sungkyun Language Institute.
- 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
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- Lee, Z. C. (2007). Queen' Korean. (2007). Peking, China: Peking University Press.



UVW120/2 RUSSIAN I

Course Synopsis

Russian Language I is a course designed for students who have no previous knowledge of the Russian language. At this level students will gain basic listening, reading, speaking and writing skills in standard spoken or written Russian. Students will learn and recognize Russian Alphabet (Cyrillic) and its sound system, as well as they will be introduced to simple grammar structures and also learn simple daily conversation in the Russian language. Throughout this course students will be introduced to Russian culture.

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.

References

 Rachel, F. (2002), Beginner's Russian, 2nd edition, Great Britain.

- Karavanova, N.B. (2006), Survival Russian. A course in conversational Russian, 6th edition (stereotype), Moscow, Russian Language. Courses.
- Kurlova,I.V. Nachinaem chitat po russki. (2008), Moscow. Russian Language. Courses.



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Introduction

cadem

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 practicaloriented; 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

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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Engineering Centre



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.
- 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

Engineering Centre



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

- 1. Timothy Sean Sykes. (2002). AutoCAD 2002 One Step at A Time. Prentice Hall.
- 2. Ralph Grabowski. (2002). Using AutoCAD 2002. Thompson Learning.
- 3. William J. Palm III. (2001). MATLAB for Engineering Students. McGraw Hill.

 Mohd Ramzan Mainal, Badri Abdul Ghani, Yahya Samian.
 (2000). Lukisan Kejuruteraan Asas. UTM





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INTRODUCTION

Institute of Engineering Mathematics is a centre of planning and monitoring the curriculum of mathematical engineering in UniMAP. Instead of research centre in mathematical engineering Institute of Engineering Mathematics provide specialist in method of mathematical research, simulations, statistics and operational research. Beside that, this institute play role as training centre for UniMAP society and others in related field of mathematics.

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Programme Offered

Doctor of Philosophy Master of Science (Engineering Mathematics) by Research Master of Science (Engineering Mathematics) by Mixed Mode

Courses Offered

DIPLOMA COURSES

DQT101/3 Mathematics I DQT102/3 Mathematics II DQT203/3 Mathematics III

DEGREE COURSES

EQT101/3	Engineeering Mathematics I
EQT102/3	Engineering Mathematics II
BQT133/3	Business Mathematics
BQT173/3	Business Statistics
EQT203/3	Engineering Mathematics III
EQT221/3	Discrete Mathematics & Linear Algebra
EQT241/3	Intermediate Mathematics
EQT271/3	Engineering Statistics
EQT272/3	Probability And Statistics
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



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.
- Ability to evaluate solutions of engineering problems using relevant concepts and methods.

References

- 1. Fundamental Mathematics McGraw Hill.
- James, G et.al. (2007): Modern Engineering Mathematics. Pearson Education, 4th edition.
- 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

This course will introduce to students to differential equations. Initially differential equations covered the methods to solve differential equations including first and second order differential equations and its applications. Next, the course will introduce to the separation of variables method to solve partial differential equations problem. Then, Laplace transform will be discussed as a method to solve differential equations. At the end of study, Fourier Series will be discussed to the students.

Cources Outcomes

- 1. Ability to solve differential equations which covered first and second order ordinary differential equations and partial differential equation.
- 2. Ability to apply the Laplace transforms method to solve and analyze certain

differential equations problems theoretically and physically.

- Ability to apply the fundamental understanding of Fourier series and able to express Fourier series and Fourier series expansions to any given function.
- 4. Ability to relate the differential equations and analyze certain physical problems.

Prerequisite

EQT 101 ENGINEERING MATHEMATICS I

- 1. Introduction To Ordinary Differential Equation (2010), Penerbit UniMAP.
- W. E. Boyce (2009): Elementary Differential Equations and Boundary Value Problems: International Student Version. John Wiley & Sons Inc., 9th edition.
- 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. B. 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.



D.G. Zill (2008). A First Course in Differential Equations. Brooks Cole, 9th edition.

BQT133/3 BUSINESS MATHEMATICS

Course Synopsis

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

This course covers topics on data and statistics, descriptive statistics (tabular, graphical presentation and numerical measures), introduction to random variable, discrete and continuous probability distributions, sampling and sampling distributions, estimation, hypothesis tests, regression and correlation, and introduction to multiple regression.

Cources Outcomes

- 1. Ability to apply the basic concept of statistics for statistical analysis and summarizing data.
- 2. Ability to differentiate between discrete and continuous random variables and solve probability distribution.
- Ability to identify and decide the suitable statistical inference and regression in decision making

- 1. Abdull Halim Abdul, Norazrita Amin, Biliana Bidin, Nor Fashihah Mohd Noor (2010) *Statistics*, Mc Graw 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.B., Levine, D. M. & Krehbiel, T.C. (2008) *Basic Business Statistics*, 11 edition, Prentice Hall.
- Bowerman, O. & Orris, P. (2008). Essentials of Business Statistics, 2nd edition, McGraw Hill/Irwin.
- 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

- 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.
- Ability to select appropriate numerical methods to solve the mathematical problems

References

- 1. Undergraduate Mathematics for Engineering Student. McGraw Hill.
- Erwin Kreyszig (2006): Advanced Engineering Mathematics, 9th edition, John Wiley & Sons, Inc.
- 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.
- K.A. Stroud (2001): Engineering Mathematics, 6th edition, Palgrave.
- K.A. Stroud (2003): Further Engineering Mathematics, 3rd edition, Palgrave.
- 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

- 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.
- Ability to relate and solve engineering problems using discrete mathematics and linear algebra.

- Rosen, H. Kenneth. 2007. Discrete Mathematics and Its Application (6th Edition). McGraw-Hill, New York.
- Ross, A. Kenneth & Wright, R. B. 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
- Buchmann, J.A. 2004.
 Introduction to Cryptography (2nd Edition). Springer-Verlag, New York.



- 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.
- 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.

 Ability to relate the relevant concept of vector calculus and numerical methods to solve engineering problems.

References

- Erwin Kreyszig (2006): Advanced Engineering Mathematics, 9th edition, John Wiley & Sons, Inc.
- 2. Undergraduate Mathematics for Engineering Student. McGraw Hill.
- 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.
- K.A. Stroud (2001): Engineering Mathematics, 6th edition, Palgrave.
- 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

This course introduces the fundamental concepts in statistics.

The definition of statistics and basic concepts of statistics such as collection of data, data summary and presentation, probability distribution and sampling distribution will be introduced to the students in topic basic statistics. This course also teaches the students on how to make a statistical inference which are estimation and hypothesis testing. Apart from that, students will learn on how to run statistical test and analyze the results obtained. These skills will be taught in topic introductoru linear regression (Simple linear regression, Least squares method, Test for linearity of regression and Pearson product moment correlation coefficient), analysis of variance (one-way and two-way ANOVA) and nonparametric statistics (The χ^2 test, Sign test, Mann-Whitney test, Kruskal Wallis test, Wilcoxonsigned rank test and Spearman rank correlation).

Cources Outcomes

- 1. Ability to understand, apply and explain the basic concepts of statistics.
- 2. Ability to solve problems using suitable statistical inference.
- 3. Ability to construct the model and analyze the result from ANOVA table and simple linear regression.
- Ability to apply the basic methodology of nonparametric statistics to solve engineering problems.

References

- 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.
- Mendenhall, W. and Sincich, T. (2006): Statistics for engineering and the sciences, 5th edition, Pearson.
- McClave, J., Sincich, T. and Mendenhall, W. (2008): Statistics, 11rd edition, Pearson.
- David, S.M., George, P.M. and Bruce, C. (2008): Introduction to the Practise of Statistics, 6th edition, Palgrave.
- 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.
- 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.
- K.A. Stroud (2001): Engineering Mathematics, 6th edition, Palgrave.
- 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).
- Ability to solve statistical problems using data analysis.

- 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.
- Mario F. Triola.(2009).
 Elementary Statistics Using
 Excel. Addison-Wesley. 4th
 Edition.



- . Beverly Dretzke. (2008). Statistics With Microsoft Excell. Prentice Hall. 4th Edition.
- Devore, J.L. (2007): Probability and Statistics for Engineering and the Sciences. Duxbury Press, 7th edition.
- 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
- W. E. Boyce (2009): Elementary Differential Equations and Boundary Value Problems: International Student Version. John Wiley & Sons Inc, 9th edition.
- 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. B. Saff and A.D. Snider (2008). Fundamentals of Differential Equations and Boundary Value Problems. Addison-Wesley, 5th edition.

- D. G. Zill and M.R. Cullen (2008): Differential Equations with Boundary-Value Problems. Brooks Cole, 7th edition.
- 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
- Ability to solve numerical problems by selecting suitable numerical methods.

References

- 1. Undergraduate Mathematics for Engineering Student. McGraw Hill.
- Erwin Kreyszig (2006): Advanced Engineering Mathematics, 9th edition, John Wiley & Sons, Inc.
- 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.
- K.A. Stroud (2001): Engineering Mathematics, 6th edition, Palgrave.
- K.A. Stroud (2003): Further Engineering Mathematics, 3rd edition, Palgrave.

PQT 274/3 STATISTICS FOR ENGINEERING TECHNOLOGY

Course Synopsis

This course introduces the fundamental concepts in statistics. The definition of statistics and basic concepts of statistics such as collection of data, data summary and presentation, probability distribution and sampling distribution will be introduced to the students in topic basic statistics. This course also teaches the students on how to make a statistical inference which are estimation and hypothesis testing. Apart from that, students will learn on how to run statistical test and analyze the results obtained. These skills will be taught in topic introductory linear regression (Simple linear regression, Least squares method, Test for linearity of regression and Pearson product moment correlation coefficient), analysis of variance (one-way) and nonparametric statistics (The χ^2 test, Sign test, Mann-Whitney test and Spearman rank correlation).

Cources Outcomes

- 1. Ability to understand, apply and explain the basic concepts of statistics.
- 2. Ability to solve problems using suitable statistical inference
- Students should be able to identify the coefficients and apply the methods to construct simple linear regression model.
- 4. Students should be able to construct the ANOVA table and analyze the result.
- 5. Students should be able to understand, select and apply the basic methodology of nonparametric statistics.

- 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.
- Mendenhall, W. and Sincich, T. (2006): Statistics for engineering and the sciences, 5th edition, Pearson.
- 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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Introduction

The Centre for Industrial Collaboration (CIC) 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. CIC consists of several main units, namely Graduate Employability, Industrial Training, Industrial Networking, ICT & Publicity, Administration (Finance & Projects) and Integration Industry (Kulim). Among the programmes conducted with the involvement from industries are Industrial Exposure (IndEx), Industrial Entrepreneur (IndEnt), Industrial Training (InTra), Forums, Seminars with Industries, Job Camps, Graduate Trainee Programs, Degree++ Programs, MoU/MoA with Industries and Industry Centre of Excellence (ICoE).



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Course Offered

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

- **CO1:** Ability to display good work performance and adapt to the working environment during training period.
- **CO2:** Ability to demonstrate good communication skills, leadership and work ethics during training period.
- **CO3:** Ability to perform assigned task given by host company.

References

- 1. UniMAP Industrial Training Guideline (Revision April 2012)
- 2. UniMAP Industrial Training Log Book

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

- **C01:** Ability to display good work performance and adapt to the working environment during training period.
- **CO2:** Ability to demonstrate good communication skills, leadership and work ethics during training period.
- **CO3:** Ability to perform assigned task given by host company.

Reference

1. UniMAP Industrial Training Log Book

Sidang Akademik 2014/2015 - *Academic Session 2014/2015* 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 ao 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

- **CO1:** Ability to display good work performance and adapt to the working environment during training period.
- **CO2:** Ability to demonstrate good communication skills, leadership and work ethics during training period.
- **CO3:** Ability to perform assigned task given by host company.

Reference

1. UniMAP Industrial Training Log Book






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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 compulsory to take 1 @ 2 course or 3 unit. Co-curriculum Centre currently offers up to 44 co-curriculum courses for degree students regardless of their academic programmes.

Address Guide Book

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Co-Curriculum Courses Offered by Co-Curriculum Centre

During their study, all the degree students must take 3 unit from the courses that had been offered by the following divisions below:

BIL	SENARAI KURSUS	KOD KURSUS	UNIT	TERAS	PRA- SYARAT
1	Golf [Golf]	UZW101	1		Ditawarkan Secara Tunggal (Offered in Single)
2	Besbal [Baseball]	UZW102	1		
3	Woodball [Woodball]	UZW103	1		
4	Bola Sepak [Football]	UZW104	1		
5	Bola Jaring [Netball]	UZW105	1		
6	Tenis [Tennis]	UZW106	1		
7	Ekuestrian [Equestrian]	UZW107	1		
8	Angkat Berat [Weightlifting]	UZW108	1		
9	Bola Tampar [Volleyball]	UZW109	1		
10	Lawan Pedang [Fencing]	UZW174	1	Sukan	
11	Futsal [Futsal]	UZW175	1	(Sport)	
12	Boling Padang [Lawn Bowl]	UZW181	1		
13	Petanque [Petanque]	UZW182	1		
14	Kayak [Canoe]	UZW183	1		
15	Badminton [Badminton]	UZW184	1		
16	Hoki [Hockey]	UZW185	1		
17	Sepak Takraw [Sepak Takraw]	UZW186	1		
18	Ragbi (Rugby)	UZW187	1		
19	Memanah [Archery]	UZW188	1]	
20	Ping Pong [Table Tennis]	UZW189	1		
	Seni Silat Cekak I [Seni Silat Cekak I]	UZW171	1	Sukan (Sport)	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)
21	Seni Silat Cekak II [Seni Silat Cekak II]	UZW271	1		
	Seni Silat Cekak III [Seni Silat Cekak III]	UZW371	1		
	Taekwon-Do GTF I [Taekwon-Do GTF I]	UZW172	1		
22	Taekwon-Do GTF II [Taekwon-Do GTF II]	UZW272	1		
	Taekwon-Do GTF III [Taekwon-Do GTF III]	UZW372	1		
	Karate-Do [Karate-Do]	UZW173	1		
23	Karate-Do II [Karate-Do II]	UZW273	1		
	Karate-Do III [Karate-Do III]	UZW373	1		
	Taekwon-Do WTF I [Taekwon-Do WTF I]	UZW176	1		
24	Taekwon-Do WTF II [Taekwon-Do WTF II]	UZW276	1		
27	Taekwon-Do WTF III [Taekwon-Do WTF III]	UZW376	1		



BIL	SENARAI KURSUS	KOD KURSUS	UNIT	TERAS	PRA- SYARAT
25	Renang I [Swimming I]	UZW180	1	- Sukan - (Sport)	Ditawarkan Secara
	Renang II [Swimming II]	UZW280	1		Berperingkat
	Renang III [Swimming III]	UZW380	1		(Gradual Offered)
26	Penerbitan Video [Video Publishing]	UZW132	1	Kebudayaan - (Culture)	Ditawarkan Secara Tunggal (Offered in Single)
27	Seni Pergerakan Kreatif [Arts of Creative Movement]	UZW155	1		
28	Drama, Pementasan & Seni Lakon [Drama, Playwright & Acting]	UZW156	1		
	Pancaragam I [Brass Band I	UZW153	1		Kursus Berpakej - (Pelajar Harus Mengikuti Dari Peringkat 1 – 3 Untuk Memperolehi 3 Unit)
29	Pancaragam II [Brass Band II]	UZW253	1	Kebudayaan (Culture)	* Tahun 1 - 2 (3 Semester) Packaged Courses – (Students
	Pancaragam III [Brass Band III]	UZW353	1		should Following From Stage 1 -3 To Acquire 3 Units) * Years 1 - 2 (3 Semesters)
	Asas Gamelan [Foundations of Gamelan]	UZW151	1	- - - Kebudayaan - (Culture)	Ditawarkan Secara Berperingkat (Gradual Offered)
30	Gamelan II [Gamelan II]	UZW251	1		
	Gamelan III [Gamelan III]	UZW351	1		
TTT	Kumpulan Jazz I [Jazz Band I]	UZW152	1		
31	Kumpulan Jazz II [Jazz Band II]	UZW25	1		
	Kumpulan Jazz III [Jazz Band III]	UZW352	1		
	Angklung I (Angklung I)	UZW154	1		
32	Angklung II (Angklung II)	UZW254	1	-	
/	Angklung III (Angklung III)	UZW354	1		
33	Khidmat Masyarakat (Community Services)	UZW191	1	Kidmat Komuniti (Community Services)	
34	Daya Usaha & Inovasi [Initiative & Innovation]	UZW192	1	Daya Usaha & Inovasi (Initiative & Innovation)	
35	Pidato [Elocution]	UZW194	1	Pengucapan Awam	
36	Radio Kampus [Campus Radio]	UZW195	1	(Public Speaking)	Ditawarkan Secara Tunggal (Offered in Single)
37	Tajwid (Tajwid)	UZW193	1	Kepemimpinan (Leadership)	
38	Student In-Free Enterprise (SIFE) [Student In-Free Enterprise (SIFE)]	UZW196	1	Keusahawanan (Entrepreneurship)	

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BIL	SENARAI KURSUS	KOD KURSUS	UNIT	TERAS	PRA- SYARAT
39	Briged Bomba I [Fire And Rescue Briged I]	UZW120	1		
40	Briged Bomba II [Fire And Rescue Briged II]	UZW121	1	Kesukarelawanan (Volunteerism) 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)
	Pandu Puteri Siswi I (PPS I) [Girl Guide I (GG I)]	UZW122	1		
	Pandu Puteri Siswi II (PPS II) [Girl Guide II (GG II)]	UZW123	1		
41	St. John Ambulans Malaysia I [Malaysian St. John Ambulance I]	UZW124	1		
	St. John Ambulans Malaysia II [Malaysian St. John Ambulance II]	UZW125	1		
	Kumpulan Latihan Kelanasiswa Malaysia I [Malaysian University Rover Training Group I]	UZW126	1		
42	Kumpulan Latihan Kelanasiswa Malaysia II [Malaysian University Rover Training Group II]	UZW127	1		
	Kumpulan Latihan Kelanasiswa Malaysia (Laut) I [Malaysian University Rover Training Group I (Sea)]	UZW128	1		
43	Kumpulan Latihan Kelanasiswa Malaysia II (Laut) [Malaysian University Rover Training GrouP II (Sea)]	UZW129	1		
44	Kursus Persijilan Bulan Sabit Merah Malaysia I (BSMM I) [The Malaysian Red Crescent Certification Course I]	UZW164	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)
	Kursus Persijilan Bulan Sabit Merah Malaysia II (BSMM III) [The Malaysian Red Crescent Certification Course II]	UZW165	1		
	Kursus Persijilan Bulan Sabit Merah Malaysia III (BSMM III) [The Malaysian Red Crescent Certification Course III]	UZW264	1		
45	Kor Siswa Siswi Pertahanan Awam I (Kor SISPA I) [Malaysia Civil Defense Department I]	UZW162	1	Kesukarelawanan (Volunteerism)	Kursus Berpakėj – (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)
	Kor Siswa Siswi Pertahanan Awam II (Kor SISPA II) [Malaysia Civil Defense Department II]	UZW163	1		
	Kor Siswa Siswi Pertahanan Awam III (Kor SISPA III) [Malaysia Civil Defense Department III]	UZW262	1		
	Kor Siswa Siswi Pertahanan Awam IV (Kor SISPA IV) [Malaysia Civil Defense Department IV]	UZW263	1		
	Kor Siswa Siswi Pertahanan Awam V (Kor SISPA V) [Malaysia Civil Defense Department V]	UZW362			

BIL	SENARAI KURSUS	KOD KURSUS	UNIT	TERAS	PRA- SYARAT
46	Palapes Darat I [ROTU Army I]	UZW160	1	Kesukarelawanan (Volunteerism) Kesukarelawanan (Volunteerism)	
	Palapes Darat II [ROTU Army II]	UZW161	1		
	Palapes Darat III [ROTU Army III]	UZW260	1		Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 6 Untuk Memperolehi 6 Unit)
	Palapes Darat IV [ROTU Army IV]	UZW261	1		
	Palapes Darat V [ROTU Army V]	UZW360	1		
	Palapes Darat VI [ROTU Army VI]	UZW361	1		
47	SUKSIS-I @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- I @ Students Voluntary Police Corp]	UZW166	1		* Tahun 1 – 3 (6 Semester)
	SUKSIS-2 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 2 @ Students Voluntary Police Corp]	UZW167	1		Packaged Courses - (Students should Following From Stage 1 -6 To Acquire 6 Units)
	SUKSIS-3 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 3 @ Students Voluntary Police Corp]	UZW266	1		
	SUKSIS-4 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 4 @ Students Voluntary Police Corp]	UZW267	1		* Years 1 - 3 (6 Semesters)
	SUKSIS-5 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 5 @ Students Voluntary Police Corp]	UZW366	1		Kursus Berpakej – (Pelajar Harus Mengikuti Dari Peringkat 1 – 6 Untuk Memperolehi 6 Unit) * Tahun 1 – 3 (6 Semester)
	SUKSIS-6 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 6 @ Students Voluntary Police Corp]	UZW367	1		
48	Briged RELA Siswa Siswi (RELASIS) I [Malaysian People's Volunteer corps I]	UZW168	1		
	Briged RELA Siswa Siswi (RELASIS) II [Malaysian People's Volunteer corps II]	UZW169	1		
	Briged RELA Siswa Siswi (RELASIS) III [Malaysian People's Volunteer corps III]	UZW268	1		Packaged Courses - (Students should Following From Stage 1
	Briged RELA Siswa Siswi (RELASIS) IV [Malaysian People's Volunteer corps IV]	UZW269	1		-ο IO Acquire ο Units) * Years 1 - 3
	Briged RELA Siswa Siswi (RELASIS) V [Malaysian People's Volunteer corps V]	UZW368	1		(6 Semesters)
	Briged RELA Siswa Siswi (RELASIS) IV [Malaysian People's Volunteer corps IV]	UZW369	1		

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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.
- Lumb, N., 'A Beginner's Guide to Golf' Smithmark Publishers, 1989.
- McCord, Gary., 'Golf For Dummies by', Wiley Publishing, 2006.
- Parks, P., 'How to improve at Golf', Tunbridge Wells Ticktock, 2007.
- 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.
- Morgan, J., 'Baseball for Dummies', For Dummies, 2005.
- 4. Wallace, J., 'Baseball: 365 Days', New York Abrams, 2008.
- 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

- 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.
- 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, B., 'Netball: The Skills of the Game', Crowood Press, 1996.
- Mullan, N., Netball (Successful Sports)', Heinemann Library, 1997.
- Navin, A., 'Netball: Skills Techniques Tactics (Crowood Sports Guides)', Crowood Press, 2008.
- 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.
- 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

- Black, D., 'Horses and Owner's Guide', Greenwich Editions, 2001.
- 2. Draper, J., 'The Ultimate Book of the Horse and Rider' LB, 2000.
- Foster, C., 'Basic Jumping (Crowood Equestrian Guides)', Crowood Press, 1991.
- Foster, C., 'Basic Riding (Crowood Equestrian Guides)', Crowood Press, 1991.
- Ripman, B., '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.
- Everett, G., 'Olympic Weightlifting: A Complete Guide for Athletes & Coaches', Catalyst Athletics, 2009.
- Drechsler, A.J., 'The Weightlifting Encyclopedia: A Guide to World Class Performance', A is A Communications, 1998.
- Kinetics, H. and Sandler, D., 'Weight Training Fundamentals (Sports Fundamentals Series)', Human Kinetics, 2003.

UZW109 VOLLEYBALL

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

 Lee E.Brown, Vance A.Ferrigno, 2005, Training for speed, agility and Quickness, Second Edition, human kinetic.

- Kinda S. Lenberg, 2004 Coaching Volleyball Defensive Fundamentals and Tecnhniques, Second Edition, Coaches Choice.
- 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.

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. Co-Curriculum Centre





- . Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
- 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

- Malay, 'Silat Cekak Hanafi - Peneraju Warisan Mutlak', 2005.
- 2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.

- 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

- Malay, 'Silat Cekak Hanafi

 Peneraju Warisan Mutlak', 2005.
- 2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
- 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.
- Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
- 4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.

Co-Curriculum Centre

 Whang S.C., Whang, J.C., Lee, D.S., and Saltz, B., '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.
- Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (GTF)', UniMAP, 2003.
- Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
- 4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
- Whang S.C., Whang, J.C., Lee, D.S., and Saltz, B., '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.
- Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
- Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
- Whang S.C., Whang, J.C., Lee, D.S., and Saltz, B., '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 karatedo 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 karatedo. While technically, this course is focused on practical training (practical) skills in the art of karatedo.

- 1. Frost, B., 'Koei-Kan Karate-Do: Practice and Precept', Frog Books, 1998.
- Funakoshi, G., 'Karate-Do Kyohan: The Master Text', Kodansha International, 1973.
- 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.
- 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 karatedo 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 karatedo. While technically, this course is focused on practical training (practical) skills in the art of karatedo.

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 karatedo 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 karatedo. While technically, this course is focused on practical training (practical) skills in the art of karatedo.

References

 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.

- Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
- 4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
- Whang S.C., Whang, J.C., Lee, D.S., and Saltz, B., 'Taekwondo: The State of the Art', Broadway, 1999.

UZW276 TAEKWON-DO WTF II

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.

- 1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
- 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.
- Whang S.C., Whang, J.C., Lee, D.S., and Saltz, B., 'Taekwondo: The State of the Art', Broadway, 1999.

UZW376 TAEKWON-DO WTF III

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.
- Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (WTF)', UniMAP, 2003.

- Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
- Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
- Whang S.C., Whang, J.C., Lee, D.S., and Saltz, B., '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.
- Evangelista, N., 'The Art and Science of Fencing', McGraw-Hill; 1st Edition, 1999.

- Evangelista, N., 'The Inner Game of Fencing: Excellence in Form, Technique, Strategy and Spirit', McGraw-Hill; 1st Edition, 2000.
- Pitman, B., 'Fencing: Techniques of Foil, Epee and Sabre', Crowood Press, 1988.
- Price, R. G., 'The Ultimate Guide to Weight Training for Fencing (Ultimate Guide to Weight Training...)', Sportsworkout.com; 2nd Edition, 2009

UZW175 FUTSAL

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.

- 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.

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

- 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.
- Thomas, D., 'Swimming: Steps to Success – 3rd Edition (Steps to Success Sports Series)', Human Kinetics; 3rd Edition, 2005.

UZW280 SWIMMING II

Course Synopsis

The swimming II co-curriculum course aims to enhance the students' knowledge and skills on the techniques of swimming. 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 (practical) in terms of swimming skills.

References

- Brems, M., 'The Fit Swimmer: 120 Workouts & Training Tips', Mc-Graw Hill; 1st Edition, 1984.
- 2. Keegan, N., 'Swimming (Vintage Contemporaries)', Vintage, 2010.
- 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.

UZW380 SWIMMING III

Course Synopsis

The swimming III Co-Curriculum course aims to enhance and sustain the students' knowledge and skills on the techniques of swimming. 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 (practical) in terms of swimming skills.

- Brems, M., 'The Fit Swimmer: 120 Workouts & Training Tips', Mc-Graw Hill; 1st Edition, 1984.
- 2. Keegan, N., 'Swimming (Vintage Contemporaries)', Vintage, 2010.
- 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.
- 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

- Bell, J., 'Bowls: Skills, Techniques, Tactics (Crowood Sports Guides)', Crowood Press; illustrated Edition, 2007.
- Dobbie, J., 'Successful Lawn Bowls', John Wiley & Sons Australia Ltd; Revised Edition, 1987.
- Marshall, B. L. G., 'Lawn Bowls Champions Secrets', Lulu.com, 2008.
- 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.
- Fieux, P., 'La Petanque de Competition', Les Presses du Midi, 2002.
- 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.

- 1. Evans, J and Mattos, B., 'The Ilustrated Handbook of Kayaking, Canoeing and Sailing', 2007.
- Harrison, D., 'Whitewater Kayaking (Canoe & Kayak Techniques)', Stackpole Books; 1st Edition, 1998.
- Harrison, D. & Morser, B., '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, B. & 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.
- 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

- 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.
- Barth, K. and Nordmann, L., 'Learning Field Hockey', Meyer & Meyer, 2007.
- 3. Complete Book of Hockey (Anupam Sharma) New Delhi India: Anmol Publication 2006.
- 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.

 Mitchell-Taverner, C., http://www.amazon.com/ Hockey-Techniques-Tactics-Claire-Mitchell-Taverner/ dp/0736054375/ref=sr_1_2? s=books&ie=UTF8&qid=1279 557235&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.

- 1. Books LLC, 'Sport in Southeast Asia: Sepak Takraw', Books LLC, 2010.
- Dunsmore, S., 'Sepak Raga (Takraw) The South East Asian Ball Game', Sarawak Museum, 1983.

 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.
- 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.

- Williams, T. and Bunce, F., 'Rugby Skills, Tactics and Rules', Firefly Books; Revised edition, 2008.
- 5. http://www.irlfunds.org/ newzealand/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

- Axford, R., 'Archery Anatomy: An Introduction to Techniques for Improved Performance', Souvenir Press, 1996.
- Engh, D., 'Archery Fundamentals (Sports Fundamentals Series)', Human Kinetics; 1st edition, 2004.

- Haywood, M. and Lewis, C., 'Archery: Step to Success', Champaign IL Kinetics, 2006.
- Ruis, S. and Stevenson, C., 'Precision Archery', Human Kinetics; 1st edition, 2003.
- Sorrells, B., '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.

523

Co-Curriculum Centre



- McAfee, R., 'Table Tennis: Steps to Success (Steps to Success Activity Series)', Human Kinetics; 1st edition, 2009.
- Roetert, P. and Ellenbecker, T., 'Complete Conditioning for Tennis (Complete Conditioning for Sports Series)', Human Kinetics; 2007.
- Seemiller, D. and Holowchak, M., "Winning Table Tennis: Skills, Drills, and Strategies', Human Kinetics, 1996.

UZW132 VIDEO PUBLISHING

Course Synopsis

The course around the process will begin phase video course publishing pre-production touches on maintenance work before the filming or production phase to prepare the work of editing in addition. This course explores the control of the control of the camera and lighting skills to support the support the publication of a short video at the end of this course.

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)
- 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 B.(2003).303 Digital I Filmmaking Solution: Solve Ang Video Shoot or edit problem in 10 minutes or less. McGraw-Hill (ISBN: 0-07-141651-X)
- 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.
- Pickvance, R., 'A Gamelan Manual: A player's guide to the central Javanese gamelan', Jaman Mas Books, 2006.
- 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.

UZW251 GAMELAN II

Course Synopsis

The Gamelan II 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. theskills 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.
- 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.

UZW351 GAMELAN III

Course Synopsis

The Gamelan III 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. skills in playing the gamelan.

References

- 1. Ahmad, A., 'Lagu- lagu Gamelan: Buku 1', UM, 1997.
- 2. Nasarudin, M.G., 'Buku Muzik Tradisional Malaysia Edisi Baharu', DBP, 2003.
- Pickvance, R., 'A Gamelan Manual: A player's guide to the central Javanese gamelan', Jaman Mas Books, 2006.
- 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

Sidang Akademik 2014/2015 - Academic Session 2014/2015

- 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.
- 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.

UZW252 JAZZ BAND II

Course Synopsis

The Jazz Group II 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.

other related features 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.
- 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.
- 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.
- Brand, V. and Brand, G., 'Brass Bands in the Twentieth Century', Egon Publishers Ltd, 1979.
- 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

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.
- 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

UZW352 JAZZ BAND III

Course Synopsis

The Jazz Group II 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 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

- 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.
- Brand, V. and Brand, G., 'Brass Bands in the Twentieth Century', Egon Publishers Ltd, 1979.
- 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.

Sidang Akademik 2014/2015 - Academic Session 2014/2015

UZW353

BRASS BAND III

Course Synopsis

Brass Band III Co-Curriculum

to both the theoretical and

background, terminology,

References

1979.

Press, 2008.

3.

features of brass band, while

course aims to expose the students

technical aspects of brass musical

instruments. The theoretical aspect

self-management and other related

brass musical instruments in aroup.

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

'Brass Bands in the Twentieth

Century', Egon Publishers Ltd,

Burns, M., 'Keeping the Beat on

the Street: The New Orleans

Brass Band Renaissance',

Louisiana State University

4. Cameron, A., 'A Whole Brass

Band', Harbour, 1992.

Pennsulvania Press, 2003.

2. Brand, V. and Brand, G.,

of the course covers the history,

the technical portion focuses on

practical training of playing the

 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, B., ,Angklung Sampler Book', Self Published, 1993.
- LLC, B., '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.

Co-Curriculum Centre





- Winitasasmita, M.H., 'Angklung: Petunjuk praktis', Balai Pustaka, 1978.
- UZW254 ANGKLUNG II

Course Synopsis

Angklung II 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, B., Angklung Sampler Book',Self Published, 1993.
- 2. LLC, B., 'Indonesian Music: Gamelan, Music of Indonesia, Indonesian Popular Music Recordings, Gamelan Gong Kebyar, Kecak, Angklung, I La Galigo', Books LLC, 2010.
- 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.

UZW354 ANGKLUNG III

Course Synopsis

Angklung III 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, B., Angklung Sampler Book',Self Published, 1993.
- LLC, B., '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.

- 1. Bossler, C., '15 minutes Dance Workout', London Dorling Kindersley, 2009.
- 2. Kaufmann, K.A., 'Inclusive Creative Movement and Dance', Human Kinetics, 2005.
- Dora, M.B., 'See what I can do!: A book of creative movement', Prentice-Hall, 1973.
- 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, selfmanagement 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.
- Bernard, I., 'Film and Television Acting, Second Edition: From stage to screen', Focal Press; 2nd edition, 1997.
- 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.

UZW191 COMMUNITY SERVICE

Course Synopsis

The community service cocurriculum 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

- Carole B., 'Community Care for an Aging Society: Issues, Policies, and Services (Springer Series on Lifestyles and Issues in Aging)', Springer Publishing Company; 1st edition, 2004.
- Faizulaswad, 'Modul perlaksana kursus & seminar Motovasi', 2003.
- Faizulaswad, 'Modul teknikteknik belajar yang berkesan', 2003.
- Kamaruddin Hussin, 'Modul konsep kumpulan Dinamika & Peranan Fasilitator dalam mengendalikan latihan kumpulan secara berkesan', 1999.
- 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

- Theory and Practice of Tajwid," Encyclopedia of Arabic Language and Linguistics, IV, Leiden, Brill, 2007.
- Surul Shahbudin bin Hassan (2007). Ilmu Tajwid Hafs 'An 'Asim. Kuala Lumpur: Prospecta Printers Sdn. Bhd.
- 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, selfconfidence, motivation, enthusiasm and accurate information.

References

- Abdullah Hassan & Ainon Muhammad (1994). Bahasa Melayu untuk maktab Perguruan. Kuala Lumpur: Fajar Bakti.
- Abdullah Hassan (1994) Tatabahasa Dinamika. Kuala Lumpur: Utusan Publication & Distributors.
- Abdul Halim A. Karim (1992) Pengucapan Awam. Sungai Petani: Intan.
- 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.
- 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)

UZW196 STUDENT IN-FREE ENTERPRISE (SIFE)

Course Synopsis

SIFE co-curriculum courses 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

 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 ed., New Jersey: Pearson Education.
- 3. AB Aziz Yusof (2003). Prinsip Keusahawanan, Prentice Hall-Pearson Malaysia Education.
- 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 ed., 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

- i) Modul Latihan dari Kolej Tentera Darat ATM
- ii) Buku Panduan Senjatasenjata Kompeni, Kementerian Pertahanan Malaysia, 2004

iii) 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

- i) Modul Latihan dari Kolej Tentera Darat ATM.
- ii) Buku Panduan Senjatasenjata Kompeni, Kementerian Pertahanan Malaysia, 2004.
- iii) 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

- i) Modul Latihan dari Kolej Tentera Darat ATM.
- ii) Buku Panduan Senjatasenjata Kompeni, Kementerian Pertahanan Malaysia, 2004.
- iii) 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**

- i) Modul Latihan dari Kolej Tentera Darat ATM.
- ii) Buku Panduan Senjatasenjata Kompeni, Kementerian Pertahanan Malaysia, 2004.



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

- i) Modul Latihan dari Kolej Tentera Darat ATM.
- ii) Buku Panduan Senjatasenjata Kompeni, Kementerian Pertahanan Malaysia, 2004.
- iii) 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

- i) Modul Latihan dari Kolej Tentera Darat ATM.
- ii) Buku Panduan Senjatasenjata Kompeni, Kementerian Pertahanan Malaysia, 2004.
- iii) 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 the teoretical 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.
- 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

- 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.
- 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, tools and techniques of 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 (KorSISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
- 2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication, Selangor.
- 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.
- 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

- 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.
- 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.
- Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
- 5. Perlembagaan dan Undangundang 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.
- Handal, K.A., 'The American Red Cross First Aid and Safety Handbook', Little, Brown and Company, 1992.
- Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
- 5. Perlembagaan dan Undangundang 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.
- DK Publishing, 'ACEP First Aid Manual, 3rd Edition', by, DK Adult, 2010.
- Handal, K.A., 'The American Red Cross First Aid and Safety Handbook', Little, Brown and Company, 1992.
- Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
- 5. Perlembagaan dan Undangundang 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) Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
- 2. Modul Latihan dari PDRM Akta Dadah Merbahaya 1952 (Akta 234)

- 3. Modul Undang-undang PDRM Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
- 4. Buku Panduan Senjata Akta Pencegahan Jenayah 1959
- 5. Manual Pertolongan Cemas PBSMM
- 6. 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.

- 1. Akta Polis 1967 (Akta 344) Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
- 2. Modul Latihan dari PDRM Akta Dadah Merbahaya 1952 (Akta 234)



- Modul Undang-undang PDRM Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
- 4. Buku Panduan Senjata Akta Pencegahan Jenayah 1959
- 5. Manual Pertolongan Cemas PBSMM
- 6. 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) Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)

- 2. Modul Latihan dari PDRM Akta Dadah Merbahaya 1952 (Akta 234)
- 3. Modul Undang-undang PDRM Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
- 4. Buku Panduan Senjata Akta Pencegahan Jenayah 1959
- 5. Manual Pertolongan Cemas PBSMM
- 6. 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) Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)

- 2. Modul Latihan dari PDRM Akta Dadah Merbahaya 1952 (Akta 234)
- 3. Modul Undang-undang PDRM Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
- 4. Buku Panduan Senjata Akta Pencegahan Jenayah 1959
- 5. Manual Pertolongan Cemas PBSMM
- 6. 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) Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)

Co-Curriculum Centre



- 2. Modul Latihan dari PDRM Akta Dadah Merbahaya 1952 (Akta 234)
- 3. Modul Undang-undang PDRM Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
- 4. Buku Panduan Senjata Akta Pencegahan Jenayah 1959
- 5. Manual Pertolongan Cemas PBSMM
- 6. 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) Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)

- 2. Modul Latihan dari PDRM Akta Dadah Merbahaya 1952 (Akta 234)
- 3. Modul Undang-undang PDRM Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
- 4. Buku Panduan Senjata Akta Pencegahan Jenayah 1959
- 5. Manual Pertolongan Cemas PBSMM
- 6. 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

- Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
- Abu Saman Abd Kader (1997). "Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
- 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.

- 1. Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
- Abu Saman Abd Kader (1997)." Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
- 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

- Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia ". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
- Abu Saman Abd Kader (1997)." Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
- 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

- Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia ". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
- Abu Saman Abd Kader (1997)." Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
- 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

 Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia ". Dewan Bahasa Dan Pustaka, Kuala Lumpur.

- Abu Saman Abd Kader (1997)." Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
- 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.

- Abdullah Sanusi Ahmad (1982) "Kerajaan & Pentadbiran Malaysia". Dewan Bahasa Dan Pustaka, Kuala Lumpur.
- Abu Saman Abd Kader (1997)." Khidmat Masyarakat (PKJ)". Muzakah FKJ, Institut Teknologi maklumat, Segamat, Johor.
- 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:

- 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.
- ii. Foster and enhance the "soft skills" among students UniMAP
- 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.
- iv. Provide knowledge, training, skills to students UniMAP as a precaution and prevention.
- v. 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:

- 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.
- ii. Foster and enhance the "soft skills" among students UniMAP
- 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.
- iv. Provide knowledge, training, skills to students UniMAP as a precaution and prevention.
- v. 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 (GG I)

Sidang Akademik 2014/2015 - Academic Session 2014/2015

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.

- 1. Ab.Alim Abdul Rahim. (2004). Pengurusan Gerak Kerja Kokurikulum. Kuala Lumpur. Fajar Bakti Sdn. Bhd.
- Ab. Alim Abdul Rahim. (2004). Panduan Perkhemahan, Simpulan dan Pioneering. Kuala Lumpur. Fajar Bakti Sdn. Bhd.
- 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.





- i. Dasar Pertubuhan dan Undang-undang Perkhemahan Persatuan Pandu Puteri Malaysia (2011).
- 6. Risalah Upacara dan Istiadat Pandu Puteri. (2011). Persatuan Pandu Puteri Malaysia.
- Baden Powell, R. (2005). Ilmu Pengakap Bagi Budak-Budak. (Terjemahan). Batu Caves: Edusystem Sdn. Bhd.
- Khairul Azman Arshad (2006). Asas Perkhemahan Dan Ikhtiar Hidup. Shah Alam: Fajar Bakti Sdn. Bhd.

UZW123 GIRL GUIDE II (GG 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 GuidesPrincess based on teamwork that can be applied in your career or life.

References

 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.
- Dasar Pertubuhan dan Undang-undang – Am – Siswi – Pemimpin. (2011). Persatuan Pandu Puteri Malaysia.
- 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.
- Baden -Powell, R. (2005). Ilmu Pengakap Bagi Budak-Budak. (Terjemahan). Batu Caves: Edusystem Sdn. Bhd.
- 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

- (i) First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley.
- (ii) Harvey D. Grant, Robert
 H. Murray, Jr., J. David
 Bergeron. Emergency Care, 5th
 Edition. U.S.A.: Prentice-Hall
 International.
- (iii) 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.

Co-Curriculum Centre


References

- (i) First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley.
- (ii) Harvey D. Grant, Robert
 H. Murray, Jr., J. David
 Bergeron. Emergency Care, 5th
 Edition. U.S.A.: Prentice-Hall
 International.
- Basic Life Support, Guidelines
 2005, Handbook for Healthcare
 Providers, 4th Edition

UZW126 MALAYSIA UNIVERSITY ROVER TRAINING GROUP I

Course Synopsis

KLKM an international uniformed bodies are discussing 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.

 Panduan Pengakap Raja (2008), Ab. Alim, Persekutuan pengakap Malaysia.

UZW127 MALAYSIA UNIVERSITY ROVER TRAINING GROUP II

Course Synopsis

KLKM an international uniformed bodies are discussing 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.
- Panduan Pengakap Raja (2008), Ab. Alim, Persekutuan pengakap Malaysia.

UZW128 MALAYSIA UNIVERSITY ROVER TRAINING GROUP I (SEA)

Course Synopsis

This course is also known bu 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 gualified 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 selfawareness 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.



Sidang Akademik 2014/2015 - Academic Session 2014/2015

- 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 selfawareness 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

- Panduan Pengurusan Kumpulan Latihan Kelanasiswa Laut Malaysia.
- 2. Panduan Skim Latihan Pengakap Kelana Laut.
- 3. Panduan Skim Lencana Pengakap Malaysia