Buku Panduan Akademik

Program Sarjana Muda

Academic Guide Book for Bachelor Degree Programmes

Sidang Akademik
Academic Session
2012-2013

UniMAP
Universiti Malaysia Perlis

Ilmu • Keikhlasan • Kecemerlangan
Knowledge • Sincerity • Excellence

Buku Panduan Akademik Program Sarjana Muda

Academic Guide Book for Bachelor Degree Programmes

Sidang Akademik
Academic Session
2012-2013

Disediakan oleh/Prepared by:
Pejabat Timbalan Naib Canselor (Akademik & Antarabangsa)
Deputy Vice-Chancellor's (Academic & International) Office

Penasihat/Advisors:
Y. Bhg. Brig. Jen. Dato' Prof. Dr. Kamarudin Hussin
Prof. Dr. Zul Azhar Zahid Jamal

Ketua Penulis & Penyelaras Projek/Head of Writer & Project Coordinator:
Prof. Ir. Dr. Rezuwan Kamaruddin
Dr. Hakimah Osman

Anggota Penulis / *Author Members*:
Nur Shafissa Shabudin
Ruzalina Ibnu Ruslan
Norren Shariza Mohamed Mokhtar
Mohamad Hairi Shaari
Rahaida Abdul Rahim
Muhamad Azuan Mohamad Nasir
Zuraida Ismaail
Aiza Jasmi
Hasrul Nizam Abdul Halim
Shazlina Isakh
Syed Amir Fatir Syed Akhir
Nursakinah Abdul Karim
Salfarina Omar
Nor Innar Md. Nor
Rasidah Abdul Wahab
Ruhaida Ismail
Isma Irini Shafie
Alma Azizah Abdul Rahim
Azilah Abidin
Mohd Rosli Abdul Ghani
Che Ku Kairulazam Che Ku Abdullah
Norashikin Abdul
Bibi Nadia Taib
Dr. Asral Bahari Jambek
Norhayati Sabani
Hasneeza Liza Zakaria
Dr. Mohammad Shahrazel Razalli
Dr. Ong Bi Lynn
Mohd Hanafi Mat Som
Dr. Siti Khadijah Za'aba
Mohd Sofian Mohammad Rosbi
Nasrul Helmei Halim
Ernie Che Mid
Noor Shahida Jamoshid
Mokhtar Mat Salleh
Norshah Afizi Shuaib
Mohd Arif Anuar Mohd Salleh
Dr. Dewi Suriyani Che Halin
Dr. Firuz Zainuddin
Huzairy Hassan
Hirun Azaman Ismail
Dr. Tengku Nuraiti Tengku Izhar
Norlia Mohd Ibrahim
Nor'izah Ahmad
Lt. Abdul Jalil Ramli
Shafiq Hizwari Md. Hashim
Azlita Abdul Jalil
Tengku Suriani Tengku Yaakob
Vithyacharan A/L Retnasamy
Mohamad Nuzaihan Md. Nor
Sharulnizam Mohd Mukhtar
Ahmad Kadri Junoh
Ahmad Hifzurrahman Ridzuan
Mohd Azrizal Mohd Salleh
Wan Norhaizar Harun
Dr. Mukhzeer Mohamad Shahimin
Dr. Shahrul Nizam Yaakob
Dr. Wan Khairunizam Wan Ahmad
Ym. Tunku Muhammad Nizar
Tunku Mansur
Azmi Harun
Prof. Madya Dr. Abdullah Chik
Zulfakar Mokhtar
Dr. Nasrul Hamidin
Sharmini Abdullah
Ahmad Zulhusny Rozali
Syed Zulkarnain Syed Idrus
Mohd Syafarudy Abu
Mohamad Ezral Baharudin
Mohd. Asyraf Che Doi

Setiausaha / *Secretary*:
Syarizal Ishar

Sekalung Penghargaan/ Acknowledgements:
Y. Bhg. Brig. Jen. Dato' Prof. Dr. Kamarudin Hussin, Prof. Dr. Zul Azhar Zahid Jamal, Prof. Dr. Ismail Daut, En. Zuber Hj. Mohamad, Pn. Mazmin Mat Akhir & Pn. Saodah Hassan.

dan / *and*

Semua Dekan Pusat-pusat Pengajian, Dekan Pusat Teknologi Komunikasi dan Pembangunan Insan (PTKPI), Dekan Pusat Kejuruteraan, Dekan Institut Matematik Kejuruteraan (IMK), Dekan Pusat Hal Ehwal Antarabangsa (PHEA), Pengarah Pusat Kerjasama Industri (CIC), Pengarah Unit Penyelarasan Program Diploma dan Pengarah Pusat Ko-kurikulum.
All of Schools' Dean, Dean of Centre for Communication Technology and Human Development (PTKPI), Dean of Engineering Centre, Dean of Institute of Engineering Mathematics (IMK), Dean of Centre of International Affairs (PHEA), Director of Centre for Industrial Collaboration (CIC), Director of Diploma Programme Unit and Director of Co-curriculum Centre.

dan / *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.

Kandungan / Contents

** Dari semasa ke semasa, universiti mungkin melakukan perubahan kepada beberapa aspek-aspek kurikulum dan sistem akademik tertentu bagi memenuhi keperluan semasa. Jika terdapat sebarang perubahan, semua pelajar akan dimaklumkan. Semua pelajar adalah tertakluk kepada perubahan tersebut.*

** From time to time, the university may do some changes on certain aspects of curriculum and academic system in order to fulfil the current needs and requirements. If there are any changes, all students will be informed. All students are subject to the change.*

Pengenalan / Introduction

Buku Panduan Program Ijazah Sarjana Muda (Sidang Akademik 2012/2013) 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 tahun 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 Guidebook for Bachelor Degree Programme (Academic Session 2012/2013) is prepared to assist UniMAP new students in understanding the process and procedure that are related to their study in UniMAP. Students should utilize this book as their major guidance in planning and deciding on courses to be taken from their first until final year of their studies. This guidebook also gives some basic information on the academic systems, program structures, list of courses offered together with the synopsis, source of 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 at UniMAP

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 (PPIPT)*

Pusat-Pusat Pemantapan Akademik/ Academic Support Centres:

1. Pusat Teknologi Komunikasi dan Pembangunan Insan/Centre for Communication Technology and Human Development (PTKPI)
2. Pusat Kejuruteraan/Engineering Centre
3. Institut Matematik Kejuruteraan/Institute of Engineering Mathematics (IMK)
4. Pusat Kerjasama Inndustri/Centre for Industrial Collaboration (CIC)
5. Pusat Ko-kurikulum/ Centre for Co-Curriculum

Senarai Program Pengajian Sarjana Muda / List of Academic Programmes (Degree)

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 Bangunan) /
    Bachelor of Engineering (Honours) (Building 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)

Misi / Mission

Melahirkan Modal Insan kamil yang menyumbang kepada agenda pembagunan dan daya saing industri negara.
To produce holistic human capitals that contribute 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

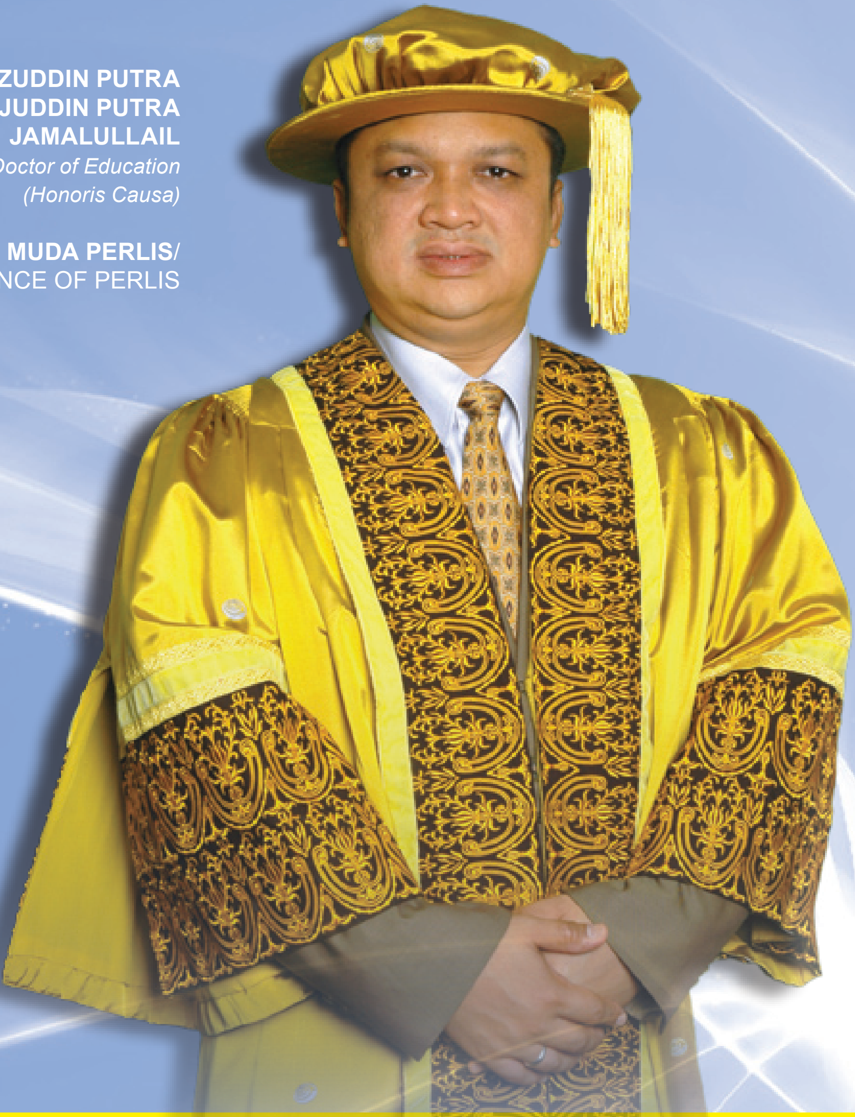
Berdikari rohaniah
Berteknologi
Pemimpin Berbestari
Untuk Bangsa Insan Dan Umat dunia
Negara Yang Tercinta

Universiti Malaysia Perlis
Alam Kejuruteraan
Ilmu Keikhlasan Kecemerlangan
Wawasan Jiwa Kita

D.Y.T.M. TUANKU SYED FAIZUDDIN PUTRA IBNI TUANKU SYED SIRAJUDDIN PUTRA JAMALULLAIL

D.K., S.P.M.P., P.A.T., Doctor of Education (Honoris Causa)

RAJA MUDA PERLIS/
CROWN PRINCE OF PERLIS



CANSELOR UniMAP/ CHANCELLOR OF UniMAP

D.Y.T.M. TUANKU SYED.Y.T.M TUANKU HAJAH LAILATUL SHAHREEN AKASHAH
S.P.M.P., Honoris Causa in Health Sciences (Universidad Nacional Pedro Henriquez Urena, DR)

RAJA PUAN MUDA PERLIS/
CROWN PRINCESS OF PERLIS

PRO CANSELOR/PRO CHANCELLOR OF UniMAP

Kata Aluan Naib Canselor

Bismillahirrahmanirrahim

Assalamualaikum, Salam Sejahtera, Salam 1 Malaysia

Selamat Datang ke Universiti Malaysia Perlis! Terlebih dahulu, saya ingin merakamkan ucapan tahniah kepada semua pelajar baru kerana telah berjaya terpilih untuk menyambung pengajian di UniMAP. Universiti ini amat komited ke arah meningkatkan pengetahuan, mengasah bakat dan meluaskan minda anda melalui pendekatan pengajaran-pembelajaran yang berkesan. Anda akan menyertai kami dalam perjalanan penting untuk menghasilkan insan kamil yang menyumbang ke pada pembangunan Negara.

Sepanjang pengajian anda di UniMAP, para pelajar akan memahami tradisi dan kecemerlangan universiti ini dalam bidang akademik dan penyelidikan. Tenaga akademik universiti yang berpengalaman dan inovatif akan membimbing anda dalam aspek pembelajaran dan penyelidikan. Mereka juga merupakan penyelidik cemerlang yang telah menghasilkan penemuan baru serta diiktiraf melalui kecemerlangan pencapaian penyelidikan pada peringkat nasional dan antarabangsa. UniMAP juga sentiasa berusaha menyediakan prasarana terbaik meliputi peralatan moden dan terkini untuk meningkatkan keberkesanan pembelajaran. Saya amat berharap agar semua para pelajar mengoptimakan penggunaan kemudahan yang telah disediakan oleh pihak Universiti.

Ekosistem yang kondusif di UniMAP akan menyumbang kepada kehidupan kampus yang menarik lagi menyeronokkan. Suasana indah dan kedamaian Negeri Perlis Indera Kayangan merupakan antara tarikan menarik untuk meningkatkan pengalaman pembelajaran anda di sini. Selain itu, Universiti ini sentiasa fokus ke arah menyediakan peluang menarik kepada para pelajar untuk berinteraksi dengan komuniti universiti dan masyarakat sekitar melalui penganjuran aktiviti ko-kurikulum. Apa yang lebih penting, saya amat berharap agar semua para pelajar melibatkan diri secara aktif dalam pelbagai aktiviti anjuran uniersiti untuk menggilap potensi anda.

Menelusuri sedekad gemilang, UniMAP masih merupakan antara universiti muda di Malaysia. Namun UniMAP sentiasa beriltizam untuk menyerlahkan keterlihatan antarabangsa melalui kecemerlangan akademik dan penyelidikan. Saya yakin dan percaya bahawa strategi berkesan untuk menarik dan menggilap kehebatan bakat pelajar akan berjaya menempatkan universiti ini dalam kalangan 500 universiti terbaik dunia menjelang tahun 2015.

Sekali lagi, saya mengucapkan tahniah dan semoga berjaya menempuhi perjalanan mencapai impian anda di UniMAP!

Wassalam.

Brig. Jen. Dato' Prof. Dr. Kamarudin Hussin
Naib Canselor
Universiti Malaysia Perlis

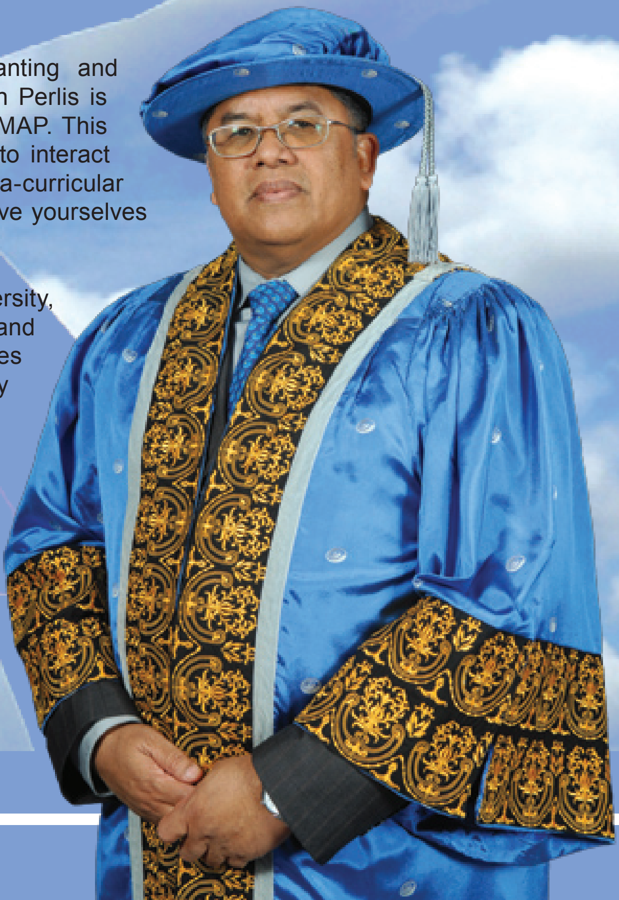
Vice Chancellor's Message

Bismillahirrahmanirrahim

Assalamualaikum, Salam Sejahtera, Salam 1 Malaysia

Welcome to Universiti Malaysia Perlis. First and foremost, I would like to congratulate all new students for being selected to enrol in UniMAP. UniMAP is committed to enhance your skills, knowledge and broaden your mind with effective teaching-learning approach. You will join us in an exciting journey to produce holistic human capital that will contribute to the nation's development.

Throughout your studies, you will learn more about our great traditions and achievements towards academic and research excellence. You will be surrounded and guided by our experienced and innovative lecturers. They have initiated and involved in research projects in various disciplines and have won many awards at national and international levels. UniMAP also place great emphasize on providing excellentinfrastructures for teaching-learning activities including sophisticated and modern equipment. I encourage you to make the most of all this university has to offer.



Conducive ecosystems in UniMAP will provide you with enchanting and enjoyable campus life. Moreover, beautiful sceneries and serenity in Perlis is among many attractions to enhance your learning experience in UniMAP. This university will also provide wonderful opportunities for all students to interact with surrounding communities and nature through various extra-curricular activities. Most importantly, I encourage all students to actively involve yourselves in as many activities as possible to reach your potential.

In its remarkable 10 years, UniMAP is still relatively a new university, striving towards raising international visibility through academic and research excellence. I strongly believe that our effective strategies towards attracting and creating exceptional talented students will firmly establish UniMAP among world's top 500 universities by the year 2015.

Once again, congratulations and wishing you all the best for your new journey in UniMAP!

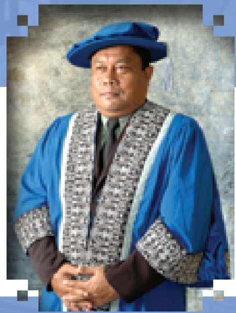
Thank you.

Brig. Gen. Prof. Dato' Dr. Kamarudin Hussin
Vice Chancellor
Universiti Malaysia Perlis

Brig. Jen. Dato' Prof. Dr. Kamarudin Hussin
Naib Canselor / *Vice Chancellor*

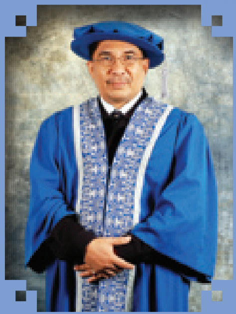
Pegawai Utama UniMAP

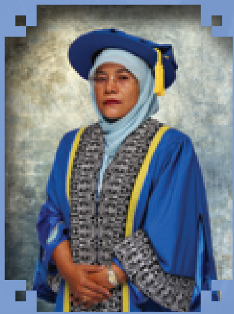
UniMAP's Top Management

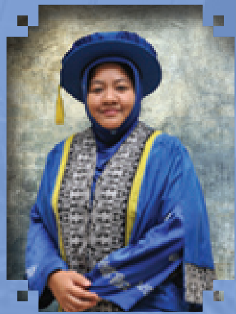


Prof. Dr. Zul Azhar Zahid Jamal
Timbalan Naib Canselor (Akademik & Antarabangsa) /
Deputy Vice Chancellor (Academic & International)

Prof. Dr. Ismail Daut
Timbalan Naib Canselor (Penyelidikan & Inovasi) /
Deputy Vice Chancellor (Research & Innovation)







En. Zuber Haji Mohamad
Pemangku Pendaftar /
Acting Registrar

Pn. Saodah Hassan
Bendahari / Bursar

Pn. Mazmin Mat Akhir
Pustakawan Kanan / Chief
Librarian

Kalendar Akademik Sidang 2012/2013

Program Ijazah Sarjana Muda

SEMESTER 1 10 September 2012 – 20 Januari 2013 (19 minggu)				
AKTIVITI	**JANGKA MASA**		**TEMPOH**	**CATATAN**
Pendaftaran Pelajar Baru / Minggu Suai Kenal	2 September 2012	7 September 2012	6 hari	-
Kuliah	10 September 2012	25 Oktober 2012	7 minggu	**Hari Malaysia** 16 September 2012
Cuti Pertengahan Semester	26 Oktober 2012	4 November 2012	1 minggu	**Hari Raya Aidiladha** 26 Oktober 2012
Kuliah	5 November 2012	23 Disember 2012	7 minggu	**Hari Deepavali** 13 November 2012 **Awal Muharam/Maal Hijrah 1433** 15 November 2012
Minggu Ulangkaji	24 Disember 2012	30 Disember 2012	1 minggu	**Hari Krismas 25** Disember 2012
Peperiksaan	31 Disember 2012	20 Januari 2013	3 minggu	-
Cuti Antara Semester	21 Januari 2013	17 Februari 2013	4 minggu	**Maulidur Rasul** 24 Januari 2013 **Tahun Baru Cina** 10 & 11 Februari 2013

SEMESTER 2 * 18 Februari 2013 – 23 Jun 2013 (18 minggu)				
AKTIVITI	**JANGKA MASA**		**TEMPOH**	**CATATAN**
Kuliah	18 Februari 2013	7 April 2013	7 minggu	-
Cuti Pertengahan Semester	8 April 2013	14 April 2013	1 minggu	-
Kuliah	15 April 2013	2 Jun 2013	7 minggu	**Hari Pekerja** 1 Mei 2013 **Hari Keputeraan DYMM Tuanku Raja Perlis** 17 Mei 2013 **Hari Wesak** 25 Mei 2013 **Hari Keputeraan SPB Yang Di-Pertuan Agung** 1 Jun 2013
Minggu Ulangkaji	3 Jun 2013	9 Jun 2013	1 minggu	**Israk Mikraj** 6 Jun 2013
Peperiksaan	10 Jun 2013	23 Jun 2013	2 minggu	-
Cuti Panjang	24 Jun 2013	1 September 2013	10 minggu	**Nuzul Al-Quran** 25 Julai 2013 **Hari Raya Aidilfitri** 8 & 9 Ogos 2013

Nota : Kalendar Akademik Semester II 2012/2013 diatas tidak terpakai kepada pelajar Tahun 3 Ijazah Sarjana Muda Kejuruteraan dan pelajar Tahun 2 Ijazah Sarjana Muda Perniagaan (Keusahawanan Kejuruteraan). Kalendar Akademik pelajar Tahun 3 Ijazah Sarjana Muda Kejuruteraan dan pelajar Tahun 2 Ijazah Sarjana Muda Perniagaan (Keusahawanan Kejuruteraan) seperti halaman berikutnya.

Kalendar Akademik Semester II Sidang 2012/2013

Bagi Pelajar Tahun 3 Program Ijazah Sarjana Muda Kejuruteraan Dan
Pelajar Tahun 2 Sarjana Muda Perniagaan (Keusahawanan Kejuruteraan)

SEMESTER 2 11 Februari 2013 – 16 Jun 2013 (18 minggu)				
AKTIVITI	**JANGKA MASA**		**TEMPOH**	**CATATAN**
Kuliah	11 Februari 2013	7 April 2013	8 minggu	-
Cuti Pertengahan Semester	8 April 2013	14 April 2013	1 minggu	-
Kuliah	15 April 2013	26 Mei 2013	6 minggu	**Hari Pekerja** 1 Mei 2013 **Hari Keputeraan DYMM Tuanku Raja Perlis** 17 Mei 2013 **Hari Wesak** 25 Mei 2013 **Hari Keputeraan SPB Yang Di-Pertuan Agung** 1 Jun 2013
Minggu Ulangkaji	27 Mei 2013	2 Jun 2013	1 minggu	**Israk Mikraj** 6 Jun 2013
Peperiksaan	3 Jun 2013	16 Jun 2013	2 minggu	-
Cuti Panjang / Latihan Industri	17 Jun 2013	8 September 2013	12 minggu	**Nuzul Al-Quran** 25 Julai 2013 **Hari Raya Aidilfitri** 8 & 9 Ogos 2013

Syarat Kemasukan bagi Program Pengajian Ijazah Sidang Akademik 2012/2013

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).
1.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mikroelektronik **RK05** (8 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (2.00)** pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:- **(i) Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia; dan** **(ii) Mathematics** Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia pada peringkat Matrikulasi /Asasi perlu mendapat sekurang-kurangnya **kepujian (Gred C)** pada peringkat SPM dalam mata pelajaran **Fizik**. **dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali. **(Permohonan juga terbuka kepada calon dari matrikulasi Sains Teknikal)**
2.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekanikal **RK08** (8 Semester)	
3.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Pembuatan **RK13** (8 Semester)	
4.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Komputer **RK20** (8 Semester)	
5.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Sistem Elektrik **RK23** (8 Semester)	
6.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekatronik **RK24** (8 Semester)	
7.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Industri **RK45** (8 Semester)	
8.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Perhubungan **RK53** (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
9.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Metalurgi **RK56** (8 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (2.00)** pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:- **(i)** **Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia; dan** **(ii)** **Matematik** Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia pada peringkat Matrikulasi /Asasi perlu mendapat sekurang-kurangnya **kepujian (Gred C)** pada peringkat SPM dalam mata pelajaran **Fizik**. **Dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali **(Permohonan juga terbuka kepada calon dari matrikulasi Sains Teknikal)**
10.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bangunan **RK82** (8 Semester)	
11.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rekabentuk Produk **RK84** (8 Semester)	
12.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik **RK86** (8 Semester)	
13.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Fotonik **RK89** (8 Semester)	
14.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rangkaian Komputer **RK93** (8 Semester)	
15.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektrik Sistem Tenaga **RK96** (8 Semester)	
16.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Alam Sekitar **RK07** (8 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (2.00)** pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:- **(i)** **Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia/ Biologi; dan** **(ii)** **Matematik** Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia / Biologi pada peringkat Matrikulasi / Asasi perlu mendapat sekurang-kurangnya k**epujian (Gred C)** pada peringkat SPM dalam mata pelajaran **Fizik**. **dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
17.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bahan **RK12** (8 Semester)	
18.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bioproses **RK28** (8 Semester)	
19.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Polimer **RK32** (8 Semester)	
20.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Bioperubatan **RK85** (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
21.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Biosistem **RK90** (8 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (2.00)** pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:- **(i)** **Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia/ Biologi; dan** **(ii)** **Matematik** Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia / Biologi pada peringkat Matrikulasi / Asasi perlu mendapat sekurang-kurangnya **kepujian (Gred C)** pada peringkat SPM dalam mata pelajaran **Fizik**. **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
22.	Ijazah Sarjana Muda Perniagaan (Kepujian) Keusahawanan Kejuruteraan **RP52** (6 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN 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 dua (2) daripada mata pelajaran berikut: Aliran Sains/Aliran Teknikal: Matematik / Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia / Biologi / Sains Komputer/ Pengajian Kejuruteraan Awam / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / *Pengkomputeran* atau Aliran Perakaunan: Matematik / Ekonomi / Pengurusan Perniagaan / Akaun Dan Mendapat sekurang-kurangnya **kepujian (Gred C)** di peringkat **Sijil Pelajaran Malaysia (SPM)/setaraf** di dalam mata pelajaran berikut: **i) Bahasa Inggeris** **dan** **ii) Salah satu (1) daripada mata pelajaran berikut:** **Fizik / Kimia / Biologi/ Matematik / Matematik Tambahan** **Dan** Calon tidak cacat anggota.

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
23.	Ijazah Sarjana Muda Perniagaan (Kepujian) Perniagaan Antarabangsa **RE09** (6 Semester)	**Memenuhi Syarat Am Universiti** **serta** **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 dua (2) **daripada mata pelajaran berikut**: Aliran Sains/Aliran Teknikal: Matematik / Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia / Biologi / Sains Komputer/ Pengajian Kejuruteraan Awam / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / *Pengkomputeran* atau Aliran Perakaunan: Matematik / Ekonomi / Pengurusan Perniagaan / Akaun Dan Mendapat sekurang-kurangnya **kepujian (Gred C)** di peringkat **Sijil Pelajaran Malaysia (SPM)/setaraf** di dalam mata pelajaran: **i) Bahasa Inggeris** **dan** **ii) Salah satu (1) daripada mata pelajaran berikut:** **Matematik/ Matematik Tambahan / Prinsip Perakaunan / Ekonomi Asas / Perdagangan / Pengajian Keusahawanan / Perakaunan Perniagaan** **Dan** Calon tidak cacat anggota.

<table>
<tr><th>BIL</th><th>(i) Program Pengajian
(ii) Kod
(iii) Tempoh Pengajian</th><th>Kelayakan Minimum Matrikulasi/Asasi</th></tr>
<tr><td>24.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Bioteknologi Industri)
RY21 (8 Semester)</td><td rowspan="5">Memenuhi Syarat Am Universiti
serta
KEPERLUAN KHAS PROGRAM

Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:-

(i) Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia/ Biologi / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / Pengajian Kejuruteraan Awam ; dan

(ii) Matematik

Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia / Biologi / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / Pengajian Kejuruteraan Awam pada peringkat Matrikulasi / Asasi perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Fizik.

dan

Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.</td></tr>
<tr><td>25.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Kuasa Industri)
RY31 (8 Semester)</td></tr>
<tr><td>26.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Rangkaian Elektronik)
RY43 (8 Semester)</td></tr>
<tr><td>27.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemesinan)
RY55 (8 Semester)</td></tr>
<tr><td>28.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Sistem Pertanian)
RY56 (8 Semester)</td></tr>
</table>

Syarat Kemasukan bagi Program Pengajian Ijazah Sidang Akademik 2012/2013

Calon Lepasan Stpm

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 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).
1.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mikroelektronik **RK05** (8 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (NGMP 2.00)** pada peringkat STPM dalam mata pelajaran berikut: **(i) Fizik / Kimia;** **dan** **(ii) Matematik T / Matematik LanjutanT** Calon yang menggunakan kelayakan mata pelajaran Kimia
2.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekanikal **RK08** (8 Semester)	
3.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Pembuatan **RK13** (8 Semester)	
4.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Komputer **RK20** (8 Semester)	
5.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Sistem Elektrik **RK23** (8 Semester)	
6.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekatronik **RK24** (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
7.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Industri **RK45** (8 Semester)	**Memenuhi Syarat Am Universiti serta KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (NGMP 2.00)** pada peringkat STPM dalam mata pelajaran berikut: **(i) Fizik / Kimia;** **dan** **(ii) Matematik T / Matematik LanjutanT** Calon yang menggunakan kelayakan mata pelajaran Kimia
8.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Perhubungan **RK53** (8 Semester	
9.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Metalurgi **RK56** (8 Semester)	**Memenuhi Syarat Am Universiti serta KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (2.00)** pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:- **(i) Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia; dan** **(ii) Matematik** Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia pada peringkat Matrikulasi /Asasi perlu mendapat sekurang-kurangnya **kepujian (Gred C)** pada peringkat SPM dalam mata pelajaran **Fizik**. **Dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali **(Permohonan juga terbuka kepada calon dari matrikulasi Sains Teknikal)**
10.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bangunan **RK82** (8 Semester)	
11.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rekabentuk Produk **RK84** (8 Semester)	
12.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik **RK86** (8 Semester)	
13.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Fotonik **RK89** (8 Semester)	
14.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rangkaian Komputer **RK93** (8 Semester)	
15.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektrik Sistem Tenaga **RK96** (8 Semester)	

<table>
<tr><th>BIL</th><th>(i) Program Pengajian
(ii) Kod
(iii) Tempoh Pengajian</th><th>Kelayakan Minimum Matrikulasi/Asasi</th></tr>
<tr><td>16.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Alam Sekitar
RK07 (8 Semester)</td><td rowspan="5">Memenuhi Syarat Am Universiti
serta
KEPERLUAN KHAS PROGRAM

Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:-

(i) Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia/ Biologi; dan

(ii) Matematik

Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia / Biologi pada peringkat Matrikulasi / Asasi perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Fizik.

dan

Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.</td></tr>
<tr><td>17.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bahan
RK12 (8 Semester)</td></tr>
<tr><td>18.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bioproses
RK28 (8 Semester)</td></tr>
<tr><td>19.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Polimer
RK32 (8 Semester)</td></tr>
<tr><td>20.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Bioperubatan
RK85 (8 Semester)</td></tr>
<tr><td>21.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Biosistem
RK90 (8 Semester)</td><td>Memenuhi Syarat Am Universiti
serta
KEPERLUAN KHAS PROGRAM

Mendapat sekurang-kurangnya Gred C (2.00) pada peringkat Matrikulasi / Asasi dalam mana-mana mata pelajaran berikut:-

(i) Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia/ Biologi; dan

(ii) Matematik

Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia / Biologi pada peringkat Matrikulasi / Asasi perlu mendapat sekurang-kurangnya kepujian (Gred C) pada peringkat SPM dalam mata pelajaran Fizik.

dan

Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.</td></tr>
</table>

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
22.	Ijazah Sarjana Muda Perniagaan (Kepujian) Keusahawanan Kejuruteraan **RP52** (6 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN 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 dua (2) **daripada mata pelajaran berikut**: Aliran Sains/Aliran Teknikal: Matematik / Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia / Biologi / Sains Komputer/ Pengajian Kejuruteraan Awam / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / Pengkomputeran atau Aliran Perakaunan: Matematik / Ekonomi / Pengurusan Perniagaan / Akaun Dan Mendapat sekurang-kurangnya **kepujian (Gred C)** di peringkat **Sijil Pelajaran Malaysia (SPM)/setaraf** di dalam mata pelajaran berikut: **i) Bahasa Inggeris** **dan** **ii) Salah satu (1) daripada mata pelajaran berikut:** **Fizik / Kimia / Biologi/ Matematik / Matematik Tambahan** **Dan** Calon tidak cacat anggota.

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
23.	Ijazah Sarjana Muda Perniagaan (Kepujian) Perniagaan Antarabangsa **RE09** (6 Semester)	**Memenuhi Syarat Am Universiti serta 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 dua (2) **daripada mata pelajaran berikut**: Aliran Sains/Aliran Teknikal: Matematik / Fizik / Kejuruteraan Fizik / Kimia / Kejuruteraan Kimia / Biologi / Sains Komputer/ Pengajian Kejuruteraan Awam / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / Pengkomputeran atau Aliran Perakaunan: Matematik / Ekonomi / Pengurusan Perniagaan / Akaun Dan Mendapat sekurang-kurangnya **kepujian (Gred C)** di peringkat **Sijil Pelajaran Malaysia (SPM)/setaraf** di dalam mata pelajaran: **i) Bahasa Inggeris** **dan** **ii) Salah satu (1) daripada mata pelajaran berikut:** **Matematik/ Matematik Tambahan / 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
24.	Ijazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Bioteknologi Industri) **RY21** (8 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** Mendapat sekurang-kurangnya **Gred C (NGMP 2.00)** pada peringkat STPM dalam mata pelajaran berikut: **(i) Fizik/ Kimia / Biologi;** **dan** **(ii) Matematik T / Matematik LanjutanT** Calon yang menggunakan kelayakan mata pelajaran Kimia / Biologi pada peringkat STPM perlu mendapat sekurang-kurangnya **kepujian (Gred C)** pada peringkat SPM dalam mata pelajaran **Fizik.** **dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
25.	Ijazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Kuasa Industri) **RY31** (8 Semester)	
26.	Ijazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Rangkaian Elektronik) **RY43** (8 Semester)	
27.	Ijazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemesinan) **RY55** (8 Semester)	
28.	Ijazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Sistem Pertanian) **RY56** (8 Semester)	

Syarat Kemasukan bagi Program Pengajian Ijazah Sidang Akademik 2012/2013

Calon Lepasan Diploma/Setaraf

<table>
<tr><th>BIL</th><th>(i) Program Pengajian
(ii) Kod
(iii) Tempoh Pengajian</th><th>Kelayakan Minimum Matrikulasi/Asasi</th></tr>
<tr><td></td><td></td><td>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 2010 atau sebelumnya dengan mendapat sekurang-kurangnya PNGK 2.00 dan mendapat;

• Gred C (NGMP 2.00) dalam mata pelajaran Pengajian Am;

dan

• Gred C (NGMP 2.00) dalam dua (2) mata pelajaran lain;
atau

Lulus peperiksaan Matrikulasi / Asasi tahun 2010 atau sebelumnya dengan mendapat sekurang-kurangnya PNGK 2.00;

dan

Mendapat sekurang-kurangnya Tahap 1 (Band 1) dalam Malaysian University English Test (MUET).</td></tr>
<tr><td>1.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mikroelektronik
RK05 (8 Semester)</td><td rowspan="3">Memenuhi Syarat Am Universiti
serta
KEPERLUAN KHAS PROGRAM

<u>Kelayakan Diploma</u>

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 di peringkat Diploma.</td></tr>
<tr><td>2.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekanikal
RK08 (8 Semester)</td></tr>
<tr><td>3.</td><td>Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Pembuatan
RK13 (8 Semester)</td></tr>
</table>

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
4.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Komputer **RK20** (8 Semester)	Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi di 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**
5.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Sistem Elektrik **RK23** (8 Semester)	<u>Kelayakan STPM/Matrikulasi/Asasi (Tahun 2010 atau sebelumnya)</u> Mendapat **Gred C (NGMP 2.00) dalam mana-mana dua (2) mata pelajaran berikut:** **i) Fizik / Kimia / Kejuruteraan Fizik / Kejuruteraan Kimia** **dan** **ii) Matematik T / Matematik LanjutanT / Matematik** Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia pada peringkat STPM / Matrikulasi / Asasi perlu mendapat sekurang-kurangnya **kepujian** pada peringkat SPM dalam mata pelajaran **Fizik**. **dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
6.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Mekatronik **RK24** (8 Semester)	
7.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Industri **RK45** (8 Semester)	
8.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Perhubungan **RK53** (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
9.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Metalurgi **RK56** (8 Semester)	
10.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bangunan **RK82** (8 Semester)	
11.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rekabentuk Produk **RK84** (8 Semester)	
12.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik **RK86** (8 Semester)	
13.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Fotonik **RK89** (8 Semester)	
14.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Rangkaian Komputer **RK93** (8 Semester)	
15.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektrik Sistem Tenaga **RK96** (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
16.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Alam Sekitar **RK07** (8 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** **<u>Kelayakan Diploma</u>** 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** di peringkat **Diploma.** Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi di 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** **<u>Kelayakan STPM/Matrikulasi/Asasi (Tahun 2010 atau sebelumnya)</u>** Mendapat **Gred C (NGMP 2.00) dalam mana-mana dua (2) mata pelajaran berikut**: **i) Fizik / Kimia/ Kejuruteraan Fizik / Kejuruteraan Kimia / Biologi;** **dan** **ii) Matematik T/ Matematik LanjutanT / Matematik** Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia / Biologi pada peringkat STPM / Matrikulasi / Asasi perlu mendapat sekurang-kurangnya **kepujian** pada peringkat SPM dalam mata pelajaran **Fizik**. **dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
17.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bahan **RK12** (8 Semester)	
18.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Bioproses **RK28** (8 Semester)	
19.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Polimer **RK32** (8 Semester)	
20.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Elektronik Bioperubatan **RK85** (8 Semester)	
21.	Ijazah Sarjana Muda Kejuruteraan (Kepujian) Kejuruteraan Biosistem **RK90** (8 Semester)	

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
22.	Ijazah Sarjana Muda Perniagaan (Kepujian) Keusahawanan Kejuruteraan **RP52** (6 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** **<u>Kelayakan Diploma</u>** 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** di peringkat **Diploma.** Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi di 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. **<u>Kelayakan STPM/Matrikulasi/Asasi (Tahun 2010 atau sebelumnya)</u>** Dalam aliran perakaunan atau aliran sastera: **Mendapat sekurang-kurangnya** Gred C (2.00) **dalam** mana-mana dua (2) **daripada mata pelajaran berikut:** *Aliran Perakaunan / Aliran Sastera:* *Matematik / Matematik S / Ekonomi / Pengurusan Perniagaan / Akaun / Perakaunan / Pengajian Perniagaan / Sains Komputer/ Pengkomputeran* Dan Mendapat sekurang-kurangnya **kepujian** di peringkat **Sijil Pelajaran Malaysia (SPM)/ setaraf** di dalam mata pelajaran berikut: **(i) Bahasa Inggeris; dan** **(ii) Salah satu (1)** daripada mata pelajaran berikut: **Fizik / Kimia / Biologi / Matematik / Matematik Tambahan** Dan Calon tidak cacat anggota.

BIL	(i) Program Pengajian (ii) Kod (iii) Tempoh Pengajian	Kelayakan Minimum Matrikulasi/Asasi
23.	Ijazah Sarjana Muda Perniagaan (Kepujian) Perniagaan Antarabangsa **RE09** (6 Semester)	**Memenuhi Syarat Am Universiti** **serta** **KEPERLUAN KHAS PROGRAM** **<u>Kelayakan Diploma</u>** 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** di peringkat **Diploma**. Pengecualian daripada beberapa mata pelajaran yang berkaitan boleh diberi tertakluk kepada keputusan peperiksaan yang diperolehi di 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. **<u>Kelayakan STPM/Matrikulasi/Asasi (Tahun 2010 atau sebelumnya)</u>** Dalam aliran perakaunan atau aliran sastera: **Mendapat sekurang-kurangnya** Gred C (2.00) **dalam** mana-mana dua (2) **daripada mata pelajaran berikut:** Aliran Perakaunan/ Aliran Sastera: Matematik / Matematik S / Ekonomi / Pengurusan Perniagaan / Akaun / Perakaunan / Pengajian Perniagaan / Sains Komputer/ Pengkomputeran Dan Mendapat sekurang-kurangnya **kepujian** di peringkat **Sijil Pelajaran Malaysia (SPM)/ setaraf** di dalam mata pelajaran: **(i)** **Bahasa Inggeris; dan** **(ii)** Salah satu (1) daripada mata pelajaran berikut: **Matematik / Matematik Tambahan / Prinsip Perakaunan / Ekonomi Asas / Perdagangan / Pengajian Keusahawanan / Perakaunan Perniagaan** Dan Calon tidak cacat anggota.

<table>
<tr><th>BIL</th><th>(i) Program Pengajian
(ii) Kod
(iii) Tempoh Pengajian</th><th>Kelayakan Minimum Matrikulasi/Asasi</th></tr>
<tr><td>24.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Kimia (Kepujian) (Bioteknologi Industri)
RY21 (8 Semester)</td><td rowspan="5">
Memenuhi Syarat Am Universiti
serta
KEPERLUAN KHAS PROGRAM

<u>Kelayakan Diploma</u>

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 di 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

<u>Kelayakan STPM/Matrikulasi/Asasi (Tahun 2010 atau sebelumnya)</u>

Mendapat Gred C (NGMP 2.00) dalam mana-mana dua (2) mata pelajaran berikut:

(i) Fizik / Kimia/ Kejuruteraan Fizik / Kejuruteraan Kimia / Biologi / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / Pengajian Kejuruteraan Awam ;

dan

(ii) Matematik T/ Matematik Lanjutan T / Matematik

Calon yang menggunakan kelayakan mata pelajaran Kimia / Kejuruteraan Kimia / Biologi / Pengajian Kejuruteraan Elektrik dan Elektronik / Pengajian Kejuruteraan Mekanikal / Pengajian Kejuruteraan Awam pada peringkat STPM / Matrikulasi / Asasi perlu mendapat sekurang-kurangnya kepujian pada peringkat SPM dalam mata pelajaran Fizik.

dan

Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
</td></tr>
<tr><td>25.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Elektrik (Kepujian) (Kuasa Industri)
RY31 (8 Semester)</td></tr>
<tr><td>26.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Elektronik (Kepujian) (Rekabentuk Rangkaian Elektronik)
RY43 (8 Semester)</td></tr>
<tr><td>27.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Pemesinan)
RY55 (8 Semester)</td></tr>
<tr><td>28.</td><td>Ijazah Sarjana Muda Teknologi Kejuruteraan Mekanikal (Kepujian) (Sistem Pertanian)
RY56 (8 Semester)</td></tr>
</table>

Sistem Akademik

Kurikulum program pengajian Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan dirangka untuk dilengkapkan dalam tempoh 4 tahun manakala bagi program pengajian Sarjana Muda Perniagaan 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 yang bersamaan dengan Tahun 1, 2, 3 dan 4.

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 manakala bagi pelajar Sarjana Muda Perniagaan pula, perlu mengambil 72 atau 74 unit Kursus Teras (mengikut pengkhususan yang diambil) dan 30 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 dan 20 unit bagi program Sarjana Muda Perniagaan.

Pelajar dikehendaki mengemukakan satu salinan keputusan Malaysian University English Test (MUET) sebagai salah satu syarat untuk bergraduat. Pelajar juga perlu mendapat sekurang-kurangnya gred C bagi Kursus Keperluan Universiti (W) dan sekurang-kurangnya gred D+ bagi Kursus Teras (T) dan sekurang-kurangnya PNGK 2.00 sebelum mereka layak dipertimbangkan untuk penganugerahan ijazah.

Struktur Program

Struktur program Sarjana Muda Kejuruteraan, Sarjana Muda Teknologi Kejuruteraan dan Sarjana Muda Perniagaan dikelompokkan seperti yang ditunjukkan dalam jadual di bawah. Pelajar dikehendaki untuk mengambil sejumlah 137 unit bagi program Sarjana Muda Kejuruteraan, 142 unit bagi program Sarjana Muda Teknologi Kejuruteraan dan 122 unit atau 124 unit bagi program Sarjana Muda Perniagaan untuk tujuan pengijazahan seperti yang ditunjukkan dalam Jadual 1 1(a), 1(b), 1(c) dan 1(d).

Bermula Sidang Akademik 2012/2013,semua pelajar diwajibkan mengumpul 3 unit Ko-kurikulum sepanjang pengajian di UniMAP. 2 unit adalah untuk Badan Beruniform dan 1 unit lagi untuk kursus bukan Badan Beruniform. Penambahan unit bagi Ko-kurikulum dalam Struktur Kurikulum bagi setiap program Ijazah Sarjana Muda akan dilakukan di peringkat Pusat Pengajian.

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 Universiti	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 Universiti	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**
KURSUS KEPERLUAN UNIVERSITI	**20**
a. Keusahawanan Kejuruteraan	2
b. Kemahiran Berfikir	2
c. Bahasa Melayu Universiti	2
d. Bahasa Inggeris Universiti	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
ELEKTIF	**30**
JUMLAH	**122**

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

SARJANA MUDA PERNIAGAAN (PERNIAGAAN ANTARABANGSA)	
KURSUS	**UNIT**
KURSUS TERAS PERNIAGAAN	**74**
KURSUS KEPERLUAN UNIVERSITI	**20**
a. Keusahawanan Kejuruteraan	2
b. Kemahiran Berfikir	2
c. Bahasa Melayu Universiti	2
d. Bahasa Inggeris Universiti	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
ELEKTIF	**30**
JUMLAH	**124**

Jenis-Jenis Kursus

1. Kursus Keperluan Universiti

Kursus Keperluan Universiti ialah kursus-kursus dari luar pengkhususan pelajar. Kursus-kursus ini ditawarkan oleh Pusat Teknologi Komunikasi dan Pembanguna Insan (PTKPI). Sebahagian kursus ini wajib diambil, manakala sebahagian lain boleh diambil sebagai opsyen. Antaranya ialah:

a. Keusahawanan Kejuruteraan (2 unit)
   Semua pelajar wajib mengambil 2 unit kursus Keusahawanan Kejuruteraan. Pelajar digalakkan mengambil kursus-kursus lain di dalam kategori 'keusahawanan', di mana unit yang dikumpul boleh dikira sebagai Kursus Opsyen. Pelajar dikehendaki lulus sekurang-kurangnya gred C.

b. Hubungan Etnik (2 unit)
Semua pelajar wajib mengambil 2 unit kursus Hubungan Etnik. Pelajar dikehendaki lulus sekurang-kurangnya gred C.

c. Tamadun Islam & Tamadun Asia (2 unit)
Tamadun Islam & Tamadun Asia adalah wajib kepada semua pelajar. Pelajar dikehendaki lulus sekurang-kurangnya gred C.

d. Bahasa Melayu Universiti (2 unit)
Semua pelajar wajib mengambil 2 unit kursus Bahasa Melayu Universiti dan dikira sebagai sebahagian keperluan pengijazahan. Pelajar dikehendaki lulus sekurang-kurangnya gred C.

e. Bahasa Inggeris Universiti (2 unit)
Semua pelajar wajib mengambil 2 unit kursus Bahasa Inggeris Universiti dan dikira sebagai sebahagian keperluan pengijazahan. Walaubagaimanapun, pelajar yang memperolehi band 1, 2 dan 3 dalam MUET dikehendaki mengambil Bahasa Inggeris Asas dan lulus sekurang-kurangnya gred C sebelum dibenarkan mengambil Bahasa Inggeris Universiti. Dua unit tambahan kursus Bahasa Inggeris Asas ini boleh dikira sebagai Kursus Opsyen. Pelajar perlu lulus sekurang-kurangnya dengan gred C dalam kursus Bahasa Inggeris Universiti.

f. Kemahiran Berfikir (2 unit)
Semua pelajar wajib mengambil 2 unit kursus Kemahiran Berfikir. Pelajar perlu mendapat gred sekurang-kurangnya C dalam kursus ini.

g. Kemahiran dan Teknologi Dalam Komunikasi (2 unit)
Pelajar Sarjana Muda Teknologi Kejuruteraan dan Sarjana Muda Perniagaan wajib mengambil 2 unit kursus Kemahiran dan Teknologi Dalam Komunikasi. Pelajar dikehendaki lulus sekurang-kurangnya gred C.

h. Komunikasi Dalam Perniagaan (3 unit)
Komunikasi Dalam Perniagaan diwajibkan kepada pelajar program Sarjana Muda Perniagaan. Pelajar dikehendaki lulus sekurang-kurangnya gred C.

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

2. Kursus Teras (Sarjana Muda Kejuruteraan)

Kursus Teras terdiri daripada kursus-kursus Kejuruteraan yang wajib diambil oleh semua pelajar menurut bidang pengkhususan masing-masing. Kursus-kursus ini menjadi sebahagian keperluan untuk pengijazahan. Pelajar yang gagal mana-mana Kursus Teras Kejuruteraan mesti mengulanginya 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 menurut bidang pengkhususan masing-masing. Kursus-kursus ini menjadi sebahagian keperluan untuk pengijazahan. Pelajar yang gagal mana-mana Kursus Teras Teknologi Kejuruteraan mesti mengulanginya sebelum layak dipertimbangkan untuk pengijazahan.

4. **Kursus Teras (Sarjana Muda Perniagaan)**

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

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

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

5. **Kursus Elektif (Sarjana Muda Perniagaan)**

   Pelajar boleh memilih kursus Elektif berdasarkan minat mereka dalam bidang-bidang tertentu.

6. **Kursus Opsyen**

   Kursus Opsyen merupakan mana-mana kursus yang ditawarkan oleh Pusat Teknologi Komunikasi dan Pembangunan Insan (PTKPI) seperti yang disenaraikan dalam Jadual 1(a) dan 1(b) untuk program Sarjana Muda Kejuruteraan dan Sarjana Muda Teknologi Kejuruteraan. Sebanyak 2 unit Kursus Opsyen perlu diambil oleh pelajar sepanjang pengajiannya.

Takrifan dan Nilaian 'Kredit' dan 'Unit'

Di UniMAP, 'kredit' dan 'unit' digunakan seakan membawa makna yang sama. Ini bermakna, 'unit' bertukar menjadi 'kredit' setelah pelajar lulus sesuatu kursus sebagaimana dikehendaki.

Pendekatan Pengajaran - Pembelajaran di UniMAP

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

1. **Komponen Teori**

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

2. **Komponen Praktikal**

   Satu unit komponen praktikal adalah bersamaan 2 jam pertemuan dalam seminggu atau 28 jam pertemuan dalam satu semester.

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

Komponen praktikal terdiri dari bentuk-bentuk pengajaran-pembelajaran berikut:

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

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

3. **E-pembelajaran –** pendekatan pembelajaran yang diperkukuhkan dengan ICT, yang melengkapkan pendekatan pembelajaran konvensional. Pelajar

mempelajari kursus atau topik-topik tertentu menggunakan modul yang boleh diakses dari laman web UniMAP. Modul mengandungi nota kuliah dalam bentuk multimedia, yang merangkumi audio, video, grafik, animasi, simulasi, permainan, dan pelbagai lagi aktiviti berbentuk interaksi.

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

Latihan Industri (Intra)

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

Pelajar Sarjana Muda Kejuruteraan Tahun 3 dikehendaki untuk menjalani 12 minggu Latihan Industri untuk mendapatkan 4 kredit dan pelajar Sarjana Muda Teknologi Kejuruteraan Tahun 4 pula dikehendaki untuk menjalani 12 minggu Latihan Industri untuk mendapatkan 12 kredit.

Pada semester ke 2 dan ke 4, pelajar program Sarjana Muda Perniagaan (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 bagi pilihan kedua, iaitu Pilihan 3 +1, pelajar akan menjalani latihan industri di syarikat multinasional di Malaysia dan lawatan sambil belajar di luar negara. Manakala pelajar program Sarjana Muda Perniagaan (Keusahawanan Kejuruteraan) pula 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:-

1. Menyemai sikap profesional di kalangan pelajar.
2. Menyedarkan pelajar tentang kepentingan dan kaitan yang kuat antara latihan industri, makmal/ amali dan teori kejuruteraan.
3. 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 akan menyelaraskan bersama pusat-pusat lain kursus-kursus 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
   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 Perniagaan (Keusahawanan Kejuruteraan) bukan sahaja meliputi kuliah dan tutorial tetapi juga Latihan Praktikal melalui Program Inkubator Perniagaan. Selepas semester keempat, 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 pengkomersialan. 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 syarikat-syarikat 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 pertubuhan-pertubuhan ini untuk menjamin kejayaan program tersebut.

Program International Business Field Trips

Pada semester ke 2 dan ke 4, pelajar program Sarjana Muda Perniagaan (Perniagaan Antarabangsa) pula akan mengikuti latihan industri mengikut Pilihan Pertama (2+2) atau Pilihan Kedua (3+1). Bagi pilihan pertama, iaitu 2+2, pelajar akan mengikuti 2 fasa (2 bulan + 2 bulan) Latihan Industri di syarikat-syarikat multinasional di Malaysia, dan penyelarasan akan dilaksanakan dengan kerjasama Pusat Kerjasama Industri UniMAP. Bagi pilihan kedua, iaitu 3 +1, pelajar akan menjalani latihan industri di syarikat multinasional di Malaysia dan lawatan sambil belajar di luar negara.

Untuk pilihan kedua ini (3+1), 2 bulan dalam Fasa 1 merupakan latihan di industri di syarikat multinasional di Malaysia. Dalam Fasa 2, sebulan yang pertama melibatkan Latihan Industri di syarikat multinasional di dalam negara dan baki sebulan lagi akan digunakan untuk membuat lawatan sambil belajar di luar negara (International Business Field Trips). Pelajar diberi kebebasan untuk memilih mana-mana dua pilihan yang diberikan untuk Latihan Industri mereka mengikut minat dan kemampuan kewangan mereka.

Kod Kursus

Setiap kursus yang ditawarkan mempunyai kod yang tersendiri. Jadual 2(a), 2(b) dan 2 (c) di bawah menunjukkan ringkasan Kod Kursus untuk setiap program Sarjana Muda :

Jadual 2(a): Huruf Pertama-Peringkat Pengajian/ jenis program yang ditawarkan di peringkat Sarjana Muda.

Huruf Pertama di dalam Kod	Jenis Program
E	Sarjana Muda Kejuruteraan
B	Sarjana Muda Perniagaan
P	Sarjana Muda Teknologi Kejuruteraan
U	Kursus Umum (Kursus yang diambil oleh semua program pengajian)

Jadual 2(b): Huruf Kedua-Pusat Pengajian yang Menawarkan Kursus.

Huruf Kedua di dalam Kod	Pusat Pengajian
E	PPK Sistem Elektrik
M	PPK Mikroelektronik
K	PPK Komputer & Perhubungan
N	PPK Mekatronik
B	PPK Bahan
P	PPK Pembuatan
R	PPK Bioproses
A	PPK Alam Sekitar
D	Pusat Pengajian Teknologi Kejuruteraan Mekanikal
G	Pusat Pengajian Teknologi Kejuruteraan Elektronik
L	Pusat Pengajian Teknologi Kejuruteraan Elektrik
S	Pusat Pengajian Teknologi Kejuruteraan Awam
T	Pusat Pengajian Teknologi Kejuruteraan Kimia
C	Pusat Kejuruteraan
Q	Institut Matematik Kejuruteraan
I	Pusat Kerjasama Industri
F	Pusat Pengajian Inovasi Perniagaan & Teknousahawan
U	Pusat Teknologi Komunikasi & Pembangunan Insan (PTKPI)
Z	Pusat Ko-kurikulum

Jadual 2(c): Huruf Ketiga-Kursus Teras atau Kursus Keperluan Universiti;

Huruf Ketiga di dalam Kod	Jenis Kursus
T	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 3 di bawah:

Jadual 3: Kod Kursus

A	B	C	1	2	3	4	ANGKA	DESKRIPSI
↓	↓	↓	↓	↓	↓	↓		
↓	↓	↓	↓	↓	↓	→	4	Unit/Kredit
↓	↓	↓	↓	↓	∟	→	3	Kelompok Kursus. (Penentuan kelompok kursus ditentukan oleh Pusat Pengajian masing-masing)
↓	↓	↓	↓	∟	→	→	2	
|	|	|	∟	→	→	→	1	Aras/ Tahap Kursus program SarjanaMuda: • 1= kursus tahun 1, • 2= kursus tahun 2, • 3= kursus tahun 3, • 4= kursus tahun 4,
↓	↓	∟	→	→	→	→	JENIS KURSUS	Sila rujuk **Jadual 2(c)**
↓	∟	→	→	→	→	→	PUSAT PENGAJIAN	Sila rujuk **Jadual 2(b)**
∟	→	→	→	→	→	→	PERINGKAT PENGAJIAN	Sila rujuk **Jadual 2(a)**

Pendaftaran Kursus

Semua pelajar dikehendaki untuk mendaftar untuk kursus yang ditawarkan pada tarikh yang ditetapkan oleh Universiti. Pendaftaran kursus ini dilakukan secara dalam talian *(online)* oleh semua pelajar UniMAP. Pelajar senior akan mendaftar mengikut keputusan semester yang terdahulu (selepas keputusan diumumkan). Subjek yang diambil bagi semester berikutnya hendaklah didaftarkan sebelum berakhir tempoh pendaftaran wajib [2 minggu] / empat belas hari (14) di dalam semester semasa.

Pelajar berstatus Aktif boleh mendaftar kursus secara online tidak melebihi dua puluh dua (22) unit dan tidak kurang daripada sepuluh (10) unit kecuali pelajar yang mengikuti Latihan Industri dan pelajar semester akhir yang akan menamatkan pengajian. Bagi pelajar yang ingin mendaftar kursus melebihi 22 unit, perlulah mendapatkan kebenaran daripada Penasihat Akademik (PA) dengan kelulusan Dekan. Pelajar perlu mengisi Borang HEA-09a (Borang Pendaftaran Kursus).

Pelajar 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 orientasi di Pusat Pengajian. Pelajar yang menangguh pengajian perlu mendaftar pada semester seterusnya.

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 mempunyai kelulusan daripada Dekan.

Pelajar adalah wajib untuk bertemu dengan Penasihat Akademik mereka selepas pendaftaran dengan membawa bersama-sama slip pendaftaran yang telah dicetak. Penasihat Akademik akan mengesahkan / tidak mengesahkan kursus yang didaftarkan oleh pelajar. Sekiranya Penasihat Akademik meluluskan kursus yang didaftarkan oleh pelajar, maka pengesahan akan dibuat dalam sistem. Apabila Penasihat Akademik meluluskan pendaftaran kursus, pelajar boleh mencetak slip pendaftaran kursus. Jika Penasihat Akademik tidak bersetuju dengan kursus yang didaftar oleh pelajar, maka pelajar harus kembali mendaftar. Pendaftaran kursus oleh pelajar adalah sah hanya dengan persetujuan Penasihat Akademik sahaja.

Adalah menjadi tanggungjawab pelajar untuk menyemak dan memastikan bahawa semua butir-butir yang dinyatakan dalam Slip Pendaftaran Subjek adalah betul.

Pendaftaran Kursus Pelajar Percubaan [P]

Pelajar dengan status Percubaan tidak dibenarkan untuk mendaftar kursus sendiri secara dalam talian. Pelajar ini perlu bertemu dengan Penasihat Akademik mereka untuk mendapatkan pengesahan daripada Dekan dan perlu juga mengisi borang HEA-09b [Borang Pendaftaran Kursus-Percubaan (P)] sebelum menyerahkannya kepada Pusat Pengajian atau Jabatan Pendaftar untuk mendaftarkan kursus. Hanya Penolong Pendaftar Pusat Pengajian/Jabatn Pendaftar sahaja boleh mendaftarkan kursus. Pelajar Percubaan hanya dibenarkan mengambil maksimum 12 unit dan minimum 10 unit.

Penambahan / Pengguguran / Tarik Diri Kursus

Pelajar diwajibkan untuk masuk (log in) ke dalam sistem pendaftaran pada awal semester bagi menyemak status pendaftaran mereka. Pelajar dibenarkan untuk menambah / menggugurkan kursus secara dalam talian selama 2 minggu (Selepas minggu tambah / gugur kursus dalam talian berakhir, pelajar perlu mengisi borang HEA-11 [Borang Tambah Kursus] sebelum menyerahkannya kepada Pusat Pengajian dan Jabatan Pendaftar untuk mendaftarkan kursus).

Selepas sesi tambah/gugur berakhir, pelajar dibenarkan untuk menggugurkan kursus yang bermula dari minggu ke-3 hingga minggu ke-7 dengan menggunakan borang HEA-10 [Borang Gugur Kursus]. Borang tersebut mesti mendapat kelulusan Dekan sebelum diserahkan kepada Jabatan Pendaftar untuk direkodkan. Borang boleh diperolehi daripada Jabatan Pendaftar, Pusat Pengajian atau portal.

Selepas sesi gugur kursus berakhir, pelajar dibenarkan untuk menarik diri dari kursus selepas minggu ke-7 (tidak melebihi minggu ke-13 atau sebelum minggu peperiksaan) dengan mengisi borang HEA-19 [Borang Tarik Diri] dan akan didenda sebanyak RM50 bagi setiap kursus. Borang tersebut mesti mendapat kelulusan Dekan sebelum diserahkan kepada Jabatan Pendaftar untuk direkodkan. Borang boleh diperolehi daripada Jabatan Pendaftar, Pusat Pengajian atau portal. Pelajar perlu mengambil maklum bahawa walaupun mereka telah ditarik balik dari kursus, pendaftaran kursus [kursus ditarik balik] akan muncul dalam transkrip pelajar. Walau bagaimanapun, gred tidak akan dimasukkan dalam pengiraan PNG dan PNGK.

Pertukaran Program Pengajian

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 dengan mengisi Borang Permohonan Pertukaran Program Pengajian (HEA-12) dengan lengkap. Borang permohonan boleh didapati di Jabatan Pendaftar atau di Pusat Pengajian. Walau bagaimanapun, bagi kes-kes tertentu permohonan pelajar untuk pertukaran program pengajian pada permulaan pengajian boleh dipertimbangkan dengan kelulusan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa).

2. Permohonan perlu dikemukakan dalam masa dua minggu pertama semester bermula.

3. Setiap permohonan perlu menyertakan sebab-sebab yang kukuh secara bertulis untuk bertukar program dan perlu ada Surat Sokongan daripada Rakan Pendamping Siswa (RPS) dan Dekan Pusat Pengajian program asal dan Dekan Pusat Pengajian program yang dipohon.

4. Setiap permohonan yang telah mendapat sokongan daripada kedua-dua Dekan Pusat Pengajian, perlu mendapat perakuan Dekan Pengurusan Akademik dan seterusnya kelulusan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa) sebelum direkodkan oleh Jabatan Pendaftar (Unit Kemasukan dan Rekod Pelajar).

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

Penangguhan Pengajian

Permohonan penangguhan pengajian dibenarkan kepada pelajar yang mempunyai masalah kesihatan dan disahkan sakit oleh hospital kerajaan atau doktor panel Universiti. Permohonan selain dari masalah kesihatan boleh dipertimbangkan sekiranya mempunyai alasan yang munasabah dan mendapat perakuan Rakan Pendamping Siswa (RPS), Dekan Pusat Pengajian, Dekan Hal Ehwal Pelajar dan Alumni dan seterusnya kelulusan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa).

Pelajar boleh memohon cuti dengan kebenaran/penangguhan pengajian dengan mengisi Borang Cuti Dengan Kebenaran/Penangguhan Pengajian (HEA/HEP-13) yang boleh didapati di Jabatan Pendaftar atau di Pusat Pengajian masing-masing. Permohonan hendaklah dikemukakan kepada Dekan Pusat Pengajian. Dekan Pusat Pengajian boleh mengarahkan pelajar merujuk kepada Kaunselor dan mendapatkan komen Kaunselor sebelum membuat pertimbangan sekiranya perlu.

Permohonan cuti dengan kebenaran dan penangguhan pengajian perlu dikemukakan sebelum minggu ketujuh pengajian kecuali dengan sebab-sebab tertentu yang diluluskan. Permohonan selepas minggu ketujuh hanya dibenarkan atas sebab kesihatan sahaja dan mendapat perakuan hospital kerajaan atau doktor panel Universiti. Pelajar tidak dibenarkan menangguh pengajian melebihi dua semester berturut-turut.

Permohonan penangguhan pengajian oleh pelajar antarabangsa mesti disertakan dengan surat sokongan daripada penaja mereka (untuk pelajar-pelajar tajaan sahaja).

Bagi pelajar yang menangguhkan pengajian atas sebab kesihatan atau sakit, semester tersebut tidak akan diambilkira dalam pengiraan semester yang digunakan untuk pengijazahan (tanpa penalti). Bagi pelajar yang menangguh pengajian atas sebab selain dari sebab kesihatan, semester berkenaan akan diambilkira dalam pengiraan semester yang digunakan untuk pengijazahan (dengan penalti) kecuali dengan kebenaran. Pelajar yang menghadapi masalah kesihatan yang agak lama boleh diberhentikan dari pengajian sekiranya didapati tidak boleh meneruskan pengajian dan mendapat perakuan daripada hospital kerajaan atau doktor panel Universiti.
Pelajar akan diberikan amaran secara bertulis sekiranya didapati tidak mendaftar pada sesuatu semester tanpa memberi sebarang permohonan penangguhan pengajian. Pelajar berkenaan yang tidak menyertakan sebarang permohonan penangguhan di dalam sesuatu tempoh yang diberikan, boleh dikeluarkan dari senarai nama pelajar berdaftar Universiti atau disahkan berhenti dari Universiti ini.

Pentarafan Pelajar

Taraf pengajian seseorang pelajar tidak boleh ditentukan secara langsung mengikut bilangan tahun dia berada di Universiti. Taraf bagi seseorang pelajar ditentukan berasaskan kepada pengumpulan unit kredit yang terkumpul seperti dalam **Jadual 4 (a), Jadual 4 (b)** dan **Jadual 4 (c)** berikut :-

Jadual 4 (a) Penentuan taraf pelajar (Sarjana Muda Kejuruteraan)

Tahun 1	Tahun 2	Tahun 3	Tahun 4
0 – 36 unit	37 – 73 unit	74 – 106 unit	107 – 135 unit

Jadual 4 (b) Penentuan taraf pelajar (Sarjana Muda Teknologi Kejuruteraan)

Tahun 1	Tahun 2	Tahun 3	Tahun 4
0 – 38 unit	39 - 76 unit	77 – 111 unit	112 - 140 unit

Jadual 4 (c) Penentuan taraf pelajar (Sarjana Muda Perniagaan)

Tahun 1	Tahun 2	Tahun 3
0 – 40 unit	41 – 80 unit	81 – 122 unit

Taraf akademik pelajar juga diukur dengan sistem Purata Nilai Gred (PNG) sepanjang pengajian di universiti. Seseorang pelajar yang berjaya mendapat sekurang-kurangnya 2.00 bagi Purata Nilai Gred (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 II untuk menentukan markah Purata Nilai Gred (PNG) dan taraf akademik pelajar. Jika purata gabungan adalah lebih baik, maka pelajar akan diberi taraf terbarunya tetapi jika purata gabungan adalah kurang baik, maka taraf Semester II dikekalkan.

Pelajar dengan PNG kurang dari 2.00 pada satu-satu semester akan diberi taraf **PERCUBAAN 1 (P1).** Taraf **PERCUBAAN II (P2)** pula diberikan kepada pelajar yang mendapat purata kurang dari 2.00 bagi dua semester berturut-turut. Jika PNG pelajar masih mendapat kurang dari 2.00 bagi PNG pada semester berikutnya, pelajar berkenaan tidak akan dibenarkan meneruskan pengajian, melainkan sekiranya PNGK pelajar 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 unit, 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, 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 unit, tempoh maksimum yang dibenarkan tertakluk kepada pengecualian unit yang diberikan oleh pihak universiti.

Kursus Kuratif

Kursus Kuratif diadakan selepas Semester II. Pendaftaran 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 tutorial dan 1 minggu peperiksaan.

Pengecualian Unit

Pemberian Pengecualian Kredit mengikut Peraturan Akademik dalam sistem semester adalah bertujuan memberi pengiktirafan atau penghargaan kepada pengajian terdahulu seorang pelajar. Pengecualian kredit adalah jumlah kredit yang dikecualikan bagi penganugerahan Diploma yang diberi berdasarkan kelayakan akademik Diploma seperti yang diluluskan oleh Universiti. Pengecualian kredit diberikan kepada pelajar yang telah mendapat minimum gred C + dalam sesuatu kursus mengikut sistem Universiti gred dan tertakluk kepada terma dan syarat-syarat yang ditetapkan oleh Universiti.

Pengecualian Kredit boleh diberi kepada pelajar yang telah mengambil satu kursus yang sama atau setara dengan 1/3 kandungan pembelajarannya adalah sama dan lulus sekurang-kurangnya C + mengikut sistem penggredan Universiti. Ianya juga terpakai untuk kursus-kursus berkaitan yang boleh digabungkan [2 kursus atau lebih] bagi satu kursus di UniMAP untuk diberi pengecualian. Pengecualian untuk Bahasa Melayu, Bahasa Inggeris dan ko-kurikulum adalah tidak dibenarkan.

Pengecualian untuk Tamadun Islam dan Tamadun Asia hanya dibenarkan bagi pelajar yang telah mengambil TITAS di bawah tajuk kursus yang sama dengan dan bilangan unit yang sama atau lebih. Keputusan peperiksaan peringkat SPM tidak diambil kira untuk pengecualian unit . Pelajar tidak akan beri pengecualian unit untuk Latihan Industri.

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 5: 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 menjadi 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 6: Gred abjad dan mata penilaian

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

Jadual 7 Menunjukkan Contoh Pengiraan GPA dan CGPA:

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

Rayuan Penyemakan Keputusan Peperiksaan Akhir Semester

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 selama 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 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, pemeriksaan akan dijalankan dalam bahasa yang sama.

Sistem Penasihatan Akademik dan Rakan Pendamping Siswa

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 diminta berjumpa dengan Rakan Pendamping Siswa (RPS)/Penasihat Akademik (PA) untuk mendapatkan nasihat semasa tempoh pendaftaran.

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

Pusat-Pusat Pemantapan Akademik

Pusat-pusat ini ditubuhkan untuk menyokong UniMAP dari segi mencapai kecemerlangan akademik..

1. **Pusat Teknologi Komunikasi dan Pembangunan Insan (PTKPI)**

   Pusat Teknologi Komunikasi dan Pembangunan Insan (PTKPI) ini dahulunya dikenali sebagai Pusat Kemahiran Komuniksai dan Keusahawanan (PKKK) yang menawarkan kursus-kursus Keperluan Universiti dan pelbagai kursus yang membawa saluran pengetahuan sosial dan kemanusiaan. Maklumat lanjut mengenai pusat ini diberikan di bahagian lain buku ini.

2. **Pusat Kejuruteraan**

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

   Pusat Kejuruteraan juga menyokong aktiviti penyelidikan dan reka bentuk di UniMAP. Terdapat beberapa kursus yang ditawarkan di sini seperti Kemahiran Kejuruteraan Asas yang wajib diambil oleh semua pelajar dari PPK Elektrik, PPK Mikroelektronik dan PPK Komputer & Perhubungan.

3. **Institut Matematik Kejuruteraan**

   Institut Matematik Kejuruteraan (IMK) adalah pusat untuk 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 di dalam kampus dan personel luar kampus dalam bidang yang berkaitan dengan matematik.

4. **Pusat Kerjasama Industri**

   Pusat Kerjasama Industri berperanan menjalin hubungan dengan pihak industri dalam pelbagai aspek, terutama dalam program- program yang berkaitan terus dengan pembelajaran pelajar. Program seperti program pendedahan kepada industri, forum bersama industri, Latihan Perindustrian Staf dan beberapa lagi diselia dan diselaraskan oleh pusat ini. Sesetengah dari program ini wajib diambil oleh semua pelajar.

5. Pusat Teknologi Maklumat dan Komunikasi

Pusat Teknologi Maklumat dan Komunukasi diwujudkan untuk menyokong penggunaan dan pelaksanaan teknologi maklumat di samping membantu fungsi akademik dan pentadbiran universiti. Pusat ICT juga membangun dan menyenggara sistem maklumat berkomputer Universiti, serta sistem rangkaian komunikasi kampus. Ia menyediakan khidmat pakar runding dalam bidang teknologi maklumat dan komunikasi, membantu membudayakan penggunaan teknologi maklumat di Universiti.

6. Perpustakaan

Perpustakaan Universiti ditubuhkan untuk menyediakan kemudahan dan perkhidmatan yang berkualiti untuk menyokong pengajaran / pembelajaran dan penyelidikan di Universiti ini

7. Pusat Hal Ehwal Antarabangsa (PHEA)

Pusat Hal Ehwal Antarabangsa adalah titik pertama kenalan untuk pelajar antarabangsa yang menawarkan pelbagai program yang menyokong pelajar antarabangsa dari segi enrolmen, pengajian dan kehidupan sosial, serta perkhidmatan rujukan kepada kemudahan di kampus dan dalam komuniti tempatan.

8. Unit Pengajaran & Pembelajaran

Unit ini membantu ke arah menyelaras perkhidmatan yang meningkatkan profesionalisme staf akademik universiti. Unit ini juga merancang kursus, bengkel dan kaunseling untuk pelajar.

Bahagian Pengurusan Akademik Jabatan Pendaftar

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

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

1. Unit Kemasukan dan Rekod Pelajar

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

i. Mengendalikan secara keseluruhan ke atas proses pengambilan dan pendaftaran pelajar dalam negara di peringkat ijazah pertama dan diploma.
ii. Mengendalikan proses pengambilan dan pendaftaran pelajar antarabangsa di peringkat ijazah pertama.
iii. Mengurus dan mengendalikan aspek-aspek pemprosesan data di 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 pemberian pengecualian unit dan pemindahan kredit pelajar.

2. Unit Peperiksaan dan Pengijazahan

Unit Peperiksaan bertanggungjawab untuk mengendalikan dan memantau perjalanan Peperiksaan Akhir Semester dan perkara-perkara yang berkaitan dengannya. Di antara tugas dan tanggungjawab yang dijalankan 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 di 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 pengurusan jubah dari segi peminjaman dan pemulangan jubah staf akademik.
x. Menyemak kelayakan pengijazahan untuk pelajar tahun akhir serta mengeluarkan surat penamatan pengajian dan kelayakan pengijzahan 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-data graduan yang telah bergraduat.

3. Unit Senat

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

i. Merancang aktiviti-aktiviti Senat dan Jawatankuasa di bawahnya, untuk memberi khidmat Urusetia dan menyelaraskannya dengan pihak-pihak lain yang berkaitan di dalam penawaran program-program sedia ada dan baru.
ii. Menyediakan Kalendar Akademik, menguruskan senarai penawaran kursus serta berurusan dengan Kementerian Pendidikan Malaysia (KPM) dan Jabatan Perkhidmatan Awam (JPA) mengenai penawaran program baru, penubuhan pusat pengajian/Jabatan dan Unit.
iii. Menguruskan pencalonan penerima Ijazah Kehormat

Alamat:

Bahagian Pengurusan Akademik
Jabatan Pendaftar
Universiti Malaysia Perlis
Tingkat 3, Bangunan KWSP
Jalan Bukit Lagi
01000 Kangar
PERLIS

Senarai Staf Bahagian Pengurusan Akademik, Jabatan Pendaftar:

Cik Ruzalina Ibnu Ruslan
Ketua Penolong Pendaftar
Tel : 04-9798702
Faks : 04-9798703
E-mel : ruzalina@unimap.edu.my

Unit Kemasukan & Rekod Pelajar:

Puan Nor Innar Md Nor
Penolong Pendaftar
Tel : 04-9798701
Faks : 04-9798703
E-mel : norinnar@unimap.edu.my

Encik Mohamad Hairi Shaari
Penolong Pendaftar
Tel : 04-9792984
Faks : 04-9798703
E-mel : hairishaari@unimap.edu.my

Puan Rosniza Abdul Hamid
Pembantu Tadbir (P/O)
Tel : 04-9798706
Faks : 04-9798703
E-mel : rosniza@unimap.edu.my

Cik Tengku Amanina Tengku Aziz
Pembantu Tadbir (P/O)
Tel : 04-9798706
Faks : 04-9798703
E-mel : amanina@unimap.edu.my

Cik Azniyanty Abdullah
Pembantu Tadbir (P/O)
Tel : 04-9797941
Faks : 04-9798703
E-mel : azniyanty@unimap.edu.my

Encik Faizan Abdul
Pembantu Tadbir (P/O)
Tel : 04-9797941
Faks : 04-9798703
E-mel : faizan@unimap.edu.my

Encik Amirrul Amar Mazri
Pembantu Tadbir (P/O)
Tel : 04-9797940
Faks : 04-9798703
E-mel : amirrulamar@unimap.edu.my

Encik Ra'qil Afzal Raus
Pembantu Am Pejabat
Tel : 04-9798706
Faks : 04-9798703
E-mel : afzal@unimap.edu.my

Unit Peperiksaan dan Pengijazahan:

Puan Rahaida Ab Rahim
Penolong Pendaftar
Tel : 04-9798705
Faks : 04-9798703
E-mel : rahaida@unimap.edu.my

Puan Salfarina Omar
Penolong Pendaftar
Tel : 04-9798700
Faks : 04-9798703
E-mel : salfarina@unimap.edu.my

Encik Muhamad Azuan Mohamad Nasir
Penolong Pendaftar
Tel : 04-9798562
Faks : 04-9798703
E-mel : mazuan@unimap.edu.my

Encik Hamizal Hamid
Pembantu Tadbir (P/O)
Tel : 04-9798708
Faks : 04-9798703
E-mel : hamizal@unimap.edu.my

Puan Tengku Amalina Tengku Aziz
Pembantu Tadbir (P/O)
Tel : 04-9798708
Faks : 04-9798703
E-mel : amalina@unimap.edu.my

Cik Norazwati Abdullah
Pembantu Tadbir (P/O)
Tel : 04-9798708
Faks : 04-9798703
E-mel : norazwati@unimap.edu.my

Encik Muhammad Isyalzieli Ishak
Pembantu Am Pejabat
Tel : 04-9798708
Faks : 04-9798703
E-mel : isyalzieli@unimap.edu.my

Puan Maisarah Ab. Karim
Pembantu Tadbir (P/O)
Tel : 04-9798707
Faks : 04-9798703
E-mel : maisarah@unimap.edu.my

Encik Mohd Hafizi Che Yusof
Pembantu Tadbir (P/O)
Tel : 04-9798707
Faks : 04-9798703
E-mel : hafiziyusof@unimap.edu.my

Encik Muhammad Faisal Norshidi
Pembantu Am Pejabat
Tel : 04-9798708
Faks : 04-9798703
E-mail : muhdfaisal@unimap.edu.my

Senarai Staf Unit Senat:

Encik Muhamad Azuan Mohamad Nasir
Penolong Pendaftar (Menanggung Tugas)
Tel : 04-9798562
Faks : 04-9798703
E-mel : mazuan@unimap.edu.my

Puan Tihazariah Husin
Pembantu Tadbir (P/O)
Tel : 04-9798561
Faks : 04-9798703
E-mel : tihazariah@unimap.edu.my

Academic Calendar Session 2012/2013

Bachelor Degree Programme

SEMESTER 1 10th September 2012 – 20th January 2013 (19 weeks)				
ACTIVITIES	**DATE**		**PERIOD**	**NOTES**
New Student Registration / Orientation Week	2nd September 2012	7th September 2012	6 days	-
Lecture	10th September 2012	25th October 2012	7 weeks	**Malaysia Day** 16th September 2012
Mid Semester Break	26th Oktober 2012	4th November 2012	1 week	**Hari Raya Aidiladha** 26th October 2012
Lecture	5th November 2012	23rd December 2012	7 weeks	**Deepavali** 13th November 2012 **Awal Muharam/Maal Hijrah 1433** 15th November 2012
Revison Week	24th December 2012	30th December 2012	1 week	**Christmas** 25th December 2012
Examination	31st December 2012	20th January 2013	3 weeks	-
Semester Break	21st January 2013	17th February 2013	4 weeks	**Maulidur Rasul** 24th January 2013 **Chinese New Year** 10th & 11th February 2013

SEMESTER 2 * 18th February 2013 – 23rd June 2013 (18 weeks)				
ACTIVITIES	**DATE**		**PERIOD**	**NOTES**
Lecture	18th February 2013	7th April 2013	7 weeks	-
Mid Semester Break	8th April 2013	14th April 2013	1 week	-
Lecture	15th April 2013	2nd June 2013	7 weeks	**Labour Day** 1st May 2013 **Birthday of DYMM Tuanku Raja Perlis** 17th May 2013 **Wesak Day** 25th May 2013 **Birthday of SPB Yang Di-Pertuan Agung** 1st June 2013
Revison Break	3rd June 2013	9th June 2013	1 week	**Israk Mikraj** 6th June 2013
Examination	10th June 2013	23rd June 2013	2 weeks	-
Semester Break	24th June 2013	1st September 2013	10 weeks	**Nuzul Al-Quran** 25th July 2013 **Hari Raya Aidilfitri** 8th & 9th August 2013

Note: Academic Calendar for Semester II 2012/2013 above does not apply to students in Year 3 Bachelor of Engineering and students in Year 2 Bachelor of Business (Entrepreneurship Engineering). Academic Calendar for these students can be reffered at the next page.

Academic Calendar Session II Semester 2012/2013

For 3rd Year Students of Bachelor of Engineering and 2nd Year Students of Bachelor of Business (Entrepreneurship Engineering)

SEMESTER 2 11th February 2013 – 16th June 2013 (18 weeks)				
ACTIVITIES	**DATE**		**PERIOD**	**NOTES**
Lecture	11th February 2013	7th April 2013	8 weeks	-
Mid Semester Break	8th April 2013	14th April 2013	1 weeks	-
Lecture	15th April 2013	26th May 2013	6 weeks	**Labour Day** 1st May 2013 **Birthday of DYMM Tuanku Raja Perlis** 17th May 2013 **Wesak Day** 25th May 2013 **Birthday of SPB Yang Di-Pertuan Agung** 1st June 2013
Revison Week	27th May 2013	2nd June 2013	1 weeks	**Israk Mikraj** 6th June 2013
Examination	3rd June 2013	16th June 2013	2 weeks	-
Semester Break/Industrial Training	17th June 2013	8th September 2013	12 weeks	**Nuzul Al-Quran** 25th July 2013 **Hari Raya Aidilfitri** 8th & 9th August 2013

Admission Requirements For Undergraduate Degree Program
Academic Session Of 2012/2013

International Students

Country	General Requirements	Specific Requirements		
China	• Completed 12 years of education in 3 levels of schools (Primary School, Junior Middle School, and Senior Middle School). • Graduated from Senior Middle School with Senior High School Certificate. • Obtain minimum average score of 60% in Senior High School Certificate. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Indonesia	• Completed 12 years of education in 3 levels of schools (Primary School, Junior Secondary School, and Senior Secondary School @ Sekolah Menengah Atas). • Pass Senior Secondary @ Sekolah Menengah Atas examination. • Pass with minimum Grade Point Average (GPA) of 6.00 in Senior Secondary @ Sekolah Menengah Atas examination. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

Country	General Requirements	Specific Requirements		
Saudi Arabia	• Completed 12 years of education in 3 levels of schools (Elementary School, Intermediate School, and General Secondary School/Technical Junior College) • Pass and obtain at least 60% in General Secondary Education Certificate (Tawjihiyah)/Secondary Vocational School Diploma/ Secondary Commercial School Diploma/ Secondary Agricultural School Diploma examination. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)* • English • Mathematics • Physics/Chemistry	 : 60% : 60% : 60%
			(Bio-Based) • English • Mathematics • Physics/Chemistry/Biology	 : 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Iraq	• Completed 11 or 12 years of education in 3 levels of schools (Primary School, Intermediate Secondary School, and Preparatory Secondary School/ Vocational Secondary School) • Pass and obtain at least 60% in Preparatory Secondary School/Vocational Secondary School. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)* • English • Mathematics • Physics/Chemistry	 : 60% : 60% : 60%
			(Bio-Based) • English • Mathematics • Physics/Chemistry/Biology	 : 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

Country	General Requirements	Specific Requirements		
Nigeria	• Completed 12 years of education in 2 or 3 levels of schools (Primary School, Junior Secondary School and Senior Secondary School/Technical Secondary School) • Pass and obtain at least B+ in five (5) subjects in Senior School Certificate. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Thailand	• Completed 12 years of education in 3 levels of schools (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 equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

Country	General Requirements	Specific Requirements		
Uzbekistan	• Completed 11 or 12 years of education in 2 levels of schools (Primary School, General Secondary School and Technical Secondary School/ Upper Secondary School /Specialized Secondary School) • Pass and obtain at least 60% in Technical Secondary School/ Upper Secondary School / Specialized Secondary School. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Yemen	• Completed 12 years of education in 2 levels of schools (Basic and Upper Secondary School / Vocational Secondary School) • Pass both Intermediate School Certificate (ISC) and General Secondary School Certificate (Al-Thanawiya) examination. • Obtain at least 60% in General Secondary School Certificate (Al-Thanawiya). • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

<table>
<tr><th>Country</th><th>General Requirements</th><th colspan="3">Specific Requirements</th></tr>
<tr><td rowspan="5">Somalia</td><td rowspan="5">• Completed 12 years of education in 2 levels of schools (Primary School and Secondary School)

• Pass and obtain at least 60% in Secondary School Leaving Certificate (SSLC) or Technical Secondary School Certificate.

• Obtain TOEFL 525 / IELTS 5.5 / Equivalent

(Candidates who do not possess equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/
Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
<tr><td rowspan="5">Mauritius</td><td rowspan="5">• Completed 12 years of education in 3 levels of schools (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 equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/
Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
</table>

Country	General Requirements	Specific Requirements		
Sudan	• Completed 11 years of education in 2 levels of schools (Basic School and Secondary School / Technical School) • Pass and obtain at least 60% in Sudan Secondary School Certificate. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Syria	• Completed 12 years of education in 3 levels of schools (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. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

<table>
<tr><th>Country</th><th>General Requirements</th><th colspan="3">Specific Requirements</th></tr>
<tr><td rowspan="5">Jordan</td><td rowspan="5">• Completed 12 years of education in 2 levels of schools (Basic School and Secondary School / Vocational Secondary School)

• Pass and obtain at least 60% in Al-Tawjihi @ General Secondary Education Certificate / Vocational Certificate.

• Obtain TOEFL 525 / IELTS 5.5 / Equivalent

(Candidates who do not possess equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/
Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
<tr><td rowspan="5">Pakistan</td><td rowspan="5">• Completed 12 years of education in 2 levels of schools (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 equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/
Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
</table>

Country	General Requirements	Specific Requirements		
Libya	• Completed 12 years of education in 2 levels of schools (Basic School and Secondary School) • Pass and obtain at least 60% in Secondary Education Certificate. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Ethiopia	• Completed 12 or 13 years of education in 3 levels of schools (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 equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

Country	General Requirements	Specific Requirements		
Iran	• Completed 12 years of education in 3 levels of schools (Primary School, Secondary School and Pre-University) • 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 equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)* • English • Mathematics • Physics/Chemistry	 : 60% : 60% : 60%
			(Bio-Based) • English • Mathematics • Physics/Chemistry/Biology	 : 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Palestine	• Completed 12 years of education in 2 levels of schools (Basic School and Secondary School/ Technical Secondary School) • Pass and obtain at least 60% in Secondary School Certificate (Al-Tawjihi). • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)* • English • Mathematics • Physics/Chemistry	 : 60% : 60% : 60%
			(Bio-Based) • English • Mathematics • Physics/Chemistry/Biology	 : 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

Country	General Requirements	Specific Requirements		
Chad	• Completed 13 years of education in 2 levels of schools (Primary School and Secondary School) • Pass and obtain at least 60% in Baccalaureat. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Algeria	• Completed 13 years of education in 2 levels of schools (Primary School and Secondary School) • Pass Diploma of Secondary Education (Baccalaureat) with minimum score of 15. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

<table>
<tr><th>Country</th><th>General Requirements</th><th colspan="3">Specific Requirements</th></tr>
<tr><td rowspan="5">Bangladesh</td><td rowspan="5">• Completed 12 years of education in 2 levels of schools (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 equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/ Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
<tr><td rowspan="5">United Arab Emirates (UAE)</td><td rowspan="5">• Completed 12 years of education in 3 levels of schools (Primary School, Preparatory School and Secondary School)

• Pass and obtain at least 60% in Secondary School Leaving Certificate (Al-Tawjihiyya).

• Obtain TOEFL 525 / IELTS 5.5 / Equivalent

(Candidates who do not possess equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/ Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
</table>

Country	General Requirements	Specific Requirements		
Lebanon	• Completed 12 years of education in 3 levels of schools (Primary School, Intermediate School and Secondary School) • Pass and obtain at least 12/20 in Baccalauréat Libanais. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Myanmar	• Completed 11 years of education in 3 levels of schools (Primary School, Middle School, and High School) • Pass University Entrance Examination and obtain minimum average score of 360/600 or 60%. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

<table>
<tr><th>Country</th><th>General Requirements</th><th colspan="3">Specific Requirements</th></tr>
<tr><td rowspan="5">Tunisia</td><td rowspan="5">• Completed 13 years of education in 2 levels of schools (Primary School and Secondary School)

• Pass and obtain at least 12/20 in Baccalauréat.

• Obtain TOEFL 525 / IELTS 5.5 / Equivalent

(Candidates who do not possess equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/ Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
<tr><td rowspan="5">Cameroon</td><td rowspan="5">• Completed 14 years of education in 2 levels of schools (Primary School, Secondary School and High School)

• Pass GCE A-Level with average score of 60%/ equivalent, and obtain at least C in relevant subjects.

• Obtain TOEFL 525 / IELTS 5.5 / Equivalent

(Candidates who do not possess equivalent qualification as 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 University Senate.</td><td rowspan="4">Bachelor of Engineering</td><td colspan="2">(Electronic-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td colspan="2">(Bio-Based)</td></tr>
<tr><td>• English
• Mathematics
• Physics/Chemistry/Biology</td><td>: 60%
: 60%
: 60%</td></tr>
<tr><td>Bachelor of Business</td><td>• English
• Mathematics
• Physics/Chemistry/Biology
or
Business/Economics/Commerce/ Accounting</td><td>: 60%
: 60%
: 60%

: 60%</td></tr>
</table>

Country	General Requirements	Specific Requirements		
Egypt	• Completed 11 or 13 years of education in 3 levels of schools (Primary School, Preparatory School and General Secondary School/Technical Secondary School) • Pass and obtain at least 60% in Secondary Education Certificate (Thanaweya Amma). • Obtain TOEFL 525 / IELTS 5.5 / Equivalent (Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Cambodia	• Completed 12 years of education in 3 levels of schools (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 equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

Country	General Requirements	Specific Requirements		
Vietnam	• Completed 12 years of education in 3 levels of schools (Primary School, Lower Secondary School and Upper Secondary School) • Pass University Entrance Examination and obtain minimum average score of 6.0/60%/equivalent. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%
Turkey	• Completed 12 years of education in 2 levels of schools (Basic School and High School) • Pass Lise Diplomasi and obtain minimum average score of 3.00/60%/equivalent. • Obtain TOEFL 525 / IELTS 5.5 / Equivalent *(Candidates who do not possess equivalent qualification as 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 University Senate.	Bachelor of Engineering	*(Electronic-Based)*	
			• English • Mathematics • Physics/Chemistry	: 60% : 60% : 60%
			(Bio-Based)	
			• English • Mathematics • Physics/Chemistry/Biology	: 60% : 60% : 60%
		Bachelor of Business	• English • Mathematics • Physics/Chemistry/Biology or Business/Economics/Commerce/ Accounting	: 60% : 60% : 60% : 60%

Academic Systems

The Bachelor of Engineering and The Bachelor of Engineering Technology curriculum are designed to be completed in 4 years while the Bachelor in Business is 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 level 100, 200, 300, and 400 that are equivalent to Year 1, 2, 3 and 4.

For the of graduation purposes, Bachelor of Engineering students must undergo 120 units of Core Courses, and Bachelor of Engineering Technology students must undergo 123 units, while Bachelor of Business students must undergo 72 or 74 units of Core Courses (taken according to specialization) and 30 units of Elective Courses.

Students also need to take University Requirement courses of 17 units for Bachelor of Engineering, 19 units for Bachelor of Engineering Technology and 20 units for Bachelor of Business.

Students are required to submit a copy of Malaysian University English Test (MUET) result as a requirement to graduate. Students also need to obtain at least C grade for the University's Requirements Course (W) and at least a grade D+ for Core Courses (T) and a minimum of 2.00 CGPA before they are eligible to be considered for the award of a degree.

Programme Structure

Bachelor of Engineering, Bachelor of Engineering Technology and Bachelor of Business programme structures are clustered as shown in the following Tables. Students are required to undergo 137 units for Bachelor of Engineering, 142 units for Bachelor of Engineering Technology and 122 units or 124 units for Bachelor of Business in order to graduate as shown in Table 1(a), 1(b), 1(c) and 1(d).

Starting Academic Session 2012/2013, all students are required to collect 3 units of Co-curriculum during their studies in UniMAP. 2 units are for Uniformed Bodies and 1 unit for courses Non-uniformed Bodies. Addition of Co-curricular unit in the curriculum structure for Degree programmes will be conducted at the School.

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. University English Language	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 CORE COURSES	**123**
UNIVERSITY REQUIREMENT COURSES	**19**
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. University English Language	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

BACHELOR OF BUSINESS (ENGINEERING ENTREPRENUERSHIP)	
COURSES	UNIT (S)
BUSINESS CORE COURSES	**72**
UNIVERSITY REQUIREMENT COURSES	**20**
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. University English Language	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
ELECTIVES	**30**
TOTAL	**122**

Table 1(d): Programme Structure for Bachelor

BACHELOR OF BUSINESS (INTERNATIONAL BUSINESS)	
COURSES	UNIT
BUSINESS CORE COURSES	**74**
UNIVERSITY REQUIREMENT COURSES	**20**
a. Engineering Entrepreneurship	2
b. Thinking Skills	2
c. University Malay Language	2
d. University English Language	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
ELECTIVES	**30**
TOTAL	**124**

Types of Courses

1. University Courses

University Courses are courses outside of the students' major. These courses are offered by the Centre for Communication Technology and Human Development (PTKPI). Some of these courses are compulsory while others are optional. The University Courses are:

a. **Engineering Entrepreneurship (2 units)**
All students are required to take 2 units of Engineering Entrepreneurship course. Students are advised to take other courses in 'entrepreneurship' category, whereby the units that are collected will be counted as Optional Courses. Students need to pass with at least grade C.

b. **Ethnic Relations (2 units)**
2 units of Ethnic Relation course is compulsory for all students. Students need to pass with at least grade C.

c. **Islam and Asian Civilization (2 units)**
Islam and Asian Civilization is compulsory for all students. Students need to pass with at least grade C.

d. **University Malay Language (2 units)**
2 units of University Malay Language course is compulsory and is a requirement for graduation. All students need to pass with at least grade C.

e. **University English Language (2 units)**
2 units of University English Language course is compulsory and is a requirement for graduation. However, students who acquired band 1, 2 and 3 in MUET need to take Foundation English and to pass with at least grade C before enrolling for University English. The 2 extra units from

Foundation English are counted as Optional Courses. Students need to pass with at least grade C for University English Language.

f. Thinking Skills (2 units)
It is compulsory for students to take 2 units of Thinking Skills course. Students need to pass with at least grade C.

g. Skills and Technology in Communication (2 units)
It is compulsory for Bachelor of Engineering and Bachelor of Engineering Technology students to take 2 units of Skills and Technology in Communication course. Student need to pass with at least C.

h. Business Communication (3 units)
Students from Bachelor of Business need to take this course and pass with at least a C.

i. Co- Curriculum Programme
All students are required to collect 3 units for Co-curricular during their study at UniMAP. 2 units of Uniformed Bodies must be taken by students as a package which is 1 unit in 1st Semester and another 1 unit in 2nd Semester (in the first year of study), while for non-Uniformed Bodies courses 1 unit can be taken in any semester.

2. Core Courses (Bachelor of Engineering)

Core Courses consist of Engineering courses that are compulsory to be taken by students according to their major. These courses are part of the requirements for graduation. Students who fail the Core Courses must repeat them before they can graduate.

3. Core Courses (Bachelor of Engineering Technology)

Core Courses consist of Engineering Technology courses that are compulsory to be taken by students according to their major. These courses are part of the requirements for graduation. Students who fail the Core Courses must repeat them before they can graduate.

4. Core Courses (Bachelor of Business)

Bachelor of Business Core Courses are divided into two groups which are (i) Business Core Courses and (ii) Programme Core Courses.

Business Core Courses consist of contemporary courses in business field which are compulsory to be taken by business students while Programme Core Courses are offered according to the students' major.

These courses are part of the graduation criteria. Students who fail any of the core courses must repeat them before they can graduate.

5. Elective Courses (Bachelor of Business)

Students can choose elective courses according to the fields that they are interested in.

6. Optional Courses

Optional Courses are any courses which are offered by the Centre for Communication Technology and Human Development (PTKPI) as in Table 1(a) and 1 (b) for Bachelor of Engineering and Bachelor of Engineering Technology. Students need to complete 2 units of the Optional Courses.

Definition and Value 'Credit' and 'Unit'

In UniMAP, credit' and 'unit' are used as if they carry the same meaning. 'Unit' changes to 'credit' after students have passed a course.

Teaching and Learning Approaches at UniMAP

Core Courses that are offered consist of theory and practical. The contact hours are as follows:

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

2. **Practical Component**
   One unit of practical component is equivalent to 2 contact hours in a week or 28 hours in a semester.

For most of the core courses, students are required to complete a mini project and sit for an exam or viva at the end of the semester.

The practical components consist of the following teaching and learning models:

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

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

3. **E- Learning –** Learning approach that is reinforced using ICT that is equipped with the latest conventional learning apparatus. Students learn the course or selected topics using moduls that can be accessed directly from the UniMAP website. These modules consist of lecture notes in multimedia format using audio, video, graphic, animation, simulation, games and numerous interaction–oriented activites.

4. **Exposure to Industry –** Students will undergo activities related to industry for a certain period of time throughout their study at UniMAP. These include IndEx programmes, InTra (Industrial Training), Industrial Entrepreneurship, Business Incubator and others.

Industrial Training (InTra)

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

The 3rd year Engineering students are required to undergo 12 weeks of industrial training in order to get 4 credits for this course while 4th year student of Engineering Technology are required to undergo 12 weeks of industrial training in order to get 12 credits for this course.

During the 2nd and 4th semester, Bachelor of Business (International Business) students will undergo Industrial Training. Students have 2 options to choose which is Option 2+2 or 3+1. For the 2+2 option, students will undergo 2 phases (2 months +2 months) of industrial training in selected multinational companies in Malaysia and second option which is the Option 3+1, students will undergo industrial training in the selected multinational companies in Malaysia for the first three months and go for an educational trip overseas. For Bachelor of Business (Engineering Entrepreneurship) students, they will go for Practical Training via the Business Incubator Programme after the 4th for 12 weeks. They will earn 6 credit hours

An average of 8 contact hours per day for 5 days in a week, which is 8 hours per day X 5 days = 40 hours per week, is regarded as contact hours evaluation (working hours for designated organization/corporation)

The main objectives of the Industrial Training are to:

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

The Center for Industrial Collaboration (CIC) is also coordinating the following programmes that require industries' involvement:

1. **Industrial Exposure (IndEx)**
   a. Short term exposure programme – 1 day
   b. Experts, managers and engineers from the industry are invited to give talks, briefings, demonstrations and dialogues according to the dates given.
   c. Involves visits to the industry
   d. This exposure is only for students who have completed their first academic session.

2. **Industrial Entrepreneurship Exposure (IndEnt)**
   a. Short term exposure programme – 1 day
   b. Involvement of small sector industries, R&D firms and government bodies such as the Ministry of Entrepreneur and Cooperative Development.
   c. Includes demonstrations, dialogues and briefings
   d. Involves only second year students.

Business Incubator Programme

This programme is based on a three-year coursework that is equivalent to 6 semesters on a full-time basis. The teaching and learning approaches for this programme not only cover lectures and tutorials but also practical training via the Business Incubator Programme. After the fourth semester, the students will participate in the Business Incubator Programme for twelve (12) weeks. They will earn 6 credit hours.

Students are mentored by companies in business incubators. This will give them the opportunity to be part of the team involved in product development which may even lead to commercialisation. They should 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 Business Incubator Programme, students are required to prepare a report on their experience throughout the Business Incubator Programme that they have undergone 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). Among its members include Technology Park Malaysia, Malaysian Technology Development Corporation, Sirim and Kulim Technology Park Corporation. UniMAP works closely with these organisations to warrant the success of the programme.

International Business Field Trips

This programme is based on a three year coursework that is equivalent to six semesters on a full time basis. The teaching and learning methods comprise lectures, tutorials and practical (via industrial training and International Business Field Trips).

During the second and fourth semester, students will undergo industrial training. Students have two options to choose which is Option 1 (2+2) or Option 2 (3+1). For the 2+2 option, students will undergo two phases (2 months +2 months) of industrial training in selected multinational companies in Malaysia. Moderation will be conducted with collaboration from the UniMAP Centre for Industrial Collaboration. In the second option which is the Option 3+1, students will undergo industrial training in the selected multinational companies in Malaysia for the first three months and go for an educational trip overseas. Students are given the freedom to choose any of the two options given for their industrial training according to their interest and financial abilities.

Course Code

Each course offered has its own code. Table 2(a), 2(b) and 2(c) below show summary Course Code for Degree programmes :

Table 2(a): First Letter-Type of program offered at the Bachelor Degree level.

First letter in the code	Type of program offered
E	Bachelor of Engineering
B	Bachelor of Business
P	Bachelor of Engineering Technology
U	General Course (This course can be taken by all programs)

Table 2(b): Second Letter-Faculty offering Courses

Second letter in the code	Faculty offering courses
E	School of Electrical Systems Engineering
M	School of Microelectronic Engineering
K	School of Computer & Communication Engineering
N	School of Mechatronic Engineering
B	School of Material Engineering
P	School of Manufacturing Engineering
R	School of Bioprocess Engineering
A	School of Environmental Engineering
D	School of Mechanical Engineering Technology
G	School of Electronic Engineering Technology
L	School of Electrical Engineering Technology
S	School of Civil Engineering Technology
T	School of Chemical Engineering Technology
C	Engineering Centre
Q	Institute of Engineering Mathematics
I	Centre for Industrial Collaboration
F	Centre of Business Innovation and Techno Entrepreneur (PPIPT)
U	Centre for Communication Technology and Human Development (PTKPI)
Z	Co-Curriculum Centre

Table 2(c): Third Letter- University's Requirements and Core Courses;

Third letter in the code	Types of Courses (University's Requirements or Core Courses)
T	Core Courses
W	University's Requirements Courses

Bahasa Inggeris (English)

The three last course codes represent the following – the first number is the level of course. The second and third numbers are the course numbers. The codes are simplified in Table 3.

Table 3: Course Code

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

Course Registration

All students are required to register for the course offered at a date specified by the University. Course registration is done online by all UniMAP students. Senior students will register according to the students' preceding semester results [after the results have been announced]. Subjects taken for the subsequent semester shall be registered before the end of the compulsory registration period [2 weeks] / fourteen days (14^{th}) of the current semester.

All the active students are allowed to registered not more than twenty two [22] units and not less than ten [10] units except for those whose who are involved in Industrial Training and the final year students. For the students who wish to register for more than twenty two [22] units, they will have to get the approval from the Academic Advisor with the confirmation from the Dean. Students must also fill the HEA-09a form [Borang Pendaftaran Kursus].

New students will register online on the specified date during the orientation week according to their School. Students will be briefed about the courses in the orientation week by the School. Students who extend their studies must register in the next semester.

Students who failed to register for their course within the stipulated period of time are subject to a penalty of RM50. The student must not register later than the third (3^{rd}) week of the semester. The students must fill up the HEA-09 [Borang Pendaftaran Kursus Lewat] and must have the approval from the Dean.

It is compulsory for the students to meet up with their Academic Advisor after the registration where they are advised to bring along their printed registration slip. The Academic Advisor will validate / not validate the course registered by the students. If the Academic Advisor approves of the course registered by the students, then validation will be made in the system. Upon the approval of a student's course registration by the Academic Advisor, the student can print out the corrected course registration slip. If the Academic Advisor disagrees with the courses registered by the students, then the students should re-register. Only with the Academic Advisor's consent will the student registration be valid.

It is the responsibility of the students to check and ensure that all particulars stated in the Course Registration Slip are correct.

Probation Student Course Registration [P]

Student with the probation status are not allowed to register online by them self. The students must meet up with their Academic Advisor to get the confirmation from their Dean and fill up the HEA-09b form [Borang Pendaftaran Kursus-Percubaan (P)] before handing it to the School or Registrar Office to register the subjects. Only the Assistant Registrar of School / Registrar Office were given the right to register the subjects. Probation students are only allowed to take the maximum of 12 units and minimum of 10 units.

Add/Drop/Withdrawal Course

It is compulsory for students to log in into the registration system at the beginning of the semester to check their registration status. After the add / drop online week ended, the student must fill up the HEA-11 form [Borang Tambah Kursus] before handing it to the School and Registrar Office to register the courses.

After add / drop session ended, the students are allowed to drop any courses starting from the third (3^{rd}) week until the seventh (7^{th}) week by using the HEA-10 form [Borang Gugur Kursus]. Students must have the Dean's approval before handing it to the Registrar to be recorded. The form can be obtained from the Registrar, School or the portal.

After the drop session ended, the students are allowed to withdraw from the course after the 7^{th} week (not exceeding the 13^{th} week or before the examination week) by filling the HEA-19 form [Borang Tarik Diri] and will be penalized RM50 for each course. Students must have the Dean's approval for the form before handing it to the Registrar to be recorded. The form can be obtained from the Registrar, School or portal. Students must take note that even though they have withdrawn from the course, the registration of the course [withdrawn course] will be appeared in the student transcript. However, the grade will not be included in the calculation of GPA and CGPA.

Change of Programme

Change of programme is not encouraged because 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 as follows:

1. Application can only be done by students who have completed at least the first semester. Students must fill in completely Borang Permohonan Pertukaran Program Pengajian / Change of Programme Application Form (HEA-12). The form can be obtained at the Registry Department or at Schools. However, for special cases, application to change the programme in the first semester can be done, subjected to approval by the Vice Chancellor or Deputy Vice Chancellor (Academic & International).

2. Application must be presented within the first two weeks of the semester.

3. Concrete reasons need to be given in written form and must be attached together with recommendation letter from both the Dean and RPS of current and applied schools.
4. Every application that has been recommended by the Dean of current and applied schools must be verified by the Dean of Academic Affairs, followed by an approval by Vice Chancellor / Deputy Vice Chancellor (Academic & International) before it is officially recorded by the Registry Department (Students Admission & Records Unit).

5. For students who obtain schorlarships or PTPTN or other types of sponsorships, they must get approval from their respective sponsors. Students need to deal directly with their sponsors or seek advice from Student Affairs and Alumni Department.

Postponement of Study

Application to postpone a study is permitted for students who have health problem and are verified of being ill by government hospitals or University's panel doctors only. Application made because of other reasons can be given consideration if it is reasonable, and is recommended by RPS, Dean of School, Dean of Academic Affairs, and last but not least, approved by the Vice Chancellor / Deputy Vice Chancellor (Academic and International).

Students can apply for postponement of study by filling in Borang Penangguhan Pengajian / Postponement of Study Application Form (HEA/HEP-13) which can be obtained from Registry Department or at their respective schools. Application should be submitted to the Dean of the School. The Dean has the right to request the student to consult a counsellor (if necessary) before making a decision.

Application for postponement of study should be submitted before the seventh (7th) week of an academic session, except those with written approval. Application made after that period will only be allowed for medical reasons and is verified by government hospitals or University's panel doctors. Students are not allowed to postpone their studies more than two (2) semesters consecutively.
Application for postponement of study from international students must be accompanied by letter of recommendation from their sponsors (for sponsored students only).

For students who postpone their studies due to health problem, the applied semester will not be counted for graduation (without penalty). Students who postpone their studies due to other problems apart from health problem, the semester will be counted for graduation (with penalty) unless permitted otherwise. Students who suffer from a long term health problem which may hinder their studies, can be considered to be terminated from continuing their studies upon recommendation from government hospitals or University's panel doctors.

A warning letter will be issued to students who do not register for present semester without submitting any application to postpone their studies. Students who fail to sumbit postponement application for a certain period of time will be terminated from the university. Their names will be dropped from List of Registered Students and verified of being quitted.

Student Level

A student's status cannot be directly determined according to the year of study. It is determined based on the accumulated credit units. The details are listed in Table 4 (a), Table 4 (b) and Table 4 (c):

Table 4 (a) Determinant of Student Level (Bachelor of Engineering)

Year 1	Year 2	Year 3	Year 4
0 – 36 units	37 – 73 units	74 – 106 units	107 – 135 units

Table 4 (b) Determinant of Student Level (Bachelor of Engineering Technology)

Year 1	Year 2	Year 3	Year 4
0 – 38 units	39 – 76 units	77 – 111 units	112-140 units

Table 4 (c) Determinant of Student Level (Bachelor of Business)

Year 1	Year 2	Year 3
0 – 40 units	41 – 80 units	81 – 122 units

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

For those students who are allowed to take the Curative Course (course offered during long semester break), their curative course 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 not good, it maintained the standard of Semester II.

A student with GPA less 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 less than 2.00 for two consecutive semesters. If the GPA of students still get a GPA of less than 2.00 for the following semester, the student will not be allowed to continue with their studies, except if the CGPA of students exceeded 2.00 with the University approval. The University authorities have the right to terminate any students who do not perform and fulfil the academic requirements stated by the university.

Student's Minimum and Maximum Period of Study

Bachelor of Engineering and Bachelor of Engineering Technology students have to complete their period of study within the duration given that is within the minimum 8 semesters (4 years) or the maximum 14 semesters (7 years). However, for students who are given unit exemptions, the maximum duration given to complete their periods of study cannot be less than 6 semesters (3 years) and not more than 12 semesters (6 years).

Bachelor of Business students' should complete the program within a minimum of 6 semesters (3 years) and a maximum of 10 semesters (5 years). However, for students who obtain exemption of unit, the maximum period allowed, subject to the exemption provided by the university.

Curative Courses

Curative Courses are held after the second semester. Registration for Curative Courses is very limited and depends on whether the particular course is offered for the second time by the school and with approval from the senate. Students are only allowed to take a maximum of 10 units (3 types) at one time. The learning and teaching of these curative courses are in the form of tutorials. The curative course normally comprises 2 weeks of tutorials and one week of examinations.

Exemption of Units

The provision of Credit Exemption according to the Academic Regulations of a semester system is for the purpose of giving recognition to a student's prior learning. A Credit Exemption is the total credit exempted for the conferment of a Diploma / that is given based on the academic qualification of Diploma as approved by the University. Credit Exemption is given to a student who has obtained the minimum grade of C+ in a subject according to the University grade system and subject to terms and conditions determined by the University.

A student who has attended similar or equivalent subject with 1/3 similar learning content and passed with a minimum of C+ according to the grading system of the University may be given Credit Exemption. The application for the relevant courses can be merged [2 courses or more] for one course in UniMAP to be exempted. Exemption for Bahasa Melayu, Bahasa Inggeris dan co-curriculum are not allowed.

Exemption for Tamadun Islam and Tamadun Asia only can be done for student who have take TITAS as long as it is the same name with the same unit or more. SPM results cannot be taken into consideration for exemption. Students will not be allowed to apply the exemption for Industrial Training.

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 others before being eligible to sit for an exam. The duration for exams is as follows:

Figure 5 - 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 consists of 100% if the entire course is lab structured. Coursework consists of assignments, lab reports and test. Students' achievement evaluation is based on letter grades and points as follows:

Figure 6– Letter grades and points

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

Figure 7 – Calculation of GPA and CGPA:

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

Appeal to Revise Examination Results

On a certain reasons, a student might want to apply for a revision on their examination results. Students are only allowed to appeal for a revision in the duration of fifteen (15) days after examination results are released officially by the Registrar. Application after this duration will not be considered.

Students must submit the form HEA-15m [Examination Results Review Appeal Form] to the Examination & Graduation Unit, Academic Management Division, Registry Department. The appeal form must be submitted within the period of fifteen (15) days after the official result was announced. This will need to be filled in two (2) copies. Students will have to keep one (1) copy of the form.

Students will be charged RM50 per course for their appeal. Payment in cash or Money Order / Pos Malaysia / Bank Draft / Cheque in the name BENDAHARI UNIMAP.

English Language Usage

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

Academic Advisor and Buddy System

Academic Advisor and Buddy System or RPS connects students and lecturers to discuss and decide on students' study plan. Even though the registration is done online, students are advised to meet with their Buddy or Academic Advisor during the registration exercise.

RPS is a system where academic staff supervise a small group of students for the whole duration of the students' stay in UniMAP. 'Supervision' here entails frequent meetings under informal settings, where students can relax with their staff ("buddies") and discuss academic and social issues that concern them. Students who do not hold satisfactory academic performance will have to look to their buddies as 'mentors', in which case the student becomes the 'mentee' of the buddy, who helps the student out every step of the way.

Academic Support Centres

These centres are established to support UniMAP in terms of achieving academic excellence.

1. **Centre for Communication Technology and Human Development**

   Centre for Communication Technology and Human Development or Pusat Teknologi Komunikasi dan Pembangunan Insan (PTKPI), formerly known as Centre for Communication Skills and Entrepreneurship (PKKK) is a centre that serves all other graduates programs in UniMAP. Instead of offering academic programmes, PTKPI provides multiple courses that channel the knowledge of social and humanities.

2. **Engineering Centre**

   The Engineering Centre was established to manage labs and common workshops that are needed for courses that are offered in UniMAP.

   Engineering Centre also supports research and design in UniMAP. A few courses are offered here such as Basic Engineering Skills that is compulsory for all students from PPK Electric, PPK Microelectronic and PPK Computer & Relations.

3. **Institute of Engineering Mathematics**

   The Institute of Engineering Mathematics is a centre for planning and handling engineering mathematics curriculum in UniMAP. It also serves as as a reference centre in providing expertise in mathematical research method, simulation and statistical method. IEM also serves as a training center for in-campus and out-campus personnels in fields related to mathematics.

4. **Centre of Industrial Cooperation**

   Centre of Industrial Cooperation liaises with industrial sectors in a lot of aspects, especially in programmes directly related towards student's learning. Programmes such as exposure to industry, industrial forum, staff industrial training and others are handled by this centre. Some of these programmes are compulsory for all students.

5. **Information Technology and Communication Centre**

   Information Communication and Technology Centre is established to implement ICT while assisting with academic and university's administration. ICT Centre also develops and facilitates computerized information system in the university. It also provides consultants in ICT and helps to promote the usage of technology in University.

6. **Library**

The University's Library is established to provide facilities and quality services to support the teaching/ learning and research in this University.

7. **The Centre for International Affairs**

   The Centre for International Affairs is the first point of contact for international students and it offers a wide range of programmes supporting the international students in term of enrolment, study and social life, as well as a referral service to facilities on campus and within the local community.

8. **Teaching and Learning Unit**

   This unit helps towards coordinating services that uplift the university's academic staff's professionalism. This unit also plans courses, workshops and counselling for students.

Academic Management Division, Registrar's Department

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

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

1. **Admissions and Student Records Unit**

   Admissions and Student Records Unit is responsible for handling matters related to the admission of the students,student records and processing of data. Tasks and duties carried out by this unit are:

   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 enrollment of international students at undergraduate level.

   iii. Manage and operate the data processing aspects of the Student Information System.

   iv. Manage the students' personal records and student status, including students' application of Postponement of Studies and change of programs.

   v. Manage students' online course registration every semester.

   vi. Manage the process of unit exemptions and credit transfer for students.

2. Examinations and Graduation Unit

Examination and Graduation Unit is responsible to manage and monitor the process of Final Examinations and other matters related. The duties and responsibilities of this unit are as follows:

i. Issue the Examination Circular to School / Centre / Institute.

ii. Issue Examination Schedules for Diploma and Degree Program.

iii. Manage the Final Examination in the prescribed period.

iv. Secretariat for the Council of the University Examination.

v. Manage the process of exanmination data using the Student Information System.

vi. Issue Final Exam results.

vii. Manage the appeal process for students to review the examination results.

viii. Issue academic transcripts after the Convocation.

ix. Conduct the process of borrowing and returning robes for academic staffs.

x. Review the eligibility to graduate for final year students and issue Completion of Study letter.

xi. Responsible for the students convocation process in term of invitation, borrowing and returning robes.

xii. Manage the preparation and delivery of graduation scrolls to the graduates.

xiii. Record and update data of graduates who have graduated.

3. The Senate Unit

The Senate Unit is responsible for handling matters related to the Senate. The tasks and duties carried out are:

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

ii. Provide Academic Calendar, manage the list of course offered as well as dealing with the Ministry of Education Malaysia (MOE) and the Public Service Department (JPA) of new programs offered, the establishment of schools / departments and units.

iii. Manage the nomination of Honorary Degree recipients

Address :

Management Academic Division,
Registrar's Department
Universiti Malaysia Perlis
3rd Floor, KWSP Building
Jalan Bukit Lagi
01000 Kangar
PERLIS.

Staff of Management Academic Division:

Cik Ruzalina Ibnu Ruslan
Principal Assistant Registrar
Tel : 04-9798702
Fax : 04-9798703
E-mail : ruzalina@unimap.edu.my

Admissions and Student Records Unit :

Puan Nor Innar Md Nor
Assistant Registrar
Tel : 04-9798701
Fax : 04-9798703
E-mail : norinnar@unimap.edu.my

Encik Mohamad Hairi Shaari
Assistant Registrar
Tel : 04-9792984
Faks : 04-9798703
E-mail : hairishaari@unimap.edu.my

Puan Rosniza Abdul Hamid
Administrative Assistant (Clerical/Operational)
Tel : 04-9798706
Fax : 04-9798703
E-mail : rosniza@unimap.edu.my

Cik Tengku Amanina Tengku Aziz
Administrative Assistant (Clerical/Operational)
Tel : 04-9798706
Fax : 04-9798703
E-mail : amanina@unimap.edu.my

Cik Azniyanty Abdullah
Administrative Assistant (Clerical/Operational)
Tel : 04-9797941
Fax : 04-9798703
E-mail : azniyanty@unimap.edu.my

Encik Faizan Abdul
Administrative Assistant (Clerical/Operational)
Tel : 04-9797941
Fax : 04-9798703
E-mail : faizan@unimap.edu.my

Encik Amirrul Amar Mazri
Administrative Assistant (Clerical/Operational)
Tel : 04-9797940
Fax : 04-9798703
E-mail : amirrulamar@unimap.edu.my

Encik Ra'qil Afzal Raus
Office Assistant
Tel : 04-9798706
Fax : 04-9798703
E-mail : afzal@unimap.edu.my

Examinations and Graduation Unit

Puan Rahaida Ab Rahim
Assistant Registrar
Tel : 04-9798705
Fax : 04-9798703
E-mail : rahaida@unimap.edu.my

Puan Salfarina Omar
Assistant Registrar
Tel : 04-9798700
Fax : 04-9798703
E-mail : salfarina@unimap.edu.my

Encik Muhamad Azuan Mohamad Nasir
Assistant Registrar
Tel : 04-9798562
Fax : 04-9798703
E-mail : mazuan@unimap.edu.my

Encik Hamizal Hamid
Administrative Assistant (Clerical/Operational)
Tel : 04-9798708
Fax : 04-9798703
E-mail : hamizal@unimap.edu.my

Puan Tengku Amalina Tengku Aziz
Administrative Assistant (Clerical/Operational)
Tel : 04-9798708
Fax : 04-9798703
E-mail : amalina@unimap.edu.my

Cik Norazwati Abdullah
Administrative Assistant (Clerical/Operational)
Tel : 04-9798708
Fax : 04-9798703
E-mail : norazwati@unimap.edu.my

Encik Muhammad Isyalzieli Ishak
Office Assistant
Tel : 04-9798708
Fax : 04-9798703
E-mail : isyalzieli@unimap.edu.my

Puan Maisarah Ab. Karim
Administrative Assistant (Clerical/Operational)
Tel : 04-9798707
Fax : 04-9798703
E-mail : maisarah@unimap.edu.my

Encik Mohd Hafizi Che Yusof
Administrative Assistant (Clerical/Operational)
Tel : 04-9798707
Fax : 04-9798703
E-mail : hafiziyusof@unimap.edu.my

Encik Muhammad Faisal Norshidi
Office Assistant
Tel :04-9798708
Fax :04-9798703
E-mail : muhdfaisal@unimap.edu.my

The Senate Unit :

Encik Muhamad Azuan Mohamad Nasir
Assistant Registrar
Tel : 04-9798562
Fax : 04-9798703
E-mail : mazuan@unimap.edu.my

Puan Tihazariah Husin
Administrative Assistant (Clerical/Operational)
Tel : 04-9798561
Fax : 04-9798703
E-mail : tihazariah@unimap.edu.my


UNIVERSITI MALAYSIA PERLIS

School of Microelectronic Engineering

PROGRAMMES OFFERED :

- Diploma of Engineering (Microelectronic Engineering)
- Bachelor of Engineering with Honours (Microelectronic Engineering)
- Bachelor of Engineering with Honours (Electronic Engineering)
- Bachelor of Engineering with Honours (Photonic Engineering)
- Master of Science (Microelectronic Engineering)
- Doctor of Philosophy (Ph.D.)

ADDRESS:

School of Microelectronic Engineering
Universiti Malaysia Perlis (UniMAP)
Pauh Putra Campus
02600 Arau, Perlis

Phone : +604-988 5509 / 5512
Fax : +604-988 5510
E-mail : roslinda@unimap.edu.my

Introduction

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

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

Some of the facilities available at SoME

- Award winning Micro Fabrication Cleanroom
- State of the art Nano Fabrication Cleanroom
- IC Design Laboratory
- IC Fabrication Laboratory
- Nano Biochip Laboratory
- Failure Analysis Laboratory
- Photonics Laboratory

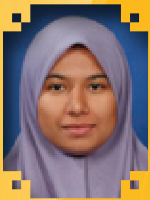
Come and reinvent yourself, enroll in our BEng programmes and create your future at SoME.

Staff Directory

DEAN
ASSOC. PROF. DR. JOHARI BIN ADNAN
E-mail: johari@unimap.edu.my

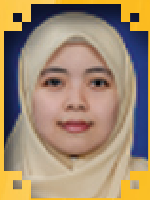
DEPUTY DEAN
(ACADEMIC AND RESEARCH)
DR. MUKHZEER BIN MOHAMAD SHAHIMIN
E-mail: mukhzeer@unimap.edu.my

DEPUTY DEAN
(STUDENT DEVELOPMENT AND ALUMNI)
DR. MOHAMAD HALIM BIN ABD. WAHID
E-mail: mhalim@unimap.edu.my



DEGREE PROGRAMME CHAIRPERSON
(MICROELECTRONIC ENGINEERING)
BIBI NADIA BINTI TAIB
E-mail: bibinadia@unimap.edu.my

DEGREE PROGRAMME CHAIRPERSON
(ELECTRONIC ENGINEERING)
DR. ASRAL BIN BAHARI JAMBEK
E-mail: asral@unimap.edu.my

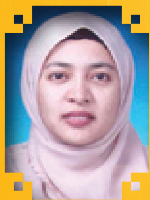


DEGREE PROGRAMME CHAIRPERSON
(PHOTONIC ENGINEERING)
NORHAYATI BINTI SABANI
E-mail: hayatisabani@unimap.edu.my

DIPLOMA PROGRAMME CHAIRPERSON
(MICROELECTRONIC ENGINEERING)
SAFIZAN BINTI SHAARI
E-mail: safizan@unimap.edu.my

POSTGRADUATE PROGRAMME
CHAIRPERSON
DR. SOHIFUL ANUAR BIN ZAINOL MURAD
E-mail: sohiful@unimap.edu.my

COORDINATOR FOR INDUSTRIAL
NETWORKING AND QUALITY MANAGEMENT
DR. NEOH SIEW CHIN
E-mail: scneoh@unimap.edu.my



ASSISTANT REGISTRAR
ZURAIDA BINTI ISMAAIL
E-mail: zuraida@unimap.edu.my

Lecturers

Prof. Dr. Uda Bin Hashim
Ph.D (Microelectronics), UKM
B.Sc (Physics), UKM
Phone : +604-9851208
E-mail : uda@unimap.edu.my

Prof. Dr.
Zul Azhar Bin Zahid Jamal
Ph.D (Electronic Materials), Univ. of Liverpool, UK
M.A (Physics), Western Michigan Univ., USA
B.Sc (Physics), Western Michigan Univ., USA
Phone : +604-9798729
E-mail : zulazhar@unimap.edu.my

Prof. Dr. Ir. Mohd Rizon
Bin Mohamed Junari
Ph.D (Computer Intelligent System) Oita Univ.,
MEng (Electrical & Elctronic) Tokushima Univ.,
BEng (Electrical & Electronic) Tokushima Univ.

Assoc. Prof. Dr.
Johari Bin Adnan
Ph.D (Magnetic Instruments), Univ. of Newcastle Upon Tyne, UK
M.Sc (Space Physics), Univ. of Iowa, USA
B.Sc (Physics), Univ. of Iowa, USA
Phone : +604-9885500
E-mail : johari@unimap.edu.my

Assoc. Prof. Dr.
Prabakaran A/L Poopalan
Ph.D (Optical Fiber), UM
M.Sc (Laser), UM
B.Sc (Physics),UM
Phone : +604-9798480
E-mail : prabakaran@unimap.edu.my

Assoc. Prof. Dr.
Zaliman Bin Sauli
Ph.D (Particle Physics), UniMAP
M.Sc (Advance Semiconductor Materials and Devices), Univ. of Surrey, UK
B.Sc (Physics), UTM
Phone : +604-9885509
E-mail : zaliman@unimap.edu.my

Dr. Asral Bin Bahari Jambek
Ph.D (Electronic), Univ. of Edinburgh, UK
M.Sc (Electronics Engineering), UPM
B.Eng (Electronics Engineering), Univ. of Southampton, UK
Phone : +604-9885503
E-mail : asral@unimap.edu.my

Dr. Mohamad Nazri
Bin Abdul Halif
Ph.D (Physics), Univ. of Nottingham, UK
M.Sc (Physics), USM
B.Sc (Physics), USM
Phone : +604-9885509
E-mail : m.nazri@unimap.edu.my

Dr. Mohamad Halim
Bin Abd. Wahid
Ph.D (Electronic Engineering), Aston Univ., UK
M.Sc (Semiconductor Physics), UM
B.Sc (Physics), UM
Phone : +604-9885502
E-mail : mhalim@unimap.edu.my

Dr. Mukhzeer
Bin Mohamad Shahimin
Ph.D (Electronics and Electrical Engineering), Univ. of Southampton, UK
B.Eng (Electronic Engineering), Univ. of Southampton, UK
Phone : +604-9885501
E-mail : mukhzeer@unimap.edu.my

Dr. Nazuhusna binti Khalid
Ph.D (Computer Science), La Trobe Univ., Australia
M.Eng (MEMS), Griffith Univ., Australia
B.Eng (Microelectronic Engineering), KUKUM
Phone : +604-9885509
E-mail : nazuhusna@unimap.edu.my

Dr. Neoh Siew Chin
Ph.D (Artificial Intelligence), USM
B.Tech (Quality Control and Instrumentation), USM
Phone : +604-9885507
E-mail : scneoh@unimap.edu.my

Dr. Rozana Aina Maulat Osman
Ph.D (Material Science and Engineering), Univ. of Sheffield, UK
B.Eng (Microelectronic Engineering), KUKUM
Phone : +604-9885532
E-mail : rozana@unimap.edu.my

Dr. Sanna binti Taking
Ph.D (Electrical and Electronics Engineering), Univ. of Glasgow, UK
M.Sc (Microelectronics), UKM
B.Eng (Electric, Electronics and Systems), UKM
Phone : +604-9885509
E-mail : sanna@unimap.edu.my

Dr. Sohiful Anuar Bin Zainol Murad
Ph.D (Electronics), Kyushu Univ., Japan.
M.Sc (Electronic System Design Engineering), USM
B.Eng (Electronic), Saga Univ., Japan.
Phone : +604-9885508
E-mail : sohiful@unimap.edu.my

Dr. Syarifah Norfaezah binti Sabki
Ph.D (Nanoscience), Univ. of Nottingham, UK
M.Sc (Solid-State Physics/ Microelectronics), USM
B.Sc (Applied Physics), UKM
Phone : +604-9885509
E-mail : norfaezah@unimap.edu.my

Dr. Yufridin Bin Wahab
Ph.D (Electrical Engineering), Victoria Univ., Australia
M.Sc (Electrical and Electronic Engineering), USM
B.Eng (Electrical and Electronic Engineering), USM
Phone : +604-9798877
E-mail : yufridin@unimap.edu.my

Ahmad Fariz Bin Hasan
M.Eng (Electrical-Electronic and Phoneecommunications), UTM
B.Eng (Electrical-Phoneecommunications), UTM
Phone : +604-9885544
E-mail : farizhasan@unimap.edu.my

Ahmad Husni Bin Mohd. Shapri
M.Sc (Computer Science), UPM
B.Eng (Computer Engineering), UTM
Phone : +604-9885509
E-mail : ahmadhusni@unimap.edu.my

Arif Mawardi Bin Ismail@Suhaimee
M.Sc (Physics), Univ. of Bonn, Germany
B.Sc (Physics), UTM
Phone : +604-9885539
E-mail : arifmawardi@unimap.edu.my

Bibi Nadia binti Taib
M.Sc (Microelectronics), UKM
B.Eng (Microelectronic Engineering), KUKUM
Phone : +604-9885504
E-mail : bibinadia@ unimap.edu.my

Ili Salwani binti Mohamad
M.Sc (Microelectronics), UKM
B.Eng (Microelectronic Engineering), UKM
Phone : +604-9885534
E-mail : ilisalwani@unimap.edu.my

Mazlee Bin Mazalan
M.Eng (Microelectronic), Victoria Univ., Australia
B.Eng (Microelectronic Engineering), UniMAP
Dip. (Electronic Engineering), UTM
Phone : +604-9885538
E-mail : mazleemazalan@unimap.edu.my

Mohammad Nuzaihan Bin Md. Nor
M.Sc (Microelectronic Engineering), UniMAP
B.Eng (Electrical Engineering (Electronics)), UTM
Dip.Eng (Electronics Engineering), UTM
Phone : +604-9798577
E-mail : m.nuzaihan@unimap.edu.my

Mohd. Fairus Bin Ahmad
M.Sc (Electronic), USM
B.Eng (Electric and Electronic), UTM
Phone : +604-9885540
E-mail : fairusahmad@unimap.edu.my

Mohd. Natashah Bin Norizan
M.Sc (Microelectronics), UKM
B.Eng (Electronic Engineering), UniMAP
Phone : +604-9885547
E-mail : mohdnatashah@unimap.edu.my

Nor Hidayah binti Saad
M.Sc (Electronic System Design Engineering), USM
B.Eng (Electronic Engineering), USM
Phone : +604-9885548
E-mail : hidayahsaad@unimap.edu.my

Nor Roshidah binti Yusof
M.Sc (Solid State Physics), USM
B.App.Sc (Engineering Physics), USM
Phone : +604-9885533
E-mail : roshidahyusof@unimap.edu.my

Noraini binti Othman
M.Sc (Electrical and Electronics), UTP
B.Eng (Microelectronic), UKM
Phone : +604-9885542
E-mail : noraini_othman@unimap.edu.my

Norazeani binti Abdul Rahman
M.Sc (Microelectronics), UKM
B.Eng (Microelectronic Engineering), KUKUM
Phone : +604-9885509
E-mail : azeani@unimap.edu.my

Norhayati binti Sabani
M.Sc (Microelectronics), UKM
B.Eng (Microelectronic Engineering), KUKUM
Phone : +604-9885504
E-mail : hayatisabani@unimap.edu.my

Norina binti Idris
M.Sc (Electrical and Electronics Engineering), USM
B.Sc (Electrical Engineering (Communications)), New Mexico State Univ., USA
Dip.Ed (English Language), Maktab Perguruan Persekutuan Pulau Pinang
Phone : +604-9885523
E-mail : norina@unimap.edu.my

Nur Hamidah binti Abdul Halim
M.Sc (Microelectronic), UniMAP
B.Eng (Chemical Engineering), USM
Phone : +604-9798576
E-mail : nurhamidah@unimap.edu.my

Nurjuliana binti Juhari
M.Sc (Physics), UM
B.Sc (Applied Physics), UM
Phone : +604-9885509
E-mail : nurjuliana@unimap.edu.my

Ramzan Bin Mat Ayub
M.Sc (Microelectronic), USM
B.Sc (Physics), USM
Phone : +604-9797814
E-mail : ramzan@unimap.edu.my

Razaidi Bin Hussin
M.Sc (Microelectronic Engineering), UniMAP
B.Eng (Electrical-Mechatronics), UTM
Phone : +604-9885509
E-mail : shidee@unimap.edu.my

Rizalafande Bin Che Ismail
M.Eng (Microelectronic), RMIT Univ., Australia
B.Eng (Electrical-Electronic), UTM
Phone : +604-9885551
E-mail : rizalafande@unimap.edu.my

Safizan binti Shaari
M.Eng (Electric and Electronics), Toyama Univ., Japan
B.Eng (Electric and Electronics), Fukui Univ., Japan
Dip.Eng (Electronic Control), Nagano Kosen, Japan
Phone : +604-9885506
E-mail : safizan@unimap.edu.my

Shamsul Amir Bin Abdul Rais
M.Eng (Sustainable Energy and Environmental Engineering), Osaka Univ., Japan
B.Eng (Nuclear Engineering), Osaka Univ., Japan
Phone : +604-9885509
E-mail : shamsulamir@unimap.edu.my

Siti Zarina binti Md. Naziri
M.Sc (Electrical and Electronic Engineering), USM,
B.Eng (Electrical and Electronic Engineering), USM
Phone : +604-9885524
E-mail : sitizarina@unimap.edu.my

Steven A/L Taniselass
M.Sc (Microelectronic Engineering), UniMAP
B.Eng (Microelectronic Engineering), UniMAP
Phone : +604-9885526
E-mail : steven@unimap.edu.my

Vithyacharan A/L Retnasamy
M.Sc (Advance Manufacturing Technology, Photonics), USM
B.Eng (Materials and Minerals), USM
Phone : +6012-4523702
E-mail : rcharan@ unimap.edu.my

Wan Mokhzani Bin Wan Nor Haimi
M.Sc (Microelectronic Engineering), UniMAP
B.Eng (Electronic Engineering), UniMAP
Phone : +604-9885509
E-mail : wanmokhdzani@unimap.edu.my

Teaching Engineer

Afzan binti Kamarudin
B.Eng (Electronic), USM
Phone : +604-9885521
E-mail : afzan@unimap.edu.my

Faradilla binti Aziz
B.Eng (Microelectronic Engineering), KUKUM
Phone: +604-9885509
E-mail: faradilla@unimap.edu.my

Mohd. Azarulsani Bin Md. Azidin
B.Eng (Electronic Engineering), MMU
Phone : +604-9855171
E-mail : azarulsani@unimap.edu.my

Mohd. Fhaizal Bin Radzi
B.Eng (Electronics Engineering), York Univ., UK
Phone : +604-9885519
E-mail : fhaizal@unimap.edu.my

Mohd. Fikri Bin Che Hussin
B.Eng (Electric, Electronic & System (Microelectronic)), UKM
Phone : +604-9885519
E-mail : fikri@unimap.edu.my

Mohd. Khairul Bin Md. Kamil
B.Eng (Electronic), USM
Phone : +604-9885509
E-mail : mohdkhairul@unimap.edu.my

Mohd. Norhafiz Bin Hashim
B.Eng (Microelectronic Engineering), KUKUM
Phone : +604-9852555
E-mail : mnorhafiz@unimap.edu.my

Mohd. Sallehudin Bin Saad
B.Eng (Electric, Electronic & System (Microelectronic)), UKM
Phone : +604-9852555
E-mail : sallehudin@unimap.edu.my

Norlida binti Abu Bakar
B.Eng (Electrical Engineering), UiTM
Phone : +604-9798760
E-mail : norlida@unimap.edu.my

Roslin Bin Jamaludin
B.Eng (Electronic), USM
Phone : +604-9885519
E-mail : roslin@unimap.edu.my

Wan Azlianawati binti Wan Aziz
B.Eng (Electronic), USM
Phone : +604-9885509
E-mail : wanazlianawati@unimap.edu.my

Study Leave

Faizah binti Abu Bakar
B. Eng (Computer), UTM
E-mail : faizah@unimap.edu.my

Hasnizah binti Aris
M.Sc (Electrical and Electronics-MEMS), UKM
B.Eng (Electrical, Electronic and System), UKM
E-mail : hasnizah@unimap.edu.my

Mohd. Hafiz Bin Ismail
M.Sc (Microelectronics System Design), Univ. of Southampton, UK
B.Eng (Electronics Engineering), Univ. of Southampton, UK
E-mail : hafizismail@unimap.edu.my

Mohd. Khairuddin Bin Md. Arshad
M.Sc (Microelectronic), UKM
B.Eng (Mechatronic), UTM
Dip.Eng (Power), UTM
E-mail : mohd.khairuddin@unimap.edu.my

Mohd. Nazrin Bin Md. Isa
M.Sc (Electronic System Design Engineering), USM
B.Eng (Electrical and Electronics), KUiTTHO
E-mail : nazrin@unimap.edu.my

Muammar Bin Mohd. Isa
M.Sc (Microelectronics), UKM
B.Eng (Electrical and Electronics), UNITEN
E-mail : muammar@unimap.edu.my

Nor Farhani binti Zakaria
M.Sc in Engineering (Bionics), Tokyo Univ. of Technology, Japan
B.Eng (Electronics), Tokyo Univ. of Technology, Japan
E-mail : norfarhani@unimap.edu.my

Norhawati binti Ahmad
M.Sc (Microelectronics), UKM
B.Eng (Electrical and Electronics), UNITEN
E-mail : norhawati@unimap.edu.my

Nur Syakimah binti Ismail
M.Sc (Microelectronic), UKM
B.Eng (Electrical and Electronic), UKM
E-mail : syakimah@unimap.edu.my

Shaiful Nizam Bin Mohyar
M.Eng (Nanomaterial System), Gunma Univ., Japan.
B.Eng (Electronic), Univ. of Electro-Communications, Japan.
E-mail : nizammohyar@unimap.edu.my

Skim Latihan Tenaga Pengajar Akademik (SLAB)

Mohd. Farizal Bin Faridus
- Program M.Sc, UniMAP

Mohd. Najib Bin Mohd. Yasin
- Program Ph.D, Sheffield Univ., UK

Muhamad Mahyiddin Bin Ramli
- Program Ph.D, Univ. of Surrey, UK

Nurul Izza binti Mohd. Nor
- Program Ph.D, RMIT Univ., Australia

Ong Siok Lan
- Program Ph.D, Sheffield Univ., UK

Shahrir Rizal Bin Kasjoo
- Program Ph.D, Imperial College, UK

Shazlina binti Johari
- Program Ph.D, Univ. of New Zealand, NZ

Siti Salwa binti Mat Isa
- Program Ph.D, Univ. of Surrey, UK

Technicians

Bahari Bin Man
Cert. (Power Electrical Engineering), Politeknik Port Dickson
Phone : +604-9852555
E-mail : bahari@unimap.edu.my

Haffiz Bin Abd. Razak
Cert. (Power Electrical Engineering), POLIMAS
Phone : +604-9852555
E-mail : haffiz@unimap.edu.my

Maznah binti Mat
Cert. (Electronic Engineering (Communications)), POLIMAS
Phone : +604-9885521
E-mail : maznah@unimap.edu.my

Mohamad Fandi Bin Puteh
Cert. (Electric and Electronic Engineering), PTSS
Phone : +604-9852840
E-mail : fandiputeh@unimap.edu.my

Mohd. Hapiz Alimin Bin Mohd. Asri
Cert. (Electric and Electronic Engineering), POLIMAS
Phone : +604-9852555
E-mail : mhapiz@unimap.edu.my

Mohd. Husyaidi Bin Rosni
Cert. (Electric and Electronic Engineering), PTSS
Phone : +604-9792555
E-mail : husyaidi@unimap.edu.my

Mohd. Norhezman Bin Rosli
Cert. (Electric and Electronic Technology), Kolej Komuniti
Phone : +6019-5660889
E-mail : norhezman@unimap.edu.my

Mohd. Zulkarnail Bin Ab. Hamid
Cert. (Electric Technology (Service and Installation)), Kolej Komuniti
Cert. (IT Administration MLVK Level II), Yayasan Pendidikan Johor
Phone : +604-9852555
E-mail : zulkarnail@unimap.edu.my

Muhamad Zulhelmi Bin Abdul Rahman
Dip. (Electronic Engineering), PTSS
Cert. (Electric and Electronic Engineering), POLIMAS
Phone : +604-9798021
E-mail : zulhelmi@unimap.edu.my

Noorshamira binti Mustaffa
Cert. (Electric and Electronic Engineering), PTSS
Phone : +604-9855172
E-mail : noorshamira@unimap.edu.my

Sharifah Roshida binti Syed Mat Noor
Cert. (Electronic Engineering (Communications)), POLIMAS
Phone : +604-9798014/8015
E-mail : sh.roshida@unimap.edu.my

Sharifah Salmah binti Syed Mat Noor
Dip. (Electronic), POLIMAS
Cert. (Electric and Electronic Engineering), POLIMAS
Phone : +604-9885520
E-mail : shsalmah@unimap.edu.my

Administrative Staff

Zuraida binti Ismail
Assistant Registrar
B.BA (International Business Management), UUM
Phone : +604-9885512
E-mail : zuraidaismail@unimap.edu.my

Shah Rizan Bin Mohd. Rejab
Science Officer
B.Sc (Physics), UPM
Phone : +604-9885511
E-mail : rizan@unimap.edu.my

Roslinda binti Fazal Mohamad
Secretary
Dip. (Office Management and Technology), UiTM Seri Iskandar
Phone : +604-9885509
E-mail : roslinda@unimap.edu.my

Azimah binti Aziz@Azaib
Administrative Assistant
STPM
Phone : +604-9885515
E-mail : azimah@unimap.edu.my

Zauyah binti Mustafa
Administrative Assistant
STPM
Phone : +604-9885514
E-mail : zauyah@unimap.edu.my

Nazmi Bin Sabu
General Office Assistant
SPM
Phone : +604-9885513
E-mail : nazmi@unimap.edu.my

Programme Objectives (PEO)

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

PEO2:
Graduates who are members and contribute to professional society

PEO3:
Graduates pursue continuing education opportunities

PEO4:
Graduates make contributions through research and development

PEO5:
Graduates who are entrepreneurial engineers

Program Outcomes (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in electronic engineering discipline

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

PO3:
Ability to design a system, component or process to meet desired needs.

PO4:
Ability to design and conduct experiments, as well as to analyze and interpret data.

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

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

PO7:
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO8:
Understanding of professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively.

PO11:
Ability to understand the need for, and an ability to engage in life-long learning

Curriculum Structure 2012/2013
Bachelor Of Engineering (Honours) (Microelectronic Engineering)
School of Microelectronic Engineering

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core	EMT110/3 Engineering Material	EMT124/3 Fundamental of Electrical Engineering	EMT230/3 Thermodynamic in Electronics	EMT243/3 Introduction to IC Design	EMT353/3 Digital Integrated Circuit Design	EMT360/3 Control Engineering	EIT 302/4 Industrial Training & Engineering Innovation	EMT 445/2 Final year Project	EMT 446/4 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	EMT 357/3 Fundamental of Microelectronic Fabrication	EMT 366/2 Engineering Writing 2		EMT470/3 Semiconductor Packaging	EMT474/3 Optoelectronics System
	EMT114/3 Introduction to Electric Circuit	EMT126/2 Engineering Writing 1	EMT237/3 Electronic Devices	EMT293/3 Signal Analysis	EMT358/3 Communication Engineering	EMT367/3 Microelectronic Fabrication		EMT475/3 Computer Organization and Architecture	**EMTXXX/3 Elective course
	EMT115/3 Programming Language	EMT127/3 Semiconductor Fundamental	EMT238/3 Electromagnetic Theory	EMT249/3 Analogue Electronics I	EMT359/3 Analogue Electronics II	EMT369/3 Power Electronics		EMT478/3 Instrumentation	EMT480/3 Reliability & Failure Analysis
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Mathematics IV				EMT490/3 Micro-Electro-Mechanical-Systems	
Non Engineering		EUT122/2 Skills & Technology in Communication				EUT 440/3 Engineers in Society		EUT443/2 Engineering Management	
University Required (15)	EUWXXX/1 Co-Curriculum	UUWXXX/2 Option	UUW223/2 University English	UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relations	UUW233/2 Islamic & Asia Civilization			
	UUW114/2 University Malay Language				UUW322/2 Thinking Skills				
	18	18	17	17	16	16	4	16	13

***EUWXXX/2 if MUET Band 3 and below is compulsory to take EUW112/2 Basic English.**

**EMT483/3 System on Chip or EMT488/3 Digital Signal Processing

School of Microelectronic Engineering

Programme Objectives (PEO)

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

PEO2:
Graduates who are members and contribute to professional society

PEO3:
Graduates pursue continuing education opportunities

PEO4:
Graduates make contributions through research and development

PEO5:
Graduates who are entrepreneur

Program Outcomes (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in a electronic engineering discipline

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

PO3:
Ability to design a system, component or process to meet desired needs.

PO4:
Ability to design and conduct experiments, as well as to analyze and interpret data.

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

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

PO7:
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO8:
Understanding of professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively.

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 2012/2013
Bachelor of Engineering (Honours) (Electronic Engineering)
School of Microelectronic Engineering

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core	EMT110/3 Engineering Material	EMT124/3 Fundamental of Electrical Engineering	EMT230/3 Thermodynamic in Electronics	EMT243/3 Introduction to IC Design	EMT353/3 Digital Integrated Circuit Design	EMT360/3 Control Engineering	EIT 302/4 Industrial Training & Engineering Innovation	EMT 445/2 Final year Project	EMT 446/4 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	EMT 355/3 Microcontroller	EMT363/3 VLSI Design		EMT473/3 MEMS Design and Fabrication	EMT483/3 Systems on Chip
	EMT114/3 Introduction to Electric Circuit	EMT126/2 Engineering Writing 1	EMT237/3 Electronic Devices	EMT293/3 Signal Analysis	EMT358/3 Communication Engineering	EMT366/2 Engineering Writing 2		EMT475/3 Computer Organization and Architecture	**EMTXXX/3 Elective course
	EMT115/3 Programming Language	EMT127/3 Semiconductor Fundamental	EMT238/3 Electromagnetic Theory	EMT249/3 Analogue Electronics I	EMT359/3 Analogue Electronics II	EMT369/3 Power Electronics		EMT478/3 Instrumentation	EMT488/3 Digital Signal Processing
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Mathematics IV				EMT479/3 Analogue Integrated Circuit Design	
Non Engineering		EUT122/2 Skills & Technology in Communication				EUT 440/3 Engineers in Society		EUT443/2 Engineering Management	
University Required (15)	EUWXXX/1 Co-Curriculum	UUWXXX/2 Option	UUW223/2 University English	UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relations	UUW233/2 Islamic & Asia Civilization			
	UUW114/2 University Malay Language				UUW322/2 Thinking Skills				
	18	18	17	17	16	16	4	16	13

***EUWXXX/2 if MUET Band 3 and below is compulsory to take EUW112/2 Basic English.**

** EMT474/3 Optoelectronics System or EMT480/3 Reliability & Failure Analysis

School of Microelectronic Engineering

Programme Objectives (PEO)

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

PEO2:
Graduates who are members and contribute to professional society

PEO3:
Graduates pursue continuing education opportunities

PEO4:
Graduates make contributions through research and development

PEO5:
Graduates who are entrepreneurial engineers

Program Outcomes (PO)

PO1:
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in a electronic engineering discipline

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

PO3:
Ability to design a system, component or process to meet desired needs.

PO4:
Ability to design and conduct experiments, as well as to analyze and interpret data.

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

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

PO7:
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO8:
Understanding of professional and ethical responsibilities and commitment to the community.

PO9:
Ability to function on multi-disciplinary teams.

PO10:
Ability to communicate effectively.

PO11:
Ability to understand the need for, and an ability to engage in life-long learning.

Curriculum Structure 2012/2013
Bachelor Of Engineering (Honours) (Photonic Engineering)
School Of Microelectronic Engineering

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core	EMT110/3 Engineering Material	EMT124/3 Fundamental of Electrical Engineering	EMT230/3 Thermodynamic in Electronics	EMT243/3 Introduction to IC Design	EMT 358/3 Communication Engineering	EMT 360/3 Control Engineering	EIT 302/4 Industrial Training & Engineering Innovation	EMT 445/2 Final year Project	EMT 446/4 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	EMT 359/3 Analogue Electronics II	EMT 354/3 Photonic Devices		EMT 475/3 Computer Organization and Architecture	EMT 474/3 Optoelectronic Systems
	EMT114/3 Introduction to Electric Circuit	EMT126/2 Engineering Writing 1	EMT237/3 Electronic Devices	EMT293/3 Signal Analysis	EMT 353/3 Digital Integrated Circuit Design	EMT 369/3 Power Electronics		EMT 491/3 Optical Design	**EMTXXX/3 Elective course
	EMT115/3 Programming Language	EMT127/3 Semiconductor Fundamentals	EMT238/3 Electromagnetic Theory	EMT249/3 Analogue Electronics I	EMT 391/3 Photonics Engineering	EMT 366/2 Engineering Writing 2		EMT 473/3 MEMS Design & Fabrication	EMT 492/3 Advance Photonic Engineering
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Mathematics IV				EMT 478/3 Instrumentation	
Non Engineering		EUT122/2 Skills & Technology in Communication				EUT 440/3 Engineers in Society		EUT443/2 Engineering Management	
University Required (15)	EUWXXX/1 Co-Curriculum	UUWXXX/2 Option	UUW223/2 University English	UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relations	UUW233/2 Islamic & Asia Civilization			
	UUW114/2 University Malay Language				UUW322/2 Thinking Skills				
	18	18	17	17	16	16	4	16	13

***EUWXXX/2 if MUET Band 3 and below is compulsory to take EUW112/2 Basic English.**

** EMT 488/3 Digital signal processing or EMT483/3 Systems on Chip

Course Syllabus

EMT110/3
ENGINEERING MATERIALS

Course Synopsis

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

Course Outcomes

CO1:
Ability to compare types of material families (metal, polymer, ceramic, and composite) and describe material structure.

CO2:
Ability to analyze, calculate, and compare various material characteristic and properties such as mechanical, electrical, magnetic, and optical properties.

CO3:
Ability to analyze material reliability in terms of material life cycle, oxidation and corrosion mechanism.

References

1. Smith, W.F. and Hashemi, J. (2011). Foundations of Materials Science and Engineering, 5th Edition, Mc Grawhill.
2. Ashby, M., Shercliff, H. and Cebon, D., A., (2007). Materials: engineering, science, processing, and design, Elsevier.
3. Ashby, M. and Jones, D.R.H. (2006). Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann.
4. Sharma, C.P. (2004). 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.

EMT114/3
INTRODUCTION TO ELECTRIC CIRCUITS

Course Synopsis

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

Course Outcomes

CO1:
Ability to analyze and solve the circuit problems using the basic circuit theory.

CO2:
Ability to choose and apply circuit analysis techniques for circuit problems.

CO3:
Ability to apply knowledge of problem solving in circuit analysis for integrated circuit systems.

References

1. Alexander, C.K, Sadiku, M.N.O, Fundamental of Electric Circuit, 3rd Editions, Mc Graw-Hill, 2009
2. Nilsson, J.W. Riedel, S.A, Electric Circuit, 6th Edition, Prentice Hall, 2001
3. Irwin, J.D, Nelms, R.M, Basic Engineering Circuit Analysis, 8th Edition, John Wiley, 2005

4. Robbins, A.H, Miller, W.C, Circuit Analysis: Theory and Practice, 3rd Edition, Thomson/ Delmar Learning, 2003
5. Hyat, W.H, Durbin, S.M, Kimmerly, J.E, Engineering Circuit Analysis, 6th Edition, Mc Graw Hill, 2002

EMT115/3
PROGRAMMING LANGUAGE

Course Synopsis

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

Course Outcomes

CO1:
Ability to analyze programming concepts and principles to solve engineering problems.

CO2:
Ability to demonstrate coding, executing and debugging the computer software program.

CO3:
Ability to design computer software programs to solve engineering problems.

References

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

EMT 124/3
FUNDAMENTAL OF ELECTRICAL ENGINEERING

Course Synopsis

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

Course Outcomes

CO1:
Ability to solve and analyze concept of transformers, dc and ac machines.

CO2:
Ability to solve and analyze the operations of ac and dc meters & ac and dc bridges.

CO3:
Ability to solve and analyze problems for sensors & transducers.

References

1. Chapman.S.J. (2005). *Electric Machinery Fundamentals*. 4th ed. Singapore: McGraw Hill.
2. Larry.D.Jomes and A.F. Chin. (1991). *Electronic Instruments and Measurements.* USA: Prentice Hall.
3. Z.A.Yamayee and J.L.Bala. (1993). *Electromechanical Energy Devices & Power Systems*. USA: Wiley & Sons.

4. C.S Rangan, G.R. Sarma & V.S. Mani, “Instrumentation Devices & System” Tata, McGraw-Hill Publishing Company Limited, 2004.
5. Bhas S. Guru & Huseyin R. Hiziroglu, “Electric Machinery and Transformers”, 2001, Oxford University Press.

EMT 125/3
DIGITAL ELECTRONIC PRINCIPLES

Course Synopsis

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

Course Outcomes

CO1:
Ability to define, convert and demonstrate arithmetic in various number systems

CO2:
Ability to illustrate, apply and analyze Boolean Algebra to minimize the design of a logic circuit

CO3:
Ability to describe, illustrate, demonstrate and evaluate combinational logic circuits design

CO4:
Ability to identify, illustrate, analyze and deduce synchronous and asynchronous sequential circuits design

References

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

EMT 126/2
ENGINEERING WRITING I

Course Synopsis

To expose the students to the common requirements and expectations of writing as an engineer; as well as to the format and techniques of writing various types of engineering documents.

Course Outcomes

CO1:
Ability to relate engineers and writing; to identify, classify and recognize ethics and plagiarism

CO2:
Ability to evaluate engineering documents: Process Description, Laboratory Report, Specifications and Progress Report; to produce Process Description and Laboratory Report.

CO3:
Ability to discover search strategies for engineering information.

References

1. Leo Finkelstein Jr (2008). Pocket Book of Technical Writing for Engineers and Scientist, 3rd Ed. (New York: McGraw Hill International Edition)
2. Beer, D. (2009). A Guide to Writing as an Engineer, 3rd Ed. (John Wiley, USA)
3. Pfeiffer, W. S., Adkins, K. E. (2010). Technical Communication – A Practical Approach, 7th Ed. (Pearson, USA)
4. Lannon, J. M, Gurak, L. J. (2011) Technical Communication, 12th Ed. (Longman).
5. Riordan, D. G., Pauley, S. E. (2005) Technical Report Writing Today 9th Ed. (Houghton Mifflin).

EMT 127/3
SEMICONDUCTOR FUNDAMENTAL

Course Synopsis

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

Course Outcomes

CO1:
Ability to formulate the theory and physics of semiconductor.

CO2:
Ability to manage the different semiconductor processes in terms of its problems and performances.

CO3:
Ability to formulate the behaviours in semiconductor devices.

References

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

EMT 230/3
THERMODYNAMIC IN ELECTRONICS

Course Synopsis

The course is tailored to give students the basic knowledge or insight on the principles of the engineering thermodynamics. In overall, this subject will cover measured thermodynamic properties, the concept of energy transformation, working fluids, theory and application of zero, first and second laws of thermodynamics. This course is also deals with the development and application of thermal analysis and design techniques to the electronic devices and systems.

Course Outcomes

CO1:
Ability to apply the concept of thermodynamics in engineering systems

CO2:
Ability to evaluate the principle of thermodynamics in engineering systems

CO3:
Ability to evaluate the principle of thermodynamics in electronic devices and systems

References

1. Yunus, A.C, Michael, A.B. (2010) *Thermodynamics: An Engineering Approach*, 7th Edition, McGraw Hill.
2. Sonntag, R. E. & Borgnakke, C. (2005) *Introduction to Engineering Thermodynamics*, 2nd Edition, Wiley.
3. David D. (2001). *Fundamental Engineering Thermodynamics*, Longman.
4. Ab. Karim Yaacob (2004). Termodinamik. McGraw Hill: Kuala Lumpur.
5. Srivastava, R.C., Subit, K.S., and Abhay, K.J. (2007). Thermodynamics: A Core Course. Prentice-Hall, India.

EMT 235/3
DIGITAL ELECTRONIC PRINCIPLES II

Course Synopsis

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

Course Outcomes

CO1:
Ability to explain and examine digital design concepts.

CO2:
Ability to define, construct, and compare various types of counters; to interpret state tables, state diagrams (Finite State Machines, FSM), and Algorithmic State Machines (ASM) charts; and to construct sequential circuit designs.

CO3:
Ability to define the basic concepts of memory used in digital circuits; to explain the principles of datapaths, Arithmetic Logic Unit (ALU), Shifter and Control Word; and to construct a simple ALU.

References

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

EMT 237/3
ELECTRONIC DEVICES

Course Synopsis

This course will expose students to the basic electronic devices. The topic covered the fundamental concept of electronic devices. Students will expose to basic operation of diode and biasing circuits using data sheet. Students also will expose to diode application. The topics covered including Half wave rectifiers, Full wave rectifiers, Power Supply Filter and Regulators, Clipper and Clamper Diode circuits and Voltage Multipliers. Bipolar Junction Transistors (BJTs) and various types of Field Effect Transistors (FETs) are also covered in this course. The topics focus on the transistor structure, basic operation, characteristics and parameters, biasing and troubleshooting.

Course Outcomes

CO1:
Ability to explain and analyze the fundamental concept of semiconductor devices.

CO2:
Ability to explain and analyze the basic operation and characteristic of diode, BJTs and FETs.

CO3:
Ability to analyze and evaluate the biasing circuit of diode, BJTs and FETs.

References

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

EMT 238/3
ELECTROMAGNETIC THEORY

Course Synopsis

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

Course Outcomes

CO1:
Ability to evaluate, derive, and analyze Maxwell's Equation for wave propagation

CO2:
Ability to evaluate the concepts and interaction of electromagnetism in media

CO3:
Ability to apply maxwells equation & interaction of electromagnetism in devices.

References

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

EMT 243/3
INTRODUCTION TO IC DESIGN

Course Synopsis

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

Course Outcomes

CO1:
Ability to apply Boolean Algebra and analyze logic circuits at transistor level using schematic.

CO2:
Ability to design the layout of a circuit based on the design rules specified.

CO3:
Ability to evaluate the CMOS transistor characteristics.

References

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

EMT 245/3
INTRODUCTION TO MICROPROCESSOR DESIGN

Course Synopsis

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

Course Outcomes

CO1:
Ability to analyze the theory of microprocessor structure and design.

CO2:
Ability to write and classify the microprocessor programming, interfacing and operation using assembly language.

CO3:
Ability to design and evaluate a microprocessor program to solve engineering related problem.

References

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Prentice Hall, 2002
2. N Senthil Kumar, M Saravanan, S Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, USA, 2011
3. Richard C. Detmer, "Introduction to 80x86 Assembly Language and Computer Architecture", Jones & Bartlett Publishers, 2009
4. Barry B. Brey, "Intel Microprocessors, The (8th Edition)", Prentice Hall, 2008
5. Richard C. Detmer, "Introduction to 80x86 Assembly Language and Computer Architecture", Jones & Bartlett Publishers, 2009
6. John Crisp, "Introduction to Microprocessors and Microcontrollers", Newnes, 2004

EMT 293/3
SIGNAL ANALYSIS

Course Synopsis

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

Course Outcomes

CO1:
Ability to reproduce, analyze and solve signal waveforms in analogue form.

CO2:
Ability to identify, analyze and solve signals and systems via Continuous Time Fourier Series and Transform.

CO3:
Ability to identify, analyze and evaluate signals and systems via Z-Transform for analogue filter application.

References

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

EMT 249/3
ANALOGUE ELECTRONICS I

Course Synopsis

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

Course Outcomes

CO1:
Ability to explain and deduce the characteristics of the analogue circuits.

CO2:
Ability to analyze and deduce the basic operations and applications of semiconductor devices.

CO3:
Ability to analyze and deduce the equivalent circuit and the frequency response of analogue circuit.

References

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

EMT 353/3
DIGITAL INTEGRATED CIRCUIT DESIGN

Course Synopsis

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

Course Outcomes

CO1:
Ability to explain and analyze the hardware and software principles of digital design using Verilog HDL

CO2:
Ability to design a complete digital system consisting of control and datapath unit

CO3:
Ability to explain and analyze the principles of field programmable gate array (FPGA) and design examples.

References

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

EMT 354/3
PHOTONIC DEVICES

Course Synopsis

To educate students on the concepts, principles and operation of various major photonics devices. The course assumes basic knowledge of optics, semiconductor and electromagnetic waves. Devices covered in this course are: waveguide and couplers, nonlinear photonics, lasers and semiconductor optoelectronics.

Course Outcomes

CO1:
Ability to evaluate principles of passive optical devices such as planar lightwave circuits and fibre based devices.

CO2:
Ability to evaluate principles of active optical devices such as optical amplifiers and modulators, photodiodes, photovoltaics and lasers

References

1. Liu, Jia Ming, "Photonic Devices", Cambridge, 2005.
2. B.E.A. Saleh, M.C. Teich, "Photonics", Wiley Interscience, 2 ed. 2007.
3. Kwok. K. Ng,"Complete Guide to Semiconductor Devices, 2nd ed., Wiley Interscience, 2002.

4. M. Born, E. Wolf, “Principles of optics”, Cambridge University Press, 7 ed. 2001.
5. Chai Yeh, “Applied Photonics”, Academic Press, 1994.
6. J. Chrostowski, “Applications of Photonic Technology”, Springer, 1995.
7. Bishnu P. Pal, “Guided Wave Optical Components and Devices: Basics, Technology, and Applications (Optics and Photonics),” Academic Press, 2005.

EMT 355/3
MICROCONTROLLER

Course Synopsis

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

Course Outcomes

CO1:
Ability to define, summarize, illustrate and classify the concept and requirement of embedded system

CO2:
Ability to define, summarize, illustrate, classify and design a structured programmed in assembly language and C for the system application

CO3:
Ability to define, summarize, illustrate, classify and design embedded system based in a single chip microcontroller

References

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

EMT 357/3
FUNDAMENTAL OF MICROELECTRONIC FABRICATION

Course Synopsis

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

Course Outcomes

CO1:
Ability to name, define and explain the essential aspects of the semiconductor fabrication technology which include materials, processes, facilities and standard practices.

CO2:
Ability to state, define, explain, demonstrate and determine important parameters of wafer cleaning, etching and thermal processes.

CO3:
Ability to state, define, explain, demonstrate and determine important parameters of photolithography process, chemical vapour deposition and physical vapour deposition.

References

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

EMT 358/3 COMMUNICATION ENGINEERING

Course Synopsis

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

Course Outcomes

CO1:
Ability to define basic principles of analogue and digital communication, and the essential of communication system in real world.

CO2:
Ability to define and explain the analogue modulation, solve the problems related to the types of analogue modulation.

CO3:
Ability to define and explain the digital modulation, solve the problems related to the types of digital modulation.

CO4:
Ability to define and explain the digital transmission, solve the problems related to the types of digital modulation.

References

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

EMT 359/3 ANALOGUE ELECTRONICS II

Course Synopsis

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

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

Course Outcomes

CO1:
Ability to analyze analogue circuits for op-amp characteristic.

CO2:
Ability to analyze analogue circuits for op-amp application.

CO3:
Ability to design and evaluate oscillator, filter and voltage regulator circuits using op-amps.

References

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

EMT 360/3
CONTROL ENGINEERING

Course Synopsis

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

Course Outcomes

CO1:
Ability to obtain the mathematical model for electrical/electronic and mechanical systems.

CO2:
Ability to perform system's time-domain analysis with response to test inputs. Analysis includes the determination of the system stability.

CO3:
Ability to perform system's frequency-domain analysis with response to test inputs. Analysis includes the determination of the system stability.

CO4:
The Ability to design P, PI, PD, PID, lead, lag controllers based on the analysis of the system's response in time and frequency domain.

References

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

EMT 363/3
VLSI DESIGN

Course Synopsis

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

Course Outcomes

CO1:
Ability to design and analyse the performance of sequential.

CO2:
Ability to design and analyse the performance of clock-tree circuit.

CO3:
Ability to design and analyse DSM Interconnect and low power circuit.

References

1. Niel H.E. Waste, David Harris (2005). CMOS VLSI Design: A Circuits and Systems Perspective, 3rd Edition Addison Wesley.
2. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic (2003). Digital Integrated Circuits: A Design Perspective. 2nd Edition. Prentice Hall.
3. Keating and Pierre Bricaud (2002). Reuse Methodology Manual for System-on-a-Chip Designs. 3rd Edition. Springer.
4. Surviving the SOC Revolution - A Guide to Platform-Based Design (1999). by Henry Chang, Lee Todd, Andrew McNelly, Grant Martin, Merrill Hunt, Larry Cooke. 1st Edition Springer
5. Wayne Wolf. (2002). *Modern VLSI Design: System-on-Chip Design*. 3rd ed. Prentice Hall PTR.

EMT 366/2
ENGINEERING WRITING II

Course Synopsis

To educate students on the concepts of technical writing for engineers. The topics covered in this course varies from grammar and punctuation in research reports, to technical how to in writing documentations and up to presentation and business communications.

Course Outcomes

CO1:
Ability to explain and distinguish the concept and principles of proper English grammar and punctuation.

CO2:
Ability to explain, discuss and solve any research report task in English

CO3:
Ability to explain, solve and analyse group work involving presentations, reports and communication task

References

1. Leo Finkelstein Jr (2008). Pocket Book of Technical Writing for Engineers and Scientist. (New York: McGraw Hill International Edition)
2. Ballard, B. and Clanchy J. (1991). Essay writing for students: a practical guide. (Melbourne: Longman Cheshire.)
3. Taylor, G. (1989). The student's writing guide for the arts and social sciences. (Cambridge: Cambridge University Press.)
4. Alley, M., The Craft of Scientific Writing, 3rd ed. (New York: Springer-Verlag New York, Inc., 1996).
5. Alley, M., The Craft of Editing: A Guide for Managers, Scientists, and Engineers (New York: Springer-Verlag New York, Inc., 2000).
6. Alley, M., The Craft of Scientific Presentations (New York: Springer-Verlag New York, Inc., 2003).

EMT 367/3
MICROELECTRONIC FABRICATION

Course Synopsis

This course focuses on the fabrication process module of the CMOS technology. The students should be able to design, produce a mask, prepare the runcard (process flow of the MOSFET), fabricate the

MOSFET, analyse and characterise the devices electrically. The students should also able to understand the important CMOS process modules such as well technology, isolation technology, multi level interconnect technology as well as related device issues mainly associated with the device miniaturisation.

Topics covered in this course are as follow:

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

Course Outcomes

CO1:
Ability to explain and construct the essential aspects of the device technology

CO2:
Ability to discuss and design the major CMOS process module for advanced CMOS process technology

CO3:
Ability to analyze, predict and characterise the major CMOS process and device issues in circuit level.

References

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

EMT 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.

Course Outcomes

CO1:
Ability to explain power electronic systems operation, applications area and need for efficiency design.

CO2:
Ability to describe different types of power semiconductor device; power diode, SCR, BJT, IGBT, GTO and MOSFET.

CO3:
Ability to analyze and design AC-DC conversion, AC-AC conversion, DC-DC conversion and DC-AC conversion.

References

1. Mohan, Undeland, Robbins. (1995). *Power Electronics: Converters, Applications & Design.* 2nd ed. John Wiley and Sons, Inc.
2. Cyril W. Lander. (1993). Power Electronics. 3rd ed. McGraw-Hill.

3. Daniel W Hart (1997), Introduction to Power Electronics, Prentice Hall International.
4. J.S.Chitode (2007), Power Electronics, Technical Publications Pune.
5. Issa Batarseh (2004), Power Electronic Circuits, John Wiley & Sons, Inc.

EMT 391/3
PHOTONIC ENGINEERING

Course Synopsis

The subject consists of fundamental principles of optics in particular properties of light propagation and its interaction in various media. This subject is divided into the following areas: light propagation characteristics, Geometrical Optics, Ray Optics, Wave Optics and Beam Optics.

Course Outcomes

CO1:
Ability to evaluate principles of light propagation in geometric and electromagnetic optics.

CO2:
Ability to analyze the concepts and principles of light spectrum, energy, and their manipulation.

CO3:
Ability to evaluate principles of quantum optics and nano photonics

References

1. Francis A.Jenkins & Harvey E.White. Fundamental of Optics 4th Edition, 2006
2. Hecht, Eugene,"Optics", Addison-Wesley, 2002.
3. Introduction to optics Third Edition, Frank L. Pedrotti, S.J, Pearson, 2007.
4. Bahaa E. A. Saleh & Malvin Carl Teich, "Fundamentals of Photonics", John Wiley & Sons, 2007.
5. Naess, Robert O., "Optics for technology students", Prentice Hall, 2001.

EMT 445/2
FINAL YEAR PROJECT

Course Synopsis

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

Course Outcomes

CO1:
Ability to apply theory into practice

CO2:
Ability to possess enhancement in problem solving skill

CO3:
Ability to strengthen capability in working independently

CO4:
Ability to undertake project planning, design, implementation and management

References

Based on project title

EMT 470/3 SEMICONDUCTOR PACKAGING

Course Synopsis

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

Course Outcomes

CO1:
Ability to understand and explain the semiconductor packaging process flow.

CO2:
Ability to identify the critical parameters in semiconductor packaging process.

CO3:
Ability to discuss the technology trend in semiconductor packaging.

CO4:
Ability to identify, analyze and tackle the common problems that occur in semiconductor packaging industry.

CO5:
Ability to identify the materials, process and technology needed to package the semiconductor product.

References

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

EMT 473/3
MEMS DESIGN AND FABRICATION

Course Synopsis

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

Course Outcomes

CO1:
Ability to explain the overview of MEMS, MEMS materials and micromachining technologies.

CO2:
Ability to analyze MEMS structures in automotive, photonic, life sciences and RF applications.

CO3:
Ability to solve scaling law problems in miniaturization.

CO4:
Ability to solve, explain and differentiate MEMS packaging and reliability issues.

References

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

EMT 475/3
COMPUTER ORGANIZATION AND ARCHITECTURE

Course Synopsis

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

Course Outcomes

CO1:
Ability to differentiate and classify the theory of computer system components and the interactions between the components.

CO2:
Ability to illustrate and classify the theory of operation in terms of central processing and control unit.

CO3:
Ability to design and evaluate a computer simulation program to solve engineering related problem.

References

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

EMT 478/3
INSTRUMENTATION

Course Synopsis

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

Course Outcomes

CO1:
Ability to apply the fundamental concept of Electronic instrumentation.

CO2:
Ability to evaluate an instrument comprising of sensors, data acquisition and embedded system.

CO3:
Ability to demonstrate and use stand-alone and computer -based instrument.

References

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

EMT 479/3
ANALOG INTEGRATED CIRCUIT DESIGN

Course Synopsis

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

Course Outcomes

CO1:
Ability to solve transistor behaviour using basic laws and circuit theorem

CO2:
Ability to design analogue sub-circuit using basic laws and circuit theorem

CO3:
Ability to design and evaluate analogue system to meet specifications

CO4:
Ability to analyse and design operational amplifier and its application to solve the project given.

References

1. Behzad Razavi, Design of Analogue CMOS Integrated Circuit, McGraw-Hill, 2000.

2. Phillip E. Allen, Douglas R. Holberg, CMOS Analogue Circuit Design, Oxford University Press, 2002.
3. Paul R. Gray, Analysis and Desgn of Analogue Integrated Circuit, 4th Ed, Wiley.
4. R. Jacob Baker, CMOS Circuit Design, Layout, and Simulation, Revised Second Edition Wiley-IEEE Press; 2 edition, 2007,
5. Niel H.E. Waste, David Harris. CMOS VLSI Design: A Circuits and Systems Perspective, Addison Wesley, 4 edition, 2010

EMT 491/3
OPTICAL DESIGN

Course Synopsis

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

Course Outcomes

CO1:
Ability to understand the fundamentals of optical communication system.

CO2:
Ability to understand the design of various display system such as plasma, LCD, LED and OLED displays and imaging systems including Fourier optics.

CO3:
Ability to understand the design of photonic band gap devices.

CO4:
Ability to design collimated and non-collimated optical systems and interferometric test system.

References

1. Robert F. Fischer, Bijana Tadic, “Optical System Design”, McGraw-Hill Professional; 1 edition (2000).
2. W. J. Smith, “Modern Lens Design”, 2nd ed., McGraw-Hill, (2005).
3. D. Malabar, & Z. Malacara, “Handbook of Optical Design”, 2nd ed., Marcel-Dekker, (2004).
4. Warren J. Smith, “Modern Optical Engineering”, McGraw-Hill Professional; 3rd edition (2000)

EMT 446/4
FINAL YEAR PROJECT

Course Synopsis

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

Course Outcomes

CO1:
Ability to apply theory into practice

CO2:
Ability to possess enhancement in problem solving skill

CO3:
Ability to strengthen capability in working independently

CO4:
Ability to undertake project planning, design, implementation and management

References

Based on project title

EMT 480/3
RELIABILITY & FAILURE ANALYSIS

Course Synopsis

This course is basically divided into two areas: Reliability & Failure Analysis. In the first section of Reliability, students will learn the concept of Reliability, its terms &

definitions, the different types of Reliability Distributions and also the different types of Reliability Prediction Techniques such as FMEA & FTA. In the second section of Failure Analysis, students will be exposed to the different types of FA techniques commonly conducted on a failed semiconductor device and the test instrumentation associated with each technique.

Course Outcomes

CO1:
Ability to define, illustrate, explain and solve Reliability-based problems

CO2:
Ability to define and explain the failure analysis process flow and the related terms

CO3:
Ability to identify, compare, explain and illustrate (where applicable) the different tools and techniques available in FA, its importance and the details operation principle

CO4:
Ability to conduct various experiment, investigate, analyze, make a hypothesis and develop solution based on a failure given

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.

Course Outcomes

CO1:
Ability to define, summarize, illustrate classify, design the System-On-Chip architecture

CO2:
Ability to define, summarize, illustrate classify, produce results in terms of circuit performance for Clock and Flip-flop

CO3:
Ability to define, summarize, illustrate classify, develop DSM interconnection and power distribution system.

References

1. Niel H.E. Waste and David Harris "CMOS VLSI Design: A Circuits and Systems Perspective", 3rd ed., Addison Wesley, 2004
2. Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic "Digital Integrated Circuits: A Design Perspective", 2nd ed., Prentice Hall, 2003
3. Keating and Pierre Bricaud "Reuse Methodology Manual for System-on-a-Chip Designs", 3rd ed., Springer, 2002
4. Sudeep Pasricha and Nikil Dutt "On-Chip Communication Architectures: System on Chip Interconnect", Morgan Kaufmann, 2008
5. Wayne Wolf "Modern VLSI Design: System-on-Chip Design", 3rd ed., Prentice Hall PTR, 2002

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 system such as optical communication and display technology. Practical skills by using software in optical fibre systems and measurement will also be acquired.

Course Outcomes

CO1:
Ability to define, describe and analyze light properties, principle in optical fibre fundamental and optical component and passive device.

CO2:
Ability to explain, solve and evaluate the concept, principles and operation of LEDS principles and operation of lasers concept,

CO3:
Ability to define and analyze laser Diode and Photodetectors

CO4:
Ability to analyze electro optics, construct non linear optics activity, acoustic optics and systems and applications for display

References

1. John Wilson and John Hawkes, Opto-Electronics: An Introduction, 3rd Edition, Prentice-Hall, 1998.
2. S.O.Kasap.Optoelectronics and Photonics, Principles and Practices, Prientice Hall, 2001
3. Amnon Yariv, Pochi Yeh, Photonics: Optical electronics in Modern Communications, 2007
4. Ghatak and Thyagarajan, Introduction to Fiber Optics, Cambridge University Press, 1998.
5. John M. Senior, Optical Fiber Communications; Principles and Practice, 2nd Edition, Prentice-Hall, 1992.

EMT 488/3
DIGITAL SIGNAL PROCESSING

Course Synopsis

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

Course Outcomes

CO1:
Ability to reproduce, analyze and solve signal waveform in digital form

CO2:
Ability to identify, analyze and solve signals and systems via discrete time Fourier Transform

CO3:
Ability to identify, analyze and solve signals and systems via Z Transform for digital filter application

References

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
3. Proakis and Manolakis, "Digital Signal Processing", Pearson, 4/e
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.

Course Outcomes

CO1:
Ability to explain and apply the fundamental concept of MEMS and its technology.

CO2:
Ability to analyze and derive the concept and formula of electrical and mechanical aspects of MEMS Micromachined sensor.

CO3:
Ability to design and analyze MEMS sensors and actuators.

CO4:
Ability to explain and design MEMS packaging and reliability issues.

References

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

EMT 492/3
ADVANCE PHOTONIC ENGINEERING

Course Synopsis

To educate students on the concepts of modern physics, quantization and postulates of quantum phenomena. The elements of this subject cover Quantum Mechanics, Boundaries and oscillators and Time-Independent Schrodinger Equation. Theories, principles and practical are stressed in this course.

Course Outcomes

CO1:
Ability to explain and distinguish the concept and principles of energy quantisation and postulates of quantum phenomena.

CO2:
Ability to analyze the concepts of field-materials interactions in dielectrics and semiconductors.

CO3:
Ability to analyze and apply light-interaction in quantum confinement structures and at nano-scale size

References

1. A. Yariv, P. Yeh, “Photonics”, Oxford University Press; 6 ed. 2006.
2. A. Ghatak, “Optics”, McGraw-Hill, 1 ed. 2009.
3. B.E.A. Saleh, M.C. Teich, “Photonics”, Wiley Interscience, 2 ed. 2007.
4. M. Born, E. Wolf, “Principles of optics”, Cambridge University Press, 7 ed. 2001.
5. Eugene Hecht, “Optics: International 4th Edition”, Addison Wesley, 2002
6. Pedrotti, “Introduction to Optics 3rd Edition”. Addison Wesley, 2007

Career Opportunities

There are a lot of demand for electronic, microelectronic & 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

SilTerra

intel

PHILIPS
sense and simplicity

PLEXUS
The Product Realization Company

VENTURE

First Solar

FUJIMI
FUJIMI INCORPORATED

School of Computer and Communication Engineering

PROGRAMMES OFFERED:

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

ADDRESS:

SCHOOL OF COMPUTER AND COMMUNICATION
Kompleks Pusat Pengajian Seberang Ramai (Blok A)
No. 12 & 14 , Jalan Satu,
Taman Seberang Jaya Fasa 3,
02000 Kuala Perlis, Perlis.
Tel : 04-9851654
Fax : 04-9851695

Introduction

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

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

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

Staff Directory

DEAN
Prof. Madya Dr. R. Badlishah bin Ahmad
E-mail : badli@unimap.edu.my

DEPUTY DEAN (ACADEMIC AND RESEARCH)
Dr. Shahrul Nizam bin Yaakob
E-mail : shahrulnizam@unimap.edu.my

DEPUTY DEAN (STUDENT DEVELOPMENT AND ALUMNI)
Dr. Mohd. Faizal bin Jamlos
E-mail: faizaljamlos@unimap.edu.my

CHAIRPERSON OF DEGREE PROGRAM (COMPUTER ENGINEERING PROGRAMME)
Miss Hasneeza Liza binti Zakaria
E-mail : hasneeza@unimap.edu.my

CHAIRPERSON OF DEGREE PROGRAM (COMMUNICATION ENGINEERING)
Dr. Mohammad Shahrazel bin Razalli
E-mail : shahrazel@unimap.edu.my

CHAIRPERSON OF DEGREE PROGRAM (COMPUTER NETWORKING ENGINEERING)
Dr. Ong Bi Lynn
E-mail : drlynn@unimap.edu.my

CHAIRPERSON OF DIPLOMA PROGRAM (COMPUTER ENGINEERING PROGRAMME)
Mr. Mohd. Zaizu bin Ilyas
E-mail : zaizu@unimap.edu.my

CHAIRPERSON OF POSTGRADUATE PROGRAMME
Mr. Muhammad Asmi bin Romli
E-mail : asmi@unimap.edu.my

COORDINATOR FOR INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
Mr. Zahari bin Awang Ahmad
E-mail : zahari@unimap.edu.my

ASSISTANT REGISTRAR
Mdm. Aiza binti Jasmi
E-mail : aiza@unimap.edu.my

Lecturers

Prof. Dr. R. Badlishah bin Ahmad
Dekan / Profesor Gred Khas C (VK7)
Ph.D. (Elektrik dan Elektronik), University of Strathclyde, UK (1999)
M.Sc. (Optoelektronik), University of Strathclyde, UK (1995)
B.Eng. (Hons) (Elektrik dan Elektronik), University of Glasgow, UK (1994)
Diploma Elektrik Perhubungan (DEP), Universiti Teknologi Malaysia (1992)
Tel. : 04-9851741/1654
Faks : 04-9851695
E-mail : badli@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~badli

Dr. Shahrul Nizam bin Yaakob
Timbalan Dekan Akademik & Penyelidikan / Pensyarah Kanan (DS51)
Ph.D (Computer System Engineering), University of South Australia (UniSA) (2010)
Ijazah Sarjana Sains (Kejuruteraan Komputer), KUKUM (2006)
Sarjana Muda Kejuruteraan (Elektrik-Elektronik) (Hons.), UTM (2004)
Research Interest:
Computational Intelligence (e.g. Neural Networks, Fuzzy Logics, Evolutionary Techniques, Reinforcement Learning), Image Processing and Analysis
Tel. : 04-9851657
Faks : 04-9851695
E-mail : shahrulnizam@unimap.edu.my

Dr. Mohd. Faizal bin Jamlos
Timbalan Dekan Pembangunan Pelajar & Alumni / Pensyarah Kanan (DS51)
Ph.D (Electrical Engineering), UTM (2011)
M.Eng (Electrical and Electronic Engineering), Adelaide University, Australia (2008)
B.Eng (Hons) (Computer Engineering), KUKUM (2006)
Research Interest:
Antenna (e.g. Smart Antenna, Reconfigurable, Metamaterial, MIMO), Digital Signal Processing, Localization Algorithm (Music, Trilateration, Triangulation), Optimization (PSO), RADAR, Modulation (OFDMA)
Tel. : 04-9851684
Faks : 04-9851695
E-mail : faizaljamlos@unimap.edu.my

Cik Hasneeza Liza binti Zakaria
Pengerusi Rancangan Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Komputer) / Pensyarah Universiti (DS45)
Sarjana Sains (Sains Komputer – Kejuruteraan Perisian Masa Nyata), UTM (2006)
Ijazah Sarjana Muda Teknologi Maklumat, UUM (1998)
Tel. : 04-9851698
Faks : 04-9851695
E-mail : hasneeza@unimap.edu.my

Dr. Mohammad Shahrazel bin Razalli
Pengerusi Rancangan Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Perhubungan) / Pensyarah Kanan (DS51)
Ph.D (Kejuruteraan Komunikasi dan Rangkaian), UPM (2010)
M.Sc (Communications and Network Engineering), UPM (2006)
B.Eng (Hons) in Electronic Engineering, The University of Leeds, United Kingdom (1995)
Diploma Kejuruteraan Elektrik (Elektronik), Institut Teknologi Mara (1993)
Tel. : 04-9851680
Faks : 04-9851695
E-mail : shahrazel@unimap.edu.my

Dr. Ong Bi Lynn
Pengerusi Rancangan Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Rangkaian Komputer) / Pensyarah Kanan (DS51)
Ph.D (Computer Network), UUM (2008)
Ijazah Sarjana Pentadbiran Perniagaan, UUM (2003)
B.Eng (Hons) Electrical and Electronic Engineering, UMS (2001)
Tel. : 04-9851778
Faks : 04-9851695
E-mail : drlynn@unimap.edu.my

En. Mohd. Zaizu bin Ilyas
Pengerusi Rancangan Diploma Kejuruteraan (Kejuruteraan Komputer) / Pensyarah Universiti (DS45)
Sarjana Sains (Kejuruteraan Elektrik, Elektronik dan Sistem), UKM (2009)
B.Eng. (Electronic and Information Engineering), Tokyo University of Agriculture and Technology, Japan (2000)
Assc. Eng. (Electrical Engineering), Tsuyama National College of Technology, Japan (1998)
Research interest : Digital Signal Processing, Artificial Intelligent, Speech Processing
Tel. : 04-9851788
Faks : 04-9851695
E-mail : zaizu@unimap.edu.my

En. Muhamad Asmi bin Romli
Pengerusi Rancangan Pascasiswazah/Pensyarah Universiti (DS45)
Ijazah Sarjana Sains (Kejuruteraan Elektrik & Elektronik), USM (2005)
Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Elektrik dan Elektronik) Kelas Kedua Bahagian Rendah, USM (2000)
Tel. : 04-9851804
Faks : 04-9851695
E-mail : asmi@unimap.edu.my

En. Zahari bin Awang Ahmad
Penyelaras Jaringan Industri dan Pengurusan Kualiti / Pensyarah Universiti (DS45)
M.Eng. (Electrical - Computer and Microelectronic System), UTM (2009)
B.Sc in Electrical Engineering, University of Kentucky, Lexington KY, USA (1994)
Tel. : 04-9851243
Faks : 04-9851695
E-mail : zahari@unimap.edu.my

Prof. Dr. Syed Alwee Aljunid bin Syed Junid
Profesor Gred Khas C (VK7) / Dekan Pusat Pengurusan Penyelidikan & Inovasi (PPPI)
Ph.D. (Communication And Network Engineering), UPM (2005)
B.Eng. (Computer System and Communication), UPM (2001)
B.T.E.C Higher National Diploma in Engineering U.K (1995)
Diploma in Electrical Engineering (Power), ITM (1985)
Tel. : 04-9798784/3
Faks : 04-9798790
E-mail : syedalwee@unimap.edu.my

Prof. Madya Abdul Rahman bin Mohd. Saad
Profesor Madya (DS54) / Dekan Pusat Kejuruteraan
B.Eng., M.Sc.(USM) Kejuruteraan (Elektrik/Elektronik)
Tel. : 04-9851119/1284
Faks : 04-9851118
E-mail : abd.rahman@unimap.edu.my

Dr. Mohd. Fareq bin Abd. Malek
Pensyarah Kanan (DS51) / Dekan PPK Sistem Elektrik
Ph.D. (Radio Frequency, Microwave and Free Electron Maser), Liverpool, U.K. (2008)
MSc. (Eng.) Distinction (Microelectronic Systems and Telecommunications), Liverpool, U.K. (2004)
BEng. (Hons.) (Electronic and Communication Engineering), Birmingham, U.K. (1997)
Tel. : 04-9851431/1517
Faks : 04-9851626
E-mail : mfareq@unimap.edu.my

Ir. Anuar bin Mat Safar
Pensyarah Kanan (DS52) / Timbalan Dekan 2 PPPI
Ph.D Communication Engineering, UniMAP (?)
P.Eng., BEM (2005)
M.Sc. (Information Technology), UUM (2002)
B.Eng. Electric & Electronic Engineering, USM (1995)
Tel. : 9853905
Faks : 9851695
E-mail : anuarms@unimap.edu.my

Dr. Abdul Hafiizh bin Ismail
Pensyarah Kanan (DS51)
Ph.D (Wireless Communication Engineering), Ibaraki University, Japan (2011)
M.Eng. Electical and Electronic (Telecommunication) Engineering, UTM (2005)
B.Eng. (Media and Telecommunication Engineering) Ibaraki University, Japan (2003)
Research Interest:
Indoor Propagation and Localization, Wireless & Mobile Communication, Cooperative Communication, Digital and Data Communication Systems, Digital Signal Processing,
Electronic Instrumentation
Tel. : 04-9852697
Faks : 04-9798790
E-mail : abdulhafiizh@unimap.edu.my

Cik Hasnah binti Ahmad
Pensyarah Universiti (DS45)
M.Eng. (Electronic Engineering), Royal Melbourne Institute of Technology (RMIT) University, Australia (2008)
Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Elektrik dan Elektronik), USM (2000)
Tel. : 04-9852530
Faks : 04-9851695
E-mail : hasnahahmad@unimap.edu.my

Pn. Hasliza binti A. Rahim @ Samsuddin
Pensyarah Universiti (DS45)
Sarjana Sains (Kejuruteraan Rekabentuk Sistem Elektronik), USM (2006)
B.Sc. in Electrical Engineering (Modern Communication System), University of Southern California, USA (2003)
Tel. : 04-9854027
Faks : 04-9851695
E-mail : haslizarahim@unimap.edu.my

Pn. Wan Nur Suryani Firuz binti Wan Ariffin
Pensyarah Universiti (DS45)
Sarjana Kejuruteraan (Komunikasi dan Komputer), UKM (2007)
Bacelor Kejuruteraan (Sistem Komputer & Komunikasi), UPM (2004)
Tel. : 04-9854089
Faks : 04-9851695
E-mail : suryanifiruz@unimap.edu.my

Pn. Sahadah binti Ahmad
Pensyarah Universiti (DS45)
Sarjana Kejuruteraan (Elektrik - Elektronik dan Telekomunikasi), UTM (2007)
Advanced Diploma in Electrical (Electronics) Engineering, ITM (1985)
Diploma in Electrical (Electronics) Engineering, ITM (1981)
Tel. : 04-9852605
Faks : 04-9851695
E-mail : shahadah@unimap.edu.my

Prof. Dr. Farid Ghani
Profesor Gred Khas C VK7
Ph.D. (Digital & Data Communication Systems), Loughborough University of Technology, UK (1974)
M.Sc. (Digital Signal Processing), Loughborough University of Technology, UK (1972)
M.Sc.Engg. (Electrical Measurement & Control Systems), Aligarh Muslim University, India (1967)
B.Sc.Engg. (Electrical Engineering), Aligarh Muslim University, India (1964)
Fellow : Institution of Engineering And Technology (UK), FIET (U.K.)
Fellow : Institution of Electronics and Telecommunication Engineers (India), FIETE (Ind.)
Fellow : National Telematic Forum (India), FNTF (Ind.)
Chartered Engineer : Registered with the Engineering Council (UK), C.Eng. (UK)
Tel. : 04-9853944
Faks : 04-9851695
E-mail : faridghani@unimap.edu.my

Pn. Ismahayati binti Adam
Pensyarah Universiti (DS45)
Sarjana Kejuruteraan (Elektrik - Elektronik dan Telekomunikasi), UTM (2008)
Sarjana Muda Kejuruteraan (Elektrik - Telekomunikasi), UTM (2006)
Tel. : 04-9854019
Faks : 04-9851695
E-mail : ismahayati@unimap.edu.my

Pn. Norizan binti Mohamed Nawawi
Pensyarah Universiti (DS45)
Sarjana Kejuruteraan (Elektrik – Elektronik dan Telekomunikasi), UTM (2008)
Sarjana Muda Kejuruteraan (Elektrik – Telekomunikasi), UTM (2006)
Tel. : 04-9853967
Faks : 04-9851695
E-mail : norizan@unimap.edu.my

Pn. Nur Baya binti Mohd. Hashim
Pensyarah Universiti (DS45)
M.Sc. (Electronic Systems Design Engineering), USM (2008)
Sarjana Muda Kejuruteraan Dengan Kepujian (Kejuruteraan Komunikasi dan Komputer), UKM (2006)
Tel. : 04-9854022
Faks : 04-9851695
E-mail : baya@unimap.edu.my

Mr. Mohamed Elshaikh Elobaid Said Ahmed
Pensyarah Universiti (DS45)
M.Sc in Electrical and Electronics Engineering, UTP (2009)
B.Sc (Hons) in Engineering Technology (Computer Engineering Technology), University of Gezira, Sudan (2004)
Tel. : 04-9854985
Faks : 04-9851695
E-mail : elshaikh@unimap.edu.my

En. Emi Izhanizam bin Azmi
Pensyarah Universiti (DS45)
Ijazah Sarjana (Rekabentuk Sistem Elektronik), USM (2009)
Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Komputer), KUKUM (2006)
Tel. : 04-9853948
Faks : 04-9851695
E-mail : emi@unimap.edu.my

En. Muhamad Sani bin Mustafa
Pensyarah Universiti (DS45)
Ijazah Sarjana (Rekabentuk Sistem Elektronik), USM (2009)
Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Komputer), KUKUM (2006)
Tel. : 04-9853920
Faks : 04-9851695
E-mail : sani@unimap.edu.my

En. Fairul Afzal bin Ahmad Fuad
Pensyarah Universiti (DS45)
Ijazah Sarjana (Elektrik & Elektronik), USM (2009)
Sarjana Muda Kejuruteraan Komunikasi, Toukai University, Jepun (2003)
Tel. : 04-9854150
Faks : 04-9851695
E-mail : fairul@unimap.edu.my

En. Azman bin Muhamad Yusof @ Kamarudin
Pensyarah Kanan (DS52)
M.Sc (Electric & Electronic Engineering), USM (2002)
B.Eng Electric & Electronic, USM (1997)
Tel. : 04-9852550
Faks : 04-9851695
E-mail : azman@unimap.edu.my

Mr. Md. Mostafijur Rahman
Pensyarah Universiti (DS45)
M.Sc (Computer Engineering), UniMAP (2009)
B.Sc (Hons) (Computer Science), National University of Bangladesh (2003)
Tel. : 04-985
Faks : 04-9851695
E-mail : mostafijur@unimap.edu.my

En. Mohd. Shaiful Aziz bin Rashid Ali
Pensyarah Universiti (DS45)
M.Sc in Programmable Digital Systems, University of Brighton, UK (2009)
B.Eng (Hons) (Computer Engineering), UniMAP (2007)
Higher National Diploma (HND) in Telecommunications Engineering, British Malaysian Institute (2002)
Tel. : 04-9854251
Faks : 04-9851695
E-mail : shaifulaziz@unimap.edu.my

En. Che Muhammad Nor bin Che Isa
Pensyarah Universiti (DS45)
M.Eng Telecommunications, University of South Australia (2009)
Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Perhubungan), UniMAP (2007)
Diploma Kejuruteraan Elektrik (Perhubungan), UTM (2003)
Tel. : 04-985
Faks : 04-9851695
E-mail : cmnor@unimap.edu.my

En. Rosemizi bin Abd. Rahim
Pensyarah Universiti (DS45)
Sarjana Sains (Kejuruteraan Rekabentuk Sistem Elektronik), USM (2004)
Sarjana Muda Kejuruteraan Dengan Kepujian (Elektrik) Kelas Kedua (Rendah), UiTM (2000)
Diploma Kejuruteraan Elektrik (Kuasa), ITM (1998)
Tel. : 04-9854132
Faks : 04-9851695
E-mail : rosemizi@unimap.edu.my

En. Phak Len a/l Eh Kan
Pensyarah Kanan (DS52)
Sarjana Sains (Teknologi Maklumat), UUM (2001)
Ijazah Sarjana Muda Kejuruteraan Elektrik (Elektronik), UTM (1997)
Diploma Kejuruteraan Elektrik (Perhubungan), UTM (1991)
Tel. : 04-9852610
Faks : 04-9851695
E-mail : phaklen@unimap.edu.my

Dr. Abid Yahya
Pensyarah Kanan (DS51) Ph.D (Wireless & Mobile Communication Engineering), USM (2010)
M.Sc by Research (Wireless & Mobile Communication Engineering), USM (2007)
B.Engg (Electrical & Electronics Engineering), UET Pakistan (2001)
Research Interest:
Cooperative Communication, Digital and Data Communication Systems, Digital Signal Processing, Image and Channel Coding, Wireless & Mobile Communication, Interference and Jamming Rejection.
Tel. : 04-9851631
Faks : 04-9851695
E-mail : abidyahya@unimap.edu.my

Dr. Hilal Adnan Fadhil
Pensyarah Kanan (DS51) Ph.D (Communication Engineering), UniMAP (2010)
M.Sc in Electronic and Communications Enginering / Modern Communications Engineering, Al-Nahrain University, Iraq (2005)
B.Sc in Electronic and Communications Engineering, Al-Nahrain University, Iraq (2002)
Tel. : 04-9852639
Faks : 04-9851695
E-mail : hilaladnan@unimap.edu.my

Cik Nur Farhan binti Kahar
Pensyarah Universiti (DS45)
M.Sc (Computer Engineering), UniMAP (2010)
B.Eng (Hons) (Electronic Engineering), USM (2006)
Tel. : 04-985
Faks : 04-9851695
E-mail : nurfarhan@unimap.edu.my

En. Fazrul Faiz bin Zakaria
Pensyarah Universiti (DS45)
M.Research in Microelectronic Architecture, Network and Communication System, TELECOM Bretagne (France) (2010)
M.Sc. Telecommunications and Electronic Engineering, TELECOM Bretagne (France) (2010)
B.Eng (Hons) Communication Engineering, UniMAP (2007)
Diploma in Electronic Engineering (Communication), UTM (2004)
Research Interest:
Digital and Data Communication Systems, Channel Coding (Turbo-code, LDPC), MPSoC Design (Embedded MultiProcessor System on a single Chip), Multiprocessor SoC for Turbo Communication
Tel. : 04-9852570
Faks : 04-9851695
E-mail : ffaiz@unimap.edu.my

Mr. Akbah A. Kalifa
Pensyarah Universiti (DS45)
M.Sc Mechatronic Engineering, UniMAP (2008)
B.Sc Electrical Engineering, Iraq (1994)
Tel. : 04-985
Faks : 04-9851695
E-mail : akbah@unimap.edu.my

Dr. Md. Mijanur Rahman
Pensyarah Kanan (DS51)
Ph.D (Photonics Based Quantum Communication), Multimedia University (2010)
M.Sc (IT) - Satellite Image Interpretation, Universiti Malaysia Sarawak (1999)
B.Sc in Computer Science & Engineering, Bangladesh University of Engineering & Technology (1995)
Tel. : 04-985
Faks : 04-9851695
E-mail : mijanur@unimap.edu.my

Pn. Rafikha Aliana binti A. Raof
Pensyarah Universiti (DS45)
M.Sc Intelligent Knowledge Based System (IKBS), UUM (2003)
B.Eng (Hons.) Electronics majoring in Computer, MMU (2002)
Tel. : 04-9852528
Faks : 04-9851695
E-mail : rafikha@unimap.edu.my

Pn. Sabarina binti Ismail
Pensyarah Kanan (DS52)
Ijazah Sarjana Kejuruteraan (Elektrik), UTM (2002)
Ijazah Sarjana Muda Kejuruteraan dengan kepujian (Komputer & Perhubungan), USM (1990)
Tel. : 985
Faks : 9851695
E-mail : sabarina@unimap.edu.my

Pn. Norsuhaida binti Ahmad
Pensyarah Universiti (DS45)
Ph.D Kej. Elektrik, University of Strathclyde, UK (?)
Sarjana Kejuruteraan Elektrik (Telekomunikasi), KUiTTHO (2003)
Ijazah Sarjana Muda Kejuruteraan Elektrik (Elektronik), UTM (2001)
Tel. : 04-9852528
Faks : 04-9851695
E-mail : norsuhaida@unimap.edu.my

Pn. Junita binti Mohd Nordin
Pensyarah Universiti (DS45)
Ph.D Communication Engineering, UniMAP (?)
M.Sc. in Radio Frequency Communication Systems, University of Southampton, United Kingdom (2005)
Bachelor of Electrical and Electronics Engineering (Hons.), UNITEN (2002)
Tel. : 04-9854093
Faks : 04-9851695
E-mail : junita@unimap.edu.my

En. Suhizaz bin Sudin
Pensyarah Kanan (DS52)
Sarjana Sains Komputer, UPM (2003)
Ijazah Sarjana Muda Teknologi Maklumat (Hons), UUM (1998)
Tel. : 985
Faks : 9851695
E-mail : suhizaz@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~suhizaz

Dr. Ruzelita binti Ngadiran
Pensyarah Kanan (DS51)
Ph.D in Communications, Sensors and Signal Processing, Newcastle University, United Kingdom (2012)
Sarjana Kejuruteraan Sains (Komputer), UKM (2006)
Ijazah Sarjana Muda Kejuruteraan Komunikasi dan Komputer, UKM (2002)
Tel. : 985
Faks : 9851695
E-mel : ruzelita@unimap.edu.my

Prof. Dr. Sabira Khatun
Profesor Gred Khas B (VK6)
Ph.D (Communication & Network Engineering), UPM (2003)
Ph.D (Mobile Computing in Megneto_Hydrodynamics), University of Rajshahi, Bangladesh (1994)
M.Sc (Applied Mathematics: Numerical Analysis), University of Rajshahi, Bangladesh (1987)
B.Sc (Honours in Applied Mathematics), University of Rajshahi, Bangladesh (1985)
Tel. : 04-9852652
Faks : 04-9851695
E-mel : sabira@unimap.edu.my

Cik Noor Syazana binti Arshad
Pensyarah Universiti (DS45)
M.Sc Electrical Engineering (Communication), UTHM (2012)
B.Eng (Hons.) Electrical Engineering (Electronic), UiTM (2009)
Diploma Electrical Engineering (Electronic), UiTM (2006)
Tel. : 04-9853980
Faks : 04-9851695
E-mel : syazana@unimap.edu.my

En. Mohd. Najmuddin bin Mohd. Hassan
Pensyarah Kanan (DS52)
Ph.D (Kej. Elektronik), Athlone Institute of Technology, Ireland (?)
M.Sc. (IT), Universiti Teknologi MARA (2004)
B.Eng. (Communication), Universiti Teknologi Malaysia (2000)
Diploma Electric (Electronic), Universiti Teknologi MARA (1994)
Tel. : 04-985
Faks : 04-9851695
E-mail : najmuddin@unimap.edu.my

Pn. Nurulisma binti Hj. Ismail
Pensyarah Universiti (DS45)
PhD Visual Informatics, UKM (?)
M.Sc. Information Technology, UUM (2002)
Bachelor of Information Technology (Hons.), UUM (2000)
Tel. : 04-985
Faks : 04-9851695
E-mail : nurul@unimap.edu.my

Study Leave

En. Azremi bin Abdullah Al-Hadi
(cuti belajar Ph.D, Helsinki University of Technology (HUT) Finland)
Pensyarah Kanan (DS52)
M.Sc. (Communications Engineering, The University of Birmingham, UK (2004)
B.Eng. (Hons) (Electrical and Electronic Engineering), USM (2002)
E-mail : azremi@unimap.edu.my

Pn. Yasmin binti Mohd. Yacob
(cuti belajar Ph.D, USM)
Pensyarah Universiti (DS45)
M.Sc. Computer Science, UPM (2003)
B.Sc. Computer Science, Univ. of Michigan, USA (1996)
E-mail : yasmin.yacob@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~yasmin

En. Muhammad Imran bin Ahmad
(cuti belajar Ph.D, Newcastle Upon Tyne University, UK)
Pensyarah Universiti (DS45)
M.Sc (Embedded System Design Engineering), USM (2005)
B.Eng (Electronics), UTM (2004)
E-mail : m.imran@unimap.edu.my

Pn. Salina binti Mohd Asi
(cuti belajar Ph.D, UM)
Pensyarah Universiti (DS45)
Sarjana Sains (Sains Komputer – Kejuruteraan Perisian Masa Nyata), UTM (1999)
Sarjana Muda Sains Komputer (Kepintaran Buatan), UTM (1996)
Diploma Sains Komputer, UTM (1994)
E-mail : salina@unimap.edu.my

En. Zahereel Ishwar bin Abdul Khalib
(cuti belajar Ph.D, UniMAP)
Pensyarah Universiti (DS45)
Sarjana Sains (Sains Komputer-Kejuruteraan Perisian Masa Nyata), UTM (2005)
B.Sc. in Computer Engineering, California State University, Sacramento, USA (2000)
E-mail : zahereel@unimap.edu.my

En. Soh Ping Jack
(cuti belajar Ph.D, Katholieke University of Leuven (KUL), Belgium)
Pensyarah Kanan (DS52)
M.Eng. (Electrical-Electronics & Telecommunications), UTM (2006)
B.Eng. (Electrical-Telecommunications), UTM (2002)
E-mail : pjsoh@unimap.edu.my

En. Amir Razif Arief bin Jamil
Abdullah *(cuti belajar Ph.D, UniMAP*
Pensyarah Universiti (DS45)
M.Sc. (Electronic Systems Design Engineering), USM (2005)
B.Sc. in Electrical Engineering, Norwich University, USA (1996)
E-mail : amirrazif@unimap.edu.my

En. Said Amirul Anwar bin Ab. Hamid @ Ab. Majid
(cuti belajar Ph.D, USM)
Pensyarah Universiti (DS45)
M.Sc. (Birmingham) Kejuruteraan Elektronik
B.Eng. (USM)
E-mail : said@unimap.edu.my

Pn. Rusnida binti Romli
(cuti belajar Ph.D, UUM)
Pensyarah Universiti (DS45)
Sarjana Sains Teknologi Maklumat (Penyelidikan:Realiti Maya), UUM (2003)
Ijazah Sarjana Muda Teknologi Maklumat (Sains Komputan), UNIMAS (2000)
E-mail : rusnida@unimap.edu.my

En. Zulkifli bin Husin
(cuti belajar Ph.D, UniMAP)
Pensyarah Kanan (DS52)
M.Sc. (Rekabentuk Sistem Elektronik), USM (2004)
B.Eng. in Mechatronic, UTM (1999)
Diploma in Electronic, UTM (1996)
E-mail : zulhusin@unimap.edu.my

Pn. Rohani binti S. Mohamed Farook
(cuti belajar Ph.D, UniMAP)
Pensyarah Universiti (DS45)
Sarjana Sains Teknologi Maklumat (Penyelidikan:Kepintaran Buatan), UUM (2006)
Ijazah Sarjana Muda Teknologi Maklumat dengan kepujian, UUM (1998)
E-mail : rohani@unimap.edu.my

En. Mohd. Alif Hasmani bin Abd. Ghani
(cuti belajar Ph.D, UniMAP)
Pensyarah Universiti (DS45)
Sarjana Sains (Sains Komputer), USM (2006)
Sarjana Muda Sains Komputer (Hons), USM (2001)
Email : alifhasmani@unimap.edu.my

Pn. 'Aini Syuhada binti Md Zain
(cuti belajar Ph.D, UniMAP)
Pensyarah Universiti (DS45)
M.Eng (Communication and Computer), UKM (2007)
B.Eng (Computer and Information) (Honours), UIAM (2005)
E-mail : ainisyuhada@unimap.edu.my

Pn. Nordiana binti Mohamad Saaid
(cuti belajar Ph.D, UniMAP)
Pensyarah Universiti (DS45)
M.Eng (Telecommunication Engineering), Royal Melbourne Institute of Technology (RMIT) University, Australia (2007)
B.Eng (Hons) (Electronic & Communications Engineering), The University of Leeds, United Kingdom (2003)
International Baccalaureate (IB), MARA College Banting, Selangor (2000)
E-mail : dianams@unimap.edu.my

En. Mohamad Suhaizal bin Abu Hassan
(cuti belajar Ph.D, UniMAP)
Pensyarah Universiti (DS45)
Sarjana Sains (Kejuruteraan Rekabentuk Sistem Elektronik), USM (2007)
Sarjana Muda Kejuruteraan (Elektrik – Elektronik), UTM (2002)
E-mail : suhaizal@unimap.edu.my

En. Ahmad Nasir bin Che Rosli
(cuti belajar Ph.D, University of Nottingham in Malaysia, Semenyih)
Pensyarah Universiti (DS45)
M.Sc (Computer Engineering), UniMAP (2009)
B. Comp. Science (Artificial Intelligence), UM (2001)
E-mail : ahmadnasir@unimap.edu.my

Pn. Aznor Hanah binti Abdul Halim
(cuti belajar Ph.D, UniMAP)
Pensyarah Universiti (DS45)
Ijazah Sarjana Sains (Kejuruteraan Elektrik & Elektronik), USM (2007)
Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Elektrik dan Elektronik), USM (2003)
E-mail : aznor@unimap.edu.my

Pegawai Latihan Vokasional

Pn. Dayang Khadijah binti Hamzah
Pegawai Latihan Vokasional (J41)
B.Eng. (Hons) (Electrical), UiTM (2002)
Diploma in Electrical Engineering (Instrumentation), UiTM (1999)
Tel. : 04-9852721
Faks : 04-9851695
E-mail : h_dayang@unimap.edu.my

En. Mohammad Nazri bin Md. Noor
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan Elektrik (Perhubungan) (Kepujian), UTM (2000) Tel. : 04-9852572
Faks : 04-9851695
E-mail : nazri@unimap.edu.my

Pn. Hazila binti Othman
Pegawai Latihan Vokasional (J41)
B. Eng (Hons) (Electrical), UiTM (2002)
Diploma in Electrical Engineering (Electronics), UiTM (1999)
Tel. : 04-9852623
Faks : 04-9851695
E-mail : hazila@unimap.edu.my

En. Mohd. Fisol bin Osman
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan Elektrik dan Elektronik, Liverpool (1995)
Tel. : 04-9798016
Faks : 04-9851695
E-mail : mohd.fisol@unimap.edu.my

En. Mohamad Rizal bin Abdul Rejab
Pegawai Latihan Vokasional (J41)
M.Sc (Information and Communication Technology), UUM (2010)
B.Eng (Hons) (Electronic Engineering), USM (2004)
Tel. : 04-9855153/5946
Faks : 04-9851695
E-mail : m.rizal@unimap.edu.my

Pn. Shariffah Zarihan binti Syed Zaharim Helmi
Pegawai Latihan Vokasional (J41)
Bachelor of Engineering (Hons) Electronics Majoring in Microwave and Communications, Multimedia University (MMU) (2003)
Tel. : 04-9852721
Faks : 04-9851695
E-mail : zarihan@unimap.edu.my

En. Abdul Hallis bin Abdul Aziz
Pegawai Latihan Vokasional (J41)
Sarjana Sains Kejuruteraan Komputer, UniMAP (2011)
Sarjana Muda Kejuruteraan Elektronik, Perhubungan & Komputer, University of Bradford, UK (1998)
Tel. : 04-9798931
Faks : 04-9851695
E-mail : abdulhallis@unimap.edu.my

En. Mat Nor Mohamad bin Ismail
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan Elektrik (Komputer) (Kepujian), KUiTTHO (2004) Tel. : 04-9853337
Faks : 04-9851695
E-mail : matnor@unimap.edu.my

En. Mohd. Fairuz bin Muhamad Fadzil
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan (Elektrik – Telekomunikasi) Dengan Kepujian Kelas Dua (Tinggi), UTM (2006)
Tel. : 04-9855153
Faks : 04-9851695
E-mail : mohdfairuz@unimap.edu.my

Pn. Nazatul Syima binti Saad
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan (Elektrik) (Telekomunikasi) (Kepujian), KUiTTHO (2006)
Sijil Kejuruteraan Elektrik (Kuasa), Politeknik Sultan Abdul Halim Mu’adzam Shah (POLIMAS), Kedah (2001)
Tel. : 04-9855201
Faks : 04-9851695
E-mail : nazatul@unimap.edu.my

Pn. Siti Nor Diana binti Ismail
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Komputer), KUKUM (2006)
Tel. : 04-9855064
Faks : 04-9851695
E-mail : sitinordiana@unimap.edu.my

En. Mohd. Ridzuan bin Mohd. Nor
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Komputer), KUKUM (2006)
Tel. : 04-9855053
Faks : 04-9851695
E-mail : mohdridzuan@unimap.edu.my

En. Mohd. Azizi bin Mohamed
Pegawai Latihan Vokasional (J41)
Sarjana Muda Kejuruteraan (Elektrik – Telekomunikasi) (Kepujian), UTM (2008)
Tel. : 04-9855230
Faks : 04-9851695
E-mail : mazizi@unimap.edu.my

Pn. Fazlina binti Farid
Pegawai Latihan Vokasional (J41)
B.Eng (Communication) (Honours), UIAM (2008)
Tel. : 04-9855201
Faks : 04-9851695
E-mail : fazlinafarid@unimap.edu.my

Pn. Noor Fazreen binti Bakar
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda (Kepujian) Kejuruteraan Elektrik (Elektronik), UiTM (2008)
Diploma Kejuruteraan Elektrik (Elektronik), UiTM (2004)
Tel. : 04-9855064
Faks : 04-9851695
E-mail : fazreen@unimap.edu.my

En. Khairil Syahmi bin Musa
Pegawai Latihan Vokasional (J41)
Ijazah Sarjana Muda Kejuruteraan Elektrik (Communication) (Kepujian), KUiTTHO (2006)
Tel. : 04-9855230
Faks : 04-9851695
E-mail : syahmi@unimap.edu.my

Staf Teknikal

En. Noorzaki bin Zainal
Penolong Jurutera (J29)
BTEC Higher National Diploma (HND) Electrical/Electronic Engineering, The British Malaysian Institute, Kuala Lumpur (1999)
Sijil Kemahiran Kajisawat Instrumen Elektronik, IKM Sungai Petani (1996)
Tel. : 04-985
Faks : 04-9851695
E-mail : norzaki@unimap.edu.my

En. Megat Norizan bin Megat Shafiee
Juruteknik Gred J22 (Juruteknik Kanan)
Diploma Kejuruteraan Elektrik, Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS) (2009)
Sijil Kejuruteraan Elektronik (Kawalan), Politeknik Shah Alam (2001)
Tel. : 04-9852315
Faks : 04-9851695
E-mail : megat@unimap.edu.my

Pn. Siti Zauyah binti Othman
Juruteknik (J17)
Diploma Kejuruteraan Elektronik (Komputer), Politeknik Seberang Perai (PSP) (2006)
Sijil Kejuteraan Elektronik (Komputer), POLIMAS, Kedah (2002)
Tel. : 04-9854797
Faks : 04-9851695
E-mail : sitizauyah@unimap.edu.my

En. Basri bin Hamid
Juruteknik (J17)
Diploma Kejuruteraan Elektrik (Elektronik Kuasa dan Kawalan), Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS), Kedah (2006)
Sijil Kejuruteraan Elektronik (Kawalan), Politeknik Ungku Omar (PUO), Ipoh (2001)
Tel. : 04-9851940
Faks : 04-9851695
E-mail : basri@unimap.edu.my

En. Mohamad Haris bin Uzir
Juruteknik (J17)
Diploma Kejuruteraan Elektrik (Elektronik Kuasa dan Kawalan), Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS), Kedah (2006)
Sijil Kejuruteraan Elektrik (Kuasa), POLIMAS, Jitra (2002)
Tel. : 04-9854797
Faks : 04-9851695
E-mail : haris@unimap.edu.my

Pn. Suraya binti Harun
Juruteknik (J17)
Diploma Kejuruteraan Elektronik (Perhubungan), POLIMAS (2006)
Sijil Kejuruteraan Elektronik (Perhubungan), Politeknik Shah Alam (2002)
Tel. : 04-9853334
Faks : 04-9851695
E-mail : suraya_harun@unimap.edu.my

En. Che Mohamad bin Che Hashim
Juruteknik (J17)
Sijil Kejuruteraan Elektronik (Perhubungan), POLIMAS (1995)
Tel. : 04-985
Faks : 04-9851695
E-mail : mohamad@unimap.edu.my

En. Mohammad Dzahir bin Zainun
Juruteknik (J17)
Sijil Kejuruteraan Elektronik (Komputer), POLIMAS (2004)
Tel. : 04-985
Faks : 04-9851695 E-mail : dzahir@unimap.edu.my

En. Mohd. Aniff bin Mohammad
Juruteknik (J17)
Certificate in Electric and Electronic, POLIMAS (2004)
Tel. : 04-9852826
Faks : 04-9851695
E-mail : aniff@unimap.edu.my

En. Azizul Hafifi bin Abd. Rahman
Juruteknik (J17)
Certificate in Domestic Electrical, Kolej Komuniti Arau (2004)
Tel. : 04-985
Faks : 04-9851695
E-mail : hafifi@unimap.edu.my

En. Izdiharuddin bin Ismail
Juruteknik (J17)
Sijil Teknologi Maklumat, POLIMAS (2004)
Tel. : 04-9852315
Faks : 04-9851695
E-mail : izdiharuddin@unimap.edu.my

Pn. Assyafinar binti Asri
Juruteknik (J17)
Sijil Sistem Komputer Dan Sokongan, Kolej Komuniti Arau (2008)
Tel. : 04-9852827
Faks : 04-9851695
E-mail : assyafinar@unimap.edu.my

Cik Nor Hasmah binti Halip
Juruteknik (J17)
Sijil Sistem Komputer Dan Sokongan, Kolej Komuniti Arau (2008)
Tel. : 04-9852828
Faks : 04-9851695
E-mail : norhasmah@unimap.edu.my

Pn. Suzanna binti Salwi
Juruteknik (J17)
Sijil Sistem Komputer Dan Sokongan, Kolej Komuniti Arau (2008)
Tel. : 04-985
Faks : 04-9851695
E-mail : suzanna@unimap.edu.my

En. Shahril bin Rosidi
Juruteknik (J17)
Diploma Kejuruteraan Elektrik, POLIMAS, Kedah (2009)
Sijil Kejuruteraan Elektronik (Perhubungan), POLIMAS (2002)
Tel. : 04-985
Faks : 04-9851695
E-mail : shahrilrosidi@unimap.edu.my

En. Hasfizul bin Mohd. Yusoff
Juruteknik (J17)
Sijil Sistem Komputer, Kolej Komuniti Arau (2009)
Tel. : 04-985
Faks : 04-9851695
E-mail : hasfizul@unimap.edu.my

Staf Pentadbiran

Pn. Aiza binti Jasmi
Penolong Pendaftar (N41)
M.Sc. Management, UUM (2005)
B.B.A (Hons.) Finance, UKM (2002)
Tel. : 04-9851690
Faks : 04-9851695
E-mail : aiza@unimap.edu.my

Pn. Rusmiza binti Abdullah
Setiausaha Pejabat (N27)
Diploma Pengurusan dan Teknologi Pejabat, UiTM Cawangan Perak, Seri Iskandar (2002)
Tel. : 04-9851654
Faks : 04-9851695
E-mail : rusmiza@unimap.edu.my

Pn. Farah Dieva binti Ab. Rahim
Pembantu Tadbir (Perkeranian/ Operasi) (N17)
Tel. : 04-9851654
Faks : 04-9851695
E-mail : farah@unimap.edu.my

Pn. Nur Hazwanie binti Mokhtar
Pembantu Tadbir (Perkeranian/ Operasi) (N17)
Tel. : 04-9851697
Faks : 04-9851695
E-mail : hazwanie@unimap.edu.my

Pn. Noor Haryaney binti Roslan
Pembantu Tadbir (Perkeranian/ Operasi) (N17)
Tel. : 04-9851697
Faks : 04-9851695
E-mail : haryaney@unimap.edu.my

En. Roshaizan bin Darus
Pembantu Am Pejabat (N1)
Tel. : 04-9852705
Faks : 04-9851695
E-mail : roshaizandarus@unimap.edu.my

Computer Engineering Programme Programme Objectives (PEO)

PEO 01
Graduates are leaders in the field of computer 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 a computer engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices so as to be easily adaptable to industrial needs.

PO 06
Ability to demonstrate 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 sustainable development.

PO 08
Ability to understand professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding of the need for, and an ability to engage in life-long learning.

PO 12
Ability to acquire project management and finance principles.

Curriculum Structure For Bachelor Of Engineering (Honours) (Computer Engineering)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (97)	EKT101/4 Electric Circuit Theory	EKT 103/3 Electrical Engineering	EKT221/4 Digital Electronics II	EKT222/4 Microprocessor Systems	EKT303/4 Principles of Computer Architecture	EKT322/4 Embedded Systems Design	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		EKT424/4 Real-Time Systems	EKT421/3 Software Engineering
	EKT102/3 Basic Electronic Engineering	EKT112/4 Principles of Measurement and Instrumentation		EKT242/3 Electromagnetic Theory	EKT333/3 Modern Operating Systems	EKT336/3 Computer Networks		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 Electronic Instrumentation		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	
	EUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra						
University Required (15)	EUWXXX/1 Co-curriculum	UUW114/2 University Malay Language	UUW223/2 University English	UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relation				UUWXXX/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 Principle of Digital Signal Processing, EKT466 Artificial Intelligence, EKT 422 Parallel Computing, EKT 426 And Open Database Management System, EKT 345 Microwave Engineering, EKT 460 Image Processing, EKT428 Mobile Computing, Elective EKT465 Optical Communication Systems, EKT 450 Network Security, EKT454 Wireless Network & Communication

Communication Engineering Programme Programme Objectives (PEO)

PEO 01
Graduates are leaders in the field of communication 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 a communication engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices so as to be easily adaptable to industrial needs.

PO 07
Ability to understand entrepreneurship, the process of innovation and the need for sustainable development.

PO 08
Ability to understand professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding of the need for, and an ability to engage in life-long learning.

PO 12
Ability to acquire project management and finance principles.

Curriculum Structure For Bachelor Of Engineering (Honours) (Communication Engineering)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (97)	EKT101/4 Electric Circuit Theory	EKT 103/3 Electrical Engineering	EKT221/4 Digital Electronics II	EKT222/4 Microprocessor Systems	EKT303/4 Principles of Computer Architecture	EKT357/3 Digital Communication Engineering	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		EKT440/4 Telecommunication Switching & Network	EKT441/3 Mobile Communication Systems
	EKT102/3 Basic Electronic Engineering	EKT112/4 Principles of Measurement and Instrumentation		EKT242/3 Electromagnetic Theory	EKT341/4 Antenna and Propagation	EKT 345/4 Microwave Engineering		Program Elective I /3	Open Elective / 3
		ECT111/3 Engineering Skills		EKT214/4 Analog Electronic Circuits II	EKT353/3 Principles of Digital Signal Processing	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	
	EUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra						
University Required (15)	EUWXXX/1 Co-curriculum	UUW114/2 University Malay Language	UUW223/2 University English UUW322/2 Thinking Skills	UUW224/2 Engineering Entrepreneurship UUW233/2 Islam & Asia Civilisation (TITAS)	UUW235/2 Ethnic Relation				UUWXXX/2 Option Subjects
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 and Open Elective: EKT 445 Radar Engineering, EKT446 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

Computer Network Engineering Programme Programme Objectives (PEO)

PEO 01
Graduates are leaders in the field of computer network 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 a computer network engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices so as to be easily adaptable to industrial needs.

PO 06
Ability to demonstrate 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 sustainable development.

PO 08
Ability to understand professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding of the need for, and an ability to engage in life-long learning.

PO 12
Ability to acquire project management and finance principles.

Curriculum Structure For Bachelor Of Engineering (Honours) (Computer Network Engineering)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (97)	EKT101/4 Electric Circuit Theory	EKT 103/3 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	
	EUT122/2 Skills and Technology in Communication		EQT221/3 Discrete Mathematics and Linear Algebra						
University Required (15)	EUWXXX/1 Co-curriculum	UUW114/2 University Malay Language	UUW223/2 University English	UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relation				UUWXXX/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 422 Parallel Computing, EKT 426 Database And Open Management System, EKT 345 Microwave Engineering, EKT 460 Image Processing, EKT428 Mobile Computing, EKT465 Optical Elective Communication Systems, EKT 450 Network Security, EKT454 Wireless Network & Communication

Bachelor of Electronic Engineering Technology (Hons) (Electronic Network Design) Programme Objectives (PEO)

PEO 01
Computer Network Technology graduates who are competent in both technology theory and practice.

PEO 02
Computer Network Technology graduates who are able to demonstrate leadership and contribute to team success and manage projects in a multi-disciplinary environment.

PEO 03
Computer Network Technology graduates who are able to make contributions to knowledge.

PEO 04
Computer Network Technology graduates who are able to demonstrate an ethical commitment to the community.

Programme Outcomes (PO)

PO 01
apply basic knowledge of mathematics, science and engineering fundamentals to routine procedures and practices in specific fields;

PO 02
identify specific engineering problems in their discipline with respect to operation and maintenance;

PO 03
assist in the investigations and design of solutions for specific engineering systems;

PO 04
demonstrate as awareness of societal, health, safety, legal and cultural issues and the consequent responsibilities;

PO 05
demonstrate communication, leadership and team skills;

PO 06
demonstrate an understanding of ethics, responsibilities and norms of engineering practices;

PO 07
demonstrate an awareness of management, business practices, entrepreneurship and sustainable development;

PO 08
recognise the need for career development and to engage in lifelong learning.

Curriculum Structure For Bachelor Of Electronic Engineering Technology (Honours) (Electronic Network Design)

YEAR	FIRST			SECOND			THIRD		FOURTH	
SEMESTER	I	II	INDUSTRIAL EXPOSURE (IndEX) – 1 WEEK	III	IV	INDUSTRIAL ENTREPRENEURSHIP (2 DAYS)	V	VI	VII	VIII
Discipline Core (102)	PGT 111/3 Computer Technology	PGT XXX/3 Digital Electronics		PGT XXX/3 Operating Systems	PGT XXX/3 Internetworking Technology I		PGT XXX/3 Communication Systems	PGT XXX/4 Final Year Project I	PGT XXX/6 Final Year Project II	PGT XXX/12 Industrial Training
	PGT 102/3 Engineering Science	PGT XXX/3 Electrical Engineering Technology		PGT XXX/3 Microprocessor	PGT XXX/3 Signals and Systems)		PGT XXX/3 Embedded Software Technology	PGT XXX/3 Elective I	PGT XXX/3 Network Security Technology	
	PGT 101/3 Electric Circuit Principles	PGT XXX/3 C Programming			PGT XXX/3 Computer Architecture		PGT XXX/3 Data Structures	PGT XXX/3 Network Management	PGT XXX/3 Elective II	
		PGT XXX/2 Writing in Engineering Technology		PGT XXX/3 Analog Electronics	PGT XXX/3 Object Oriented Programming		PGT XXX/3 Internetworking Technology II	PGT XXX/3 Network Modeling	PGT XXX/3 Elective III	
	PGT 121/3 Networking Fundamentals			PGT XXX/3 Database Management Systems				PGT XXX/3 Programming for Networking		
Common Core (21)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II		PQT 213/3 Mathematics for Engineering Technology III	PQT XXX/3 Mathematics for Engineering Technology IV		EUT XXX/3 Technology Management	EUT XXX/3 Technologist and Society		
	PCT 111/3 Engineering Skills									
University Required (17)	EUW XXX Co-Curricular Activity	UUW 114/2 University Malay Language		UUW 224/2 Engineering Entrepreneurship	UUW 235/2 Ethnic Relation		UUW 322/2 Thinking Skills			
		EUT 122/2 Skills & Technology in Communication		UUW 223/2 University English Language	UUW233/2 Islamic & Asian Civilizations		UUW XXX/2 Option Subjects			
122	19	18		19	19		19	19	15	12
18	University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curriculum, Option Subject									
Total Units for Graduation 140										

Elective : CCNA I, CCNA II, CCNA III, CCNA IV, Mobile Computing, Web Programming, Artificial Intelligent

School of Computer and Communication Engineering

Course Syllabus

EKT 101/4
ELECTRIC CIRCUIT THEORY

Course Synopsis

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

References

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

EKT 102/3
BASIC ELECTRONIC ENGINEERING

Course Synopsis

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

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

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

References

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

EKT 103/3
ELECTRICAL ENGINEERING

Course Synopsis

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

References

1. Chapman S.J., “Electric Machinery Fundamentals”, Fourth Edition, 2005, McGraw Hill, Singapore.
2. Z.A. Yamayee & J.L. Bala, “ Electromechanical Energy Devices & Power Systems”, 1993, Wiley & Sons, USA.
3. Larry D. Jomes & A.F. Chin, “Electronics Instruments and Measurement”, 1991, Prentice Hall, USA.
4. Edward Hughes, John Hiley, Keith Brown, Ian McKenzie-Smith, “Electrical and Electronic Technology”,10th Edition, Jun 2008.
5. Austin Hughes, “6. Electric Motors and Drives: Fundamentals, Types and Applications”, Third edition 2006.

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.

References

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

EKT 120/4
COMPUTER PROGRAMMING

Course Synopsis

This course introduces basic programming using high level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with the programming tools such as 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.
3. Hanly, J.R. and Koffman, E.B., “C Program Design for Engineers”, 2nd Ed., Addison-Wesley, 2001.

4. Tan, H.H. and D'Orazio, T.B., "C Programming for Engineering & Computer Science", McGraw Hill, 1999.
5. Hanly, J.R. and Koffman, E.B., "Problem Solving and Program Design in C", 6th Ed., Pearson, 2007.

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

1. Rafikha Aliana A Raof, Norina Idris, Phaklen Eh Kan, Mohammad Nazri Md. Noor. (2007). Digital Electronics Design. 1st Edition. Malaysia: Prentice Hall.
2. Floyd. TL. (2006). Digital Fundamentals. 9th Edition. New Jersey: Prentice Hall.
3. Ronald J. Tocci. (2003). Digital Systems – Principles and Applications. 7th Ed. New Jersey: Prentice Hall.
4. M. Morris Mano. (2005). Digital Design. 3rd Edition. Prentice Hall.
5. Fundamentals of Digital Logic and Microcomputer Design. Fifth Edition. John Wiley & sons, Inc.

EKT 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 skills covering theories and practices.

References

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

EKT 214/4
ANALOG ELECTRONIC CIRCUITS II

Course Synopsis

This course offers the students an exposure to the operational amplifier : Operation, differential amplifier, common-mode, parameters, basic op-amp, practical op-amp circuits, op-amp datasheet, applications of op-amp and frequency response and compensation; feedback circuits: Concepts and feedback, types of feedback connection, practical feedback circuit, feedback amplifier; Oscillator : basic operating principles of an oscillator, phase shift, Wien bridge, crystal oscillator, uni-juction; action filters : basic filter, filter response characteristics, low-pass filter, high-pass filter, band-pass filter, band-stop filter, frequency response measurement, design of filter, Butterworth, chebchev and Elliptic; Voltage regulators : Basic series and basic shunt regulators, basic switching regulator, IC regulators and applications

References

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

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

1. Rafikha Aliana, Norina Idris, Phak Len Eh Kan, Mohammad Nazri, “Digital Electronics Design”, 1st Ed. Prentice Hall, 2007.
2. Mano, M. Morris and Kime, Charles R., “Logic and Computer Design Fundamentals”, 4th Ed. Prentice Hall, 2007.
3. Wakerly, John F., “Digital Design – Principles & Practice”, 3rd Ed. Prentice Hall, 2003.
4. Mano, M. Morris, Michael D. Ciletti, “Digital design / M. Morris Mano”, 4th Ed. Pearson/ Prentice Hall , 2007.
5. Floyd, Thomas L., “Digital Fundamentals”, 8th Ed. Prentice Hall, 2003.

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

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

EKT 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 analysed in the time and frequency domain.

References

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

EKT 242/3
ELECTROMAGNETIC THEORY

Course Synopsis

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

References

1. Ulaby Fawwaz T., M.S. Anuar, S.A Aljunid, R. Badlishah, A. A. H. Azremi, P. J. Soh, “Electromagnetics Theory”, Prentice Hall Pearson Malaysia, 2008.
2. Fawwaz T. Ulaby, Eric Micielssen, Umberto Ravaioli, “Fundamentals of Applied Electromagnetics”, Pearson (Prentice Hall) 2010.
3. Stuart M. Wentworth, “Applied Electromagnetics”, John Wiley, USA, 2007.
4. Stuart M. Wentworth, “Fundamental of Electromagnetics with Engineering Applications”, Wiley edition, 2005.
5. William H.Hayt, John A Buck, “Engineering Electromagnetics”, McGraw Hill, International Edition 2001.

EKT303/4
PRINCIPLES OF COMPUTER ARCHITECTURE

Course Synopsis

This course focuses on the computer system which involves with the design of interface techniques, organization and architecture. The syllabus coverage will be on the theory of basic computer system, format of instruction set, memory organization and arithmetic logic unit (ALU) as well as certain designing issues such as bus structure, parallel processing, pipelining and memory management. The students are required to design a simple CPU during their experiments. The lab sessions will complement the theories given in a class.

References

1. William Stallings. (2006). Computer Organization and Architecture. Seventh Edition. Prentice-Hall.
2. M. Morris Mano. (1992). Computer System Architecture. Third Edition. Prentice-Hall.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky. (2001). Computer Organization. Fifth Edition. McGraw Hill.
4. Andrew S. Tanembaum. (2006). Structured Computer Organization. Fifth Edition.
5. Linda Null, The Essentials of Computer Organization and Architecture. (2006). 2nd Edition. Jones and Bartlett Publishers.

EKT314/4
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 & Systems. Tata McGraw-Hill Publishing Company Limited.
3. Sawhney, A.K. and Sawhney, P. (2001). A Course in Electronic and Electrical Measurement and Instrumentation. Dhanpat Rai & Co. (P) Ltd.
4. Bentley, J.P. (1995). Principles of Measurement Systems. Longman Singapore Publisher.
5. Kuphaldt T.R. (2009), Lessons in Industrial Instrumentation. Version 0.4 – 2009

EKT318/3
MODERN CONTROL SYSTEMS

Course Synopsis

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

References

1. Dorf, Richard C., Bishop, Robert H., “Modern Control Systems”, Pearson, 12 Ed., 2011.
2. Nise , Norman S. , “Control Systems Engineering”, John Wiley and Sons , 4 Ed., 2004.
3. Kuo B.C., “Automatic Control Systems”, Prentice Hall, 8 Ed., 1995.
4. Ogata, K, “Modern Control Engineering”, Prentice Hall, 1999.
5. Stanley M. Shinners, “Advanced Modern Control System Theory and Design”, John Wiley and Sons, 2 Ed., 1998.

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

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

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

EKT 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 Ed.),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++ (3 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

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

References

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

1. A. L. Garcia and A. Widjaja, (2004), Communication Networks: Fundamental Concepts and Key Architectures, 2nd Ed., McGraw Hill Publication.
2. A. S. Tanenbaum, (2003), Computer Networks, Prentice Hall.
3. K. C. Mansfield Jr. and J. L. Antonakos, (2002), An Introduction to Computer Network, Prentice Hall.
4. J.F. Kurose and K.W.Ross, (2002), Computer Networking: A Top-Down Approach Featuring the Internet, 2nd Ed., 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 principles of the functions, types and characteristics of antenna. Students should be able to analyze the characteristics of wave and waveguide. Students should also have ability to explain the characteristics of radio wave propagation.

References

1. Fundamentals of Electromagnetics with Engineering Applications, Stuart M Wentworth, Wiley, 2005.
2. Antenna Theory: Analysis and Design, 3rd Ed., C.A. Balanis, Wiley, 2005.
3. Antenna: For All Applications, Kraus, Marhefka, McGraw Hill International Edition, 2003.
4. Engineering Electromagnetics, 8th Edition, William H. Hayt Jr, John A.Buck, McGraw-Hill, 2012.

EKT 343/4
PRINCIPLES OF COMMUNICATION ENGINEERING

This course is intended to cover the basic principles and concepts of electronic communication systems. It includes theory and circuits of Amplitude modulation and Angle modulation. It covers sampling of analog signal and generation of PAM, PPM, PWM signals. Basic digital modulation techniques like ASK, FSK, PSK, PCM and DM are also included in the course. Performance of communication system in the presence of noise is also considered.

References

1. Simon Haykin, “Communication Systems”, John Wiley, 2009.
2. Wayne Tomasi, “Electronic Communication Systems Fundamental through Advanced”, Pearson Prentice Hall 2004.
3. J. Taub & D.L. Scilling, “Principles of Communication Engineering”, Mc Graw Hill International 1986.
4. B.P. Lathi, “Modern Digital and Analog Communication Systems”, Oxford University Press 1993.
5. K. Sam Shanmugam, “ Analog and Digital Communication”, Wiley 2002

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. Analysis the device characteristics for microwave. To explain the importance and applications of microwave communication system. Additionally, the students are introduced how to design microwave’s filters and amplifiers.

References

1. 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.
4. Om P.Gandhi, (1989). Microwave Engineering and Applications, Maxwell Macmillan Int. Edition.
5. Collin, R.E., (1992). Foundations For Microwave Engineering, Mc-Graw Hill.

EKT 353/3
PRINCIPLES 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

1. Ifeachor & Jervis, (2001), Digital Signal Processing: A Practical Approach. 2 Ed., Prentice Hall.
2. Sanjit K. Mitra, (2006), Digital Signal Processing: A Computer-Based Approach, 3 Ed., McGraw Hill
3. Proakis and Manolakis, (2007), Digital Signal Processing, 4 Ed., Pearson.
4. S. Orfanidis, (1996), Introduction to Signal Processing, Prentice Hall.
5. C.T.Chen, (2001), Digital Signal Processing, Oxford University Press.
6. B.P.Lathi, (2000), Signal Processing and Linear Systems, Oxford University Press.

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

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

EKT 357/3
DIGITAL COMMUNICATION ENGINEERING

Course Synopsis

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

References

1. Skalar B. (2005). Digital Communications, Fundamentals and Applications. 2nd Ed. IE Prentice Hall.
2. Pursely M.B. (2005). Introduction to Digital Communications. IE Prentice Hall.
3. M.Schwartz. (2003). Information Transmission, Modulation and Noise. 3rd Ed. McGraw Hill.
4. Proakis, John G. (1995). Digital Communications. 3rd Ed. International Ed. - New York; Singapore. McGraw Hill.
5. John Proakis and Masoud Salehi. (2007). Digital Communications. 5th edition, McGraw-Hill.

EKT 421/3
SOFTWARE ENGINEERING

Course Synopsis

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

References

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

EKT 424/4
REAL TIME SYSTEM

Course Synopsis

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

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.

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.

Reference

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

EKT433/4
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

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

EKT434/3
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 program 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

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

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

1. L. Garcia and A. Widjaja. (2004). Communication Networks: Fundamental Concepts and Key Architectures. 2nd Edition. McGraw Hill Publication.
2. S. Tanenbaum. (2003). Computer Networks. Prentice Hall.
3. K. C. Mansfield Jr. and J. L. Antonakos (2002). An Introduction to Computer Network. Prentice.

4. P.Gnanasivam. (2008). Telecommunication Switching and Networks” New Age Publications (Academic).
5. Viswanathan Thiagarajan (2010). Telecommunication Switching Systems And Networks Phi Learning Publication.

EKT441/3
MOBILE COMMUNICATION

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

EKT445/2
FINAL YEAR PROJECT I

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.

PGT 101/3
ELECTRIC CIRCUIT PRINCIPLES

Course Synopsis

This course covers introduction to the basic of electrical measurements, Ohm’s Law, Series and Parallel Circuits, Circuit Theorems and Conversions and RLC circuits. This course will expose the students to the elements and principles of electrical circuit theory with appropriate to any RLC circuit applications. The laboratory sessions will complement the theories given in a class.

Course Outcomes

1. Ability to perform the basic concept of electrical measurement and RLC Circuits Theorems
2. Ability to apply the concept of Ohm’ Law, Series and Parallel Circuits, and Circuit Theorems for any RLC Circuits
3. Ability to analyze RLC Circuits related to electric circuits applications

Syllabus

Quantities and Units, Voltage, Current and Resistance, Ohm’s Law, Energy and Power, Resistors in Series and Parallel, Application of Ohm’s Law, Kirchhoff’s Voltage and Current Law, Branch, Loop and Node Analysis, Series and Parallel Circuit Applications, The DC

Voltage and Current Source, The Superposition Theorem, Thevenin's and Norton Theorem, Delta to Wye and Wye to Delta Conversions, Basic concepts of Capacitors and Inductors Circuits, Series and Parallel Capacitors and Inductors Circuits, Capacitors and Inductors Applications

References

1. Thomas L. Floyd. *Principles of Electric Circuits*, Pearson Prentice Hall, 2009 (Floyd 9e)
2. Alenxander and Sadiku. *Fundamentals Of Electric Circuits*, McGraw-Hill, 2007
3. Nilsson and Riedel, *Electric Circuits*, Pearson Prentice Hall, 2008
4. Thomas L.Floyd, Electric Circuit Fundamental 8 Edition

PGT 102/3
ENGINEERING SCIENCE

Course Synopsis

This course covers introduction to physic and science which are force and motion, circular motion, work, power and energy, electrostatic, magnetism and electric current and resistance. Fundamental physics is combined with problem solving and engineering skills through suitable experiments. This course will expose the students to the elements and principles of basic concepts of physics and its application.

Course Outcomes

1. Ability to describe standard unit, apply the concept of force and motion and analyze work, energy and power principles.
2. Ability to apply circular motion principles in oscillation and wave
3. Ability to define and apply the basics of electrostatic and electromagnetism
4. Ability to calculate electric current and resistivity

Syllabus

Units and Dimension, Force and Motion, Scalars and vectors, Speed and velocity, Motion Equation, Newton's Law, Force from Newton's Law, Angular Measure, Angular Speed and Velocity, Frequency and Period, Uniform Circular Motion, Work, Power and Energy, Work and standard units, Power concept, Power calculation, Kinetic energy concept and potential energy, The law of conservation of energy, Vibration and Wave, Coulomb's Law, Charge units, Electric field, Electric force line, Capacitance and unit, Parallel plate capacitor, Dielectric constant and it's function, Magnets, magnetic poles and magnetic field direction, Magnetic field strength and magnetic force, Force and current-carrying conductor, Electric current, Resistance, Resistivity and Ohm's Law, Temperature variation of resistance, Electrical Energy and Power.

References

1. Jerry Wilson, Anthony Buffa. "College Physics", 7th ed., Pearson Education,2009
2. Giambattista, Richardson, Richardson, "College Physics", McGraw Hill Internationatial Ed., 2007.
3. Stephen T.Thornton, Andrew Rex. "Modern Physics for Scientists & Engineers", 2nded, Brooks Cole, 1999.
4. W. Bolton. "Engineering Science". Fourth Edition**.** Newnes. 2001

PGT 111/3
COMPUTER TECHNOLOGY

Course Synopsis

This course prepares the student to be familiar with computer hardware and software available in the market. The hardware includes CPU, memories and I/O such as monitor, keyboard and mouse. Computer software contains various Operating Systems (OS) such as Android, GNU/Linux, Microsoft and Apple based OS. Introduction to Free Open Source Software (FOSS) concept and philosophy, various applications such as Office Suite (word processor and spread sheet) will be explained.

Course Outcomes

1. Ability to illustrate concepts and principles of various hardware components in a computer system.
2. Ability to interpret Free/Open Source Software (FOSS) and proprietary software.
3. Ability to justify suitable software for the right application/task.

Syllabus

Introduction of Computer System, Brief history of Computer, Computer architecture, Structure and Function, Central Processing Unit (CPU),Memory: Internal Memory, Memory: External Memory, Input and Output (I/O),Computer Operating System, Mobile Operating System, Office Tools: Word Processor, Spread Sheet and Presentation.

References

1. Randal E. Bryant and David R. O'Hallaron*, "Introduction to Computer Systems: A Programmer's Perspective", Second edition* Prentice Hall.
2. William Stallings " Computer Organization and Architecture", *Eight edition* Pearson
3. M. Morris Mano, "*Computer System Architecture*", Third Edition, Prentice-Hall.
4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "*Computer Organization*", Fifth Edition, McGraw Hill.

PGT 121/3
NETWORKING FUNDAMENTALS

Course Synopsis

This course prepares the students to know how computers are connected. In addition, students are able to connect the computer to the Internet both wired and wireless. The students are expected to be able to troubleshoot problems that cause network disconnection, slow and effectiveness.

Course Outcomes

1. Ability to utilize the Internet exploring software to gather, explore and discover the importance of Internet
2. Ability to apply the knowledge of networking to set up the local area network, to connect computers together and identify the network IP
3. Ability to solve and troubleshoot problems which cause network disconnection and distortion.

Syllabus

Network components, Enterprise networks and home internet access, TCP/IP protocol suite and TCP/IP software, bits and bytes, decimal numbering system, binary numbering system, converting between numbering system, converting IP address between decimal and binary, Hexadecimal numbering system, IP subnet masks, using XOR math with subnets, brief history of networking universe, need of networking protocol and standard, Ethernet LANs and LAN device, Wide area networks, Network Topologies, LAN and WAN bandwidth, Calculating data transfer time, OSI model, TCP/IP model, Digital transmission using copper wires, LAN copper cabling, Comparing fiber-optic cabling and copper cabling, Electromagnetic spectrum, Fiber-optic cabling, WLAN components and design, WLAN organization and standards, TCP/IP network access layers, TCP/IP internet layer, TCP/IP transport layer, TCP/IP application layer, Address assignment and addresses classes, Network math (calculate number of host power), Network math (number of class networks), Subnetting basics, Brief review o subnetting, Number of required subnets and the resulting subnet mask, Subnet numbers and assignable IP addresses in each subnet, Subnet in which a host resides.

References

1. W. Odom and T. Knott, *Networking Basics*, Cisco Press, 2012.
2. J. F. Kurose, *Computer Networking: A Top-Down Approach*, 7thEdition, Addison-Wesley, 2011.

3. S. Tanenbaum, *Computer Network*, 5th Edition. Prentice-Hall, 2011.
4. M. Dye, R. McDonald, A.W. Rufi, *Network Fundamentals-CCNA Exploration Companion*, Cisco Press, 2008.
5. BehrouzForouzan, Data Communications and Networkings, 5th Edition, McGraw Hill, 2012.

PGT XXX/3
DIGITAL ELECTRONICS

Course Synopsis

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

Course Outcomes

1. Carry out analysis in basic numbering system and be able to understand basic theory of binary system
2. Minimize Boolean functions and be able to design and optimizes logic circuit in digital applications.
3. Design combinational and sequential logic circuit to solve mathematical equations in terms of Boolean Functions

References

1. Rafikha Aliana, Norina Idris, Phak Len Eh Kan, Mohammad nazri, “Digital Electronics Design”, 1st Ed., Prentice Hall, 2007
2. Floyd. TL, “Digital Fundamentals”, 9th Ed., Prentice Hall, 2006.
3. Ronald J. Tocci, “Digital Systems – Principles and Applications”, 7th Ed., Prentice Hall, 2003
4. Nigel, P.C. “A First Course in Digital Electronics”, 1st Ed., Prentice Hall, 1999.

PGT XXX/3
ELECTRICAL ENGINEERING TECHNOLOGY

Course Synopsis

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

Course Outcomes

1. Ability to define and solve problems on transformers, dc machines and ac machines with respect to their efficiency, equivalent circuits and losses.
2. Ability to define and solve problems on the basic operations of dc and ac meters, dc and ac bridges.
3. Ability to define and solve problems on sensors & transducers.

References

1. Chapman S.J., “Electric Machinery Fundamentals”, Fifth Edition, 2009, McGraw Hill, Singapore.
2. C.S Rangan, G.R. Sarma & V.S. Mani, “Instrumentation Devices & System” Tata, McGraw-Hill Publishing Company Limited, 2004.
3. Bhas S. Guru & Huseyin R. Hiziroglu, “Electric Machinery and Transformers”, 2001, Oxford University Press.
4. A.K. Sawhney & P.Sawhney, “A Course in Electronic and Electrical Measurement and Instrumentation” Dhanpat Rai & Co. (P) Ltd., 2001.

5. Z.A. Yamayee & J.L. Bala, “ Electromechanical Energy Devices & Power Systems”, 1994, Wiley & Sons, USA.

PGT XXX/3
C PROGRAMMING

Course Synopsis

This course introduces basic programming using high level language (C language). The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with the programming tools such as organization chart, IPO chart, flowchart and pseudo code and then to implement them by developing C program.

Course Outcomes

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

PGT XXX/2
WRITING IN ENGINEERING TECHNOLOGY

Course Synopsis

To expose the students to the common requirements and expectations of writing as an engineering technologist; as well as to the format and techniques of writing various types of engineering technology documents.

Course Outcomes

1. Ability to produce engineering documents in consideration of ethics, spelling, grammar and avoidance of typing errors while at the same time considering the flow and continuity of ideas.
2. Ability to explain, solve and analyse group work involving presentations, reports and communication task
3. Ability to write common engineering documents and to discover sources of engineering information

References

1. Leo Finkelstein Jr (2008). Pocket Book of Technical Writing for Engineers and Scientist, 3rd Ed. (New York: McGraw Hill International Edition)
2. Beer, D. (2009). A Guide to Writing as an Engineer, 3rd Ed. (John Wiley, USA)
3. Pfeiffer, W. S., Adkins, K. E. (2010). Technical Communication – A Practical Approach, 7th Ed. (Pearson, USA)
4. Lannon, J. M, Gurak, L. J. (2011) Technical Communication, 12th Ed. (Longman).
5. Riordan, D. G., Pauley, S. E. (2005) Technical Report Writing Today 9th Ed. (Houghton Mifflin).

PGT XXX/3
OPERATING SYSTEMS

Course Synopsis

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

Course Outcomes

1. Define and explain the major concepts which build up an operating system.

2. Use GNU/Linux operating system for coding, compile, execute and test C programming in simulating issues in Operating System.
3. Describe the processes, file management, processor scheduler and memory management.
4. Develop lifelong learning attitude within oneself.

References

1. Silberchatz, A., Galvin & Gagne. 2009. Operating System Principles, 8th Edition. John Wiley.
2. Modern Operating Sys Ver Pie HAM TANENBAUM 03P
3. Stallings, W. 2007. Operating Systems: Internals and Design Principles, 6th Edition. Prentice-Hall.
4. Any C/C++/Java programming book for coding example.

PGT XXX/3
MICROPROCESSOR

Course Synopsis

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

Course Outcomes

1. Ability to describe the theory and basic architecture of microprocessor system.
2. Ability to write an assembly language programming.
3. Ability to describe and capable of interfacing the microprocessor to the I/O devices.
4. Ability to design a simple application on a microprocessor-based system.

PGT XXX/3
ANALOGUE ELECTRONICS

Course Synopsis

This course exposes the student the basic knowledge in analogue electronic. The exposure encompasses amplifier design based on bipolar and field effect transistors, for single and multi stage, power amplifier, frequency response analysis of amplifiers. Emphasis is placed on basic design aspects and applications. The course has been designed to provide basic analogue electronic skills covering theories and practices.

Course Outcomes

1. Ability to ANALYZE DC and AC, small-signal analysis and frequency performance of basic configurations of amplifier (BJT and FET).
2. Ability to DESIGN basic configurations of BJT and FET amplifiers.
3. Ability to DEFINE, ANALYZE and PERFORM simple design of classes A, B and AB of BJT and FET power amplifiers in term of their equivalent circuit and gain.

PGT XXX/3
DATABASE MANAGEMENT SYSTEMS

Course Synopsis

The subject will focus on the concept of database system and architecture. This includes data models, schemas and instances and system environment. Students will be exposed with data modelling by using high level conceptual data models for relational database design that includes Entity Relationship Diagram(ERD), Structured Query Language(SQL) and normalization and also covers database storage and management.

Course Outcomes

1. Ability to explain the database system concepts
2. Ability to write and analyze SQL statements
3. Ability to design a relational database with Entity Relationship Diagram(ERD)
4. Ability to normalize and evaluate a relational database
5. Ability to explain the database storage and management.

PGT XXX/3
INTERNETWORKING TECHNOLOGY I

Course Synopsis

This course will introduce students with the fundamental knowledge and tools for study 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. Related technologies such as Local Area Network, Wide Area Network and techniques use in data transmission as well as latest technologies. Practical exercises such as design, install and testing of a simple computer internetworking which improve understanding and develop skills on networking are integrated in laboratories exercises.

Course Outcomes

1. Understand the basic concept, advantages and computer networking technologies
2. Ability to use GNU/Linux for coding, compile, execute and test network based programming
3. Ability to identify, analyze and solve network problems using hardware and software tools
4. Ability to think logically, creative and innovative
5. Ability to work in a team and communicate effectively

References

1. Communication Networks: Fundamental Concepts and Key Architectures 2nd Edition, by Leon-Garcia Widjaja, McGraw Hill Publication 2004.
2. *Data & Computer Communications*, 6th Edition, William Stallings, Prentice Hall, 2000.
3. Introduction to Data Communications and Networking, Behrouz Forouzan, McGraw Hill, 1998.

PGT XXX/3
SIGNALS AND SYSTEMS

Course Synopsis

This course introduce student to mathematical foundation and computational tools for processing continuous-time and discrete-time signals in both time and frequency domains. Key concepts and tools introduced and discussed in this class include linear time-invariant systems, impulse response, frequency response, convolution, filtering, sampling, and Fourier transform, Laplace Transform and z-Transform. This course serves as entry and prerequisite for any higher level course in the fields of signal processing, communications, and control.

Course Outcomes

1. Ability to describe the concept of signal and system classifications, impulse response and convolution in both analog and discrete time domain.
2. Ability to apply and analyze the concept of Fourier representation of analog and discrete signals
3. Ability to differentiate the different forms and properties of Fourier transforms, concept of frequency response in analog and discrete systems.
4. Ability to evaluate and perform sampling and reconstruction of analog signals using Laplace transform and Z-transform
5. Ability to perform analysis of linear and time-invariant analog and discrete systems.
6. Ability to apply analysis tools to mathematically analyze continuous and discrete signals and systems.

References

1. Simon Haykin, Barry Van Veen, "Signals and Systems", 2nd Ed., Wiley, 2005.
2. J. Robert, "fundamental of Signal and Systems", McGraw Hill International Ed., 2008.
3. Edward W. Kamen, Bonne S. Heck, "Fundamental of Signals and Systems Using the Web and Matlab", Pearson Prentice Hall, 2007.
4. MJ Robert, "Signal & System", McGraw Hill, 2003.

PGT XXX/3 COMPUTER ARCHITECTURE

Course Synopsis

This course covers both the architectural and organizational aspects of computer systems. Architectural aspects of a system are defined as the features that are available to the operating system kernel such as the instruction set, data representations and peripheral interfaces. On the other hand, organizational aspects of a system are defined as the physical implementations that realize the features given for a system. These include the design of basic building blocks such as the ALU and the control unit, as well as the logic level interface of both internal and external units. This course expects the students to have a good fundamental on digital logic design (both combinatorial and sequential logic).

Course Outcomes

1. Able to discuss the theoretical aspects of computer organization and architecture
2. Able to design basic Central Processing Unit (CPU) based on given specifications
3. Able to analyze design issues involving cost and performance using theoretical knowledge and/or simulation tools

References

1. William Stallings, "Computer Organization and Architecture: Designing for Performance " 8th Edition, Pearson Education, New Jersey (2010).
2. M. Morris Mano, "Computer System Architecture", Third Edition, Prentice-Hall.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", Fifth Edition, McGraw Hill.

PGT XXX/3 OBJECT ORIENTED PROGRAMMING

Course Synopsis

This course discuss Object-oriented problem solving in Java, with attention to general as well as language-specific issues including applications, event-driven programming; elements of graphical user interfaces (GUIs); inheritance and polymorphism; exception handling; packages; applets; swing

Course Outcomes

1. Ability to explain the object oriented paradigm
2. Ability to apply the concepts of class and object
3. Ability to apply the concepts of inheritance and polymorphism
4. Ability to develop JAVA standalone program and applet

PGT XXX/3 COMMUNICATION SYSTEMS

Course Synopsis

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

Course Outcomes

1. Able to IDENTIFY and EXPLAIN basic principles of communication systems, and the essential of communication system in real world.

2. Ability to analyze noise and types of analog modulation and digital modulation and calculate SNR.
3. Ability to use the laboratory equipments and instruments to measure and analyze output signals and perform some troubleshooting.
4. Ability to apply related software tool in understanding principle of communication system.

References

1. Wayne Tomasi," Electronic Communication System, Fundamental Through Advanced",5th Ed. Pearson Prentice Hall, 2003.
2. Paul Young, Electronics Communications Techniques, 5th Edition, Prentice Hall, 2004
3. Mullet," Basic Telecommunications: The Physical Layer", Thomson Learning, 2003.

PGT XXX/3
EMBEDDED SOFTWARE TECHNOLOGY

Course Synopsis

This course introduces a real-world embedded system software technology development environment from hardware and software perspectives. It applies the concept of open source embedded operating system (GNU/Linux) and using appropriate tools in designing a system. Few of the techniques such as advance C programming, scripting and external hardware interfacing on single board computer (SBC). Student will be assigned with laboratory-oriented design projects, with emphasis on the use of open source and GNU/Linux OS and Free Software tools; and hardware interfacing.

Course Outcomes

1. Ability to describe the concepts of embedded OS
2. Ability to apply the concepts of embedded OS in designing system using appropriate tools
3. Ability to evaluate the system using appropriate tools

References

1. M. Tim Jones (2008), "GNU/Linux Application Programming", Charles River Media, Second Edition.

2. Craig Hollabaugh (2002), "*Embedded Linux: Hardware, Software, and Interfacing*", Addison Wesley, First Edition.

PGT XXX/3
DATA STRUCTURES

Course Synopsis

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

Course Outcomes

1. Ability to learn the systematic way of solving problems
2. Ability to apply different methods of organizing large amounts of data
3. Ability to develop and implement the different data structures in solving problems

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

PGT XXX/3
INTERNETWORKING TECHNOLOGY II

Course Synopsis

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

Course Outcomes

1. Understand and distinguish between the principles of the OSI and TCP/IP Models, their layers and the open communication principles for LAN and WAN interconnections
2. Apply and investigate advanced networking protocols, mechanisms and technique such as IP addressing, subnetting, connection orientation, name resolution, and network security
3. Use the networking protocol troubleshooting mechanisms (Ping, Traceroute, etc.) in solving network problems
4. Design the basic of router configuration and perform basic Router Configuration

References

1. Communication Networks: Fundamental Concepts and Key Architectures 2nd Edition, by Leon-Garcia Widjaja, McGraw Hill Publication 2004.
2. Data & Computer Communications, 6th Edition, William Stallings, Prentice Hall, 2000.
3. Introduction to Data Communications and Networking, BehrouzForouzan, McGraw Hill, 1998.

PGT XXX/4
FINAL YEAR PROJECT I & II

Course Synopsis

This is a research project in connection with engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

For both FYP I and II, each student prepares a comprehensive engineering report, present and demonstrate findings and results of the project work

Course Outcomes

1. Apply and integrate theory and practical which has been studied to solve the engineering problems.
2. Develop new design or upgrade the existing design.
3. Develop appropriate methodology for the research/problem.
4. Write the technical report (dissertation), present and justify/defend the project's fact.

PGT XXX/3
NETWORK MANAGEMENT

Course Synopsis

The course aims to give knowledge of operation, and maintenance of modern computer and global networks. Network Management basics, and standards is described with focus on Internet Management with the aid of Simple Network Management Protocol (SNMP), as well as the application of the same. The course also gives practical knowledge in system and network administration as well as network supervision.

Course Outcomes

1. Understand five major functional areas of network management, namely Configuration and Fault Management, Accounting, Performance and Security Management;
2. Understand how to formulate an effective Network Systems Design Plan.
3. Understand the need for security in networking monitoring and control;
4. Design the network according to the extent, breadth and depth of a complete network management plan for a moderate to large network enterprise.
5. Have a general understanding of what administrative positions are required, to manage a computer network.

References

1. "Network Management – Principles and Practice" by Mani Subramanian, Addison- Wesley Pub Co, First Edition, 2000.
2. "SNMP, SNMPv2, SNMPv3, AND RMON 1 and 2" by William Stallings, Addison-Wesley, Third Edition, 1999.

PGT XXX/3
NETWORK MODELING

Course Synopsis

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

Course Outcomes

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

PGT XXX/3
PROGRAMMING FOR NETWORKING

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 analyse, test, develop and design the protocols that are setting up a network.

Course Outcomes

1. Understand the concepts of network programming and the related network protocols involved
2. Develop application by using network programming techniques learned
3. Apply network programming in computer networking environment

PGT XXX/3
NETWORK SECURITY TECHNOLOGY

Course Synopsis

The aims of this course are to introduce basic concept of network security technology. It includes concepts, security practice and encryption and decryption techniques. Discussion in network security will involved network defence concepts and network intruders. Firewall application software will be discussed together with computer security services and security management.

Course Outcomes

1. Understand basic issues, concepts, principles and mechanism in modern network security technology.
2. Understand how network security concepts are applied in the global network.

3. Analyze network security threats and related current issues
4. Identify and investigate solutions to network security threats

References

1. Cryptography and Network Security, Principles and Practices; William Stallings; Prentice Hall 5th Edition 2010

2. Network Security Essentials: Applications and Standards; William Stallings; Prentice Hall 4th Edition 2010
3. Introduction to Cryptography with Coding Theory Wade Trappe, Lawrence C. Washington; Prentice Hall 2nd Edition 2005

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 of Engineering (Mechatronic Engineering)
- Bachelor of Engineering (Hons) (Mechatronic Engineering)
- Bachelor of Engineering (Hons) (Mechanical Engineering)
- Bachelor of Engineering (Hons) (Biomedical Electronic Engineering)
- 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)

ADDRESS:

SCHOOL OF MECHATRONIC ENGINEERING
Universiti Malaysia Perlis (UniMAP),
Pauh Putra Campus,
02600 Arau, Perlis, Malaysia.
Tel : +6-04-988-5166
Fax : +6-04-988-5167

Introduction

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

School of Mechatronic Engineering offers three exciting study programmes, which are, 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.

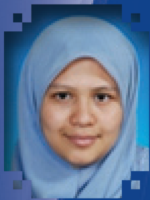
The Biomedical Electronic engineering programme comBines knowledge of electrical, electronic and mechanical engineering, as well as medical science such as anatomy, physiology and radiology, with a strong emphasis in medical instrumentation and design. ComBination of the knowledge in these areas enables 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.

Staff Directory

DEAN
ASSOCIATE PROFESSOR DR. ABDUL HAMID ADOM
Tel: +604-9885165 / 5354
Email: abdhamid@unimap.edu.my

DEPUTY DEAN OF ACADEMIC AND RESEARCH
DR. SHAFRIZA NISHA BIN BASAH
Tel: + 604-9885169
Email : shafriza@unimap.edu.my

DEPUTY DEAN OF STUDENTS AND ALUMNI AFFAIRS
DR. SHAHRIMAN ABU BAKAR
Phone: +604-9885173
Email: shahriman@unimap.edu.my



PROGRAMMEME CHAIRPERSON (MECHATRONIC ENGINEERING)
DR. SITI KHADIJAH ZA'BAA
Tel: +604-9885161
Email: khadijah@unimap.edu.my

PROGRAMMEME CHAIRPERSON (MECHANICAL ENGINEERING)
DR. MOHD AFENDI BIN ROJAN
Phone: +604-9885162 / 5245
e-mail: afendirojan@unimap.edu.my

PROGRAMMEME CHAIRPERSON (BIOMEDICAL ELECTRONIC ENGINEERING)
DR. SHUHAIDA BINTI YAHUD
Phone: +604-9885159
Email: shuhaidayahud@unimap.edu.my

DIPLOMA PROGRAMMEME CHAIRPERSON
MR. MUHAMAD KHAIRUL BIN ALI HASSAN
Phone: +604-9885244
Email: khairulhassan@unimap.edu.my

PROGRAMMEME CHAIRPERSON (POSTGRADUATE STUDIES)
DR. CHENG EE MENG
Phone: +604-9885253
Email: emcheng@unimap.edu.my

COORDINATOR OF INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
MR. ABDUL HALIM BIN ISMAIL
Phone: +604-9885326
Email: ihalim@unimap.edu.my

ASSISTANT REGISTRAR
MR. ZAKARIA BIN OTHMAN @ ISMAIL
Phone: +604-9885170
Email: zakariaothman@unimap.edu.my

Lecturers

Professor Dr. Ali Yeon Bin Md Shakaff
Ph.D (Electronic) (Newcastle, UK)
B.Sc.(Hons)(Electrical & Electronic) (Newcastle, UK)
Tel : +604-9885166
e-mail : aliyeon@unimap.edu.my

Professor Dr. Sazali Bin Yaacob
Ph.D (Control Engineering) (Sheffield, UK)
M.Sc. (System Engineering) (Surrey)
B.Eng. (Hons) (Electrical) (UM)
C.Eng. MIEEE
Tel : +604-9885166
e-mail : s.yaacob@unimap.edu.my

Professor Dr. Yusoff Bin Mashor
Ph.D (Sheffield, UK)
M.Sc (Sheffield, UK)
Tel : +604-9885166 / +604-9798331/8336
e-mail : yusoff@unimap.edu.my

Professor Dr. Raymond Boon Whee Heng
Ph.D (Acoustic) (Sheffield, UK)
B.Eng. (Mechanical) (Sheffield, UK)
Tel : +604-9885166
e-mail : rbwheng@unimap.edu.my

Professor Dr. Kyaw Sein
Post Doctoral Fellow (Hannover, Germany)
Ph.D (Process Engineering) (Kyushu, Japan)
M.Eng. (Process Engineering) (Tokyo, Japan)
B.Eng. (Mechanical) (YTU Yangon)
Tel : +604-9885273
e-mail : kyawsein@unimap.edu.my

Professor Dr.Abdul Hamid Bin Adom
Ph.D (Control Engineering) (LJMU)
M.Sc. (Modern Control and Instrumentation Systems) (LJMU)
B.Eng. (Hons) (Electronic Systems Engineering) (LJMU)
Tel : +604-9885165 / 5354
e-mail : abdhamid@unimap.edu.my

Associate Professor Dr. Hazry Bin Desa
Ph.D (Electrical and Electronic) (Oita, Japan)
B.Eng. (Mechanical) (Tokushima, Japan)
Tel : +604-9885166
e-mail : hazry@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~hazry

Assoc. Prof. EurIng. Ir. Dr. Kenneth Sundaraj
Ph.D (Image, Vision & Robotics), France
M.Sc (Image, Vision & Robotics), France
B.Eng (Electrical), Singapore
Tel : 04-9885166
e-mail : kenneth@unimap.edu.my

Associate Professor Dr. Paulraj Murugesa Pandiyan
Ph.D (Computer Science and Engineering) (Bharathivar, India)
M.Eng. (Computer Science) (Bharathivar, India)
B.Eng. (Electrical and Electronic) (Madras, India)
Tel : +604-9885257
e-mail : paul@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~paul

Associate Professor Dr. Mohammad Iqbal Bin Omar @ Ye Htut
Master of Medicine (Geriatric Medicine) (Edith Cowan, Australia)
Post Grad Diploma (Reproductive Medicine) (D.R.M) (UPM)
Bach. of Medicine & Bach. of Surgery (M.B, B.S) (Yangon)
Tel : +604-9888915 / 5321
e-mail : iqbalomar@unimap.edu.my

Associate Professor Dr. Ghulam Abdul Quadir
Ph.D (Fluid Mechanics) (Indian Institute of Science)
M.Sc. (Mechanical - Heat Power) (Aligarh Muslim University, India)
B.Sc. (Mechanical) (Bhagalpur, India)
Tel : +604-9888476
e-mail : gaquadir@unimap.edu.my

Dr. Ir. Merdang Sembiring
Dr. Energy (Universite d'e Poitiers, France)
DEA, Thermis (Universite de Poitiers,France)
Dip. E.S, Solar Eng. (Universite de Perpigan, France)
Ir. Energy Convention (North Sumatera University, Indonesia)
Tel : +604-9885274
e-mail : merdang@unimap.edu.my

Dr. Haftirman
Ph.D (Material) (Fukui, Japan)
M.Eng. (Industry) (Fukui, Japan)
B.Eng. (Mechanical) (USU)
Tel : +604-9885166
e-mail : haftirman@unimap.edu.my

Dr. Marwan Affandi
Ph.D (Mechanical) (UTM)
M.Eng. (Rational Use of Energy) (A.I.T)
B.Eng. (Mechanical) (USU)
Tel : +604-9885234
e-mail : marwan@unimap.edu.my

Dr. Wan Khairunizam Bin Wan Ahmad
Ph.D (Signal Sensing) (Kagawa, Japan)
B.Eng. (Electrical & Electronic) (Yamaguchi, Japan)
Tel : +604-9885169
e-mail : khairunizam@unimap.edu.my

Dr. Shahriman Bin Abu Bakar
Ph.D (Mechanical)(Mie, Japan)
M.Eng. (Mechanical)(Mie, Japan)
B.Eng. (Mechanical)(Mie, Japan)
Tel : +604-9885173
e-mail : shahriman@unimap.edu.my

Dr. Mohd Afendi Bin Rojan
Ph.D (Mechanics and Energy) (Tsukuba, Japan)
M.Eng. (Mechanics and Energy) (Tsukuba, Japan)
B.Eng. (Systems) (Tsukuba, Japan)
Tel : +604-9885162 / 5245
e-mail : afendirojan@unimap.edu.my
URL : http://afendirojan.wordpress.com/

Dr. Siti Khadijah Binti Za'aba
Ph.D (Medical Engineering) (Yamanashi, Japan)
M.Eng. (Electrical & Electronic) (Yamanashi, Japan)
B.Eng. (Electrical & Electronic) (Yamanashi, Japan)
Tel : +604-9885161
e-mail : khadijah@unimap.edu.my

Dr. M. Hariharan
Ph.D (Mechatronic) (UniMAP)
M.Eng.(Applied) (Anna University, Chennai, India)
B.Eng. (Electrical & Electronic) (Bhrathiar, India)
Tel : +604-9885166
e-mail : hari@unimap.edu.my

Dr M. Murugappan
Ph.D (Bio-Medical Signal Processing), Universiti Malaysia Perlis
M.E (Applied Electronics), Anna University, India
B.E (Electrical and Electronics), Anna University, India
Tel : 04-988 5268
e-mail : murugappan@unimap.edu.my

Dr. Shafriza Nisha Bin Basah
Ph.D (Engineering - Computer Vision) (Melbourne, Australia)
M.Sc. (Mechatronic) (London, UK)
B.Eng. (Mechanical) (UNITEN)
Tel : +604-9885166
e-mail : shafriza@unimap.edu.my

Dr. Shuhaida Binti Yahud
PhD (Biomedical Engineering) (UNSW, Australia)
M.Sc. (Artificial Organ) (UM)
B.Eng. (Biomedical) (UM)
Tel : +604-9885159
e-mail : shuhaidayahud@unimap.edu.my

Dr. Cheng Ee Meng
Ph.D (Microwave), UPM
M.Sc (Wave Propagation), UPM
B.Sc (Instrumentation Science), UPM
Tel : 04-9885252
e-mail : emcheng@unimap.edu.my

Dr. Haniza Yazid
Ph.D (Electrical Engineering), UM
M.Sc (Computer Engineering), UniMAP
B.Sc (Computer System and Networking), UM
Tel :+04-9885166
e-mail : hanizayazid@unimap.edu.my

Dr. Mohd Shukry Bin Abdul Majid
Ph.D (Composite Engineering), Newcastle University, UK
M.Sc. (Eng) Mechanical System, Liverpool University
B.Eng (Hons) Mechanical Eng, UMIST
Tel :+04-9885166
e-mail : shukry@unimap.edu.my

Dr. Ahmad Faizal Bin Salleh
Ph.D (Mechanical), Mie University, Japan
M.Eng (Mechanical), UTM, Malaysia
B.Eng (Mechanical), Nagoya University, Japan
Tel :+04-9885166
e-mail : ahmadfaizal@unimap.edu.my

Dr. Zuradzman Bin Mohamad Razlan
Ph.D Mechanical Engineering (System Energy), Mie University, Japan
Non Degree Research Student, Mie University, Japan
B.Eng (Hons) Mechanical Eng (System Design),Yamagata University, Japan
Tel :+04-9885166

Mr. Zol Bahri Bin Hj. Razali
Master of Educational Technology (Computer-Based Learning) (USM)
B.Eng. (Hons) (Mechanical - Aeronautical) (UTM)
Tel : +604-9885186
e-mail : zolbahri@unimap.edu.my

Mr. Shah Fenner Khan Bin Mohamad Khan
M.Sc. (Advanced Engineering) (CAE)
B.Sc. (Mechanical Engineering) (USA)
Cert. Edu. (Technical) (MPT)
Tel : +604-9885166
e-mail : sfkhan@unimap.edu.my

Mrs. Saufiah Binti Abdul Rahim
M.Sc. (Electrical and Electronic) (USM)
B.Eng. (Hons) (Electrical and Electronic) (USM)
Tel : +604-9882550 / 5239
e-mail : saufiah@unimap.edu.my

Mr. Azizul Bin Mohamad
M.Eng. (Mechanical) (Curtin)
B.Eng. (Hons) (Mechanical) (UNITEN)
e-mail : azizul@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~azizul

Mrs. Siti Nurul Aqmariah Bin Mohd. Kanafiah
M.Sc. (Electrical & Electronic), USM
B.Eng (Electrical-Robotics & Automation Control), UTHM
Tel : +04-9885166
e-mail : aqmariah@unimap.edu.my

Ms. Azian Azamimi Binti Abdullah
M.Eng. (Electrical & Electronic) (Tokushima, Japan)
B.Eng. (Electrical & Electronic) (Tokushima, Japan)
Grad. I.E.M.
Tel : +604-9885268
e-mail : azamimi@unimap.edu.my

Mrs. Nur Liyana Binti Tajul Lile
M.Eng. (Mechanical) (UKM)
B.Eng. (Mechatronic) (UIA)
Tel : +604-9885317
e-mail : liyanatajul@unimap.edu.my

Mrs. Siti Marhainis Binti Othman
M.Eng. (Mechatronic & Automatic Control) (UTM)
B.Eng. (Hons) (Mechatronic) (UTM)
Tel : +604-9885202
e-mail : marhainis@unimap.edu.my

Mrs. Norazian Binti Abdul Razak
M.Eng. (Biomedical) (UM)
B.Eng. (Biomedical) (UM)
Tel : +604-9885313
e-mail : norazianrazak@unimap.edu.my

Mrs. Normahira Binti Mamat @ Mohamad Nor
M.Eng. (Biomedical) (UM)
B.Eng. (Biomedical) (UM)
Tel : +604-9885294
e-mail : normahira@unimap.edu.my

Mr. Mohammad Shahril Bin Salim
M.Sc. (Biomedical) (Brunel, UK)
B.Eng. (Hons) (Mechanical) (USM)
Tel : +604-9885237
e-mail : mshahril@unimap.edu.my

Mr. Ahmad Nasrul Bin Norali
M.EngSc. (Biomedical) (New South Wales)
B.Eng. (Telecommunication) (UM)
Tel : +604-9885302
e-mail : ahmadnasrul@unimap.edu.my

Mr. Ahmad Firdaus Bin Ahmad Zaidi
M.Sc. (Mechatronic) (UIAM)
B.Eng. (Electric & Electronic) (UMS)
Tel : +604-9885261
e-mail : ahmadfirdaus@unimap.edu.my

Mr. Bukhari Bin Ilias
M.Sc. (Mechatronic) (UniMAP)
B.Eng. (Mechatronic) (Middlesex university, UK)
Tel : +604-9885222
e-mail : bukhari@unimap.edu.my

Mr. Hamzah Bin Sakeran
M.Biomed.E (New South Wales)
B.Eng. (Biomedical) (UM)
Tel : +604-9885235
e-mail : hamzahsakeran@unimap.edu.my

Mr. Ishak Bin Ibrahim
M.Sc. (Mechanical) (Mie, Japan)
B.Eng. (Mechanical) (Mie, Japan)
Tel : +604-9885219
e-mail : ishakibrahim@unimap.edu.my

Mr. Muhamad Safwan Bin Muhamad Azmi
M.Sc. (Mechanical) (Mie, Japan)
B.Eng. (Mechanical) (Mie, Japan)
Tel : +604-9885282
e-mail : safwanazmi@unimap.edu.my

Mr. Abdul Halim Bin Ismail
M.Sc. (Control & Automation Engineering) (UPM)
B.Eng. (Electrical & Electronic) (UPM)
Tel : +604-9885326
e-mail : ihalim@unimap.edu.my

Mr. Tan Wee Choon
M.Eng. (Mechanical) (UTHM)
B.Eng. (Hons) (Mechanical) (UTHM)
Tel : +604-9885220
e-mail : tweechoon@unimap.edu.my

Mr. Mohd Nasir Bin Ayob
M.Eng. (Mechatronic) (UTM)
B.Eng. (Hons) (Mechatronic) (USM)
Tel : +604-9885264
e-mail : nasirayob@unimap.edu.my

Mr. Anas Bin Abdul Rahman
M.Eng. (Mechanical) (UKM)
B.Sc. (Mechanical) (Iowa State, USA)
Tel : +604-9885201
e-mail : anasrahman@unimap.edu.my

Mr. Imaduddin Helmi Bin Wan Nordin
M.Eng. (Mechanical) (Tottori, Japan)
B.Eng. (Mechanical) (Tottori, Japan)
Tel: +604-9885190 / 5178
e-mail: imaduddin@unimap.edu.my

Mr. Mohd Hafis Bin Sulaiman
M.Eng. (Mechanical) (UTM)
B.Eng. (Hons) (Mechanical) (UTM)
Tel : +604-9885305
e-mail : hafissulaiman@unimap.edu.my

Mr. Mohd Ridzuan Bin Mohd Jamir
M.Eng. (Mechanical) (UTM)
B.Eng. (Hons) (Mechanical) (UTM)
Tel : +604-9885246
e-mail : ridzuanjamir@unimap.edu.my

Mr. Anas Bin Mohd Noor
M.Sc. (Electronic System Design) (USM)
B.Eng. (Electronic) (UniMAP)
Tel : +604-9885166
e-mail : anasnoor@unimap.edu.my

Mr. Hassrizal Bin Hassan Basri
M.Eng. (Mechatronic) (UTM)
B.Eng. (Mechatronic) (UTM)
Tel : +604-9885166
e-mail : hassrizal@unimap.edu.my

Ms. Nurul Syahirah Binti Khalid
M. Eng (Electrical - Mechatronics & Automatic Control), UTM
B. Eng (Hons) (Mechatronics), UTeM
Tel :+04-9885166
e-mail : syahirahkhalid@unimap.edu.my

Mr. Mohd Sani
Bin Mohamad Hashim
M.Eng. (Mechanical) (UKM)
B.Eng. (Hons) (Mechanical) (UKM)
Tel : +604-9885296
e-mail : sanihashim@unimap.edu.my

Lecturers (Study Leave)

Mr. Muhamad Khairul
Bin Ali Hassan
M.Sc. (Mechatronic) (UniMAP)
B.Eng. (Hons) (Mechatronic) (USM)
e-mail : khairulhassan@unimap.edu.my

Mr. Mohd Fahisal Bin Abdullah
M.Eng. (Mechatronic & Automatic Control) (UTM)
B.Eng. (Hons) (Mechatronic) (UniMAP)
Dip. (Power Eng.) (UTM)
e-mail : fahisal@unimap.edu.my

Mr. Jefri Efendi Bin Mohd Salih (cuti belajar)
M.sc (Mechatronic Eng) , UniMAP
B.Eng (Hons) (Electrical – Mechatronics), UTM
e-mail : jefri_salih@unimap.edu.my

Mr. Mohd Arinal Bin Abd. Halim
M.Eng (Electrical), Kyushu University
B.Eng (Electrical), Kyushu University
e-mail : arinal@unimap.edu.my

Mr. Muhajir Bin Ab. Rahim
M.Sc. (Control System Engineering) (Sheffield, UK)
B.Eng. (Hons) (Electrical) (UNITEN)
e-mail : muhajir@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~muhajir

Mr. Zulkarnay Bin Zakaria
M.Eng. (Electrical & Electronic) (UTM)
B.Eng. (Hons) (Electrical and Electronic) (USM)
e-mail : zulkarnay@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~zulkarnay

Mr. Ahmad Syayuthi
Bin Abdul Rahman
M.Eng. (Mechanical - Adv. Manufacturing Tech.) (UTM)
Dip.Ed. (Tech. Management) (IPTKL)
B.Eng. (Hons) (Mechanical) (USM)
Dip. (Mechanical - Manufacturing) (Polimas)
e-mail : syayuthi@unimap.edu.my

Mr. Nashrul Fazli Bin Mohd Nasir
M.Sc. (Biomedical) (Keele)
B.Eng. (Hons) (Biomedical) (UM)
e-mail : nashrul@unimap.edu.my

Mr. Khairul Salleh
Bin Basaruddin
M.Eng. (Mechanical) (UTM)
B. Eng. (Hons) (Mechanical) (UTM)
e-mail : khsalleh@unimap.edu.my

Mr. Md. Tasyrif
Bin Abdul Rahman
M.Eng. (Mechanical) (Gunma, Japan)
B. Eng. (Mechanical) (Gunma, Japan)
e-mail : tasyrif@unimap.edu.my

Mr. Muhammad Juhairi Aziz
Bin Safar
M.Eng. (Biomedical) (TUT, Japan)
B. Eng. (Mechatronic) (TUT, Japan)
e-mail : juhairi@unimap.edu.my

Mr. Fathinul Syahir
Bin Ahmad Saad
M.Eng. (Electrical & Electronic) (USM)
B. Eng. (Computational & Electronic Physic) (UM)
e-mail : fathinul@unimap.edu.my

Mr. Muhammad Izham Bin Ismail
M.Eng. (Mechanical) (Kyoto, Japan)
B.Eng. (Mechanical) (Kyoto, Japan)
e-mail : izham@unimap.edu.my

Mr. Handy Ali Bin Munir
M.Eng. (Electrical) (UTHM)
B.Sc. (Electrical Engineering) (UTM)
e-mail : handy@unimap.edu.my

Mr. Ruslizam Bin Daud
M.Eng. (Mechanical) (UTM)
B.Eng. (Mechanical - Material) (UKM)
e-mail : ruslizam@unimap.edu.my

Mr. Norasmadi Bin Abdul Rahim
M.Sc. (Electrical) (UiTM)
B.Eng. (Hons) (Electrica)l (UiTM)
Dip. (Electrical) (UiTM)
e-mail : norasmadi@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~norasmadi

Mr. Mohd Hafiz Fazalul
Bin Rahiman
M.Eng. (Electrical) (UTM)
B. Eng. (Control & Instrumentation)

(UTM)
e-mail : hafiz@unimap.edu.my
URL : http://publicweb.unimap.edu.my/~hafiz

Mr. Mohd Noor Arib Bin Md. Rejab
M.Sc. (Mechanical) (UPM)
B.Eng. (Hons) (Mechanical) (UPM)
e-mail : mnarib@unimap.edu.my

Mrs. Hafizawati Binti Zakaria
M.Sc (Mechanical), UTM
B.Eng (Mechanical), UNITEN
e-mail : hafizawati@unimap.edu.my

Mr. Mohd Sofian Bin Mohammad Rosbi
M.Eng. (Mechanical) (UNSW)
B.Eng. (Mechanical) (Hiroshima, Japan)
e-mail : sofian@unimap.edu.my

Mr. Mohd Hanafi Bin Mat Som
M.Biomed.E (New South Wales)
B.Eng. (Hons) (Biomedical) (UM)
e-mail : mhanafi@unimap.edu.my

Mr. Nur Saifullah Bin Kamaruddin
M.Sc. (Mechanical) (Mie, Japan)
B.Eng. (Mechanical) (Mie, Japan)
e-mail : saifullah@unimap.edu.my

Mr. Mohd Shuhanaz Bin Zanar Azlan
M.Eng. (Electronic) (La Trobe University)
B.Eng. (Hons.) (Mechatronic) [Dipl. Ing. (FH)] (University of Applied Science Aalen)
e-mail : shuhanaz@unimap.edu.my

Mrs. Shazmin Aniza Binti Abdul Shukor
M.Eng. (Mechatronic) (KUiTTHO-FH Cologne, Germany)
B.Eng. (Hons) (Mechatronic) (UIA)
e-mail : shazmin@unimap.edu.my

Mrs. Fauziah Binti Mat
M.Eng. (Mechanical) (UKM)
B.Eng. (Hons) (Mechanical) (UKM)
e-mail : fauziah@unimap.edu.my

Mrs. Saidatul Ardeenaawatie Binti Awang
M.Sc. (Medical Physic) (UM)
B.Eng. (Hons) (Biomedical) (UM)
e-mail : saidatul@unimap.edu.my

Ms. Nazahah Binti Mustafa
M.Sc. (Electrical & Electronic) (USM)
B.Eng. (Hons) (Electronic) (USM)
e-mail : nazahah@unimap.edu.my

Ms. Nur Farahiyah Binti Mohammad
M.Eng. (Biomedical) (Melbourne)
B.Eng. (Hons) (Biomedical) (UM)
e-mail : farahiyah@unimap.edu.my

Mrs. Hasimah Binti Ali
M.Sc. (Mechatronic) (UIAM)
B.Eng. (Hons) (Mechatronic) (UIAM)
e-mail : hasimah@unimap.edu.my

Mr. Nor Shaifudin Bin Abdul Hamid
B. Eng (Hons) (Mechatronics), IIUM
e-mail : norshaifudin@unimap.edu.my
URL : http://publicweb.unimap.edu/~norshaifudin

Teaching Engineers

Mr. Mohd Hanif Bin Abdul Hamid
B.Eng. (Mechatronic) (UTM)
Tel : +604-9885166
e-mail : hanif@unimap.edu.my

Mr. Mohd Anuar Bin Mat
B.Eng. (Hons) (Mechanical) (USM)
Dip. (Mechanical) (UPM)
Tel : +604-9885166
e-mail : m.anuar@unimap.edu.my

Mr. Mohd Rudzuan Bin Mohd Nor
B.Eng. (Electrical) (Hiroshima, Japan)
Tel : +604-9885324
e-mail : rudzuan@unimap.edu.my

Mr. Mohd Shahril Bin Shariff
B.Eng. (Hons) (Mechanical) (UTM)
Tel : +604-9885216
e-mail : mohdshahril@unimap.edu.my

Mr. Wan Shahrizal Bin Wan Nadhari
B.Eng. (Hons) (Mechanical) (UTM)
Tel : +604-9885277
e-mail : w.shahrizal@unimap.edu.my

Mr. Sofi Bin Yahya
B.Eng. (Hons) (Electrical - Power) (UTM)
Tel : +604-9885166
e-mail : sofi@unimap.edu.my

Mr. Wan Mohd Nooriman Bin Wan Yahya
B.Eng. (Mechatronic) (UTM)
Dip. (Mechatronic) (UTM)
Tel : +604-9885226
e-mail : nooriman@unimap.edu.my

Mr. Mohd Saifizi Bin Saidon
B.Eng. (Electrical & Electronics) (Fukui, Japan)
Dip. (Electronic Control) (Gifu, Japan)
Tel : +604-9885166
e-mail : saifizi@unimap.edu.my

Mr. Ismail Ishaq Bin Ibrahim
B.Eng. (Mechatronic) (UniMAP)
Tel : +604-9885303
e-mail : ismailishaq@unimap.edu.my

Mr. Mohd Khairul Faizi Bin Abd Rahman
B.Eng. (Hons.) (Mechanical - Industrial) (UTM)
Dip. (Mechanical) (KUiTTHO)
Tel : +604-9885179
e-mail : mkhairulfaizi@unimap.edu.my

Mohammad Fauzi Bin Mahmud
B.Eng (Electrical-Electronics)- UTM,
Dip. Electronic Engineering (Communication)- POLISAS
Grad. BEM (2010)
Tel :+04-9885166
e-mail : mfauzi@unimap.edu.my

Mr. Mohd Azri Bin Abd Aziz
B.Eng. (Mechatronic) (UIAM)
Tel : +604-9885259
e-mail : azriaziz@unimap.edu.my

Mr. Mohd Asrul Bin Md Saad
B.Eng. (Material) (USM)
Tel : +604-9885166
e-mail : asrulsaad@unimap.edu.my

Mr. Roejhan Bin Md Kawi
B.Eng. (Mechatronic) (UniMAP)
Tel : +604-9885176
e-mail : roejhan@unimap.edu.my

Mr. Erdy Sulino Bin Mohd Muslim Tan
B.Eng. (Mechatronic) (UniMAP)
Tel : +604-9885166
e-mail : erdysulino@unimap.edu.my

Mrs. Robiyanti Binti Adollah
B.Eng. (Hons.) (Biomedical) (UM)
Tel : +604-9888549
e-mail : robiyanti@unimap.edu.my

Mrs. Adilah Binti Hashim
B.Eng. (Hons.) (Biomedical) (UM)
Tel : +604-9883516
e-mail : adilah@unimap.edu.my

Mrs. Norazila Binti Shoib
B.Eng. (Hons.) (Electrical & Electronics) (UTM)
Tel : +604-9885308
e-mail : azilashoib@unimap.edu.my

Mrs. Norlaili Binti Saad
B.Eng. (Electrical - Control & Instrumentation) (UTM)
Tel : +604-9885166
e-mail : norlaili@unimap.edu.my

Mrs. Sharifah Nurul Husna Binti Syed Hanapi
B.Eng. (Mechatronic) (UIAM)
Tel : +604-9885314
e-mail : nurulhusna@unimap.edu.my

Mrs. Rahaton Azirah Binti Ramli
B.Eng. (Manufacturing - Management) (USM)
Tel : +604-9885329
e-mail : rahaton@unimap.edu.my

Ms. Farah Hanan Binti Mohd Faudzi
B.Eng. (Hons) (Mechatronic) (UniMAP)
Tel : +604-9885181
e-mail : farahh@unimap.edu.my

Ms. Maizatul Nurul Bariah Binti Ahmad
B.Eng. (Hons) (Mechatronic) (UniMAP)
Tel : +604-9885289
e-mail : maizatulnurul@unimap.edu.my

Mrs. Nordiana Binti Shariffudin
B.Eng. (Hons) (Mechatronic) (UniMAP)
Tel : +604-9885259
e-mail : dianashariffudin@unimap.edu.my

Technicians

Mr. Zalizam Mulyadi Bin Ghazali
Diploma in Mechanical Engineering (Manufacturing) (POLIMAS)
Certificate of Mechanical Engineering (POLIMAS)
Tel : +604-9885166
e-mail : zalizam@unimap.edu.my

Mr. Mohd Nizam Bin Hashim
Diploma in Mechanical Engineering (Manufacturing) (POLIMAS)
Certificate of Mechanical Engineering (Manufacturing) (POLIMAS)
Tel : +604-9885166
e-mail : nizam@unimap.edu.my

Mr. Norshahrizat Bin Shaidin
Diploma in Electrical Engineering (POLIMAS)
Certificate of Electronic Engineering (Control) (PUO)
Tel : +604-9885166
e-mail : norsharizat@unimap.edu.my

Mr. Shujairi Bin Sahdzar
Diploma in Electrical Engineering (POLIMAS)
Certificate of Electronic Engineering (Control) (POLISAS)
Tel : +604-9885166
e-mail : shujairi@unimap.edu.my

Mr. Mohammad Firdaus Bin Rejab
Diploma in Electrical Engineering (POLIMAS)
Certificate of Electrical Engineering (POLIMAS)
Tel : +604-9885304
e-mail : firdausrejab@unimap.edu.my

Mr. Bazli Bin Bahadon
Certificate of Electronic Engineering (PD)
Tel : +604-9885232
e-mail : bazli@unimap.edu.my

Mr. Anuar Bin Ahmad
Diploma in Mechanical Engineering (Manufacturing) (POLIMAS)
Certificate of Mechanical Engineering (POLIMAS)
Tel : +604-9882251
e-mail : anuarahmad@unimap.edu.my

Mr. Mohd Razif Bin Omar
Diploma in Mechanical Engineering (Manufacturing) (POLIMAS)
Certificate of Mechanical Engineering (POLIMAS)
Tel : +604-9885166
e-mail : mohdrazif@unimap.edu.my

Ms. Zanhassida Binti Md. Isa
Diploma in Mechanical Engineering (Manufacturing) (POLIMAS)
Certificate of Mechanical Engineering (Machinery) (POLIPD)
General Machining Certificate (ILP Jitra)
Tel :+04-9885166
e-mail : zanhassida@unimap.edu.my

Mr. Rimi Rafeek Bin Abd. Latif
Diploma in Mechanical Engineering (Manufacturing) (POLIMAS)
Certificate of Mechanical Engineering (Machinery) (POLIMAS)
Tel : +604-9885166
e-mail : rimi@unimap.edu.my

Mr. Mohd Al-Haffiz Bin Saad
Certificate of Computer Engineering (PSP)
Tel : +604-9885222
e-mail : alhafiz@unimap.edu.my

Mr. Muhamad Aliff Bin Mad Yussof
Certificate of Mechanical Engineering (Machinery) (POLIMAS)
Tel : +604-9885290
e-mail : aliff@unimap.edu.my

Mr. Mohammad Abid Bin Abdul Rahman
Diploma in Mechanical Engineering (Mechanical) POLIMAS
Certificate of Mechanical Engineering (PTSS)
Tel : +604-9885166
e-mail : abid@unimap.edu.my

Mr. Mohd Amri Bin Zainol Abidin
Diploma in Mechanical Engineering (Mechanical) POLIMAS
Certificate of Mechanical Engineering (PTSS)
Tel : +604-9885166
e-mail : amrizainol@unimap.edu.my

Mr. Mohd Nadzrin Bin Mohammad Radzi
Diploma in Mechanical Engineering (Mechanical) POLIMAS
Certificate of Mechanical Engineering (PTSS)
Tel : +604-9885166
e-mail : mohdnadzrin@unimap.edu.my

Mr. Norzarul Asri Bin Kamis
Diploma in Mechanical Engineering (Mechanical) POLIMAS
Certificate of Mechanical Engineering (PTSS)
Tel : +604-9885181
e-mail : norzarul@unimap.edu.my

Mr. Mohamad Amirol Bin Johari
Diploma Design Mechanical (UTM)
Tel : 04-9885175
e-mail : amirol@unimap.edu.my

Mr. Muhamad Zakuan Bin Abd Samad @ Zakaria
Diploma in Electronic Engineering (PTSS)
Certificate of Electrical and Electronic Engineering (POLIMAS)
e-mail : zakuansamad@unimap.edu.my

Mrs. Siti Khalijah Binti Hasan @ Yusuf,
Certificate in Mechanical Engineering (General Machinery) (PSA)
Politeknik Shah Alam (PSA)
e-mail : sitikhalijah@unimap.edu.my

Craftsmen

Mr. Muhamad Ikbal Bin Azudin
Diploma Technology Foundry (CIAST)
Certificate (Level 3) Pattern Maker, (Level 2) Technology Foundry
Tel : +604-9885176 / 5175
e-mail : ikbal@unimap.edu.my

Mr. Mohd Yamin Bin Jamil
Malaysian Skills Certificate Level 1&2 Arc of Welding(SKM) (ILP Jitra)
Technician Certificate - Jitra Industrial Training
Tel : 04-9885175
e-mail : mohdyamin@unimap.edu.my

Administration Staffs

Assistant Registrar
Mr. Zakaria Bin Othman @ Ismail
B.A (Hons) Pentadbiran Sosial (UM)
Tel : +604-9885170
e-mail : zakariaothman@unimap.edu.my

Personal Assistant
Mrs. Zuraida Binti Mansor
Diploma in Secretarial Science (UiTM)
Tel : +604-9885166
Fax : +604-9885167
e-mail : zuraida@unimap.edu.my

Assistant Admin Officer
Ms. Saliza Binti Khalid
Sijil Pelajaran Malaysia
Tel : +604-9885168
e-mail : saliza@unimap.edu.my

Assistant Admin Officer
Mr. Husni Ashraf Bin Hussin
Sijil Pelajaran Malaysia
Tel : +604-9885168
e-mail : husniashraf@unimap.edu.my

Assistant Admin Officer
Mr. Mustaza Bin Mansor
Sijil Pelajaran Malaysia
Tel : +604-9885168
e-mail : mustazamansor@unimap.edu.my

General Worker
Mr. Basri Bin Abu Bakar
Sijil Pelajaran Malaysia
Tel : +604-9885168
e-mail : basribakar@unimap.edu.my

Programmme Objectives (PEO) (Mechatronic Engineering)

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 01
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in Mechatronic Engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for 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
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO 08
Understanding of professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

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	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Core Courses (98)	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	EIT302/4 Industrial 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 473/4 Mechatronic Systems Design	ENT XXX/3 Elective 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	ENT XXX/3 Elective III
			ENT 289/3 Drives and Power Electronics		ENT 373/4 Embedded System Design and Applications	ENT 331/3 Management Production & Control of Quality		ENT XXX/3 Elective I	
Non Engineering (22)	ENT189/3 Computer Programming	EQT 102/3 Engineering Mathematics II	EQT241/3 Numerical Methods & Vector Calculus	EQT271/3 Engineering Statistics				EUT440/3 Engineers in Society	EUT443/2 Engineering Management
	EQT 101/3 Engineering Mathematics I								
	EUT122/2 Skills and Technology in Communication								
University Requirement (15)		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			
		EUW XXX/1 Co-Curriculum		UUW 223/2 University English	UUW 224/2 Engineering Entrepreneurship				
	18	17	18	17	17	16	4	16	12
Total Units for Graduation 135									

Electives :
Elective I : ENT491/3 Robotic Control / ENT493/3 Advanced Control Systems
Elective II :ENT478/3 Mobile Robotics / ENT497/3 Artificial Intelligence in Engineering
Elective III :ENT474/3 Intelligent Mechatronic Systems / ENT499/3 Digital Signal Processing & Applications

Programme Objectives (PEO) (Mechanical Engineering)

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 01
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in Mechanical Engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for 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
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO 08
Understanding of professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

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			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (98)	ENT141/3 Engineering Statics	ENT142/3 Engineering Dynamics	ENT242/3 Solid Mechanics I	ENT 246/3 Solid Mechanics II	ENT347/3 Finite Element Methods	ENT346/3 Vibration Mechanics	EIT 302/4 Industrial Training	ENT445/2 Final Year Project I	ENT446/4 Final Year Project II
	ENT150/3 Engineering Graphic & Computer Aided Drafting	ENT143/3 Thermodynamics I	ENT243/3 Thermodynamics II	ENT245/4 Product Design Development	ENT345/4 Mechanical Components Design	ENT 348/4 Mechanical System Design		ENTXXX/3 Elective I	ENTXXX/3 Elective III
	ENT145/3 Materials Engineering	ENT144/2 Machining Skills	ENT241/3 Fluid Mechanics I	ENT247/3 Fluid Mechanics II	ENT343/3 Principles of Heat Transfer	ENT342/3 Computational Fluid Dynamics		ENTXXX/3 Elective II	ENTXXX/3 Elective IV
		ENT188/3 Electrical Technology	ENT286/3 Instrumentations & Measurements	ENT244/3 Manufacturing Processes	ENT 388/3 Electronics	ENT385/3 Control Engineering		ENT457/3 Management, Production & Operations	
						ENT381/2 Microprocessors			
Non Engineering (22)	EQT 101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT241/3 Numerical Methods & Vector Calculus	EQT271/3 Engineering Statistics		EUT443/2 Engineering Management			EUT440/3 Engineers in Society
	EUT122/2 Skills & Technology in Communication								
	ENT189/3 Computer Programming								
University Required (15)		UUW114/2 University Malay Language	UUW233/2 Islamic & Asian Civilisations	UUW212/2 University English	UUW224/2 Engineering Entrepreneurship	UUW322/2 Thinking Skills			
	EUWXXX/1 Co-curriculum	UUW235/2 Ethnic Relations			UUWXXX/2 Option				
	18	18	17	18	17	17	4	14	12
Total Units for Graduation 135									

Elective:
Elective I : ENT461/3 Renewable Energy / ENT463/3 Elasticity / ENT465/3 Rapid Engineering
Elective II : ENT462/3 Turbomachinery / ENT464/3 Fracture Mechanics / ENT466/3 Design Optimization
Elective III : ENT431/3 Refrigeration & Air Conditioning / ENT433/3 Plasticity / ENT435/3 Robotics
Elective IV : ENT432/3 Energy Conversion / ENT434/3 Impact Mechanics / ENT436/3 Computer Aided Manufacturing

Programme Objectives (PEO) (Biomedical Electronic Engineering)

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 01
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in Biomedical Engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for 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
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO 08
Understanding of professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

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	II	III	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	EIT 302/4 Industrial Training	ENT445/2 Final Year Project I	ENT446/4 Final Year Project II
	ECT111/3 Engineering Skills	ENT116/3 Digital Electronic Principles	ENT216/3 Analogue Electronics II	ENT222/3 Electromagnetic Field Theory	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		ENT412/4 Bioelectrical Instrumentation Design	ENTXXX/3 Elective III
					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				EUT440/3 Engineers in Society	EUT443/2 Engineering Management
	EKT120/4 Computer Programming	ENT111/4 Anatomy & Physiology	ERT106/3 Biochemistry						
	EUT122/2 Skills & Technology in Communication								
University Required (15)	UUW233/2 Islamic & Asian Civilizations	UUW114/2 University Malay Language	UUW224/2 Engineering Entrepreneurship	UUW322/2 Thinking Skills					
	EUWXXX/1 Co-Curriculum	UUW235/2 Ethnic Relation		UUW212/2 University English		UUWXXX/2 Option			
	18	17	17	17	17	18	4	15	12
Total Units for Graduation 135									

Elective I (Medical Computing) : ENT420/3 Biological System Modeling, ENT421/3 Medical Image Processing, ENT422/3 E-Health & Telemedicine, ENT423/3 Artificial Intelligent Systems, ENT424/3 Forces, Fields & Flows in Biomedical Engineering

Elective II (Medical Instrumentation) : ENT425/3 Advanced Bioinstrumentation, ENT426/3 Computed Tomography & Applications, ENT427/3 Clinical Engineering, ENT428/3 Medical Robotics & Automation, ENT429/3 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 body 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

1. Seely, R. R., Stephens, T.D., & Tate, P. (2005). Essentials of Anatomy and Physiology. 5th Ed. McGraw Hill.
2. Tortora, G.J., Grabowski, S.R. (2002). Principles of Anatomy and Physiology. 10th Ed. Wiley.
3. Marieb, E. (2000). Human Anatomy & Physiology. 5th Ed. Benjamin-Cummings.
4. Van Wynsberghe, D. M., Noback, C.R., & Carola, R. (1995). Human Anatomy and Physiology. 3rd Ed. Mc-Graw Hill.
5. Marieb, E.N (2009), “Essentials of Human Anatomy & Physiology”, 9th Ed., Benjamin-Cummings.

ENT 114/3
CIRCUIT THEORY

Course Synopsis

This course provide the fundamentals of electrical elements, basic laws such as Kirchorff’s law, Nodal analysis, Thevenin’s law and also circuit theorem i.e. mesh analysis, nodal analysis and superposition theorem. Calculate current, voltage and power in ac circuits using phasor approach. Study the mutual Inductance and transient response in RC, RL and RLC circuits.

Course Outcomes

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.

References

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

1. Floyd, T. (2008). Electronic Devices. 8th ed. Prentice Hall.
2. Boylestad, R.L., and Nashelsky, L. (2008). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
3. Cathey, J.J. (2002), Schaum's outline of theory and problems of electronic devices and circuits, 2nd edition, McGraw-Hill.
4. Salivahanan, S., Kumar, N.S., Vallavaraj, A(1998)., Electronic Devices and Circuits, Tata McGraw-Hill.
5. Robert A. Pease (2008). Analogue Circuits: World Class Designs. Elsevier.

ENT 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

1. Floyd, T. (2009). Digital Fundamentals. 10th ed. Prentice Hall.
2. Mano, M.M. (2002). Digital Design. 3rd ed. Prentice Hall.
3. Tocci, R.J. (2001). Digital Systems: Principles and Applications. 8th ed. Prentice Hall.
4. Balaniaban, N. and Carlson, B. Digital Logic Design Principles. 1st ed. Wiley.
5. Donald D. Givone (2003). 'Digital Principles and Design', 1st Ed., Mcgraw-Hill.

ENT 117/3
ENGINEERING MECHANICS

Course Synopsis

The course provides a foundation for the students to analyze mechanical problems using simple and logical methods. The syllabus is designed to enable non-mechanical engineering students to have strong fundamental to solve mechanical problems.

Course Outcomes

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

1. Hibbler, R.C. (2010). Engineering Mechanics: Statics. 12th ed. Prentice Hall.
2. Hibbler, R.C. (2010). Engineering Mechanics: Dynamics. 12th ed. Prentice Hall.
3. Ferdinand P. Beer, E. Russell Johnston & William E.C (2007)., "Vector Mechanics for Engineers: Statics.", 8th ed., Mc Graw Hill.
4. Ferdinand P. Beer, E. Russell Johnston & William E.C.(2007), "Vector Mechanics for Engineers: Dynamics.", 8th ed., Mc Graw Hill.
5. Anthony M. Bedford and Wallace Fowler (2007). Engineering Mechanics: Statics & Dynamics, 5th Edition, Prentice Hall.

ENT 141/3
ENGINEERING STATICS

Course Synopsis

The objective of the course is to evaluate problems related to concept of mechanics in static conditions. It covers topics of equilibrium force analysis of a particle in static conditions, equilibrium force analysis for rigid body, structural analysis, friction analysis, centre gravity and centroid analysis, and moment of inertia analysis.

Course Outcomes

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

1. R.C. Hibbeler. (2010). *Engineering Mechanics: Statics.* 12th ed., Prentice Hall.
2. Beer and E.R. Johnson Jr. (2005). *Vector Mechanics for Engineer: Statics*. 7th Ed. In SI Units, McGraw Hill.
3. J.L. Meriam L.G. Kraige (2003). *Engineering Mechanics: Statics.* 7th ed., John Wiley and Sons.

ENT 142/3
ENGINEERING DYNAMICS
(Pre Requisite: ENT 141/3 Engineering Statics)

Course Synopsis

The objective of the course is to enable students to evaluate problems related to mechanics concepts in dynamic condition. The course covers topics of force and acceleration, work and energy, and also impulse and momentum for both kinematics of a particle and planar kinetics of a rigid body problems.

Course Outcomes

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

1. R. C. Hibbler (2009). *Engineering Mechanics: Dynamics*. 12th edition, Pearson / Prentice Hall.
2. Anthony Bedford and Wallace Fowler (2008). *Engineering Mechanics: Dynamics*. 5th edition in SI unit, Prentice Hall.
3. R.C Hibbeler (2006). *Engineering Mechanics: Principles of dynamics*. Pearson/Prentice.
4. Wan Abd Rahman Assyahid dan Suhaimi Ilyas (2006). *Engineering Mechanics (EPT 101)*. Penerbit KUKUM, Perlis.

ENT 143/3
THERMODYNAMICS I

Course Synopsis

To introduce the concepts and basic knowledge of thermodynamics to the students of mechanical engineering. Emphasis will be given to the first and second laws of thermodynamics, physical properties, pure substances, enthalpy, entropy, ideal and real gas, and energy.

Course Outcomes

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

1. Y.A. Cengel and M.A. Boles (2009). *Thermodynamics: An Engineering. Approach*, 6th edition, McGraw-Hill.
2. Kurt C. Rolle (2005). *Thermodynamics and Heat Power.* University of Wisconsin-Platteville.
3. Davin Dunn (2001). *Fundamental Engineering Thermodynamics.* Illustrate edition, Longman Group, United Kingdom.

ENT 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

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

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

ENT 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

1. William D Callister (2010). *Materials Science and Engineering*. 8th Edition, John Wiley & Sons.
2. Donald R. Askeland and Pradeep P. Phule (2003). *The Science and Engineering of Materials*. 4th Ed., Thomson Brooks/Cole.
3. Kenneth G. Budinski (2010). *Engineering Materials: Properties and Selection.* 9th Ed., Pearson.
4. 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

CO1:
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

References

1. Gary R. Bertoline and Eric N. Wiebe (2008). *Technical Graphics Communication*. 5th Ed., McGraw-Hill.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill and James E. Novak (2009). *Technical Drawing*. 13th Ed., Prentice Hall.
3. Timothy Sean Sykes (2002). *AutoCAD 2002 One Step at a Time*. Prentice Hall,.
4. Ralph Grabowski (2002). *Using AutoCAD 2002.* Thomson Learning.

ENT 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

1. 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.
4. 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.

References

1. 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.
3. 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

1. Floyd T., “Electronic Devices”, 8th Edition, Pearson Prentice Hall, 2008.
2. Boylested R L and Nashelsky L., “Electronics Devices and Circuit Theory”, 7th Edition, Prentice Hall, 1999.
3. Schuler C A., “Electronics- Principles and Applications”, 6th Edition, Prentice Hall, 2003.
4. Aminian, A., and Kazimierczuk, M., “Electronic Devices- A Design Approach”, Pearson Prentice Hall, 2004.
5. Salivahanans S., Kumar N., Vallavaraj A., “Electronic Devices and Circuits”, McGrawHill, 2007.

ENT 188/3
ELECTRICAL TECHNOLOGY

Course Synopsis

The objective of the course is to introduce the students with the fundamentals concept of electric circuits, electric supply system and installation, magnetic and electromagnetic, inductance, capacitance and AC circuit, three-phase system, basic principles of electrical machines, DC and AC electrical machines, transformer and electrical safety. The laboratory will be used to aid the students understanding of the concept introduced.

Course Outcomes

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

1. Charles K. Alexander and Matthew N. O. Sadiku (2004). *Fundamentals of Electrical Circuits.* 2nd Ed, McGraw Hill.
2. 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 well-structured 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

1. Deitel & Deitel, Suhizaz Sudin, R. Badlishah and Yasmin Yacob (2006). *C How To Programme*. Pearson-Prentice Hall.
2. 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.
4. Forouzan, B. A. & Gilberg R. F. (2001). *Computer Science: A Structured Programming Approach Using C*. Brooks/ Cole.
5. Al Kelley and Ira Pohl (2000). *C by Dissection: The Essentials of C Programming*. 4th ed., Addison-Wesley.
6. 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.
2. Boylestad, R.L., and Nashelsky, L. (2008). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
3. Cathey, J.J. (2002), "Schaum's outline of theory and problems of electronic devices and circuits", 2nd edition, McGraw-Hill.
4. Salivahanan, S., Kumar, N.S., Vallavaraj, A. (1998), "Electronic Devices and Circuits", Tata McGraw-Hill.
5. Robert A. Pease (2008). Analogue Circuits: World Class Designs. Elsevier.

ENT 217/3
PRINCIPLES OF SIGNALS & SYSTEMS

Course Synopsis

This course introduces the different types of signals and networks present in an engineering systems. Signal and system representations are discussed for both time (Fourier Series) and frequency domains (Fourier and Laplace transform). The concept of transfer function is introduced and other applications of the Laplace transform such as for the solution of differential equations, and circuit analyses are presented. The application of z-transform is introduced in the analysis of signals and systems. At the end of this course, the students are able to analyze different types of signals using numerous transformation techniques and evaluate its performance.

Course Outcomes

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.
2. C.L. Phillips, J.M. Parr, E.A. Riskin. (2003). Signals, Systems & Transforms. 3rd Ed. Prentice Hall.
3. B.P. Lathi (1998). 'Signal Processing & Linear Systems', Oxford University Press.
4. M.J. Roberts (2003). 'Signals & Systems', McGraw Hill.
5. Charles L.Philips (2007). Signals, Systems and Transforms. 4th Edition. Prentice Hall.

ENT 218/3
BIOMECHANICS
(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.
2. Iwan W.G. (2006). Principles of biomechanics & Motion Analysis. 3rd Ed.
3. Ellen Kreighbaum and Katharine M Barthels (1996), "Biomechanics: A qualitative approach for studying human movement", 4th Edition.
4. David A.W. (2005), "Biomechanics and Motor Control of Human Movement", 3rd Edition.
5. Joseph H., Kathleen M.K (2003), "Biomechanical Basis of Human Movements", 2nd Edition.

ENT 219/3
BIOMATERIALS

Course Synopsis

This course is designed to provide a fundamental knowledge of materials that are commonly utilized in engineering and biomedical field specifically. Various types of materials currently being utilized for biomedical applications and their biocompatibility with references to the biological environments will be discussed.

Course Outcomes

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.

CO3:
Ability to assess tissue reactions to implanted biomaterials.

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.
2. Callister W.D., “Fundamentals of Materials Science and Engineering: An Integrated Approach”, 3rd ed., John Wiley, 2008.
3. Ratner, B.D., Hoffman, A.S., Schoen, F.J., Lemons, J.E. (2004). Biomaterials Science: An Introduction to Materials in Medicine. 2nd Ed. Academic Press.
4. Park, J.B., Bronzino, J.D. (2002). Biomaterials: Principles and Applications. CRC Press.
5. Shi, D. (2004). Biomaterials and Tissue Engineering. Springer.

ENT 220/3
LINEAR CONTROL SYSTEMS

Course Synopsis

This course will introduce students to linear control system techniques for analysis and design; includes mathematical modeling of electrical, mechanical and biomedical systems, stability analysis, time domain analysis and frequency domain analysis. PID and lead-lag controllers design using root locus will be discussed. The controller performance will be evaluated both in time and frequency domains. MATLAB software will be used for the analysis and design. At the end of the course, the students should be able to analyze, design and evaluate controlled systems.

Course Outcomes

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

1. Nise, N.S, (2009). Control Systems Engineering. 4th Ed. Wiley.
2. Ogata, K. (2002). Modern Control Engineering. 4th ed. Prentice Hall.
3. Gopal, M. (1995). Control Systems: Principles and Design. 2nd Ed. Tata McGraw-Hill.
4. Khandpur, R.S. (2003), “Handbook of Biomedical Instrumentation”, 2nd Ed. Tata McGraw-Hill.
5. Carr, J.J., Brown, J.M.(2001), “Introduction to Biomedical Equipment Technology”, 4th Ed. Prentice Hall.

ENT 221/3
BIOMEDICAL ACTS, STANDARDS & SAFETY

Course Synopsis

The course provides an introduction to the acts and standards used in biomedical engineering. This includes ethical issues and the power system safety of electrical appliances especially medical equipments. The course also focuses on the safety issues in the healthcare institution which particularly emphasized on medical devices and their interrelation with the hospital’s environment. At the end of this course, students will appreciate on how acts and standards are established with the requirements in compliance with the acts and standards. Safety aspects and measures will be emphasized so that students will be able to control and be prepared in any situation involving human life.

Course Outcomes

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

1. Reese, C.D. (2003). Occupational Health and safety Management: A Practical Approach. Lewis Publishers.
2. Carr, J.J. (2000). Introduction to Biomedical Equipment Technology. 4th Ed. Prentice Hall.
3. Lusardi, M.M., Nielsen, C.C. (2000). Orthotics and Prosthetics in Rehabilitation. Butterworth-Heinneman.
4. Joseph D.B. (2006). Medical Devices and Systems, Biomedical Engineering Handbook. 3rd Ed. Taylor and Francis.
5. Daniel, A.V.(2007), "Biomedical Ethics for Engineers", Elsevier.

ENT 222/3
ELECTROMAGNETIC FIELD THEORY

Course Synopsis

The course provides a fundamental knowledge on electromagnetic. Student will be exposed to basic postulates of electrostatic and electromagnetic fields and able to solve related problems. On completion of this course, students should have a firm grasp of basic electromagnetic and identify their characteristic in different situations.

Course Outcomes

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

1. William H. Hayt, Jr and John A. Buck "Engineering Electromagnetics", 7th Ed., McGraw Hill International Ed. 2006.
2. Ulaby, F.T. (2003). Fundamental of Applied Electromagnetics. Prentice Hall.
3. Kraus, J.D., Fleisch, D.A. (1999). Electromagnetics. 5th ed. McGraw-Hill.
4. Cheng D.K. (1992). Fundamental of Engineering Electromagnetics. Prentice Hall.
5. Dragan Poljak, "Human Exposure to Electromagnetic Fields", WIT Press, 2004.

ENT 223/3
MACHINES & ELECTRICAL DRIVES

Course Synopsis

This course provides the students both theories and applications of electrical machines and drives which include different types of motor, generator and transformer. This course allows the students to identify and select a suitable electrical machines and drives for various applications.

Course Outcomes

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

1. Theodore Wildi (2006). Electrical Machines, Drives, and Power Systems. 6th Edition.
2. S.J. Chapman (2005), Electric Machinery Fundamentals, 4th Edition, McGraw Hill.
3. Leonard L. Gigsby (2007), Electric Power Engineering Handbook, 2nd Edition, CRC Press.
4. J. F. Gieras (2008). Advancements in Electric Machines (Power Systems), Springer.
5. Andre Veltman (2007). Fundamentals of Electrical Drives (Power Systems), Springer.

ENT 241/3
FLUID MECHANICS I

Course Synopsis

This course aims to develop the student basic knowledge on the principles of fluid mechanics and the application of these principles to practical, applied problems. Emphasis is on fluid properties, fluid statics, flow of fluids in pipes, and in non-circular conduits. The students shall also be introduced on momentum analysis and its application in engineering problems.

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

ENT 242/3
SOLID MECHANICS I
(Pre Requisite: ENT 141/3 Engineering Statics)

Course Synopsis

The objective of the course is to introduce the fundamental theories of solid mechanics. The basic of mechanics that have been learned in static and dynamic subjects will be extended and emphasized on solid materials. The course covers the law of mechanics, the concept of stress and strain, torsion and bending. The theoretical knowledge will be emphasized with practical in the lab. The tests of tensile and torsion will be performed. The testing of materials will be referred to international standards so that the students have a proper knowledge of material testing.

Course 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

1. Hibbeler, R.C. (2008). *Mechanics of Materials*. 7th ed., Prentice Hall.
2. Ferdinand P. Beer (2006). *Mechanics of Materials*. 4rd ed., McGraw-Hill.
3. Barber, J.R. (2001). *Intermediate Mechanics of Materials*. McGraw-Hill.
4. Madhuhar Vable (2002) *Mechanics of Materials*. Oxford.
5. Raymond Parnes (2001). *Solid Mechanics in Engineering*. John Willey & Sons.

ENT 243/3
THERMODYNAMICS II
(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.

References

1. Y.A. Cengel and M.A. Boles (2009). *Thermodynamics: An Engineering Approach*. 6th edition, McGraw-Hill.
2. Kurt C. Rolle (2005). *Thermodynamics and Heat Power*. University of Wisconsin-Platteville.
3. Davin Dunn (2001). *Fundamental Engineering Thermodynamics.* Illustrate edition, Longman Group, United Kingdom.
4. W.Z. Black and J.G. Hartley (1996). *Thermodynamics*. English/SI version, 3rd edition, Prentice-Hall.
5. M.J. Moran and H.N. Shapiro (1998). *Fundamentals of Engineering Thermodynamics.* 3rd Edition, John Wiley & Sons.
6. R. Sonntag, C. Borgnakke and G. Van Wylen (1998). *Fundamentals of Thermodynamics*. 5th Edition, John Wiley and Sons.

ENT 244/3
MANUFACTURING PROCESSES

Course Synopsis

This course is an introduction of manufacturing processes and techniques used in industry to convert raw materials into finished or semi-finished part. This includes the study on the characteristics of manufacturing processes such as forming, casting, moulding, rapid prototyping, non-conventional machining and welding, soldering and mechanical fasteners. The influence of materials and processing parameters in understanding individual processes are also highlighted

Course 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

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

ENT 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.

References

1. K.T. Ulrich and S. D. Eppinger (2008). *Product Design and Development*, 4th Edition, McGraw-Hill.
2. Richard Budynas and J. Keith Nisbett (2008). *Shigley's Mechanical Engineering Design*. Eighth Edition, McGraw Hill.
3. Joseph E. Shigle and Charles R. Mischke (2001). *Mechanical Engineering Design*. Sixth Metric Edition.
4. Karl T. Ulrich and Steven D. Eppinger (2004). *Product Design and Development*, 3rd Edition, McGraw-Hill.

5. David G. Ullman and David Ullman (2003). *Mechanical Design Process*. 3rd Edition, McGraw Hill.
6. 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.
8. M. F. Spotts (1992). *Design of Machine Elements.* 6th Edition, Prentice-Hall.
9. Robert C. Juvinall and Kurt M. Marshek (!991). *Fundamentals of Machine Component Design*. 2nd Edition, John Wiley & Sons.

ENT 246/3
SOLID MECHANICS II
(Pre Requisite: ENT 242/3 Solid Mechanics I)

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

1. Hibbeler, R.C. (2009). *Mechanics of Materials*. 12th ed., Prentice Hall.
2. Pytel. Kiusalaas (2001). *Mechanics of Materials*. 3rd ed., McGraw-Hill.
3. Barber, J.R. (2001). *Intermediate Mechanics of Materials*. McGraw-Hill.
4. Madhuhar Vable (2002). *Mechanics of Materials*. Oxford.
5. Raymond Parnes (2001). *Solid Mechanics in Engineering*. John Willey & Sons.

ENT 247/3
FLUID MECHANICS II
(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.

References

1. Yunus A. Cengel and John M. Cimbala (2008). *Fluids Mechanics: Fundamentals and Applications.* Int'l Edition, McGraw-Hill.
2. Robert L. Mott (2006). *Applied Fluid Mechanics.* 6th Edition, Pearson.
3. M.C.Potter and D.C. Wiggert (2002). *Mechanics of Fluids*. 3rd Edition, Brooks/Cole.
4. Robert W. Fox and A.T. McDonald (1998). *Introduction to Fluid Mechanics.* 5th Edition, John Wiley and Sons.
5. JF Douglas, JM Gasiorek, JA Swaffield and LB Jack (2005). *Fluid Mechanics*. 5th Edition, Prentice Hall.

ENT 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.
3. Richard G. Budynas and J. Keith Nisbet (2008). *Shigley's Mechanical Engineering Design*. 8th Ed., McGraw Hall.
4. Robert L. Mott (2006). *Machine Elements in Mechanical Design.* 4th Ed. in SI Units, Prentice-Hall.
5. Charles E. Wilson and J. Peter Sandler (2006). *Kinematics and Dynamics of Machinery.*3rd Ed., Pearson Prentice-Hall.

ENT 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.
3. Tocci, RJ., "Digital systems: Principles and Applications", 8th Ed., Prentice Hall 2001.
4. 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

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

1. Matthew N.O. Sadiku "Elements of Electromagnetics", 4th Ed., Oxford University Press, 2007.
2. William H. Hayt, Jr and John A. Buck "Engineering Electromagnetics", 7th Ed., McGraw Hill International Ed. 2006.
3. David K. Cheng, "Fundamentals of Engineering Electromagnetics" Addison Wesley, 1992.
4. Fawwaz T. Ulaby, "Fundamentals of Applied Electromagnetics", 5th Ed., Pearson International Edition, 2007.
5. Joseph A. Edminister, "Schaum's Outline of Theory and Problems of Electromagnetics", 2nd Ed., McGraw Hill International Ed. 1995.
6. 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 frequency-domain techniques.

References

1. Simon Haykin and Barry Van Veen, "Signals and Systems", Wiley, 2nd Edition, 2002.
2. John G. Proakis and Masoud Salehi, "Fundamentals of Communication System", Prentice- Hall, 2005.
3. Charles L. Phillips, John M. Parr, Eve A. Riskin; "Signals, Systems and Transforms", Prentice Hall, Fourth Edition, 2009.
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 type of sensors and their application in measuring electronics signal, temperatures, humidity, displacement as well as velocity and acceleration, force, torques strain and stress and also the flow rate measurement. The use of computer for interfacing application is also covered in this course.

Course Outcomes

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
2. Bentley, J.P., "Principles of Measurement Systems", 4th Edition, Prentice Hall, 2005.
3. Johnson, C., "Process Control Instrumentation Technology", 8th Edition, Prentice Hall, 2006.
4. Doebelin, E.O., "Measurement System: Application and Design", Mc Graw Hill, 2004.
5. Sinclair, I., "Sensors and Transducers", 3rd Edition, Newnes, 2001.

ENT 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 microprocessor-based 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.

References

1. Muhammad Ali Mazidi, Rolin D. Mckinlay & Danny Causey PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18, Pearson Prentice Hall 2008
2. Barry B. Brey Applying PIC18 Microcontrollers: Architecture, Programming, and Interfacing using C and Assembly, Pearson Prentice Hall 2008
3. 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-width-modulation (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.
3. 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.
5. 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.

References

1. Proakis J.G. and Manolakis D.G., (2007), "Digital Signal Processing: Principles, Algorithms and Applications" 4th edition, Prentice Hall
2. Lyons R.G., (2004), "Understanding Digital Signal Processing", 2nd ed, Prentice Hall
3. Mitra S.K., (2006), "Digital Signal Processing", McGraw-Hill
4. Charles L.Byrne (2005). Signal Processing: A Mathematical Approach, Wellesley.
5. Steven Smith (2003). Digital Signal Processing: A Practical Guide for Engineers and Scientists, Elsevier.

ENT 316/3
PRINCIPLES OF COMMUNICATION SYSTEMS

Course Synopsis

This course is designed to introduce the principles of communication system and its applications in communication, broadcasting and other modern equipments. At the end of the course, the students are expected to provide clear understanding in fundamental communication system, relate the principles to various applications in engineering field and propose a conceptual model of a communication setup.

Course Outcomes

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

1. Louis E. Frenzel (2008), "Principles of Electronic Communication Systems", 3rd Ed., McGraw-Hill, 2008.
2. N. Benvenuto, R. Corvaja, T. Erseghe, N. Laurenti (2007), Communication Systems – Fundamentals and Design Methods, Willey.
3. Wayne Tomasi (2004), "Electronic Communication System, Fundamental Through Advanced",5th Ed., Pearson Prentice Hall.
4. William L. Schweber (2002), "Electronic Communication Systems: A Complete Course", 4th Edition, Prentice Hall.
5. Mullet (2003),"Basic Telecommunications: The Physical Layer", Thomson Learning.

ENT 317/4
MEDICAL ELECTRONICS & BIOINSTRUMENTATION
(Pre Requisite: ENT 216/3 Analogue Electronics II)

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.
2. Webster, J.G. (2003). Bioinstrumentation. Wiley.
3. Perez, R. (2002). Design of Medical Electronic Devices. Academic Press.
4. Carr, J.J. (2000). Introduction to Biomedical Equipment Technology. 4th Ed. Prentice Hall.
5. Khandpur, R.S (2007).'Handbook of Biomedical Instrumentation', 2nd Edition, Tata McGraw-Hill.

ENT 318/3
ARTIFICIAL ORGANS

Course Synopsis

This course covers the artificial organ for the heart, kidney, lung, pancreas and ear. These topics focus on the implementation of artificial organs by understanding the anatomical, physiological and biological transport aspects as well as mathematical concepts of the respective organs. At the end of the course, students are expected to have the ability to apply the fundamental principles of the artificial organs, perform simple modeling and able to propose the suitable methods/devices for each problematic organ.

Course Outcomes

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

1. Marieb E.N. (2006), “Essentials of Human Anatomy and Physiology”, 8th Edition, Pearson Benjamin Cummings.
2. Lee Waite, (2006), “Biofluid Mechanics in Cardiovascular System”, Mc Graw Hill.
3. Truskey G.A., Fan Yuan, Katz D.F., (2004) “Transport Phenomena in Biological System”, Prentice Hall.
4. Dayan P., Abbott L.F., (2001) “Theoretical Neuroscience”, MIT Press.
5. Ritter A.B., Reisman S., Michniak B.B., (2005), “Biomedical Engineering Principles”, CRC Press.

ENT 319/3
THERMOFLUIDS

Course Synopsis

The objective of the course is to expose the students to the fundamental principles of fluid mechanic, thermodynamic, heat transfer, and also fundamental application of fluid mechanics in

Biomedical Engineering. In Fluid Mechanics attention will be given to the fundamental principles of fluid mechanics and definition, fluid statics, fluid dynamics, and flow over bodies. In Thermodynamics focus is on the fundamental principles of thermodynamics and definition, the Zeroth law, the first law and the 2nd law. In Heat Transfer, different modes through conduction, convection and radiation to be covered.

Course Outcomes

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

1. Massoud, M. (2005). Engineering Thermofluids: Thermodynamics, Fluid Mechanics, and Heat Transfer. 1st Ed. Springer.
2. Cengel Y.A, Boles M.A. (2001). Thermodynamics: an engineering approach. 4th Ed. McGraw Hill.
3. Marquand, C. (2000). Thermofluids: an integrated approach to thermodynamics and fluids mechanics principles. John Willey.
4. Y.A Cengel and R.H Turner. (2008). Fundamental of Thermal Fluid Sciences. 3nd Edition, Mc Graw Hill.
5. Lee Waite (2006), "Biofluid Mechanics in Cardiovascular System", Mc Graw Hill.

ENT 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

1. Evans, J.R & Lindsay, W.M. (2007). The Management and Control of Quality. 7th Edition. Thompson Learning.
2. Foster, (2006). Managing Quality. 2nd ed. Prentice Hall.
3. Kolarik, W.J. (2005). Creating Quality Concepts, Systems, Strategies, and Tools. McGraw Hill.
4. Besterfield, Dale H. Quality control 7th Edition. Upper Saddle River, New Jersey: Pearson Prentice-Hall, Inc.: 2006
5. C. M. Creveling,, J. L. Slutsky, D. Antis, Jr. Design for Six Sigma in Technology and Product Development, Prentice Hall, 2003

ENT 342/3
COMPUTATIONAL FLUID DYNAMICS
(Pre Requisite: ENT 189/3 Computer Programming & ENT 241 Fluid Mechanics I)

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.
2. Versteeg, Versteeg, Malalasekra and Malalasekra (2007). *An introduction to Computational Fluid Dynamics: The Finite Volume Method*. 2nd Ed., Pearson.
3. Oleg Zikanov (2010). *Essential Computational Fluid Dynamics*. John Wiley.
4. H.K. Versteeg and W. Malalasekera (1996). *An introduction to Computational Fluid Dynamics: The Finite Volume Method*. 2nd Ed., Longman Scientific & Technical.
5. John D. Anderson, Jr. (1995). *Computational Fluid Dynamics: The Basics with Applications*. McGraw-Hill International editions.
6. Jiyuan Tu, Guan Heng Yeoh and Chaoqun Liu (2008). *Computational fluid dynamics: a practical approach.* Amsterdam: Butterworth-Heinemann.

ENT 343/3
PRINCIPLES OF HEAT TRANSFER
(Pre Requisite: ENT 143/3 Thermodynamics I)

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

1. 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.
3. 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.
5. Mohammad Zainal Mohd Yusof (1991).
6. *Pemindahan Haba Kejuruteraan Edisi Kedua, 2nd Edition*, Penerbit Universiti Teknologi Malaysia.

ENT 345/4
MECHANICAL COMPONENTS DESIGN
(Pre Requisite: ENT 141/3 Engineering Statics)

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.
2. Karl T. Ulrich and Steven D. Eppinger (2004). *Product Design and Development*. 3rd Edition, McGraw-Hill.
3. David G. Ullman and David Ullman (2003). *Mechanical Design Process*. 3rd Edition, McGraw Hill.
4. 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.
6. M. F. Spotts (1991). *Design of Machine Elements*. 6th Edition, Prentice-Hall.
7. Robert C. Juvinall and Kurt M. Marshek (1991). *Fundamentals of Machine Component Design*. 2nd Edition, John Wiley & Sons.

ENT 346/3
VIBRATION MECHANICS
(Pre Requisite: ENT 142/3 Engineering Dynamics)

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 simple-harmonic 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.

ENT 347/3
FINITE ELEMENT METHODS
(Pre Requisite: ENT 242/3 Solid Mechanics I)

Course Synopsis

The objective of this course is to introduce finite element methods for approximate numerical solutions to engineering problems. The course concentrates on solution of structural problems, but also provides the basis for expanding to other engineering filed problem. The formulation and solution of the finite element system equations for 1, 2 and 3 dimensional elements will be discussed including on how to assemble the finite element equations and applying boundary conditions. Analyses will be conducted using computer programming and commercial FEA software.

Course 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.

4. I. M. Smith and D.V. Griffiths (2004). *Programming the Finite Element Method*. 4th Edition, John Wiley & Sons Ltd.
5. Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom (2001). *The Finite Element Method for Engineers*. 4th edition, John Wiley & Sons.

ENT 348/4
MECHANICAL SYSTEM DESIGN
(Pre Requisite: ENT 345/4 Mechanical Components 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.

References

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.
4. 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.
6. 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.
2. Horn, Berthold K. P (1986). *Robot Vision*. Cambridge, MA: MIT Press/McGraw-Hill.

3. Robert M. Haralick and Linda G. Shapiro (1993). *Computer and Robot Vision*. Addison Wesley Publishing Company Inc. U.S.A.
4. David Forsyth and Jean Ponce (2003). *Computer Vision: A modern approach*. Prentice Hall.
5. Milan Sonka, Vaclav Hlavac and Roger Boyle (1999). Image Processing Analysis and Machine Vision. Brooks/Cole Publishing Company. U.S.A.
6. S.N.Sivanandham and M.Paulraj. ' Introduction to Artificial Neural Networks'. Vikas Publications, India, 2003

ENT 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 work-cell 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.
5. R. D. Klaffer, T. A. Chmielewski and M. Negin (2006). *Robotic Engineering: An Integrated Approach*. Prentice-Hall, India.

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.
3. 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 microprocessor-based 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
2. Barry B. Brey, Applying PIC18 Microcontrollers: Architecture, Programming, and Interfacing using C and Assembly, Pearson Prentice Hall 2008
3. 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

1. George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems: Concepts & Design", 4th Ed., Pearson Education Limited, 2005
2. Richard Zurawski, editor "The Industrial Communication Technology Handbook", CRC Press, 2005.
3. Andrew S. Tanenbaum, Maarten van Steen, "Distributed System: Principles and Paradigms", Prentice-Hall, 2002.
4. Behrouz A. Forouzan, "Data Communications and Networking", 4th Ed., Mc-Graw Hill, 2007.
5. William Stallings, "Data and Computer Communications", 7th Ed., Prentice-Hall, 2004.

ENT 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 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

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

ENT 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

1. Norman S. Nise, “Control System Engineering”,4th Edition, Wiley, 2004
2. Katsuhiko Ogata; “Modern Control Engineering”, 4th Edition, Prentice-Hall, 2002.
3. Benjamin C. Kuo; “Automatic Control Systems”, 8th Edition, John Wiley, 2003.
4. Richard C. Dorf, Robert H. Bishop; “Modern control System”, 9th Edition, Prentice Hall, 2001
5. Richard Dorf and R.H. Bishop “Modern Control Systems”, Addison-Wesley, 1998.

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

1. Floyd T. (2005). *Electronic Devices*. 7th Edition, Pearson Prentice Hall.
2. Storey, N. (2006). *Electronics: A System Approach*. 3rd Ed., Prentice Hall.
3. Schuler, C. (2008). *Electronics: Principles & Applications*. 7th Ed., Mc Graw Hill.
4. Tocci, R.J., WIdmer, 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.
6. 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 412/4
BIOELECTRICAL INSTRUMENTATION DESIGN
(Pre Requisite: ENT 265/4 Microcontroller and Interfaces)

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 its applications. Their theoretical knowledge will be tested in a mini-project, specifically developed to give an integrated input in designing a complete bioelectrical instrumentation system.

Course Outcomes

CO1:
Ability to design an instrumentation system to acquire bioelectrical signals.

CO2:
Ability to design a microcontroller-based medical device and integrate with personal computer.

CO3:
Ability to function as a team in executing and evaluate design projects.

CO4:
Ability to present and defend the outcomes of a project and write technical report of acceptable quality.

References

1. Plonsey, R (2007). Bioelectricity: A Quantitative Approach, 3rd Edition, Springer.
2. Marieb, E.N. (2006). Human Anatomy and Physiology. 7th Ed. Benjamin Cummings.
3. Webster, J.G (2010). Medical Instrumentation: Application and Design, 4th Ed., Wiley.
4. Wilmhurst, T. (2007). Designing Embedded Systems with PIC Microcontrollers: Principles and Applications. 1st Ed. Newnes.
5. Nise, N.S. (2004). Control Systems Engineering. 4th Ed., Wiley.

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.
5. Glenn F. Knoll (2000).“Radiation Detection and Measurement”, John Wiley and Sons.

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.

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.

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.

References

1. Jay Heizer and Barry Render (2010). *Operations Management.* 10th Edition, Person.
2. Steven Nahmias (2009). *Production and Operations Analysis*. McGraw Hill.
3. Russell and Taylor (2009). *Operations Management: Along The Supply Chain*. 6th Edition, John Wiley & Sons.
4. Stephen Chapman (2004). *Fundamentals of Production Planning and Control*. Prentice Hall.
5. R. Dan Reid and Nada R. Sanders (2005). *Operation Management: An Integrated Approach*. 2nd Edition, John Wiley & Sons.
6. Faridah Maarof, Maslin Masrom and Mohd Yunus Majid (1998). *Penyelidikan Operasi: Penggunaan dan Algoritma*. Penerbit Universiti Teknologi Malaysia, Johor.

ENT 471/4
AUTOMATION
(Pre Requisite: ENT 289/3 Drive and Power Electronics)

Course Synopsis

This course aims to convey the knowledge of automation technologies. It comBines the automation technology principles and its relationship with assembly process and system, the element of sensor, actuator and drive technology as an input/output component in automation technology. It also covers automation technology and technique in terms of hardware and software control, the automation technology issues in design, engineering analysis, planning, tooling and manufacturing.

Course Outcomes

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

1. Mikell P. Groover (2001), “Automation, Production Systems, and Computer-Integrated Manufacturing” 2nd Edition, Prentice Hall
2. Jon Stenerson (2003), “Industrial Automation and Process Control” 1st Edition, Prentice Hall
3. Frank D. Petruzella (1999), “Programmable Logic Controllers” 2nd Edition, Glencoe/McGraw-Hill
4. Ridley, J.E (1999), “Introduction to Programmable Logic Controller”

ENT 473/4
MECHATRONIC SYSTEMS DESIGN

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.

References

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

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.
2. A. C. Kak and Malcolm Slaney (2001), Principles of Computerized Tomographic Imaging, Society of Industrial and Applied Mathematics.
3. S. C. Bushon (2000) Computed Tomography, McGraw Hill.
4. C. B. Grossman (*1991), “Magnetic Resonance Imaging and Computed Tomography of the Head and Spine”, Williams & Wilkins.
5. T. Grumme, W. Kluge, K. Kretzschmar and A. Roesler (1998), “Cerebral and Spinal Computed Tomography”, 3rd ed. Blackwell Science.

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.

References

1. C.P.Arora (2001). *Refrigeration and Air conditioning*. Second Edition Mc Graw Hill.
2. 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.
5. 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.
3. Leyzerovich, A. (2005). *Wet-Steam TurBines for Nuclear Power Plants.* PennWell Corp.
4. 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.

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

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 work-cell 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

CO1:
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.
2. Mikell P. Groover (2002). *Automation, Production Systems, and Computer-Integrated Manufacturing*. 2nd Edition, Reprint 2002, Pearson Education Asia.
3. YoramKoren (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

CO1:
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.
3. Tester, Drake, Driscoll, Golay and Peters (2000). *Sustainable Energy*. The MIT Press, Cambridge, Massachusetts London, England.
4. Dewulf, Van Langenhove (2006). *Renewable based technology*. John Wiley & Sons Ltd.
5. Z. Lubosny (2003). *Wind TurBine Operation in Electrical Power Systems*. Springer Verlag Berlin Heidelberg.

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.
3. S.L. Dixon (1998). *Fluid mechanics and Thermodynamics of Turbomachinery*. 5th Ed., Pergamon, Oxford.
4. 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.
6. C.T. Crowe, D.F. Elger, and J.A. Roberson (2005). *Engineering Fluid Mechanics*. 8th Ed., John Wiley & Sons.

7. 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 geometry-based 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

1. Martin H. Sadd (2009). *Elasticity: theory, applications and numerics*. 2nd edition, Academic Press, London.
2. Anthony Armenakas (2006). *Advanced Mechanics of materials and applied elasticity*. Boca Raton Fla. Taylor & Francus.
3. Albrecht Bertram (2005). *Elasticity and plasticity of a large deformations: an introduction*. Springer, New York.
4. A. I Lurie, translated by A. Belyaev (2005). *Theory of Elasticity*. Springer, Berlin.
5. 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 mechanics have a wide range of engineering design applications, including the analysis of brittle fracture of low-toughness structural materials and many non-metallic, and quantitative prediction of fatigue crack growth in a wide range of engineering materials. It will emphasize on the mathematical principles of linear elastic fracture mechanics and their application to engineering design. Student will conduct laboratory work with experiments using servo hydraulic fatigue testing machines and scanning electron microscopy.

Course Outcomes

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 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

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

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

1. Frank W. Liou (2007). *Rapid Prototyping and Engineering Applications: A Toolbox for Prototype Development*. Vol. 210, CRC Press, Dekker Mechanical Engineering Series.
2. Kenneth Cooper (2001). *Rapid Prototyping Technology: Selection and Application*. Vol. 133, CRC Press, Dekker Mechanical Engineering Series.
3. D.T. Pham and S.S. Dimov (2001). *Rapid Manufacturing: The technologies and applications of Rapid Prototyping and Rapid Tooling*. Springer, London.
4. C. K. Chua, K. F. Leong and C. S. Lim (2003). *Rapid Prototyping: Principle and Applications*. 2nd Edition, World Scientific Publishing.

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 off-the-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

1. Vanderplaats, Garret N. *Numerical Optimization Techniques for Engineering Design: With Applications*. McGraw-Hill.
2. Arora, Jasbir S. *Introduction to Optimum Design*, McGraw-Hill.
3. Reklaitis, G.V., A. Ravindran, and D.M. Ragsdell, *Engineering Optimization-Methods and Applications*. John Wiley.

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.

References

1. Sivanandam S N., Paulraj M., “Introduction to Artificial Neural Networks”, Second Edition, 2005, Vikas Publications.
2. Russell S.J., Norvig P., Canny J.F., “Artificial Intelligence: A Modern Approach”, Prentice Hall, 2003
3. Rajasekaran. S., Pai G.A.V., “Neural Networks, Fuzzy Logic and Genetic Algorithms”, 7th Edition, Prentice Hall India, 2007 By Mukaidono M., Kikuchi H., “Fuzzy Logic for Beginners”, World Scientific, 2001.
4. Bolton, W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition, Addison Wesley Longman: Essex England, 2003.
5. D. Shetty and R. A. Kolk, Mechatronics System Design, PWS Publishing Co., Boston, MA, 1997

ENT478/3
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 force-torque 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.
3. M P Groover, ”Automation, Production systems and Computer Integrated Manufacturing”, Prentice hall, NJ, 1990
4. Phillp John McKerrow, “Introduction to Robotics”, Addison Wesley, NY, 1998
5. Man Zhihong, ‘ Robotics”, Pearson Prentice Hall, Singapore, 2005

ENT 491/3
ROBOTIC CONTROL

Course Synopsis

The objective of this course is to impart knowledge in the application and design aspect of mechatronic system. The course topics include the applications of sensors and transducers, signal conditioning, pneumatic, hydraulic, mechanical and electrical actuators, input and output interfacing, communication systems, programmable logic controllers, microprocessors and fault analysis.

Course Outcomes

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.

References

1. Bolton, W., *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition,* Addison Wesley Longman: Essex England, 2003.
2. D. G. Alciatore and M. B. Histand, *Introduction to Mechatronics and Measurement Systems*. 3rd edition, McGrawHill.
3. D. Shetty and R. A. Kolk, *Mechatronics System Design*, PWS Publishing Co., Boston, MA, 1997.

4. Godfrey C. Onwubolu, "Mechatronics: Principles and Applications", Butterworth-Heinemann 2005.
5. R. Isermann, *Mechatronic Systems: Fundamentals*, Springer-Verlag: Great Britain, 2003.

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

Course Synopsis

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

Course Outcomes

CO1:
Ability to analyze the concepts of state-space design, non-linear 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
2. Charles L. Philips, H. Troy Nagle, "Digital Control Systems Analysis and Design", 3rd ed. Prentice Hall, 1995
3. Gene F. Franklin, J. David Powell, Micheal Workman, "Digital Control of Dynamic Systems", 3rd ed. Addison-Wesley,1998.
4. M. Gopal, "Digital Control and State Variable Methods", McGraw-Hill, 1997.
5. Kevin Warwick," An Introduction to Control Systems", 2nd ed. World Scientific, 1996

ENT 497/3
ARTIFICIAL INTELLIGENCE IN ENGINEERING

Course Synopsis

This course is designed to introduce the fundamentals of Artificial Intelligence (AI). It provides an introduction to definitions of human and artificial intelligence. The students will be exposed to fuzzy systems, artificial neural networks and evolutionary computation. At the end of this course students should know a few major techniques in AI and ability to build simple intelligent systems applied to Mechatronic Engineering.

Course Outcomes

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

CO2:
Ability to perform analysis on different types of AI techniques.

CO3:
Ability to design and evaluate AI techniques for Mechatronics Applications.

References

1. Negnevitsky M., (2004). *Artificial Intelligence: A guide to Intelligent System, 2nd Edition.* Addison Wesley.
2. Sivanandam S N., Paulraj M., (2005). *Introduction to Artificial Neural Networks, Second Edition.* Vikas Publications.
3. Russell S.J., Norvig P., Canny J.F., (2003). *Artificial Intelligence: A Modern Approach.* Prentice Hall.
4. Rajasekaran. S., Pai G.A.V., (2007), *Neural Networks, Fuzzy Logic and Genetic Algorithms, 7th Edition.* Prentice Hall India.
5. Mukaidono M., Kikuchi H., (2001). *Fuzzy Logic for Beginners*. World Scientific.

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

1. S.K. Mitra , 'Digital Signal Processing: A Computer Based Approach', Tata McGraw Hill , 2006.
2. E.C. Ifeachor and B.W. Jervis, 'Digital Signal Processing: A Practical Approach' Prentice Hall, Second Edition 2002.
3. Richard G. Lyons, 'Understanding Digital Signal Processing', Prentice Hall, Second Edition, 2004.
4. J. G. Proakis and D. G. Manolakis, 'Digital Signal Processing: Principles, Algorithms, and Applications', 1989.
5. Stephen W. Smith, 'The Scientist and Engineer's Guide to Digital Signal Processing', California Technical Publishing, 2nd Edition, 2003.
6. John G. Proakis , 'Digital Signal Processing', PEARSON Fourth Edition, 2007.

Career Opportunities

Graduates in these areas will have the ability to engage in the design, research and development, consultancy, education, manufacturing, construction, maintenance, sales and management in many industries such as manufacturing, processing, automotive, aviation and shipping, mining and services, communications and building services and medical industries. Among of the firms that had offered employment opportunities to the graduates of these areas are as follows:

- Vehicle making and installation firms
- Home making appliances firms
- Electronic products firms
- Plant food processors
- Oil and gas companies
- High-tech firms
- Consultant firms
- Engineering & product development firms
- Automation system firms
- Bio-medical engineering firms
- Software development firms
- Research & development agencies
- Hospitals
- Companies, maintenance and repair firms of medical equipment
- Companies, marketing and sale firms of medical equipment
- Manufacturing industry of medical instrumentation

School of Electrical System Engineering

PROGRAMME OFFERED

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

ADDRESS:

School of Electrical System Engineering,
Universiti Malaysia Perlis (UniMAP),
UniMAP Kampus Pauh Putra,
D/A Pusat Pengajian Kejuruteraan Mikroelektronik
Tingkat 1, Blok 12,
02600 Arau, Perlis.
Tel : +604 - 988 5461
Fax : +604 - 988 5462

Introduction

School of Electrical System Engineering offers four programmes, Bachelor of Electrical System Engineering, Bachelor of Industrial Electronic Engineering, Bachelor of Electrical Energy Systems Engineering and Bachelor of Technology in Industrial Power 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 Laboratory, Instrumentation Laboratory, Power 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 provides emphasis on the major fields of power engineering, which includes electrical machines, power systems and high voltage engineering. These are offered as compulsory course so as 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 systems, 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 a broad scope, particularly in the sectors of power generation and energy renewal.

Industrial Power Engineering (RY31)

Bachelor of Technology in Industrial Power Engineering also is a new programme offered in UniMAP. This program focuses on the needs of leading engineers or engineering technologists to develop a more practical and innovative design to solve real problems in the workplace.

The programme is known for quality and responsiveness to industry. In addition to a solid foundation in industrial power concepts, Engineering Technology Degree students learn the most current and relevant topics for today’s advanced technologies. Real world theory and applications are emphasized throughout the in industrial power technology degree program and theory is balanced with extensive hands-on experience.

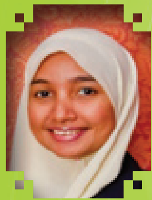
Staff Directory

DEAN
DR. MOHD. FAREQ BIN ABD. MALEK
e-mail: mfareq@unimap.edu.my

DEPUTY DEAN (ACADEMIC AND RESEARCH)
YM. TUNKU MUHAMMAD NIZAR BIN TUNKU MANSUR
e-mail: tunkunizar@unimap.edu.my

DEPUTY DEAN OF STUDENT (DEVELOPMENT AND ALUMNI)
MR. AZRALMUKMIN BIN AZMI
e-mail: azralmukmin@unimap.edu.my

CHAIRPERSON OF DEGREE PROGRAMME (ELECTRICAL SYSTEM ENGINEERING)
MR. NASRUL HELMEI BIN HALIM
e-mail: nasrulhelmei@unimap.edu.my



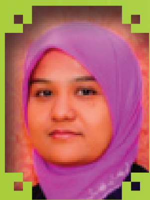
CHAIRPERSON OF DEGREE PROGRAMME (INDUSTRIAL ELECTRONICS ENGINEERING)
MRS. ERNIE BINTI CHE MID
e-mail: ernie@unimap.edu.my

CHAIRPERSON OF DEGREE PROGRAMME (ELECTRICAL ENERGY SYSTEMS ENGINEERING)
MS. NOOR SHAHIDA BINTI JAMOSHID
e-mail: shahida@unimap.edu.my

CHAIRPERSON OF DIPLOMA PROGRAMME (ELECTRICAL ENGINEERING)
MRS. NUR ADYANI BINTI MOHD AFFENDI
e-mail: nuradyani@unimap.edu.my

CHAIRPERSON OF POSTGRADUATE PROGRAMME
PROF. DR. SYED IDRIS BIN SYED HASSAN
e-mail: syedidris@unimap.edu.my

COORDINATOR FOR INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
MR. MUHAMMAD SHAKIR BIN LAILI
e-mail: mshakir@unimap.edu.my



ASSISTANT REGISTRAR
MRS. SHAZLINA BINTI HJ. ISAKH
e-mail: shazlina@unimap.edu.my

Lecturers

Prof. Dr. Ismail bin Daut
Ph.D. in Energy Conservation & Power Eng. (University of Wales, Cardiff, UK)
M.Sc. in Electrical & Electromagnetic Eng. (University of Wales, Cardiff, UK)
B. App.Sc. in Electronic & Industry Technology (USM)
No. Tel: +604-9798729
E-mail : ismail.daut@unimap.edu.my

Prof. Dr. Syed Idris bin Syed Hassan
Ph.D. in Antenna Design (Exeter University)
M.Sc. in Radar and Radio Communication Systems (Birmingham University)
B.Sc. (UKM)
E-mail : syedidris@unimap.edu.my

Prof. Robert Teasdale Kennedy
M.Sc., B.Sc.(Electrical Eng.) (Heriot-Wattt University, Edinburgh, Scotland)
C.Eng. FIEE SMIEEE FIERE
E-mail : robert@unimap.edu.my

PM. Ir. Abdul Rashid bin Haron
Certificate in Training and Development, Institute of Training and Development, UK
B.Sc. (Electrical Engineering) (University of Aston in Birmingham, UK)
M.Sc. (Electrical Power Engineering & Management), University of Dundee/University of Abertay Dundee, UK)
E-mail : rashidharon@unimap.edu.my

Prof. Madya Shamshul Bahar bin Yaakob
M.Eng (Artificial Intelligent) - Nagaoka University, Japan
B.Eng (Electrical Electronic Systems) - Shizuoka University, Japan
E-mail : shamshul@unimap.edu.my

Dr. Mohd Fareq bin Abd. Malek
Ph.D (Radio Frequency, Microwave and Free Electron Maser), Liverpool, U.K
M.Sc. (Eng.) Distinction (Microelectronic Systems and Telecommunications), Liverpool, U.K
B.Eng. (Hons)(Electronic and Communication Engineering), Birmingham, UK
E-mail : mfareq@unimap.edu.my

Dr. S.Thangaprakash
Ph.D. (Power Electronics)(Anna University Chennai, India)
M.E. (Power Electronics and Drives)(Anna University Chennai, India)
B.E. (Electrical & Electronics Engineering)(Bharathiar University, India)
E-mail : thangaprakash@unimap.edu.my

Dr. Khor Shing Fhan
Ph.D. (Materials Science)(UPM)
B.Sc.with Edu. (Hons.)(Physics) (UPM)
E-mail : sfkhor@unimap.edu.my

Dr. Nuriziani binti Hussin
Ph.D. (High Voltage Engineering) (University of Southampton, UK)
B.Eng. (Electrical Engineering) (University of Southampton, UK)
E-mail : nuriziani@unimap.edu.my

Dr. Dina Maizana Maiz Ahmad
Ph.D. (Transformer Design) (UniMAP)
Magister Technic (MT) in Electrical Conservation (Institut Teknologi Bandung (ITB), Indonesia)
B.Eng.(Electrical Technique) (Universiti Sumatera Utara (USU), Indonesia)
E-mail : dina@unimap.edu.my

Dr. Mohd. Abdur Rashid
Ph.D. (Electrical & Information Eng.)(Ryudai, Japan)
Master's (Electrical & Electronics Eng.)(Ryudai, Japan)
M.Eng. (Electrical & Computer Eng.)(Waterloo Univ. Canada)
B.Sc. (Electrical & Electronic Eng.)(KUET, Bangladesh)
E-mail : abdurrashid@unimap.edu.my

Dr. Samila binti Mat Zali
Ph.D (Electrical Energy & Power Systems)(University of Manchester)
M.Sc.(Electrical)(UKM)
B.Eng(Electrical)(UKM)
E-mail : samila@unimap.edu.my

Mr. Ahmad Shukri Fazil bin Rahman
M.Sc.(Electrical)(UiTM),
B.Eng.(Hons)(Electrical Instrument)(UiTM)
Dip. in Electrical (Electronic)(ITM)
E-mail : ahmadshukri@unimap.edu.my

Mr. Azralmukmin bin Azmi
M. Eng. Electrical (Power) (UTM)
B. Eng. (Hons)(Electrical System Eng.) (UniMAP)
Dip. in Eng. (Electrical-Power)(UTM)
E-mail : azralmukmin@unimap.edu.my

Mr. Baharuddin bin Ismail
M.Sc.(Electrical & Electronic)(USM)
B.Eng.(Hons)(Electrical)(UTM)
E-mail : baha@unimap.edu.my

YM. Engku Ahmad Rafiqi bin Engku Ariff
M.Sc.(Electrical Power Eng.), (Newcastle University, United Kingdom)
B.Sc.(Electrical Eng.)(Purdue University, West Lafayette, United States)
E-mail : rafiqi@unimap.edu.my

Mrs. Ernie binti Che Mid
M.Sc.(Electrical Eng.)(UM)
B.Eng.(Hons)(Electrical Eng.)(UM)
E-mail : ernie@unimap.edu.my

Mr. Gomesh Nair A/L Shasidharan
M.Sc. Electrical Systems Eng. (UniMAP),
B.Eng.(Hons)(Industrial Electronics Eng (UniMAP))
E-mail : gomesh@unimap.edu.my

Mrs. Hana binti Abdull Halim
M. Eng. Electrical-Power (UTM)
B. Eng. (Hons) Electrical and Electronics Engineering (UTP)
E-mail : hanahalim@unimap.edu.my

Mr. Indra Nisja
M.Eng.(Electrical Power Eng.)(UPM)
B.Sc.(Electrical Eng.)(Univesitas Bung Hatta, Indonesia)
No. Tel: +604-9798655
E-mail : indra@unimap.edu.my

Ms. Latifah binti Mohamed
M.Eng.(Electrical & Electronics)(Iwate University, Japan)
B.Eng.(Hons)(Electrical & Electronics)(Iwate University, Japan)
E-mail : latifah@unimap.edu.my

Ms. Melaty binti Amirruddin
M. Eng.Electrical- Power (UTM)
B. Eng.(Hons) Electrical and Electronics Engineering (UTP)
E-mail : melaty@unimap.edu.my

Mr. Mohd. Irwan bin Yusoff
M.Sc. of Electrical System(UniMAP)
B.Eng.(Hons)(Electrical System Eng.)(UniMAP)
E-mail : irwanyusoff@unimap.edu.my

Mr. Muhammad Irwanto Misrun
Magister Technic(MT)(Electrical Eng.)(Gadjah Mada University Jogjakarta Indonesia (UGM))
Bech. in (Electrical Eng.)(Medan Institute of Technology Medan Indonesia (ITM))
E-mail : irwanto@unimap.edu.my

Mr. Muhammad Shakir bin Laili
M.Eng.(Electrical-Power)(UTM)
B.Eng.(Electrical)(UTM)
E-mail : mshakir@unimap.edu.my

Mr. Muhd. Hafizi bin Idris
M.Eng (Electrical - Power)(UTM)
B.Eng.(Hons) in Electric & Electronic Eng. (Electrical Power)(UKM)

Mr. Muzaidi Othman @ Marzuki
M.Eng.(Industrial Electronic and Control)(UM)
B.Eng.(Hons)(Electrical System Eng.)(UniMAP)
Dip.in.Eng.(Power Electronic and Control)(Polimas)
E-mail : muzaidi@unimap.edu.my

Mr. Nasrul Helmei bin Halim
M.Eng.(Electrical-Power)(UTM)
B.Eng.(Hons)(Electrical System Eng.)(UniMAP)
Dip.in Electrical Engineering (Power)(UTM)
No. Tel: +604-9851517
E-mail : nasrulhelmei@unimap.edu.my

Ms. Noor Ashikin binti Mohd Razali
M.Eng. Electrical (High Voltage)(UTM)
B.Eng.(Hons)(Electrical and Electronic Eng.)(UKM)
E-mail : ashikinrazali@unimap.edu.my

Mr. Noor Hasnizam bin Hanafi
M.Eng.(Electrical)(UTHM)
B.Eng. in Electrical Eng.(Power)(UiTM)
Dip. in Electrical Eng.(Power)(ITM)
E-mail : hasnizam@unimap.edu.my

Ms. Noor Shahida binti Jamoshid
M.Eng.(Electrical - Power)(UTM)
B.Eng.(Hons)(Electrical)(UTM)
Dip. in Power Electrical (UTM)
E-mail : shahida@unimap.edu.my

Ms. Noor Syafawati binti Ahmad
M.Sc. (Electrical System Engineering)(UniMAP)
B.Eng. (Electrical Engineering)(UTHM)
E-mail : syafawati@unimap.edu.my

Mrs. Nor Baizura binti Ahamad
M.Eng. Electrical (Industrial Electronic & Control)(UM)
B.Eng.(Hons)(Electrical Systems Eng.)(UniMAP)
Dip. in Eng. (Technology Computer)(PSP)
E-mail : baizura@unimap.edu.my

Mr. Norjasmi bin Abdul Rahman,
M.Sc.(Tech) Electronics and Electrical Eng. (Electrical Drives)(Aalto University)
B.Eng.(Hons)(Industrial Electronic Eng.)(UniMAP)
Dip. in Electrical Engineering (Electronics)(UiTM)
E-mail : norjasmi@unimap.edu.my

Mrs. Norshafinash binti Saudin
M.Eng.(Electrical-Power)(UTM)
B.Eng.(Hons)(Electrical)(UTM)
E-mail : norshafinash@unimap.edu.my

Mrs. Nor Hanisah binti Baharudin
M.Eng.Sc. (Renewable Energy Electrical Power Systems)(Curtin)
B.Eng.(Hons)(Electrical & Electronics)(UTP)
E-mail : norhanisah@unimap.edu.my

Ms. Nurhakimah binti Mohd Mukhtar
M.Eng.(Industrial Electronic & Control)(UM)
B.Eng.(Hons)(Electrical System Eng.)(UniMAP)

Mrs. Nur Adyani binti Mohd. Affendi
M.Eng. (Electrical-Electronic & Telecommunication)(UTM)
B.Eng.(Hons)(Industrial Electronic)(KUTKM)
Dip. of Electronic Communication (PUO)
E-mail : nuradyani@unimap.edu.my

Mrs. Nur Hafeizza binti Ramly
M.Sc.(Electrical-Power)(UTM)
B. Eng.(Electrical & Electronics (Electronics))(UMP)
E-mail : hafeizza@unimap.edu.my

Ms. Nur Sabrina binti Mood Noorpi
M. Eng. Electrical-Power (UTM)
B. Eng. (Hons) Electrical and Electronics Engineering (UTP)
E-mail : nursabrina@unimap.edu.my

Mrs. Risnidar Chan Bahaudin
Magister Technic(MT)(Power Systems)(Institut Teknologi Bandung (ITB), Indonesia)
B.Sc.(Power System)(Universiti Sumatera Utara (USU), Indonesia)
E-mail : risnidar@unimap.edu.my

Mr. Shuhaimi bin Zakaria @ Abdullah
M.Sc. (Electrical System Engineering)(UniMAP)
B.Eng.(Hons)(Computer & Communication Eng.)(USM)
E-mail : shuhaimi@unimap.edu.my

Mrs. Surina binti Mat Suboh
M.Sc.(Electrical Eng.)(Robotics & Control)(USM)
B.Eng.(Electrical & Electronics Eng.)(UPM)
E-mail : surina@unimap.edu.my

Mr. Surya Hardi Amrin
Magister Technic(MT)(Electrical Power System)(Institut Teknologi Bandung (ITB), Indonesia)
B.Sc.(Electrical Eng,)(Universiti Sumatera Utara (USU), Indonesia)
E-mail : surya@unimap.edu.my

Mr. Syafruddin bin Hasan
Magister Technic(MT)(Electrical Eng.)(Institut Teknologi Bandung (ITB), Indonesia)
B.Sc.(Electrical Eng.)(Universiti Sumatera Utara (USU), Indonesia)
E-mail : syafruddin@unimap.edu.my

YM. Tunku Muhammad Nizar bin Tunku Mansur
MIEEE, Grad.IEM(Electrical)
M.Eng.Sc. (Renewable Energy Electrical Power Systems)(Curtin)
B.Eng.(Hons)(Electrical & Electronics)(UTP)
E-mail : tunkunizar@unimap.edu.my

Mr. Yazhar bin Yatim
M.Sc. Power Eng.(BTU Cottbus, Germany)
B.Eng.(Electrical Systems Eng.)(UniMAP)
Dip.Electrical Eng.(Communication)(UTM)
E-mail : yazhar@unimap.edu.my

Mrs. Zetty Nurazlinda binti Zakaria
M.Eng.(Electrical-Power)(UTM)
B.Eng.(Electrical)(UTM)
E-mail : zetty@unimap.edu.my

Mrs. Haziah binti Abdul Hamid
M.Eng (Electrical)(UTM)
B.Eng (Electrical Power)(UTM)
E-mail : haziah@unimap.edu.my

Mr. Ahmad Zaidi bin Abdullah
M.Eng (Electric Power System)(UNITEN)
B.Eng (Hons) (Industrial Electronic)(UniMAP)
Dip.in Electrical Eng.(Communication Eng.) (POLIMAS)
E-mail : zaidiabdullah@unimap.edu.my

Mr. Mohd. Asri bin Jusoh
B.Eng. (Industrial Electronic)(UniMAP)
M.Sc. (Machine Design)(UniMAP)
E-mail : asrijusoh@unimap.edu.my

Mrs. Siti Khodijah binti Mazalan
B.Eng. (Electrical System)(UniMAP)
M.Sc. (Electrical Power)(UniMAP)
E-mail : khodijah@unimap.edu.my

Mr. Syahrun Nizam bin Md Arshad @ Hashim
M.Eng. (Electrical-Power)(UTM)
B.Eng.(Electrical)(UTM)
Dip. in Electrical Eng.(Electronic)(UiTM)
E-mail : syahrunnizam@unimap.edu.my

Ms. Syatirah bin Mohd Noor
B.Eng. (Industrial Electronic)(UniMAP)
M.Sc. (Machine Design)(UniMAP)
E-mail : syatirah@unimap.edu.my

Ms. Noor Anida binti Abu Talib
M.Sc. (Mechanical Engineering)(UTHM)
B.Eng.(Mechanical Engineering)(UTHM)
E-mail : anidatalib@unimap.edu.my

Mr. Musdar bin Dahlan
M.Eng (Signal Electronic System, Gajah Mada University, Yogyakarta, Indonesia)
B.Eng (Electric Power Engineering, Medan Institut of Technology, Medan, Indonesia)
E-mail : musdar@unimap.edu.my

Mr. Mohd Zamri bin Hasan
M.Eng. (Electrical & Electronics)(University of Miyazaki, JPN)
B.Eng.(Electrical & Electronics Eng.)(University of Miyazaki, JPN)
Diploma (Electrical Eng)(Kagoshima National College of Technology, JPN)
E-mail : zamrihasan@unimap.edu.my

Mr. Mohd Saufi bin Ahmad
M.Sc. (Electrical Machines & Drive) (USM)
B.Eng.(Electrical & Electronics Eng.)(USM)
E-mail : saufiahmad@unimap.edu.my

Ms. Farrah Salwani binti Abdullah
M.Eng. (Electrical Eng.)(UTHM)
B.Eng.(Electrical & Electronic Eng.) (UTHM)
E-mail : farrahsalwani@unimap.edu.my

Mrs. Azuwa binti Ali
M.Eng. (Communication & Computer)(UKM)
B.Eng.(Electrical & Electronics Eng.)(UTP)
E-mail : azuwa@unimap.edu.my

Mrs. Ami Nurul Nazifah binti Abdullah
M.Sc. (Electrical Power System) (UPM)
B.Eng.(Hons)(Electrical System Eng.)(UniMAP)
E-mail : nazifah@unimap.edu.my

Ms. Adawati binti Yusof
M.Eng. (Industrial Electronic and Control) (UM)
B.Eng. (Hons)(Industrial Electronics Eng)(UniMAP)
E-mail : adawati@unimap.edu.my

Teaching Engineers

Mr. Ahmad Muhyiddin bin Yusof
B.Eng.(Electrical Power)(UTM)
E-mail : muhyiddin@unimap.edu.my

Mrs. Arizadayana binti Zahalan
B.Eng.(Hons)(Electrical & Electronic Eng.)(USM)
E-mail : arizadayana@unimap.edu.my

Mrs. Diyya Hidayah binti Abd. Rahman
B.Eng.(Hons)(Electrical System Eng.)(UniMAP)
E-mail : dhidayah@unimap.edu.my

Mrs. Habibah Hj. Mokhtaruddin
B.Eng.(Hons)(Industrial Electronics Eng.)(UniMAP)
Dip. Kejuruteraan Elektronik (Komputer)(PUO)
E-mail : habibah@unimap.edu.my

Mr. Jimirafizi bin Jamil
B.Eng.(Hons)(Electrical Eng.) (MMU),
Dip. in Electric Communication Eng. (UTM)
E-mail : rafizi@unimap.edu.my

Ms. Junaidah binti Ali Mohd. Jobran
M.Eng.(Electrical-Power)(UTM),
B.Eng.(Hons)(Electrical)(USM),
Adv. Dip. in Opto - Electronic & Photonic (Advance Manufacturing Institute)
E-mail : junaidah@unimap.edu.my

Mrs. Khairul Nadiah binti Khalid
B.Eng.(Electrical)(UTM)
E-mail : khairulnadiah@unimap.edu.my

Mr. Mohd. Adzrie bin Hj. Radzali
B. Eng.(Hons) Mechanical Engineering (Multimedia University)
E-mail : mohdadzrie@unimap.edu.my

Mr. Mohd. Zulhisham bin Mohd. Radzi
B.Eng.(Hons)(Electrical System Eng.)(UniMAP)
E-mail : mzulhisham@unimap.edu.my

Mrs. Norhanisa binti Kimpol
B.Eng.(Hons)(Electrical Eng.) (Communication)(UiTM)
Dip. in Electrical Eng. (Electronics) (UiTM)
E-mail : norhanisa@unimap.edu.my

Mr. Nor Haidar bin Hashim
B.Eng.(Electrical Eng. Power) (UiTM)
Dip. in Electrical Eng. (ITM)
E-mail : haidar@unimap.edu.my

Mrs. Nurhafiza binti Azizan
B.Eng.(Hons)(Industrial Electronics Eng.)(UniMAP)
Dip. in Electrical (Instrumentation) (UiTM)
E-mail : hafizaazizan@unimap.edu.my

Mr. Pungut bin Ibrahim
B.Eng. Electrical (UTM)
Dip. Public Admin (UiTM)
E-mail : pungut@unimap.edu.my

Mrs. Salsabila binti Ahmad
B.Eng.(Hons)(Electrical & Electronic)(UNITEN)
Adv. Dip. in Industrial Automation (Selangor Human Resource Development Centre)
E-mail : salsabila@unimap.edu.my

Mr. Syed Akhmal bin Syed Jamalil
B.Eng.(Hons)(Industrial Electronics Eng.)(UniMAP)
E-mail : syedakhmal@unimap.edu.my

Fellow Slab

Pn. Norkharziana binti Mohd Nanyan
M.Sc.(Electrical & Electronic Eng.)(USM)
B.Eng.(Hons)(Electrical Eng.)(UTM)

Study Leave

Mr. Muzamir bin Isa
M.Eng.(Elect.)(KUiTTHO & FH Koln, Germany)
B.Eng.(Elect.Power)(UTM)
E-mail : muzamir@unimap.edu.my

Mr. Rosnazri bin Ali
M.Sc.(Electrical & Electronic Engineering)
B.Eng. (Hons)(Electrical Engineering) (RMIT Melbourne)
E-mail : rosnazri@unimap.edu.my

Mr. Mohd. Rafi bin Adzman
M.Sc.(Technology) in Electrical Engineering (Electrical Power)(TKK Finland)
B.Eng.(Hons) in Electrical Engineering (Electrical Power)(UiTM)
Dip. in Electrical Engineering (Electrical Power)(ITM)
E-mail : mohdrafi@unimap.edu.my

Mrs. Shahrul Ashikin binti Azmi
M.Eng.(Electrical Power)(University of New South Wales (UNSW), Australia)
B.Sc.(Hons)(Electrical & Electronics Eng.)(UTP)
E-mail : ashikin@unimap.edu.my

Mr. Fijay bin Fauzi
M.Eng.(Electical - Mechatronic and Automatic Control)(UTM)
B.Eng. in Electrical (Power)(UTM)
E-mail : fijay@unimap.edu.my

Mr. Mohammad Faridun Naim bin Tajuddin
M.Eng.(Electrical Energy & Power System)
B.Eng.(Hons)(Electrical Eng.)(UM)
E-mail : faridun@unimap.edu.my

Mrs. Amizah binti Mohd Ariffen
B.Eng.(Hons)(Electrical)(UTM)
E-mail : amizah@unimap.edu.my

Mrs. Siti Rafidah binti Abdul Rahim
M.Sc.(Electrical Eng.-Power System)(UiTM)
B.Eng.(Hons)(Electrical Eng.-Power System)(UiTM)
Dip. in Electrical Eng. (Power)(UTM)
E-mail : rafidah@unimap.edu.my

Mr. Abdul Rahim bin Abdul Razak
M.Sc.(Electrical Power)(USM)
B.Eng.(Electrical Power)(USM)
E-mail : abdulrahim@unimap.edu.my

Mr. Mohd. Fayzul bin Mohammed
M.Eng.(Electrical Energy & Power System Eng.)(UM)
B.Eng.(Hons) in Electric, Electronic & System (UKM)
E-mail : m.fayzul@unimap.edu.my

Mr. Zainuddin bin Mat Isa
M.Sc.(Electrical Eng.)(KUTKM)
B.Eng.(Hons)(Electrical)(UTM)
E-mail : zainuddin@unimap.edu.my

Mr. Muhamad Hatta bin Hussain
M.Eng. (Electrical-Electronic & Telecommunication)(UTM)
B.Eng.(Hons)(Electrical)(UiTM)
Dip. in Electrical Eng. (ITM)
E-mail : muhdhatta@unimap.edu.my

Assistant Engineer

Mrs. Norsyakiela binti Ramli
E-mail : syakiela@unimap.edu.my

Technicians

Mr. Ahmad Fadhli bin Zainol
E-mail : ahmadfadhli@unimap.edu.my

Mr. Ahmad Saiful bin Salim
E-mail : saifulsalim@unimap.edu.my

Mr. Ahmad Zaker bin Roslan
E-mail : ahmadzaker@unimap.edu.my

Mr. Aidil Syukri bin Shaari
E-mail : aidil@unimap.edu.my

Mr. Arif Firdaus bin Mohd. Yunus
E-mail : arif@unimap.edu.my

Mrs. Mahshithah binti Mohamad
E-mail : mahshithahmohamad@unimap.edu.my

Mr. Mohamad Fuad bin Ahmad
E-mail : fuadahmad@unimap.edu.my

Mr. Mohamad Khairi bin Mohd. Zahir
E-mail : mkhairi@unimap.edu.my

Mr. Mohd. Ariff bin Yusoff
E-mail : ariffyusoff@unimap.edu.my

Mr. Mohd. Azlizan bin Moh Adib
E-mail : azlizan@unimap.edu.my

Mr. Mohd. Azrin bin Che Tam
E-mail : azrin@unimap.edu.my

Mr. Mohd. Faizal bin Mohd Zahir
E-mail : faizalzahir@unimap.edu.my

Mr. Mohd. Hafis bin Md. Nor
E-mail : mohdhafis@unimap.edu.my

Mr. Mohd. Hazri bin Che Nadzir
E-mail : mohdhazri@unimap.edu.my

Mr. Mohd. Izanne bin Harun
E-mail : izanne@unimap.edu.my

Mr. Mohd. Nor Ekhsan bin Nordin
E-mail : ekhsan@unimap.edu.my

Mr. Mohd. Khairul bin Abidin
E-mail : khairulabidin@unimap.edu.my

Mr. Nazril bin Husny
E-mail : nazril@unimap.edu.my

Mr. Shuhaimi bin Sulaiman
E-mail : shuhaimis@unimap.edu.my

Ms. Siti Najihah binti Zakaria @ Abdullah
E-mail : sitinajihah@unimap.edu.my

Mrs. Roshila binti Hamzah @ Mohamed
E-mail : roshila@unimap.edu.my

Chargeman

Mr. Shukur bin Abdullah
No. Tel: +604-9853036
E-mail : shukur@unimap.edu.my

Mr. Azliman bin Musa
No. Tel: +604-9853036
E-mail : azliman@unimap.edu.my

Administrative Staffs

Mrs. Shazlina binti Hj. Isakh
Assistant Registrar
No. Tel: +604-9885463
E-mail : shazlina@unimap.edu.my

Mrs. Nordiana binti Jamadin
Dean's Secretary
No. Tel: +604-9885461
E-mail : nordiana@unimap.edu.my

Mrs. Haslina binti Ahmad
Clerk
E-mail : haslinaahmad@unimap.edu.my

Mrs. Nurul Nadiah binti Kamarudin
Clerk
E-mail : nurulnadiah@unimap.edu.my

Mrs. Azizah binti Hassan
Clerk
E-mail : azizahhassan@unimap.edu.my

Mr. Muhammad Fazly bin Mansor
Officer
E-mail : mfazlym@unimap.edu.my

Electrical System Engineering Programme Objectives (PEO)

Programme Objective 1
Graduates who are leaders in the field of electrical engineering 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.

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

PO3
Ability to design a system, component or process to meet desired needs.

PO4
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO5
Ability to use techniques, skills and modern engineering tools necessary for engineering practices

PO6
Ability to demonstrate/understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO7
Ability to demonstrate/understand entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO8
Understanding of professional and ethical responsibilities and commitment to the society.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively.

PO11
Understanding 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	III	IV	V	VI		VII	VIII
Engineering Core (98)	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	EIT302/4 Industrial Training	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		EET414/3 Substation Design	
								EETXXX/3 Elective I	EETXXX/3 Elective II
Non Engineering (22)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics					
		EUT122/2 Skills And Technology in Communication			EUT440/3 Engineers in Society	EETxxx/2 Engineering Economics			EUT443/2 Engineering Management
		ECT111/3 Engineering Skills							
University Required (15)	UUW233/2 Islamic Civilization and Asia Civilization			UUW223/2 University English Language		UUW322/2 Thinking Skills		UUWXXX/2 Option	
	UUW114/2 University Malay Language		EUWXXX/1 Co-curriculum	UUW224/2 Engineering Entrepreneurship					
	UUW235/2 Ethnic Relation								
135	15	17	17	17	17	17	4	16	15
Total Units for Graduation 135									

Elective I: EET427/3 Industrial Electronic Control or EET426/3 Power Electronics II or EET431/3 Electrical Energy System
Elective II: EET418/3 Power Quality or EET433/3 Renewable Energy System

School of Electrical System Engineering

Industrial Electronic Engineering Programme Objectives (PEO)

Programme Objective 1
Graduates who are leaders in the field of electrical engineering 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.

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

PO3
Ability to design a system, component or process to meet desired needs.

PO4
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO5
Ability to use techniques, skills and modern engineering tools necessary for engineering practices

PO6
Ability to demonstrate/understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO7
Ability to demonstrate/understand entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO8
Understanding of professional and ethical responsibilities and commitment to the society.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively.

PO11
Understanding 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	III	IV	V	VI		VII	VIII
Engineering Core (98)	EET106/3 Engineering Science	EET110/3 Computer Programming	EET206/3 Electric Circuit II	EET208/3 Electrical Power Technology	EET301/4 Power System Engineering	EET308/3 Power System Analysis	EIT302/4 Industrial Training	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		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
Non Engineering (22)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics					
		EUT122/2 Skills And Technology in Communication			EUT440/3 Engineers in Society	EETXXX/2 Engineering Economics			EUT443/2 Engineering Management
		ECT111/3 Engineering Skills							
University Required (15)	UUW233/2 Islamic Civilization and Asia Civilization			UUW212/2 University English Language		UUW322/2 Thinking Skills		UUWXXX/2 Option	
	UUW114/2 University Malay Language		EUWXXX/1 Co-curriculum	UUW224/2 Engineering Entrepreneurship					
	UUW235/2 Ethnic Relation								
135	16	17	17	17	17	17	4	16	15
Total Units for Graduation 135									

Elective:
EET412/3 Electrical Machine Design or EET414/3 Substation Design or EET432/3 Electrical Energy Utilization

Electrical Energy Systems Engineering Programme Objectives (PEO)

Programme Objective 1
Graduates who are leaders in the field of electrical engineering 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.

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

PO3
Ability to design a system, component or process to meet desired needs.

PO4
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO5
Ability to use techniques, skills and modern engineering tools necessary for engineering practices

PO6
Ability to demonstrate/understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO7
Ability to demonstrate/understand entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO8
Understanding of professional and ethical responsibilities and commitment to the society.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively.

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

PO12
Demonstrate understanding of project management and finance principles

Curriculum Structure for Bachelor of Engineering (Honours) (Electrical Energy Systems Engineering)

YEAR		FIRST		SECOND		THIRD			FOURTH	
SEMESTER		I	II	III	IV	V	VI		VII	VIII
Engineering Core (98)		EET106/3 Engineering Science	EET110/3 Computer Programming	EET206/3 Electric Circuit II	EET208/3 Electrical Power Technology	EET301/4 Power System Engineering	EET308/3 Power System Analysis	EIT302/4 Industrial Training	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		EET424/3 Power Electronics For Energy System	
									EETXXX/3 Elective I	EETXXX/3 Elective II
Non Engineering (22)		EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics					
			EUT122/2 Skills And Technology in Communication			EUT440/3 Engineers in Society	EETXXX/2 Engineering Economics			EUT443/2 Engineering Management
			ECT111/3 Engineering Skills							
University Required (15)		UUW233/2 Islamic Civilization and Asia Civilization			UUW223/2 University English Language		UUW322/2 Thinking Skills		UUWXXX/2 Option	
		UUW114/2 University Malay Language		EUWXXX/1 Co-curriculum	UUW224/2 Engineering Entrepreneurship					
		UUW235/2 Ethnic Relation								
135		15	17	17	17	17	17	4	16	15
Total Units for Graduation 135										

Elective:
EET427/3 Industrial Electronic Control or EET426/3 Power Electronics II or EET411/3 Power System Operation and Control

Industrial Power Engineering Programme Objectives (PEO)

Programme Objective 1
Graduates are leaders in the field of electrical engineering as demonstrated through career advancement.

Programme Objective 2
Graduates who are members and contribute to professional society.

Programme Objective 3
Graduates pursue continuing education opportunities.

Programme Objective 4
Graduates make contributions through research and development.

Programme Objective 5
Graduates who are entrepreneurs.

Programme Outcomes (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles.

PO2
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs.

PO3
Plan and conduct experimental investigations of broadly-defined problems.

PO4
Select and apply appropriate techniques, resources and modern engineering tools.

PO5
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to electrical engineering technology

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an understanding of professional and ethical responsibilities and commitment to the community for sustainable development.

PO9
Recognize the need for professional development and to be engage in independent and lifelong learning.

PO10
Demonstrate an awareness of management, business practices and entrepreneurship.

Curriculum Structure for Bachelor of Engineering Technology (Honours) (Industrial Power Engineering)

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	SEMESTER	I	II	III
DISCIPLINE CORE (105)	PLT101/3 Computer programming	PLT105/3 Electric Circuit Theory I	PLT201/3 Electric Circuit Theory II	PLT205/4 Electrical Machines Technology I	PLT301/4 Electrical Machines Technology II	PLT340/4 Final Year Project I	PLT440/6 Final Year Project II	PLT400/12 Industrial Training
	PLT102//2 Computer Aided Drafting (CAD)	PLT106/3 Digital Electronics	PLT202/3 Measurement & Instrumentation	PLT206/3 Microprocessor System & Microcontroller	PLT302/3 Electrical Installation I	PLT306/3 Electrical Installation II	PLT401/3 Power System Protection & Switchgear	
	PCT111/3 Engineering Skills I	PLT107/3 Electronics I	PLT203/3 Electronics II	PLT207/3 Power Electronic	PLT303/3 Electrical Drives	PLT307/3 Programmable Logic Controller *(PLC)*	**PLT4XX/3 Elective II	
		PLT108/3 Engineering Skills II	PLT 204/3 Electromagnetic Field Theory	PLT208/3 Communication System	PLT304/4 Electrical Power System	*PLT3XX/3 Elective I	***PLT4XX/3 Elective III	
				PLT209/3 Signal & Systems	PLT305/3 Control System Technology			
COMMON CORE (18)	PQT111/3 Mathematics for Engineering Technology I	PQT112/3 Mathematics for Engineering Technology II	PQT213/3 Mathematics for Engineering Technology III					
	PLT104/3 Engineering Science					EUT442/3 Engineering Management	EUT444/2 Engineers in Society	
UNIVERSITY REQUIRED (17)	UUW223/2 University English Language	UUW114/2 University Malay Language	UUW233/2 Islamic Civilization and Asia Civilization	UUW235/2 Ethnic Relation	UUW322/2 Thinking Skills	UUWXXX/2 Option subjects		
	EUT122/2 Skills & Technology in Communication	EUWXXX/1 Co-Curricular Activity	UUW224/2 Engineering Entrepreneurship					
140	18	18	19	18	19	18	18	12
Total Units for Graduation 140								

Elective I	Elective II	Elective III
A1: PLT 308/3 Power Quality A2: PLT 309/3 Substation Maintenance	B1: PLT 402/3 Industrial Automation B2: PLT403/4 High Voltage Technology	C1: PLT 404/3 Renewable Energy System C2: PLT 405/3 Energy Efficiency & Management

EET103/4
ELECTRICAL TECHNOLOGY

Course Synopsis

This course is offered to non-electrical 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

CO1:
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

1. Richard J. Fowler. (2008). Electricity Principles and Applications. 7th Edition. Mc Graw Hill.
2. Boylestad, Robert L. (2007). Introductory Circuit Analysis. 11th Edition. Prentice Hall..
3. 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.
5. 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.

References

1. Y.A.Cengal and M.A. Boles. (2008). Thermodynamics: An Introduction Approach', 6th Ed., McGraw-Hill.
2. William D. Callister, Jr. (2007). Materials Science and Engineering: An Introduction. 7th ed.
3. Robert L. Mott. (2006). Applied Fluid Mechanics. 6th ed. Pearson.
4. Yunus A. Cengel, Robert H. Turner. (2005). Fundamentals of Thermal-Fluid Sciences. Int ed. McGraw-Hill.
5. Lim Poh Seng, Tay Seng How, Koh Kok Pin. (2003). Strength of Materials for Polytechnic. Revised ed. Prentice Hall.

EET 107/3
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. Floyd. TL. (2009). Digital Fundamentals. 10th Ed. Prentice Hall.
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 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 important equations 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 steady-state sources using complex impedances and phasor representations.

References

1. Nilssen, J.W. and Riedel, S.(2008) Electric Circuits, 8th Edition, Addison Wesley.
2. Robert L. Boylestad. (2007) Introductory Circuit Analysis. 11th Ed. Prentice Hall.
3. 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.

EET 109/3
ELECTRONIC DEVICES

Course Synopsis

EET 109 will expose the students with basic electronic devices. It provides a depth study on the concept of PN junction, operation and characteristics of the diode. The students will be emphasized to Half wave rectifiers, Full wave rectifiers, Power Supply Filter and Regulators, Clipper and Clamper Diode circuits and Voltage Multipliers. The students also will learn about the special-purpose of Zener diode in terms of its characteristics and applications. Bipolar Junction Transistors (BJTs) and various types of Field-Effect Transistor which are Junction Field-Effect Transistor (JFET) and the Metal Oxide Semiconductor Field-Effect Transistor (MOSFET) will be introduced in this course as well.

Course Outcomes

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

1. Neamen Donald A. (2010). Microelectronics Circuit Analysis and Design. 4th Ed. McGraw Hill. Int. Ed.
2. Robert L. Boleystad.. (2009). Electronic Devices and Circuit Theory. 10th Ed. Prentice Hall
3. T. Robert Paynter. (2009). Introductory Electronic Devices and Circuits. 10th Ed. Prentice Hall
4. Thomas L. Floyd. (2008). Electronic Devices: Conventional Current Version. 8th Ed. Prentice Hall
5. Puspa Inayat Khalid, Rubita Sudirman, Siti Hawa Ruslan. (2001). Modul Pengajaran Elektronik 1. Edisi ke 3

EET 110/3
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.

References

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

PLT101/3
COMPUTER PROGRAMMIG

Course Synopsis

The main objective of this course is to prepare the students with the ability of problem solving with programming, to be able to do analysis with the programming tools such as organization chart, IPO chart, flowchart and pseudo code and then to implement them by developing C program.

Course Outcomes

CO1:
Ability to define and describe programming concepts and principles.

CO2:
Ability to apply programming techniques and tools such as flowchart and pseudo code to design computer programs.

CO3:
Ability to apply GNU/Linux for coding, compiling, executing and debugging computer programs.

References

1. Cheng, H. (2010). C for Engineers and Scientists. McGraw Hill.
2. Deitel, Sudin S. (2006). C How To Program. Pearson-Prentice Hall.
3. Hanly, J.R. and Koffman, E.B. (2001). C Program Design for Engineers. 2nd Edition. Addison-Wesley.

PLT102/2
COMPUTER AIDED DRAFTING (CAD)

Course Synopsis

This is a core subject. It will expose the students to understand the concepts of Computer Aided Drafting. Student also would able to illustrate engineering drawing, 2D & 3D modelling and construct a product drawing.

Course Outcomes

CO1:
Ability to apply fundamental concepts of Computer Aided Drafting.

CO2:
Ability to illustrate engineering drawing by using proper techniques.

CO3:
Ability to use of Computer Aided Drafting to construct a simple product drawing.

CO4:
Ability to perform in groups to illustrate 2D and 3D modeling.

References

1. Alan J Kalameja. (2008). AutoCAD 2008 Tutor for Engineering Graphics'. Delmar Learning.
2. James A. Leach. (2007). AutoCAD 2007 instructor: a student guide to complete coverage of Autocad's commands and features. McGraw Hill.
3. David Frey. (2007). AutoCAD 2007 & AutoCAD LT 2007: no experience required. In:Wiley.
4. Paul Whelan; alih bahasa, T.H. Lai. (1999). AutoCAD LT:cara mudah. Federal Publications.

PLT104/3
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.

CO4:
Ability to work in team and communicate effectively.

References

1. William D. Callister, Jr. (2007). Materials Science and Engineering: An Introduction. 7th ed.

2. Yunus A. Cengel, Robert H. Turner. (2005). Fundamentals of Thermal-Fluid Sciences. Int ed. McGraw-Hill.
3. Lim Poh Seng, Tay Seng How, Koh Kok Pin. (2003). Strength of Materials for Polytechnic. Revised ed. Prentice Hall.
4. Robert L. Mott. (2006). Applied Fluid Mechanics. 6th ed. Pearson.

PLT105/3
ELECTRIC CIRCUIT THEORY 1

Course Synopsis

This course covers topics of introduction to the DC circuit's covers fundamental laws and theorems. Students also get knowledge about AC circuits that introduces phasors and sinusoidal steady state analysis. This course intends to give the students knowledge on understanding three-phase balance systems.

Course Outcomes

CO1:
Ability to derive important equations to solve problems in DC circuits.

CO2:
Ability to analyze the first and second order circuits containing passive elements, DC sources and switches using differential equations.

CO3:
Ability to calculate circuit parameters containing sinusoidal steady-state sources using complex impedances and phasor representations.

References

1. Nilson, J.W.,Riedel, S.A . (2010). Electric Circuits. 9th Edition. Prentice Hall.
2. Irwin, J.D., Nelms, R.M. (2008). Basic Engineering Circuit Analysis. 9th Edition. John Wiley.
3. RobBins, A.H, Miller, W.C. (2006). Circuit Analysis: Theory and Practice. 4th Edition. McGraw Hill.

PLT106/3
DIGITAL ELECTRONICS

Course Synopsis

Basically this introductory circuit course can be divided into two parts. Part I, consisting of chapter 1 through 4, is devoted to DC circuits. It covers fundamental laws and theorems, circuit analytical techniques, passive and active elements. Part 2, consisting of chapter 5 through 7, deals with AC circuits. It introduces phasors, sinusoidal steady state analysis, using previous analytical techniques under sinusoidal steady state excitation, RLC circuits, AC power calculations and power factor correction and rms values.

The aim of this course is to introduce students to the basic knowledge in the digital electronics. The lectures and laboratories cover the following topics: Numbering System, Algebraic Switching, Boolean Function, ComBinational Logic and Sequential Logic Circuit.

Course Outcomes

CO1:
Ability to explain and use the basic principles of numbering system and basic theory of Binary system in digital electronics

CO2:
Ability to design and optimizes logic circuit using Boolean functions and Karnaugh maps

CO3:
Ability to design digital system applications using comBinational and sequential logic design techniques.

References

1. Rosni Abu Kassim, Nooritawati Md Tahir., (2010) Introduction to Electric Circuits, Wiley.
2. David E. Jhonson.(2010). Sistem Digit, Pearson Education, Penerbit Universiti Teknologi Malaysia Press.
3. Floyd. TL. (2009). Digital Fundamentals. 10th Ed. Prentice Hall.

4. Ronald J. Tocci.(2007) Digital Systems – Principles and Applications. 10th Edition, Prentice Hall.
5. Godse, Atul P. Godse, Deepali A. Godse, Gurpreet Singh Ghai. (2007). Digital Electronics, Technical Publications Pune.

PLT107/3
ELECTRONICS 1

Course Synopsis

This subject will expose the students with basic electronic devices. It provides a depth study on the concept of PN junction, operation and characteristics of the diode. The students will be emphasized to Half wave rectifiers, Full wave rectifiers, Power Supply Filter and Regulators, Clipper and Clamper Diode circuits and Voltage Multipliers. The students also will learn about the special-purpose of zener diode in terms of its characteristics and applications. Bipolar Junction Transistors (BJTs) and various types of Field-Effect Transistor which are Junction Field-Effect Transistor (JFET) and the Metal Oxide Semiconductor Field-Effect Transistor (MOSFET) will be introduced in this course as well. Basic theories, principles and practical are stressed in this course.

Course Outcomes

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 calculate and analyze the basic biasing circuits using datasheet.

References

1. Neamen Donald A. (2010). Microelectronics : Circuit Analysis and Design. 4th ed. McGraw Hill, Int. Ed.
2. Robert L. Boleystad. (2009). Electronic Devices and Circuit Theory. 10th ed. Prentice Hall.
3. T. Robert Paynter. (2009). Introductory Electronic Devices and Circuits. 10th ed. Prentice Hall.
4. Puspa Inayat Khalid, Rubita Sudirman, Siti Hawa Ruslan. (2001). Modul Pengajaran Elektronik 1. Edisi ke-3.

PLT108/3
ENGINEERING SKILLS II

Course synopsis

This is the core subject which is 100% practical and carried out 3 units credit hours. This course contains modules to provide students with engineering skills such as Printed Circuit Board (PCB) fabrication and design module and electrical domestic wiring.

Course Outcomes

CO1:
Ability to use OrCAD software to construct PCB circuit board.

CO2:
Ability to apply and construct the basic skills and standard practiced of PCB layout design and fabrication process.

CO3:
Ability to apply and construct the basic skills and standard practiced of domestic wiring.

References

1. Steward, W.E. and Stubbs, T.A. (2005). Modern Wiring Practice: design and installation. 12th Edition, Newnes.
2. William J.Palm III. (2001). MATLAB for Engineering Students. McGraw Hill.
3. ORCAD Capture & Layout User’s Guide Manual. Cadence design Systems, Inc.

4. Pethebridge, K. and Nesson, I. (2002). Electrical Wiring Practice. 6th Edition, Mc-GrawHill.

EET 202/3
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, 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. Floyd. TL. (2009). Digital Fundamentals. 10th ed. Prentice Hall.
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.

EET 203/4
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 system and present in group.

References

1. S. Katzen. (2010). The Essential PIC18® Microcontroller (Computer Communications and Networks). Springer
2. M.A Mazidi, R.D Mckinlay, and D Causey. (2008). PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18. Prentice Hall
3. B.B. Brey. (2008). Applying PIC18 Microcontroller: Architecture, Programming and Interfacing using C and Assembly. Prentice Hall
4. M Bates. (2006). Interfacing PIC Microcontrollers: Embedded Design by Interactive Simulation. Newness
5. H.W Huang. (2005). PIC Microcontroller: An Introduction to Software and Hardware Interfacing. Thomson & Delmar Learning

EET204/3
INSTRUMENTATION AND MEASUREMENT

Course Synopsis

The course is aimed at providing an overview of modern instrumentation and measurement techniques. It is divided into four main topics namely the fundamentals of electronic instrumentation and measurement systems; the working principles and application of sensors and transducers; principles and application of signal conditioning circuits including bridges, amplifiers and filters; and finally display, data acquisition and interfacing techniques.

Course Outcomes

CO1:
Ability to define, describe and analyze the elements of a complete electronic instrumentation and measurement system

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. Wai Kai Chen. (2006). Passive, Active & Digital Filters. US, CRC Press.
2. Walt Jung. (2005). Op Amp Applications Handbook. UK, Elsevier.
3. Rajendra Prasad. (2004). Electrical Measurement and Measuring Instrument. Khanna Publishers, India.
4. H.S Kalsi. (2003). Electronics Instrumentation. Tata Mc Graw Hill.
5. J.Park & S.Mackay. (2003). Practical Data Acquisition for Instrumentation and Control Systems. 1st Edition, Great Britain, Elsevier.

EET205/4
ANALOG ELECTRONICS

Course Synopsis

This course exposes the student the basic knowledge in analog electronic. The exposure encompasses DC and AC analysis, frequency analysis and simple 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

1. Boylestad, R.L. (2009). Nashelsky, L., ‘Electronic Devices and Circuit Theory. 10th Ed. Prentice Hall.
2. Adel S. Sedra, Kenneth C. Smith. (2009). Microelectronic Circuits. 6th Ed. Oxford University Press.
3. Floyd, T. (2008). Electronic Devices. 8th Ed. Pearson Education, Inc.
4. Donald A. Neamen. (2007). Microelectronics Circuit Analysis and Design. 3rd Ed. Mc Graw-Hill.

5. Bogart, T.F. (2004). Electronic Devices and Circuits. 6th Ed. Prentice Hall.

EET 206/3
ELECTRIC CIRCUIT II

Course Synopsis

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

1. Dorf, R.C., Svodoba, J.A. (2010). Introduction to electric circuits. 8th Ed. John Wiley
2. Sadiku, M. N. O, Alexander, C. K. (2009). Fundamentals of Electric Circuits. Singapore. 4th Ed. McGraw-Hill
3. Nilsson, J. W. and Riedel, S.A. (2008). Electric Circuits. 8th Ed. Prentice Hall. New Jersey
4. Irwin, J.D., Nelms, R.M. (2008). Basic Engineering Circuit Analysis. 9th Ed.. John Wiley
5. Hyat W.H., DurBin, S.M., Kimmerly, J.E. (2007). Engineering Circuit Analysis. 7th Ed. McGraw Hill

EET 207/3
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

1. Charles L. Philips, John M. Parr, Eve A. Riskin. (2008). Signals, Systems and Transforms. 4th Ed. Prentice Hall International Edition
2. P Rao. (2008). Signals and Systems. Tata Mc Graw Hill
3. Simon Haykin, Barry Van Veen. (2005). Signals and Systems. 2nd Ed. Wiley
4. Fred J. Taylor. (1994). Principles of Signals and Systems. McGraw Hill International
5. Ashok Ambardar. (1999). Analog and Digital Signal Processing. 2nd Ed.

EET 208/3
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 single-phase and three-phase transformer. At the end of these practical lab sessions they are asked to prepare lab report on the experiments they have carried out and submit for assessment.

Course Outcomes

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 single-phase and three-phase transformer

References

1. Edward Hughes, Ian McKenzie Smith, John Hiley, Keith Brown. (2008). ‘Electrical and Electronic Technology’, 10th Ed., Prentice Hall.
2. Theraja B.L. (2007). ‘A Text Book of Electrical Technology’, Volume II (AC & DC Machines), S.Chand & Company Ltd.
3. Boylestad, Robert L. (2007). ‘Introductory Circuit Analysis’, 11th Edition, Prentice Hall.
4. John Bird. (2007). ‘Electric Circuit Theory and Technology’, Newnes.
5. Chapman, Stephen J. (2005). ‘Electric Machinery Fundamentals’, 4th Ed., New York: McGraw-Hill.

PLT 201/3
ELECTRIC CIRCUIT THEORY II

Course Synopsis

This is a core subject. It will expose the students to the circuit analysis using Laplace and Fourier Transform. Student also would able to explain the concept of mutual inductance, frequency response of AC circuit and two port network.

Course Outcomes

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 explain the concepts of frequency response for AC circuits and derive and analyze Bode plot for various types of transfer function.

CO4:
Ability to work in team and communicate effectively.

References

1. Nilsson, J. W. and Riedel, S.A. (2010). Electric Circuits. 9th Edition. Prentice Hall, New Jersey.
2. Dorf, R.C., Svodoba, J.A. (2010). Introduction to electric circuits. 8th Edition. John Wiley.
3. Robert L. Boylestad. (2010). Introductory Circuit Analysis, 12th Edition. Pearson.
4. Charles K Alexander and Matthew Sadiku. (2009). Fundamentals of Electric Circuits. 4th Edition. McGraw-Hill.
5. Hyat W.H., DurBin, S.M., Kimmerly, J.E. (2007). Engineering Circuit Analysis, 7th Edition. McGraw Hill.

PLT 202/3
MEASUREMENT & INSTRUMENTATION

Course Synopsis

This course covers topics of introduction to the basic concepts of measurement methods and instrumentation. This course intends to give the students knowledge on measuring devices, bridge methods and transducers.

Course Outcomes

CO1:
Ability to define, describe and analyze the elements of a complete electronic instrumentation and measurement system.

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. Uday A.Bakshi, Ajay V.Bakshi, K Shiteeja A. Bakshi. (2007). Electrical Measurements and Measuring Instruments. Pune India.Technical Publications Pune.
2. H.S Kalsi. (2003). Electronics Instrumentation. Tata-McGraw Hill.
3. Ruzairi Hj Abdul Rahim, Herlina Abdul Rahim, Nasaruddin Ahmad, Anita Ahmad. (2003). Pengukuran & Instrumentasi Elektrik. Fakulti Kejuruteraan Elektrik. UTM.
4. Jones L.R, Chin, A.F. (1991). Electronic instruments and measurements. 2nd Edition. Prentice Hall.
5. Bell D.A. (1991). Electronics Instrumentation and measurements. 2nd Edition. Prentice Hall.

PLT 203/3
ELECTRONICS II

Course Synopsis

This course covers topics of introduction to the basic concepts of electronics. This course intends to give the students knowledge on BJT and FET, Operation amplifier, Op-Amp applications, Feedback circuits and Voltage Regulator.

Course Outcomes

CO1:
Ability to analyze DC, small-signal and frequency performance of basic amplifier configurations (bjt and fet).

CO2:
Ability to describe the principles operation of some special electronic devices such as triac, ujt, scr and analyze their application in circuits.

CO3:
Ability to describe the operation, analyze and design basic non-inverting and inverting amplifiers, summers, difference amplifier, integrator and differentiator.

CO4:
Ability to define and differentiate the different types of feedback amplifier and their effects on some amplifier characteristics.

CO5:
Ability to describe the operation, analyse and design simple linear and non-linear voltage regulator circuits.

References

1. Boylestad, R.L., Nashelsky, L. (2009). Electronic Devices and Circuit Theory. 10th Edition. Prentice Hall.
2. Adel S. Sedra, Kenneth C. Smith. (2009). Microelectronic Circuits. 6th Edition. Oxford University Press.
3. Donald A. Neamen. (2007). Microelectronics Circuit Analysis and Design. 3rd Edition. McGraw-Hill.
4. Floyd, T. (2008). Electronic Devices. 8th Edition. Pearson Education, Inc.
5. Bogart, T.F. (2004). Electronic Devices and Circuits. 6th Edition. Prentice Hall.

PLT 204/3
ELECTROMAGNETIC FIELD THEORY

Course Synopsis

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

Course Outcomes

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 magneto static.

CO4:
Ability to apply the concept of electromagnetic in transmission line analysis.

References

1. Matthew N.O. Sadiku. (2008). Element of Electromagnetics. 3rd Edition. Amazon.
2. U.A. Bakshi and A.V.Bakshi. (2007). Electromagnetic Fields. 1st Edition. Technical Publications Pune.
3. Stuart M Wentworth. (2005). Fundamentals of Electromagnetics with Engineering Applications. Wiley.
4. William H.Hayt, John A Buck. (2006). Engineering Electromagnetics. 6th Edition. McGraw Hill. International ed.
5. Fawwaz T Ulaby. (2004). Fundamentals of Applied Electromagnetics. Pearson. Prentice Hall

PLT 205/4
ELECTRICAL MACHINES TECHNOLOGY I

Course Synopsis

The practical and laboratory work are designed to give the students the practical perspective of the single phase, three phase transformer and DC machine. Practical based on experiments are the main practical work for the students in this course. They are given the opportunity to fully utilize the current available facilities to realize the knowledge of practical transformer and DC machine.

Course Outcomes

CO1:
Ability to define and explain the machinery principle and magnetic circuits and its application to the electrical machines.

CO2:
Ability to explain, apply and analyze the operation and performance of a transformer, DC and AC machines.

CO3:
Ability to determine and analyze the parameters for DC Machines.

CO4:
Ability to apply the related software tools in understanding the principle of electrical machines.

References

1. Kothari. D.P, Nagrath. I.J. (2010). Electric Machines. 4th Edition. Tata McGraw Hill. New Delhi.
2. Stephen J. Chapman. (2005). Electric Machinery Fundamentals. 4th Edition. McGraw-Hill.
3. Wildi, T. (2005). Electrical Machine, Drives and Power System. 6th Edition. Prentice-Hall.

PLT 206/3
MICROPROCESSOR SYSTEM & MICROCONTROLLER

Course Synopsis

The aims of this course is to study the PIC 18 microcontroller architecture, its programming language (assembly and C) and basic interfacing with input and output devices. These knowledge are gathered and applied to design a simple microcontroller based system.

Course Outcomes

CO1:
Ability to explain the basic microcontroller architecture.

CO2:
Ability to analyze and write a microcontroller programming language in assembly and C program.

CO3:
Ability to interface the input and output devices with microcontroller.

CO4:
Ability to design a simple microcontroller based system and present in group.

References

1. Katzen, S. (2010). The Essential PIC18® Microcontroller (Computer Communications and Networks). Springer.
2. Brey, B.B. (2008). Applying PIC18 Microcontroller: Architecture, Programming and Interfacing using C and Assembly. Prentice Hall.
3. Mazidi, M.A, Mckinlay, R.D, and Causey, D. (2008). PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18. Prentice Hall.
4. Bates, M. (2006). Interfacing PIC Microcontrollers: Embedded Design by Interactive Simulation. Newness.
5. Huang, H.W. (2005). PIC Microcontroller: An Introduction to Software and Hardware Interfacing. Thomson & Delmar Learning.

PLT 207/3
POWER ELECTRONICS

Course Synopsis

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. Power electronics 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 explain 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 design 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. 1st Edition. McGraw Hill.
2. Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices & Applications. 3rd Edition. Pearson. Prentice Hall.
3. Mohan, Underland, RobBins. (2002). Power Electronics: Converters, Applications & Design. 3rd Edition. John Wiley.
4. Cyril W. Lander. (1994). Power Electronics. 3rd Edition. McGraw Hill.

PLT 208/3
COMMUNICATIONS SYSTEM

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 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

1. Ian Glover, Peter M. Grant. (2009). Digital Communications. Prentice Hall.
2. Louis E. Frenzel. (2007). Principles of Electronic Communication Systems. McGraw-Hill.
3. William D. Stanley and John M. Jeffords. (2006). Electronic communications: principles and systems. Thomson Delmar Learning.
4. Jeffrey S. Beasley, Gary M. Miller. (2005). Modern electronic Communication. Pearson/ Prentice Hall.

PLT 209/3
SIGNAL & SYSTEMS

Course Synopsis

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

Course Outcomes

CO1:
Ability to identify type and analyze waveform of the signals and its characteristic in engineering systems.

CO2:
Ability to analyze signals and determine the process of the systems.

CO3:
Ability to explain and calculate the system response using variable methods.

CO4:
Ability to prepare a report in relevant topics using various resources.

References

1. Charles L. Philips, John M. Parr, Eve A. Riskin. (2003). Signals, Systems and Transforms. 3rd Edition. Prentice Hall International Edition.
2. Simon Haykin, Barry Van Veen. (1999). Signals and Systems. 2nd Edition. Wiley.
3. Fred J. Taylor. (1994). Principles of Signals and Systems. McGraw Hill International Edition.

EET 301/4
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 classify types and operation of power system generations in groups.

CO2:
Ability to solve single-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

1. Yoshihide Hase. (2007). Handbook of Power Systems Engineering, John Wiley & Sons, Inc.
2. Chapman, Stephen J. (2002). Electric Machinery and Power System Fundamentals. Boston: McGraw Hill.
3. Juergen Schlabbach, Karl Heinz Rofalski, 2008. Power System Engineering, Wiley-VCH Verlag GmbH & Co. KGaA.
4. Hadi Saadat. (2004). Int. ed. Power System Analysis. 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 analyze control system problems by utilizing control system graphical tools such as root locus or bode plot.

CO4:
Ability to design appropriate controller/s through system compensation in performing control system analysis.

References

1. Norman S. Nise. (2011). Control System Engineering. 6th ed. John Wiley & Sons.
2. Richard C. Dorf & Robert H. Bishop. (2011). Modern Control Systems. 12th Edition. Prentice Hall.
3. Kuo B. C. Automatic Control System. 9th Edition. John Wiley & Sons.
4. Ogata K. (2009). Modern Control Engineering. 5th Ed. Prentice Hall.
5. Franklin G. F., Powell J. D. and Emani-Naeni A. (2009). Feedback Control of Dynamic Systems System. 9th Edition. Prentice Hall.

EET 303/3 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 apply the concept of electromagnetic in transmission line analysis

References

1. Matthew N.O. Sadiku. (2008). Element of Electromagnetics. 3rd Ed. Amazon
2. U.A. Bakshi and A.V.Bakshi. (2007)Electromagnetic Fields. 1st Ed. Technical Publications Pune.
3. William H.Hayt, John A Buck. (2006). Engineering Electromagnetics. 6th Ed. McGraw Hill. International ed.
4. Stuart M Wentworth. (2005). Fundamentals of Electromagnetics with Engineering Applications. John Wiley
5. Fawwaz T Ulaby. (2004). Fundamentals of Applied Electromagnetics. Pearson. Prentice Hall.

EET 304/3
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.

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

1. 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
3. Paul Young. (2004). Electronics Communications Techniques. 5th Ed. Prentice Hall
4. Wayne Tomasi. (2004). Electronics Communication Systems. 5th Ed. Prentice Hall
5. Mullet. (2003). Basic Telecommunications: The Physical Layer. Thomson Learning

EET 306/4
ELECTRICAL MACHINES

Course Synopsis

Primarily this Electrical Machines course can be divided into three parts. Part 1, begins by reviewing the basic concept of electromechanical conversion and transformers. Part 2, consisting of theoretical and performance analysis of DC machines, i.e. DC motors and DC Generators. Part 3 will cover the theoretical and performance analysis of single/ three-phase AC machines which consist of Induction motor and Synchronous generators and also special motors

Course Outcomes

CO1:
Ability to apply the principle of electro-mechanical energy conversion and its application to electrical machines

CO2:
Ability to analyse operation and performance of a transformer

CO3:
Ability to evaluate parameters for AC and DC Machines

References

1. Stephen J. Chapman, (2010). Electric Machinery Fundamentals. 5th ed., McGraw-Hill.
2. Bhattacharya S.K. (2008). Electrical Machines. 3rd ed. Tata McGraw-Hill.
3. Theraja B.L. (2007). A Text Book of Electrical Technology. Volume II (AC & DC Machines), S.Chand & Company Ltd.
4. Charles A. Gross, (2007). Electric Machines. CRS Press.
5. Wildi, T., (2005). Electrical Machine, Drives and Power System. 6th. ed, Prentice-Hall.

EET 307/4
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. Pressman, Billings & Morey. (2009). Switching Power Supply Design. 3rd Ed., McGraw Hill.
2. S Maniktala. (2006). Switching Power Supplies A to Z. Elsevier Newnes.
3. Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices & Applications. 3rd Ed., Pearson: Prentice-Hall.
4. Mohan, Undeland, RobBins. (2003). Power Electronics: Converters, Applications & Design. 3rd Ed., John Wiley.
5. Erickson R.W., Maksimovic D. (2001). Fundamentals of Power Electronics. 2nd Ed. Springer.

EET 308/4
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

1. Saadat, H. (2004). Power System Analysis. 2nd Ed. McGraw-Hill
2. Professor Tom Overbye. (2004). Power System Analysis. Department of Electrical and Computer Engineering University of Wisconsin
3. D.P. Nagrath, I.J. Kothari. (2003). Modern Power System Analysis. 3rd Ed. Tata McGraw-Hill
4. Bergen, A.R., Vittal, V. (2000). Power System Analysis. Prentice Hall
5. John.J.Grainger, William D. Stevenson, Jr. (1994). Power System Analysis. Mgraw-Hill

PLT301/4
ELECTRICAL MACHINES TECHNOLOGY II

Course Synopsis

Electrical Machines Technology II is intended to give the students deep knowledge about the three phase system, single phase, three phase induction motor, synchronous machine, motor starter, testing and maintenance of electrical machines. This course focuses on the following concepts:

- The practical and laboratory work are designed to give the students the practical perspective of the three phase system, three phase AC motor, open and fix motor, star-delta starter and testing the AC motor.

- Practical based on experiments are the main practical work for the students in this course. They are given the opportunity to fully utilize the current available facilities to realize the knowledge of practical three phase system and AC motor.

Course Outcomes

CO1:
Ability to define and explain the three phase system and its application to the electrical machines.

CO2:
Ability to define and explain the single phase, synchronous and three phase motor and its application to the electrical machines.

CO3:
Ability to determine and analyze parameters for AC Machines and the used of the motor starter.

CO4:
Ability to apply related testing, maintenance and software tools in understanding the principle of electrical machines.

References

1. Stephen J. Chapman. (2011). Electric Machinery Fundamentals. 5th Edition. McGraw-Hill.
2. Bhattacharya S.K. (2009). Electrical Machines. 3rd Edition. McGraw-Hill.
3. D.P. Kothari and I.J. Nagrath Hughes. (2008). Electric Machines. 4th Edition. Tata McGraw-Hill.

4. Theraja B.L. (2007). A Text Book of Electrical Technology, Volume II (Electrical Machines. S. Chand & Company Ltd.
5. Wildi, T. (2005). Electrical Machine, Drives and Power System. 6th. Edition. Prentice-Hall.

PLT302/3
ELECTRICAL INSTALLATION I

Course Synopsis

This course uses a comBination of theory and practical ‘hands on’ project assignment to demonstrate and reinforce the principles. Students in this course are expected to work through the project assignments. The project assignments are based on actual installations and projects in low voltage system.

Course Outcomes

CO1:
Describe, explain and apply the IEE Regulations and IEC Standards.

CO2:
Define the general characteristics of an electrical installation.

CO3:
Design electrical lighting and power requirements for building and specific applications.

CO4:
Design electrical lighting and power installations for specific application

References

1. N.Hasnizam & M.Rafi. (2011). Lectures Notes: Electrical Installation Design. PPKSE.
2. G.Stokes & J.Bradley. (2009). A Practical Guide To The Wiring Regulations – 17th Edition IEE Wiring Regulations (BS 7671:2008).4th edition. John Wiley & Sons.
3. BSI & IEE. (2008). BS 7671 (2008) Requirements For Electrical Installations – IEE Wiring Regulations. 17th Edition. Polestar Wheatones.
4. T.Linsley. (2008). Basic Electrical Installation Work. 5th edition. UK: Elsevier & Newnes Press.
5. T.Linsley. (2008). Advanced Electrical Installation Work. 5th edition. UK: Elsevier & Newnes Press.

PLT303/3
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 analyze 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. Muhammad H. Rashid. (2004). Power Electronics : Circuits, Devices and Application. Second Edition. Prentice Hall International Inc. New Jersey
2. Gopal K.Dubey. (2001). Fundamentals of Electrical Drives, Second Edition. Alpha Science. Kanpur
3. El-Sharkawi A. Mohamed (2000). Fundamentals of Electric Drives. A division of Thomson Learning. USA
4. Bodea Ion, Nasar A.S. (1999). Electric Drives. CRC Press LLC
5. Vedam Subrahmanyam. (1994). Electric Drives : Concepts and Applications. Tata McGraw-Hill

PLT304/4
ELECTRICAL POWER SYSTEM

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 systems, fault and protection system.

Course Outcomes

CO1:
Ability to explain types and operation of power system generations in groups.

CO2:
Ability to solve single-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 analyze fault and protection system in power system.

References

1. Hadi Saadat. (2004). Power System Analysis. 3rd Edition. McGraw Hill.
2. Theodore R. Bosela. (2003). Electrical Systems Design. Pearson Education.
3. Dugan, Roger C. (2003). Electrical Power Systems Quality. 2nd Edition. McGraw Hill.
4. Chapman, Stephen J. (2002). Electric Machinery and Power System Fundamental. McGraw Hill.
5. Burke, James J. (1994). Power Distribution Engineering: Fundamentals and Application. Marcel Dekker.

PLT305/3
CONTROL SYSTEM TECHNOLOGY

Course Synopsis

This course is an introduction to control systems theory involving different areas of applications, comprises of three major parts: Part I - Control Systems Representations -representation of physical systems by differential equation, transfer function, state-space modeling, block diagram techniques and signal flow graph. Part II – Control Systems Performance Analysis - analysis of systems in terms of transient response, stability and steady-state errors. Root locus and frequency response techniques are used for higher order systems. Part III – Control Systems Design - design of controllers and compensators for systems via root locus and frequency response.

Course Outcomes

CO1:
Ability to obtain the mathematical model for electrical and mechanical systems.

CO2:
Ability to analyze system's time-domain with response to test inputs. Analysis includes the determination of the system stability.

CO3:
Ability to analyze system's frequency-domain with response to test inputs. Analysis includes the determination of the system stability.

CO4:
Ability to design PID, lead and lag controllers based on the analysis of the system's response.

References

1. Nise, N. S. (2008). Control Systems Engineering. 5th edition. John Wiley.
2. Ogata, K. (2002). Modern Control Systems. 4th edition. Addison-Wesley Company.
3. Dorf, R.C. & Bishop, R.H. (2001). Modern Control Systems. 9th edition. Addison-Wesley Company.

4. Kuo, B.C. (1997). Automatic Control Systems. 7th edition. Prentice-Hall Publishing Company.

PLT340/4
FINAL YEAR PROJECT I

Course Synopsis

Small-scaled research project that inclined towards designing is necessary for each final-year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar.

Course Outcomes

CO1:
Ability to apply and integrate theory and practical to solve the engineering problems.

CO2:
Ability to develop suitable research methodology for the project.

CO3:
Ability to explain a project in a technical report.

CO4:
Ability to present and defend effectively project proposal to selected audience.

CO5:
Ability to identify commercialization potential for proposed project.

PLT 306/3
ELECTRICAL INSTALLATION DESIGN II

Course Synopsis

Maximum efficiency, reliability, and longevity of the various types of generators, exciters, voltage regulators, and uninterruptible power supply are of great concern to many industries. These objectives can only be achieved by understanding the characteristics, selection criteria, common problems and repair techniques, preventive and predictive maintenance.

This course covers on diesel generator and uninterruptible power supply used in industrial and commercial facilities. The course also covers the bust duct system and lightning protection system.

Course Outcomes

CO1:
Describe the fundamental operations of a backup energy system.

CO2:
Describe how generators operate in parallel and design the synchronizing system for parallel generator.

CO3:
Apply and design the backup energy system.

CO4:
Explain and select the bust duct and performing all necessary calculations.

CO5:
Design the lightning protection system for commercial buildings and facilities.

References

1. Paul Cook. (2008). Electrical Installation Design Guide: Calculations for Electricians L.L.J.Mohan. (2003). Diesel Generator Handbook. Butterworth Heinemann.
2. Ismail Kasikci. (2004). Analysis and Design of Low voltage Power Systems. Wiley-Vch Verlag GmBH & Co.
3. K.C. Agrawal. (2001). Industrial Power Engineering and Application Handbook. Butterworth-Heinemann.
4. and Designer. The Institution of Engineering & Technology Publication.
5. American National Standards Institute. (1986). ANSI/ IEEE Std 944-1986 – IEEE Recommendation Practice for the Application and Testing of Uninterruptible Power Supplies for Power Generation Stations. The Institute of Electrical and Electronics Engineers.

PLT307/3
PROGRAMMABLE LOGIC CONTROLLER (PLC)

Course Synopsis

The student will be expose to programmable logic controller (PLC), PLC components, PLC programming and operational procedure. PLC capable to perform more complex motion and process control applications.

Course Outcomes

CO1:
Ability to explain ladder diagram that will perform a specified operation using PLC programming.

CO2:
Ability to design a specified operation using PLC programming in applications of industrial electronic control.

References

1. Jacob, M. (1995). Industrial Control Electronics. Prentice Hall.
2. Webb, J., Greshock, K. (1993). Industrial Control Electronics. 2nd Edition. Prentice Hall.

PLT308/3
POWER QUALITY

Course Synopsis

This course will help students to understand the basics of the power quality. This course intends to give the students knowledge on power quality terms and definitions.

Course Outcomes

CO1:
Ability to apply the basic principles of measurement electrical power transmission.

CO2:
Ability to apply the concept of distribution system for current and voltage measurement.

CO3:
Ability to apply the concept of power quality.

CO4:
Ability to use the basic principle of energy management on power system economics.

References

1. Kusko, A. T., Marc T. (2007). Power Quality in Electrical Systems. McGraw-Hill Professional Publishing.
2. Dugan, R. S., Surya M., Mark F. (2002). Electrical Power Systems Quality. McGraw-Hill Professional Publishing.
3. Kennedy, B. W. (2000). Power Quality Primer. McGraw-Hill Professional Publishing.

PLT309/3
SUBSTATION MAINTENANCE

Course Synopsis

This course, to introduce aspects of the fundamentals and considerations of substation maintenance, configuration, bus bar and safety requirement. This course describe the functions of various substation main equipments, substation auxiliary included protection design against internal and external fault. The students also learn how to measure soil resistivity and resistance grounding, substation grounding design, furthermore calculation of the ground grid substation. This course will cover the principle elements of task to maintenance of a substation. Latter in this course, they will learn and practice how to test and maintain substation

Course Outcomes

CO1:
Ability to explain fundamentals and considerations of substation design.

CO2:
Ability to describe operation, maintenance, selection and functions of substation equipments part and ability to design simple busbar.

CO3:
Ability to measure resistivity and grounding resistance and ability to design and analysis ground grid substation and safety requirement.

CO4:
Ability to identify and calculate parameters in protection system of substation equipments caused by internal and external faults.

CO5:
Ability to calculate capacity and service area substation, explain foundation and structure of substation and test some substation equipments.

References

1. John MC Donald. (2007). Electrical Power Substations Engineering. 2nd Edition. CRC Press.
2. Rao, S. (2003). Electrical Substation Engineering & Practice. Khana Publishers.
3. Garzon Ruben D. (2002). High Voltage Circuit Breaker. Marcel Decker Inc.
4. Colin Bayliss. (2002). Transmission and Distribution electrical engineering. Newness.

EET 411/3
POWER SYSTEM OPERATION & CONTROL

Course Synopsis

This course aims to provide further understanding of the fundamentals of power system operations. 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 with Lambda method, power system control and optimal power flow, unit commitment (UC), interconnected power systems, communication in power system and contingency study in power transmission and distribution system. To further strengthen the theoretical background, students are exposed to simulation of power system operations and control in the laboratory using MiPower software.

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 Tie-line interchange between interconnected utilities.

CO4 :
Ability to describe basic principle of security studies, sensitivity factors and sensitivity methods.

CO5 :
Ability to describe, calculate and analyze the basic principles of the HVDC System.

References

1. Saadat,H.(1999). Power System Analysis. Singapore. McGraw-Hill.
2. J.J Grainger, W.D. Stevenson. (1994). Power System Analysis. McGraw-Hill
3. Wood A.J. Wolleenberger, B.D.(1996). Power System Operation, Generation and Control. 2nd Edition. John Wiley and Sons.
4. Miller, R.H., Malinowski, J.H.(1994). Power System Operation. Singapore: McGraw-Hill.
5. BM Weedy& B.J. Cory. Electric Power System. John Wiley & Sons. 4th Edition.

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

1. Juha Pyrhonen, Tapani Jokinen, Valeria Hrabovcova. (2008). Design of rotating electrical machines. John Wiley & Sons.
2. S.V.Kulkarni, S.A. Khaparde. (2004). Transformer Engineering Design and Practical. Marcel Dekker Inc.
3. 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.

EET 414/3
SUBSTATION DESIGN

Course Synopsis

This course, to introduce aspects of the fundamentals and considerations of substation design, configuration and design of busbar and safety requirement. This course describe the functions of various substation main equipments, substation auxliary included protection design against internal and external fault. The students also learn how to measure soil resistivity and resistance grounding, substation grounding design, furthermore calculation of the ground grid substation. Latter in this course, students will learn and practice how to test and to do maintenance of the substation equipment parts.

Course Outcomes

CO1:
Ability to classify type of substation and explain fundamentals and considerations of substation design

CO2:
Ability to describe operation, maintenance, selection and functions of substation equipments part and ability to design simple busbar

CO3:
Ability to measure resistivity and grounding resistance and ability to design and analysis ground grid substation and safety requirement

CO4:
Ability to identify and calculate parameters in protection system of substation equipments caused by internal and external faults.

CO5:
Ability to calculate capacity and service area substation and explain testing and commissioning method of substation equipments.

References

1. John MC Donald. (2007). Electrical Power Substations Engineering. 2nd Ed. CRC Press.
2. Rao, S. (2003). Electrical Substation Engineering & Practice. Khana Publishers, New Delhi.
3. 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.

EET 416/3
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. Wildi Theodore. (2006). Electrical Machines, Drives, and Power Systems. Pearson-Prentice Hall. New Jersey.
2. Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices and Application. Second Edition. Prentice Hall International Inc. New Jersey.
3. Gopal K.Dubey. (2001). Fundamentals of Electrical Drives. 2nd Ed. Alpha Science. Kanpur.
4. El-Sharkawi A. Mohamed. (2000). Fundamentals of Electric Drives. A division of Thomson Learning. USA.
5. Vedam Subrahmanyam. (1994). Electric Drives: Concepts and Applications. Tata McGraw-Hill.

EET 417/3
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 over-voltage phenomena, insulation coordination in power system, types of high voltage testing for electrical apparatus and non-destructive testing of materials

References

1. M.S. Naidu & V. Kamaraju. (2009) 'High Voltage Engineering', 4th ed., Tata McGrawHill.
2. C.L. Wadhwa. (2007). 'High Voltage Engineering'. New Age International.
3. Subir Ray. (2004). 'An Introduction to High Voltage Engineering', Prentice-Hall of India.
4. E. Kuffel, W.S. Zaengl, J. Kuffel. (2000). 'High Voltage Engineering: Fundamentals', 2nd ed., Newness.
5. M.E. Khalifa. (2000). 'High Voltage Enfineering: Theory and Practice'. 2nd ed. Marcel Dekker Inc.

EET 422/3
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

1. M I Montrose: E M Nakauchi. (2004). Testing for EMC Compliance: Approaches and Techniques. IEEE.
2. T Williams. (2001). EMC for Product Designers. 3rd Ed. Newnes.
3. 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.

EET 424/3
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. Ewald F. Fuchs, Mohammad A. S. Masoum. (2008). Power quality in power systems and electrical machines. Academic Press/Elsevier.
2. M. H. Rashid. (2007). Power Electronics Handbook: Devices, Circuits, and Applications - Engineering Series Academic Press Series in Engineering. Academic Press.
3. G. N. Tiwari and M K Ghosal. (2005). Renewable Energy Resources. Alpha Science.
4. M. H. Rashid. (2004). Power Electronics: Circuit, Devices and Applications. Prentice Hall.
5. Barry W. Kennedy. (2000). Power Quality Primer. McGraw-Hill.

EET 426/3
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

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

EET 427/3
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. Typical 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

CO1:
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

1. Kissell Thomas. (2008). Industrial Electronics: Applications for Programmable Controllers, Instrumentation and Process Control, And Electrical Machines And Motor Controls. Prentice-hall Of India Pvt Ltd
2. Terry Bartelt. (2006). Industrial Control Electronics; Devices, Systems and Application. 3rd Ed. Thomson Delmar Learning.
3. Frank Petruzella. (2005). Programmable Logic Controllers. 3rd Ed. Amazon.
4. Jacob, M,. (1995). Industrial Control Electronics. Prentice Hall. Singapore.
5. Webb, J. Greshock, K. (1993). Industrial Control Electronics. 2nd Ed. Prentice Hall

EET 428/3
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 calculate converters parameters for power electronic drives.

CO4:
Ability to design and recommend appropriate power electronic drives parameters in electrical machines application.

References

1. Wildi Theodore. (2006). Electrical Machines, Drives, and Power Systems. Pearson-Prentice Hall. New Jersey
2. Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices and Application. Second Edition. Prentice Hall International Inc. New Jersey
3. Gopal K.Dubey. (2001). Fundamentals of Electrical Drives. 2nd Ed. Alpha Science, . Kanpur
4. El-Sharkawi A. Mohamed. (2000). Fundamentals of Electric Drives', A division of Thomson Learning. USA
5. Vedam Subrahmanyam. (1994). Electric Drives: Concepts and Applications. Tata McGraw-Hill

EET 431/3 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 whose outputs are suitable for conversion into electrical power generation.

References

1. 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
3. Gilbert M. Masters. (2005). Renewable and Efficient Electric Power Systems. John Wiley & Sons
4. 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

EET 432/3 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

1. Joel N. Swisher, Gilberto de Martino Jannuzi, and Robert Y. Redlinger. Tools and methods for Integrated Resource Planning: Improving Energy efficiency and protecting the Environment. UNEP Collaborating Centre on Energy and Environment
2. Wayne C. Turner and Steve Doty. (2009). Energy Management Handbook. 7th Ed. Fairmont Press Inc
3. Frank Kreith and D. Yogi Goswami. (2008). Energy Management and Conservation Handbook. CRC Press
4. Gilbert M. Masters. (2004). Renewable and Efficient Electric Power Systems. John Wiley and Sons
5. Bary W. Kennedy. (2000). Power Quality Primer. Mc Graw Hill

EET 433/3 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
3. G. N. Tiwari and M. K Ghosal. (2005). Renewable energy resources: basic principles and applications. Alpha Science International
4. Godfrey Boyle. (2004). Renewable Energy: Power for a Sustainable Future. Oxford University Press. Oxford
5. Gilbert M. Masters. (2004). Renewable and Efficient Electric Power Systems. John Wiley & Sons

EET 445/2
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 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.

EET 446/4
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.

PLT 440/6
FINAL YEAR PROJECT II

Course Synopsis

Small-scaled research project that inclined towards designing is necessary for each final-year student. The student will be given an engineering problem (or encourage to identify on their own) and gain expertise by problem solving, investigation, research writing and effective presentation of the research outcome in the form of thesis and seminar. The research area is mainly on electrical engineering technology.

Course Outcomes

CO1:
Ability to apply and integrate theory and practical to solve the engineering problems.

CO2:
Ability to develop suitable research methodology for the project.

CO3:
Ability to explain a complete project in a technical report (dissertation).

CO4:
Ability to present and defend effectively project findings to selected audience.

CO5:
Ability to identify commercialization potential for developed project.

PLT 401/3
POWER SYSTEM PROTECTION & SWITCHGEAR

Course Synopsis

This course introduces varieties of Circuit Breakers, Isolator, Earthing Switch, Bus-bar and Relays for protection of Generators, Motor, Transformers from short circuit, over voltage and other hazards caused by internal and external faults. This course also describes various Neutral grounding of the equipment related to protection systems.

Course Outcomes

CO1:
Ability to explain and calculate restriking phenomenon, operation and selection of switchgear equipment.

CO2:
Ability to identify abnormal condition on equipment, application, choice of protective relay correctly.

CO3:
Ability to explain causes of overvoltage, Evaluate application of Arrester to equipment protection the related insulation coordination problems and necessity of earthing neutral.

References

1. Gupta J. B. (2010). Switchgear and Protection. S. K. Kataria & Sons.
2. B. Ravindranat and M. Chander (2008). Power System Protection and Switchgear. New Age International Publisher.
3. Rao, S. S (2004). Switchgear Protection and Power Systems. Khanna Publishers.
4. Leslie Hewitson, Mark Brown and Ramesh Balakrishnan (2004). Practical Power Systems Protection. Elsevier.
5. Badri Ram, and D.N (1995). Power System Protection and Switchgear. Tata McGraw-Hill.

PLT402/3 INDUSTRIAL AUTOMATION

Course Synopsis

This course will expose to the students about the properties and applications of concept of automation in industry, industrial automation tool, open and closed-loop process control systems and distinguish between their dynamics, principles of stability, disturbance rejection and robustness of control systems to process variations. The course also provides the student with basic skills useful in identifying the concepts of automated in machines and equipment and describe the terms and phrases associated with industrial automation. This course cover topics related to control pressure, level, temperature, flow and automation in the process industry. These include a study on industrial sensors and actuators, industrial controllers such as computer-based control. The control strategies for specific process applications and the applications of PLC's to industrial processes and design PLC programs to solve sequential control problems are also provide in this course.

Course Outcomes

CO1:
Ability to describe the properties and applications of concept of automation in industry, industrial automation tool, open- and closed-loop process control systems and distinguish between their dynamics, principles of stability, disturbance rejection and robustness of control systems to process variations.

CO2:
Ability to describe, summarise and evaluate of hydraulic, pneumatic and electronic automation systems, the operation of the different controller modes and their practical limitations, determine their response to standard inputs and to process disturbances in open- and closed-loop, the stability of given control systems.

CO3:
Identify and outline the common control strategies for specific process applications, and the applications of PLC's to industrial processes and design PLC programs to solve sequential control problems.

References

1. Terry Bartelt (2006). Industrial Control Electronics; Devices, Systems and Application. Third Edition. Thomson Delmar Learning.
2. C. D. Johnson (2002). Process Control Instrumentation Technology. Prentice Hall.
3. Poppovik Bhatkar. Distributed Computer Control for Industrial Automation. Dekkar Publications.

4. Webb and Reis. Programmable Logic Controllers: Principles and Applications. PHI.
5. S.K.Singh. Computer Aided Process Control. PHI.

PLT 403/3
HIGH VOLTAGE TECHNOLOGY

Course Synopsis

This course focus on phenomena of high voltage surges and insulation coordination for power systems, characteristics of conduction and breakdown of gas, liquid and solid dielectrics, generation of high voltages and currents, measurement of high voltages and currents, `non-destructive testing (NDT) for high voltage components, detection and measurement of discharge process.

Course Outcomes

CO1:
Ability to explain the concept of high voltage engineering and calculate various breakdown parameters and identify applications of vacuum dielectrics, liquid dielectrics, solid dielectrics, and composite dielectrics.

CO2:
Ability to explain, calculate and analyze the concept of generations and measurements of high voltage AC, DC, Impulse voltage and impulse current generators.

CO3:
Ability to explain the over-voltage phenomena and the related insulation coordination problems and analyze types of high voltage testing for electrical apparatus and non-destructive materials.

References

1. S. Naidu & V. Kamaraju (2003). High Voltage Engineering. 3rd Edition. McGrawHill.
2. E. Kuffel & M. Abdullah (2000). High Voltage Engineering. 2rd Edition. Pergamon Press.
3. Arrilaga, J (1998). High Voltage Direct Current Transmission. 2rd Edition. IEE.
4. Davies T (1998). Protection of Industrial Power Systems. 2nd Edition. Newness.

PLT 404/3
RENEWABLE ENERGY

Course Synopsis

This course will introduce students with conversion, storage, integration and economic assessment techniques for renewable energy systems. This course also enables students to assess and design basic system configuration from major renewable energy technologies for both standalone and grid-connected power generation.

Course Outcomes

CO1:
Ability to explain the fundamental principles of major renewable energy technologies.

CO2:
Ability to analyze and solve problems on both technical and economic aspect of renewable energy systems.

CO3:
Ability to design and evaluate appropriate system configuration based on given application.

References

1. John Twidell and Anthony D. Weir (2006). Renewable Energy Resources. 2nd Edition. Taylor & Francis.
2. John A. Duffie, William A. Beckman. (2006). Solar Engineering of Thermal Processes. John Wiley & Sons.
3. Mukund R. Patel. (2005). Wind and Solar Power Systems: Design, Analysis and Operation. 2nd Edition. CRC Press.
4. Gilbert M. Masters. (2004). Renewable and Efficient Electrical Power Systems. John Wiley & Sons.
5. J. Larminie, A. Dicks. (2003). Fuel Cells System Explained. 2nd Edition. John Wiley & Sons.

PLT 405/3
ENERGY EFFICIENCY & MANAGEMENT

Course Synopsis

This course exposes the students to the energy efficiency and energy management in order to reduce energy costs and promote economic and environmental sustainability. At the end of this course, students will be exposed to the techniques for energy audit such as analyzing energy consumptions and design a solution for energy saving programs. In addition, safety aspect of electrical equipment will also be exposed to the student to create awareness and safe working practice.

Course Outcomes

CO1:
Ability to apply the basic principles of measurement electrical power transmission.

CO2:
Ability to apply the concept of distribution system for current and voltage measurement.

CO3:
Ability to apply the concept of power quality.

CO4:
Ability to use the basic principle of energy management on power system economics.

References

1. Frank Kreith and D. Yogi Goswami (2008). Energy Management and Conservation Handbook. CRC Press.
2. Frank Kreith, Ronald E. West (2007). CRC Handbook of Energy Efficiency. CRC Press.
3. Wayne C. Turner (2005). Energy Management Handbook. Fairmont Press Inc.
4. Gilbert M. Masters. (2004). Renewable And Efficient Electric Power Systems. John Wiley and Sons.
5. Joel N. Swisher, Gilberto de Martino Jannuzi, and Robert Y. Redlinger. Tools and methods for Integrated Resource Planning: Improving Energy efficiency and protecting the Environment. UNEP Collaborating Centre on Energy and Environment.

Career Opportunities

Electrical System Engineering, Industrial Electronics, Electrical Energy Systems and Industrial Power Engineering 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 of Engineering (Manufacturing)
- Bachelor of Engineering (Hons.) (Manufacturing Engineering)
- Bachelor of Engineering (Hons.) (Product Design Engineering)
- Bachelor of Mechanical Engineering Technology (Honours) (Machining)
- Master of Science (Manufacturing Engineering)
- Master of Science (Product Design Engineering)
- Doctor of Philosophy (Manufacturing Engineering)

ADDRESS:

School of Manufacturing Engineering
Universiti Malaysia Perlis (UniMAP),
Ulu Pauh Campus,
02600 Arau, Perlis
Tel : 04-9885035
Fax : 04-9885034
e-mail : dean_mfr@unimap.edu.my

Introduction

Initially, the School of Manufacturing, 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 and it has been approved officially by the Ministry of Higher Education dated October 30, 2004. Among the major justification for the changing the name of the school was due to the manufacturing engineering field is larger than the manufacturing systems engineering, or in other words, engineering manufacturing system is one aspect in the field of manufacturing engineering itself.

At its inception, the School of Manufacturing commenced its operation in the location of the School Complex, located at Kubang Gajah, Arau. Starting in 2004, School of Manufacturing was moved to a new location located at the Jejawi Enginnering Complex along with six other schools. Then, once again this school was moved to new location in Seberang Ramai, Kuala Perlis on 1 November 2007. Among the main factors for the second move was to accommodate the needs of the rooms for the increasing number of the academic staff, and also to facilitate communication between the non-academic staff, academic staff and students as the majority of students are placed in residential colleges around Kuala Perlis.

In line with the development of a more rapidly growing industry and a key contributor to economic growth in Malaysia, the School of Manufacturing so far has offered two programs of study at Bachelor level, namely Bachelor of Engineering (Manufacturing) and Bachelor of Engineering (Product Design).

In general, the structure of the manufacturing engineering curriculum is designed to create a balance between technical specialization and industrial management. The entire core courses are offered in order to expose students to the important aspects of the manufacturing industry particularly to the methods for the production and an exposure to manufacturing technology. Manufacturing technologies focus on the selection of appropriate technology in the manufacturing process, taking into account several important factors such as the use of appropriate machines and the optimum process in accordance with the set standard.

Apart from that,the structure of product design engineering curriculum has been designed to create a balance between functionality and aesthetic aspects of design. The entire core courses are offered to expose students to the industry, especially the production of the design product is coordinated with the leading branded products in the world as well as an exposure the students to the manufacturing technology. Designs require the skills to create and produce consumer products by using the technology available in industrial design. An application of aesthetic values is also important to allow the product to be marketed globally.

For the Bachelor program, the number of credits needed to be completed prior the graduation requirement is 135 units of credit, where 120 unit credits include core courses, while the remaining 15 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, in line with current industry requirements.

No less important, students are also required to carry out industrial training during the semester break before entering the fourth year of study. Students will be issued to undergo industrial training in the industries associated with the program of study offered. The main objective of these industrial training courses is required to complete the prospective graduates with the necessary technical knowledge in the real world of work in selected industries, when students were eligible for graduation.

In addition, the School of Manufacturing also offers a Diploma in Engineering (Manufacturing), Bachelor of Science (Manufacturing), Bachelor of Science (Product Design) and Doctor of Philosophy (Manufacturing). In principle, the school was founded with the goal of making the public to produce 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.

Staff Directory

DEAN
DR. KHAIRUL AZWAN ISMAIL
e-mail: k.azwan@unimap.edu.my

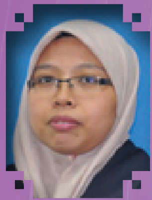
DEPUTY DEAN (ACADEMIC AND RESEARCH)
MR. AZMI HARUN
e-mail: azmiharun@unimap.edu.my

DEPUTY DEAN (STUDENT DEVELOPMENT AND ALUMNI)
MR. MALIKI IBRAHIM
e-mail: maliki@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAM (MANUFACTURING ENGINEERING)
MR. ZAILANI ZAINAL ABIDIN
e-mail: zailani@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAM (PRODUCT DESIGN ENGINEERING)
MR. NORSHAH AFIZI SHUAIB
e-mail: norshahafizi@unimap.edu.my

CHAIRPERSON of DIPLOMA PROGRAM (MANUFACTURING ENGINEERING)
MRS. SAKINAH ZAKARIA
e-mail: sakinahzakaria@unimap.edu.my



COORDINATOR FOR INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
MRS. NOORAIZEDFIZA ZAINON
e-mail: nooraizedfiza@unimap.edu.my

CHAIRPERSON of POST GRADUATE STUDIES
EN. MOHD. ZAMZURI MOHAMMAD ZAIN
e-mail: mzamzuri@unimap.edu.my

ASSISTANT REGISTRAR
MR. SYED AMIR FATIR SYED AKHIR
e-mail: syedamir@unimap.edu.my

Lecturers

Prof. Ir. Dr. Md Yusof Ismail
Ph.D. Quality Management – Dublin City University, Ireland
M.Sc. (Industrial Management) – Northern Illinois University, USA
B.Eng. (Mechanical) – Institut Teknologi Bandung
Tel : 04-9885104
e-mail : mdyusof@unimap.edu.my

Prof. Dr. Mohd Zaki Ab. Muin
Ph.D. (Modelling and Control) - UM
M.Sc. (Thermofluids) - Strathclyde University, UK,
B.Sc (Mech. Eng.) - Teesside Polytechnic, Middlesbrough, UK
Tel : 04-9885130
e-mail : zakimuin@unimap.edu.my

Prof. Dr. Ryspek Usubamatov
Ph.D.(Technical Sciences) - Moscow State Technical University, Russia
M.Sc. (Technical Sciences) - National Academy of Sciences, Kyrgyzstan
Dip. (Mechanical & Manufacturing Eng) - Moscow State Technical University, Russia
Tel : 04-9885131
e-mail : ryspek@unimap.edu.my

Prof. Dr. Zuraidah Mohd Zain
Ph.D. (Industrial Studies) - University of Liverpool, UK,
B.Sc. Eng. (Materials Science and Eng.) - University of Florida, USA
Tel : 04-9885353/04-9798093
e-mail : zuraidah@unimap.edu.my

Prof. Madya Dr. Bhuvenesh Rajamony
Ph.D. Tech. (Mech. Manufacturing Eng.) – University of Bombay, India
M.Sc. Eng. (Machine Tools Eng.) - University of Madras, India
B.Eng. (Mechanical Eng.) - University of Madurai, India
Dip. Eng. (Industrial Eng.) - University of Bombay, India
Tel : 04-9885143
e-mail : bhuvenesh@unimap.edu.my

Prof. Madya Mazelan Abdul Hamid
M.Sc. (Advanced Manufacturing) - Salford University, UK
B.Sc. (Electrical Engineering) - Seoul National University, Korea
Tel : 04-9798100
e-mail : mazelan@unimap.edu.my

Dato' Nazaruddin Abdul Jalil
Masters in Fine Art Technology - UITM
B.Art & Design (Ceramics) - UITM
Tel : 04-9885023
e-mail : nazaruddinjalil@unimap.edu.my

Dr. Khairul Azwan Ismail
PhD (Impact Mechanics) - University of Cambridge, UK
M.Sc. (Impact and Explosion Engineering) - UMIST, UK
B.Eng. (Mechanical Engineering) - UMIST, UK
Tel : 04-9885036/04-9885052
e-mail : k.azwan@unimap.edu.my

Dr. Muhammad Iqbal Muhammad Hussain
PhD (Manufacturing Eng.) - UniMAP
M.Sc. (TQM) - University of the Punjab Lahore, Pakistan.
B.Eng. (TQM) - University of the Punjab Lahore, Pakistan.
Tel : 04-9885102
e-mail : miqbal@unimap.edu.my

Dr. Muhamad Saifuldin Abdul Manan
PhD. (Mechanical Eng.) - University College of London, UK
B.Eng. (Mechanical Eng) - University of Liverpool, UK
Tel : 04-9885022
e-mail : m.saifuldin@unimap.edu.my

Mr. Ahmad Fairuz Mansor
M.Eng. (Mechanical – Advanced Manufacturing Tech.) - UTM
B.Eng. (Manufacturing) - UniMAP
Tel : 04-9885093
e-mail : fairuzmansor@unimap.edu.my

Mr. Ahmad Nabil Mohd Khalil
M.Sc. (Manufacturing) - UniMAP
B.Eng. (Mechanical Manufacturing) – UTHM
Tel : 04-9885094
e-mail : nabilkhalil@unimap.edu.my

Mr. Asmawi Sanuddin
M.Sc. (Mechanical Eng.) - UPM
B.Eng. (Mechanical Eng.) – UPM
Tel : 04-9885128
e-mail : asmawi@unimap.edu.my

Miss Atikah Hj Awang @ Mohd Ramli
PhD Design (Manufacture and Engineering Mgmt) – University of Strathclyde, UK
M.Sc. (Manufacturing Systems Eng.) - Warwick University, UK
B.Eng. (Mechanical Eng.) – UNITEN
Tel : 04-9885051
e-mail : atikah@unimap.edu.my

Mr. Azmi Harun
M.Eng. (Manufacturing Systems) - UPM
B.Eng. (Manufacturing) - UKM
Dip. Mechanical Eng. (Manufacturing) - POLIMAS
Cert. Mechanical Eng. (Manufacturing) - Politeknik Ungku Omar
Tel : 04-9885036/04-9885017
e-mail : azmiharun@unimap.edu.my

Mr. Azuwir Mohd Nor
M.Sc. (Information Technology) - UUM
B.Sc. (Electrical and Computer Eng.) - Wisconsin University, USA
Tel : 04-9885134
e-mail : azuwir@unimap.edu.my

Mr. Azwan Iskandar Azmi
M.Eng. (Advanced Manufacturing Tech.) - UTM
B.Sc. (Mechanical Eng.) - Purdeu University, USA
Tel : 04-9885112
e-mail : azwaniskandar@unimap.edu.my

Mr. Bakri Bakar
M.A Design Visualization - Bournemouth, UK
B. Design (Industrial Design) – UITM
Tel : 04-9885105
e-mail : bakribakar@unimap.edu.my

Mr. Jamali Md Sah
M.Sc. (Industrial Control Systems) - Salford University, UK
B.Eng. (Mechanical Eng.) - Salford University, UK
Tel : 04-9885019
e-mail : jamali@unimap.edu.my

Mr. Maliki Ibrahim
M.Eng. (Electrical- Electronics and Telecommunications) - UTM
B.Eng. (Electric) Hons - UiTM
Tel : 04-9885018/04-9885141
e-mail : maliki@unimap.edu.my

Mr. Mohd. Asyraf Che Doi
M.Phil. (Mfr Eng & Operation Management) - Univ. of Nothingham
B.Sc. (Industrial Engineering) - Univ. of Missouri, US
Tel : 04-9885114
e-mail : asyraf@unimap.edu.my

Mr. Mohd. Fidzwan Md Amin Hamzas
M.Sc. (Mechanical Manufacturing) - UTHM
B.Eng. (Mechanical Eng.) - UniMAP
Tel : 04-9885085
e-mail : fidzwan@unimap.edu.my

Mr. Mohd. Hafiezal Mohd Radzi
M.Sc. Mechanical System Design – University of Aix-Marseille, France
B.Eng. Mechanical – University od Provence, France
Tel : 04-9885092
e-mail : hafiezalradzi@unimap.edu.my

Mr. Mohd. Sabri Hussin
M.Sc. (Innovation and Engineering Design) - UPM
B.Eng. (Manufacturing Engineering) - UniMAP
Tel : 04-9885135
e-mail : mohdsabri@unimap.edu.my

Mr. Mohd. Zahiruddin Md Zain
M.Eng. Mech. (Manufacturing) - KUiTTHO
B.Eng. (Mechanical Engineering) - Waseda University, Japan
Tel : 04-9885009
e-mail : zahiruddin@unimap.edu.my

Mr. Mohd. Zamzuri Mohammad Zain
M.Sc. Production System Engineering - Toyohashi University Technology
B. Eng. Production System Engineering - Toyohashi University Technology
Tel : 04-9885048
e-mail : mzamzuri@unimap.edu.my

Mr. Mokhtar Mat Salleh
M.Sc. (Manufacturing System Eng.) - Coventry University, UK
B.Eng. Hons (Mechanical) - UKM
Tel : 04-9885055
e-mail : mokhtarms@unimap.edu.my

Mr. Muhammad Hasnulhadi Mohammad Jaafar
M.Sc . (Manufacturing System Eng.) - UPM
B.Eng. Hons (Mechatronics) - UIAM
Tel : 04-9885028
e-mail : hasnulhadi@unimap.edu.my

Mr. Muhammad Syahril Bahari
M.Sc. in Mechanical Engineering - USM
Bachelor of Mechanical Engineering (Hons) - UNITEN
Tel : 04-9885127
e-mail : syahrilbahari@unimap.edu.my

Mr. Norshah Afizi Shuaib
M.Sc. (Manufacturing Engineering) - UPM
B.Eng. (Mechanical Engineering) - UNITEN
Tel : 04-9885016/04-9885095
e-mail : norshahafizi@unimap.edu.my

Ms. Nooraizedfiza Zainon
M.Sc. (Manufacturing Systems) - UPM
B.Eng. (Manufacturing Eng. with Management) - USM
Tel : 04-9885081
e-mail : nooraizedfiza@unimap.edu.my

Ms. Nurul Ikhmar Ibrahim
M.Sc. (Design in Ergonomics) - Conventry University, UK
B.Eng. (Manufacturing Engineering) - UniMAP
Tel : 04-9885086
e-mail : ikhmar@unimap.edu.my

Ms. Roshaliza Hamidon
M.Sc. (Manufacturing Systems) - UPM
B.Eng. (Manufacturing) - UIA
Tel : 04-9885113
e-mail : roshaliza@unimap.edu.my

Ms. Sakinah Zakaria
M.Sc. (Automation and Control Engineering) - Newcastle University, UK
B.Eng. (Electrical and Electronics Engineering) - Portsmouth University, UK
Tel : 04-9885017/04-9885139
e-mail : sakinahzakaria@unimap.edu.my

Ms. Shaliza Azreen Mustafa
M.Sc. (Mechanical Engineering) - USM
B.Industrial Technology (Quality control & Instrumentation) - USM
Tel : 04-9885101
e-mail : shalizaazreen@unimap.edu.my

Ms. Siti Aishah Adam
M.Sc (Innovation & Engineering Design)- UPM
B.Eng. (Manufacturing Eng. with Mgmt) - UIAM
Tel : 04-9885082
e-mail : aishahadam@unimap.edu.my

Miss Siti Norbahiyah Mohamad Badari
M.Sc (Manufacturing Eng.)- UIAM
B.Eng. (Manufacturing Eng.) - UIAM
Tel : 04-9885049
e-mail : norbahiyah@unimap.edu.my

Ms. Ummi Noor Nazahiah Abdullah
M.Sc. (Innovation and Engineering Design) - UPM
B.Eng. (Manufacturing Eng. with Mgmt) - USM
Tel : 04-9852233/04-9885008
e-mail : nazahiah@unimap.edu.my

Mr. Zailani Zainal Abidin
M.Sc. (Manufacturing System) - UPM
B.Eng. (Manufacturing) Hons. - UniMAP
Dip. Mechanical (Manufacturing Eng.) – POLIMAS
Tel : 04-9885140
e-mail : zailani@unimap.edu.my

Mr. Zulkifli Abdul Rashid
M.Sc. (Manufacturing Systems) Warwick, UK
B.Sc. (Mechanical Eng.) Texas
Tel : 04-9885093
e-mail : zulkifli_rashid@unimap.edu.my

Teaching Engineer

Mr. Amarul Talip
B.Eng. (Electrical) - KUiTTHO
Tel : 04-9885065
e-mail : amarul@unimap.edu.my

Ms. Anis Abdul Aziz
B.Eng. (Manufacturing) Hons - UniMAP
Dip. (Manufacturing Technology) - POLIMAS
Tel : 04-9885060
e-mail : anisaziz@unimap.edu.my

Ms. Kartini Alir
B.Eng.(Manufacturing Systems Eng.) Hertfordshire University, UK
Tel : 04-9885075
e-mail : kartini_alir@unimap.edu.my

Mr. Leong Kean Wei
B.Eng. (Manufacturing Eng.) Hons. - UniMAP
Dip. (Mechanical Eng. Manufacturing) - POLIMAS
Tel : 04-9885047
e-mail : kwleoong@unimap.edu.my

Mr. Nor Zaiazmin Yahaya
B.Sc. (Mechanical Eng.) - Iowa State University, USA
Tel : 04-9885136
e-mail : zaiazmin@unimap.edu.my

Ms. Marina Marzuki
B.Eng. (Manufacturing Eng. with Mgmt) - USM
Tel : 04-9885076
e-mail : marina@unimap.edu.my

Mr. Mohd. Faizal Hamid
B.Eng. (Manufacturing Eng. with Mgmt) - USM
Tel : 04-9885062
e-mail : faizalhamid@unimap.edu.my

Mr. Mohd. Hatta Musa
B.Eng. (Mechanical Eng.) - USM
Tel : 04-9885103
e-mail : hatta@unimap.edu.my

Mr. Mohd. Khairul Fadzly Abu Bakar
B.Eng. (Mechanical) - UTHM
Tel : 04-9885066
e-mail : fadzly@unimap.edu.my

Mr. Mohd. Nasir Mat Saad
B.Eng. (Mechanical) - USM
Tel : 04-9885115
e-mail : nasirsaad@unimap.edu.my

Mr. Mohd. Shuhidan Salleh
B.Eng. (Mechanical Eng.) - UiTM
Dip. (Mechatronics Eng.) - POLIMAS
e-mail : shuhidan@unimap.edu.my

Mr. Mohd. Syedi Imran Mohd Dawi
B.Eng. (Product Design Eng.) Hons - UniMAP
Tel : 04-9885010
e-mail : syediimran@unimap.edu.my

Mr. Muhammad Khairy Md Naim
B.Eng. (Manufacturing) Hons - UniMAP
Tel : 04-9885031
e-mail : mkhairy@unimap.edu.my

Ms. Noor Diyana Dahlan
B.Eng. (Manufacturing) Hons – UniMAP
Dip. (Manufacturing Technology) – Politeknik Sbrg Perai
Tel : 04-9885087
e-mail : diyanadahlan@unimap.edu.my

Ms. Rafizah Abdul Rashid
B.Eng. (CAD/CAM) - UM
Tel : 04-9885129
e-mail : rafizah@unimap.edu.my

Ms. Shafizan Sharifuddin
M.Eng. (Manufacturing) - UM
B.Eng. (Manufacturing Eng. with Mgmt) - USM
Tel : 04-9885020
e-mail : izan@unimap.edu.my

Miss Suhaireza Md Esa
B.Eng. (Mechanical Industry) - UTM
Tel : 04-9885021
e-mail : suhaireza@unimap.edu.my

Mr. Yusmarizal Yusop
B.Eng. (Mechanical Manufacturing) - UTM
Tel : 04-9885148
e-mail : yusmarizal@uniamp.edu.my

Tutor

Mr. Mohd Effendi Muhammad Suandi
Bachelor of Art & Design (Industrial Design) Hons - UiTM
Tel : 04-9885056
e-mail : effendi@unimap.edu.my

Mr. Muhamad Farizuan Rosli
Master of Art & Design (Design Tech.) – UiTM
Bachelor of Art & Design (Hons) Industrial Design - UiTM
Diploma in Art & Design (Industrial Design) - UiTM
Tel : 04-9885029
e-mail : farizuan@unimap.edu.my

Mr. Muhammad Aiman Ahmad Fozi
Master of Innovasion & Engineering Design – UPM
Bachelor of Design Hons.(Industrial Design) - UPM
Tel : 04-9885056
e-mail : aiman@unimap.edu.my

Ms. Norashiken Othman
M.Sc (Innovation & Engineering Design) - UPM
Bac. Ind. Design – UPM
Tel : 04-9885062
e-mail : norashiken@unimap.edu.my

Study Leave

Lt. Ahmad Humaizi Hilmi
M.Eng. (Advanced Manufacturing Technology) - UTM
B.Eng. (Manufacturing Eng. with Management) - USM
e-mail : humaizi@unimap.edu.my

Mr. Badrul Azmi Abdul Holed
Master. (Industrial Design) - University of Central England, UK
Bachelor of Design (Industrial Design) - UiTM Shah Alam
e-mail : badrul@unimap.edu.my

Mr. Irfan Abd Rahim
M.Sc. (Aerospace Eng.) - UPM
B.Eng. Hons (Mechanical Eng.) - KUiTTHO
Dip. (Mechanical Eng.) - POLIMAS
e-mail : irfanrahim@unimap.edu.my

Mr. Lee Chang Chuan
M.Sc. (Mechanical & Material Eng.) - UKM
B.Eng. (Manufacturing Eng.) - UKM
Cert. (Manufacturing Eng.) - POLIMAS
e-mail : cclee@unimap.edu.my

Mr. Mohamad Ezral Baharudin
M.Sc. Mechanical Eng. (Manufacturing Systems & Automation) - USM
B.Sc. (Mechanical Eng.) Hons. - USM
Tel : 04-9851217 / 9853317 / 04-9885135
e-mail : m.ezral@unimap.edu.my

Mr. Mohamad Shaiful Ashrul Ishak
M.Eng. (Mechanical) - UTM
B.Eng. (Mechanical Aeronautics) - UTM
e-mail : mshaiful@unimap.edu.my

Mr. Mohd. Azaman Md Deros
M.Eng. (Manufacturing) - UM
B.Eng. (Mechanical) - USM
Tel : 04-9885128
e-mail : azaman@unimap.edu.my

Mr. Mohd. Fathullah Ghazli @ Ghazali
M.Sc. (Manufacturing Systems) - Coventry University, UK
B.Eng. (Manufacturing) - UIA
Tel : 04-9885061
e-mail : fathullah@unimap.edu.my

Ms. Noorhafiza Muhammad
M.Eng. (Manufacturing Systemc) -Coventry University, UK
B.Eng. (Manufacturing Engineering with Management) Hons - USM
e-mail : noorhafiza@unimap.edu.my

Mr. Rozie Nani Ahmad
M.Eng.Mech. (Advanced Manufacturing Technology) - UTM
B.Eng. (Mechanical Engineering) - UTM
Tel : 04-9885009
e-mail : rozienani@unimap.edu.my

Mr. Suhaimi Illias
M.Eng. (Mechanical Systems) - Gunma University, Japan
B.Eng. (Mechanical) - Ehime University, Japan
Tel : 04-9885029
e-mail : suhaimi@unimap.edu.my

Mr. Wan Abdul Rahman Assyahid Wan Ibrahim
M.Eng. (Advanced Manufacturing Tech.) - UTM
B.Eng. (Mechanical Eng.) - UTM
e-mail : warawi@unimap.edu.my

Mr. Mohd. Sazli Saad
M.Eng. (Mechatronics & Automatic Control) - UTM
B.Eng. (Electrical Eng.) - UiTM
Dip. Mechatronics - POLIMAS
e-mail : sazlisaad@unimap.edu.my

Mr. Syamsul Syahrun Awang @ Hashim
M.Eng. (Mechanical Systems Eng.) - Gunma University, Japan
B.Eng. (Mechanical System Eng.) - Gunma University, Japan
e-mail : syamsul@unimap.edu.my

Mr. Muhamad Nasir Murad
M.Eng. Mech. (Manufacturing) - KUiTTHO
B.Eng. Mech. (Manufacturing) - UTM
Dip. (Mechanical Eng.) - PUO
Cert. (Mechanical Eng.) - POLIMAS
e-mail : mnasir@unimap.edu.my

Mr. Mohd. Nazri Omar
M.Sc. (Ing.) Global Production Engineering - Technical University, Berlin
B.Eng. (Mechanical) Hons. - UiTM
e-mail : nazriomar@unimap.edu.my

Mr. Shayfull Zamree Abd Rahim
M.Eng. (Advanced Manufacturing Tech.) - UTM
B.Eng. (Mechanical) - UTM
e-mail : shayfull@unimap.edu.my

Ms. Suhaila Hussain
M.Sc. (Advanced Mech Eng.) - Imperial College London, UK
B.Eng. Hons (Mech) - UNITEN
e-mail : suhaila@unimap.edu.my

Ms. Marina Marzuki
B.Eng. (Manufacturing Eng. with Mgmt) - USM
Tel : 04-9885076
e-mail : marina@unimap.edu.my

Assistant Engineer

Mr. Narzrezal Abdul Razak
Diploma in Mechanical Engineering (Manufacturing) - Politeknik PD
Cert. in Mechanical Eng. (Manufacturing) - Politeknik JB
Tel : 04-9885117
e-mail : narzrezal@unimap.edu.my

Technician

Mr. Fazrul Izham Azizan
Cert. in Mechanical Eng. (Manufacturing) - POLIMAS
Tel : 04-9885145
e-mail : fazrulizham@unimap.edu.my

Mr. Mazlan Mohamad Husin
Cert. in Mechanical Eng. (Manufacturing) - POLIMAS
Tel : 04-9885110
e-mail : mazlanhusin@unimap.edu.my

Ms. Misni Rosli
Cert. in Mechanical Eng. (Automotive) - Politeknik KB
Tel : 04-9885151
e-mail : misni@unimap.edu.my

Mr. Mohd. Hazwan Hussin
Cert. in Electrical Eng. & Electronic - Politeknik Perlis
Tel : 04-9885035
e-mail : mohdhazwan@unimap.edu.my

Mr. Mohd. Jasmin Shaari
Cert. in Mechanical Eng. - Politeknik KB
Tel : 04-9885074
e-mail : mjasmin@unimap.edu.my

Mr. Mohd. Nazri Abdul Hamid
Cert. in Mechanical Eng. (General) - POLIMAS
Tel : 04-9885083
e-mail : nazrihamid@unimap.edu.my

Mr. Mohd. Nazmi Mohammad Radzi
Cert. in Electrical Eng. & Electronic - Politeknik Perlis
Tel : 04-9885090
e-mail : mohdnazmi@unimap.edu.my

Mr. Mohd. Nazry Mat Nayan
Cert. in Mechanical Eng. (Logy) - POLIMAS
Tel : 04-9885090
e-mail : mohdnazry@unimap.edu.my

Mr. Mohd. Nurhilmi Mohamad
Cert. in Electrics Technology (Service) - Kolej Komuniti Arau
Tel : 04-9885063
e-mail : mnurhilmi@unimap.edu.my

Mr. Mohd. Shukri Nordin
Cert. in Mechanical Eng. (Manufacturing) – Politeknik JB
Tel : 04-9885032
e-mail : shukri@unimap.edu.my

Mr. Muhamad Fairuz Abdul Karim
Cert. in Mechanical Eng. (General) - POLIMAS
Tel : 04-9885084
e-mail : fairuzkarim@unimap.edu.my

Mr. Rashid Ramli
Cert. in Mechanical Engineering – Politeknik Muadzam Shah
Tel : 04-9885058
e-mail : rashid@unimap.edu.my

Mr. Roszi Anuar Hamid
Cert. in Mechanical Eng. (Manufacturing) - POLIMAS
Tel : 04-9885094
e-mail : roszianuar@unimap.edu.my

Foreman K1

Mr. Suhelmi Wi @ Senawi
Cert. in Mechanics Tech. (Electronics Industry) - ITTAR, Penang
Tel : 04-9885001
e-mail : suhelmi@unimap.edu.my

Administrative Staff

Mr. Syed Amir Fatir Syed Akhir
Assistant Registrar
B.Mgmt.(Human Resource) Hons - UUM
Tel : 04-9885033
Fax : 04-9885034
e-mail : syedamir@unimap.edu.my

Miss Fariza Ileyna Mansor
Administrative Assistant (Office Secretary)
Dip. (Secretarial Science) - PTSS
Tel : 04-9885035
e-mail : ileyna@unimap.edu.my

Mr. Azmi Azit
Administrative Assistant (Clerical/ Operational)
Tel : 04-9885040
e-mail : azmi@unimap.edu.my

Mr. Mohamad Zaki Kerya
Administrative Assistant (Clerical/ Operational)
Tel : 04-9885035
e-mail : mohamadzaki@unimap.edu.my

Ms. Shela Shariff
Administrative Assistant (Clerical/ Operational)
Tel : 04-9885041
e-mail : shela@unimap.edu.my

Mr. Amir Hazreen Mohamad Hadzi
General Office Assistant
e-mail : amirhazreen@unimap.edu.my

Manufacturing Engineering Programme 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.

PO 02
Ability to identify, formulate and solve electronic engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices.

PO 06
Ability to demonstrate/understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO 07
Ability to demonstrate/understand entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO 08
Understanding of professional and ethical responsibilities and commitment to the society.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding 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	
SEMESTER	I	II	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	EPT312/3 Vibration and Mechanics of Machines	EIT300/6 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	EPT313/3 Machine Components Design		EPT412/3 Mechanical System Design	EPT424/2 Heat Transfer
		EPT181/2 CAD/CAM	EPT261/3 Electronics	EPT281/3 Industrial Engineering	EPT383/3 Automation and Robotics	EPT328/3 Fluid Mechanics II		EPT403/3 Advanced Materials	EPT495/2 Operational Research
		EPT182/3 Manufacturing Process I	EPT282/3 Manufacturing Process II		EPT385/3 Metrology and Quality Control	EPT361/4 Instrumentation and Control		EPT484/2 Lean Manufacturing	EPT4XX/3 Elective
		EPT183/2 Engineering Workshop			EPT384/3 Advanced Manufacturing Technology	EPT381/3 Tools and Die Design		EPT485/2 Production Planning and Control	
Non Engineering (23)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EPT371/2 Finite Element Analysis				
	EPT162/2 Computer Programming	EUT122/2 Skills and Technology in Communication						EUT443/2 Engineering Management	EUT440/3 Engineers in Society
University Required (15)	UUW233/2 Islamic & Asian Civilisations & UUW114/2 University Malay Language & UUW235/2 Ethnic Relations & EUWXXX/1 Co-Curriculum Subjects		UUW223/2 University English	UUW224/2 Engineering Entrepreneurship & UUWXXX/2 Option Subjects		UUW322/2 Thinking Skills			
120	**17**	**18**	**17**	**16**	**17**	**18**	**4**	**14**	**14**
15	University English, Engineering Entrepreneurship, Islamic & Asian Civilisations, Ethnic Relations, Thinking Skills, University Malay Language, Co-Curiculum, Option Subjects								
Total Units for Graduation 135									
Elective: EPT487 Manufacturing Automation; EPT486 Ergonomics									

Product Design Engineering Programme 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.

PO 02
Ability to identify, formulate and solve electronic engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices.

PO 06
Ability to demonstrate/understand the social, cultural, global and environmental responsibilities of a professional engineer.

PO 07
Ability to demonstrate/understand entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO 08
Understanding of professional and ethical responsibilities and commitment to the society.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding of the need for, and an ability to engage in life-long learning.

PO 12
Demonstrate understanding of project management and finance principles

School of Manufacturing Engineering

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

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core (97)	EPT103/3 Materials	EPT161/3 Electrical Technology	EPT241/3 Solid Mechanics I	EPT228/3 Fluid Mechanics I	EPT335/3 Applied Thermodynamics	EPT313/3 Machine Components Design	EIT300/6 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	EPT314/3 Machines Mechanism		EPT 403/3 Advanced Materials	EPT424/2 Heat Transfer
	EPT191/2 Workshop and Studio Practice	EPT184/3 Manufacturing Technology	EPT261/3 Electronics	EPT262/2 Measurement and Instrumentation System	EPT363/3 Automatic Control	EPT364/3 Mechatronics		EPT427/3 Pneumatics and Hydraulics System Design	EPT495/2 Operational Research
		EPT192/3 Product Innovation	EPT283/2 Computer Aided Design	EPT293/3 Engineering Product Design I	EPT393/3 Engineering Product Design II	EPT395/3 Engineering Product Design III		EPT415/3 Vibration	EPT4XX/3 Elective
					EPT394/3 Product Ergonomic and Safety	EPT328/3 Fluid Mechanics II			
Non Engineering (23)	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EQT203/3 Engineering Mathematics III	EQT271/3 Engineering Statistics	EPT371/2 Finite Element Analysis				
	EPT162/2 Computer Programming	EUT122/2 Skills and Technology in Communication						EUT443/2 Engineering Management	EUT440/3 Engineers in Society
University Required (15)	UUW233/2 Islamic & Asian Civilisations & UUW114/2 University Malay Language & UUW235/2 Ethnic Relations	UUWXXX/1 Co-Curriculum Subjects	UUW223/2 University English	UUW224/2 Engineering Entrepreneurship & UUWXXX/2 Option Subjects		UUW322/2 Thinking Skills			
120	18	18	16	18	17	17	4	13	14
15	University English, Engineering Entrepreneurship, Islamic & Asian Civilisations, Ethnic Relations, Thinking Skills, University Malay Language, Co-Curiculum, Option Subjects								
Total Units for Graduation 135									
Elective: EPT497 New Product Development; EPT498 Green Product									

Bachelor of Mechanical Engineering Technology (Honours)(Machining) Programme Objectives (PEO)

PEO 01
To produce competent Engineering Technologists who are able to apply principles of science, engineering and modern technology in solving current and future problems related to manufacturing engineering technology. (K, TPS)

PEO 02
To produce Engineering Technologists in manufacturing engineering field who perform work and duty ethically with high moral values and responsibility to God, nation and societies. (CTPS & ES)

PEO 03
To produce creative and innovative Engineering Technologist in research and development in fulfilling the nation's requirements. (CTPS & ES)

PEO 04
To produce Engineering Technologists who are able to communicate effectively with good leadership as well as able to function in teamwork environment. (CS, TS, LS)

PEO 05
To produce Engineering Technologists that shows enthusiasm in engaging long-life learning through continuity of learning, technical practices and professional development. (LL)

Programme Outcomes (PO)

PO1
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization;

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns;

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources;

PO5
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations;

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams;

PO7
Communicate effectively with the engineering community and society at large;

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities;

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices;

PO10
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development;

PO11
Demonstrate an awareness of management, business practices and entrepreneurship;

PO12
Recognize the need for professional development and to engage in independent and lifelong learning.

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

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
Machining Core Subject	PDT101/3 Statics and Dynamics	PDT122/3 Material Science	PDT201/3 Strength of Materials	PDT203/3 Noise & Vibration	PDT309/3 Manufacturing Economics	PDT313/4 Final Year Project I	PDT413/6 Final Year Project II	PDT400/12 Industrial Training
	PDT106/3 Engineering Graphics	PDT111/3 Manufacturing Process	PDT209/3 Industrial Safety	PDT206/3 Jigs & Fixtures Design	PDT311/4 Advance Machining Technology II	PDT314/4 Machining Project	PXX 4XX/3 Technology Management	
	PDT109/2 Workshop Practice	PDT107/2 Computer Aided Design	PDT210/4 Conventional Machining	PDT211/4 Advance Machining Technology I	PDT312/3 Computer Aided Manufacturing	Elective I /3	PXX4XX/3 Humanities & Technology	
	PDT110/3 Metrology	PDT120/3 Basic Electrical and Electronic	PDT202/3 Heat Transfer	PDT222/3 Metallurgy	PDT310/3 Quality Control	PDT315/3 Maintenance	Elective II /3	
		PDT112/3 Theory in Machining		PDT212/3 Geometric, Dimensioning & Tolerencing		PPT316/3 Sustainable Machining	Elective III /3	
Mathematics	PQT111/3 Mathematics for Engineering Technology I	PQT112/3 Mathematics for Engineering Technology II	PQT213/3 Statistics for Engineering Technology					
University Required	UUW233/2 Islam & Asia Civilisation (TITAS)	EUWXXX/1 Co-Curriculum	UUW223/2 University English Language	UUW224/2 Engineering Entrepreneurship	UUW322/2 Thinking Skills	EUT122/2 Communication Skills/2		
	UUW114/2 University Malay Language				UUWXXX/2 Options Subjects			
					UUW 235/2 Ethnic Relation			
Total Credit	18	18	18	18	19	19	18	12
Total units for Graduation 140								

School of Manufacturing Engineering

Course Syllabus

EPT 103/3
MATERIALS

Course Synopsis

This course introduces students to the engineering materials fundamentals including the engineering materials application, atomic bonding, crystal structure, mechanical and physical properties, corrosion mechanism, microstructural analysis, phase diagram, ferrous and non-ferrous alloys, polymer and advance materials.

References

1. William F. Smith, Javad Hashemi, 2006, Foundation of Materials Science and Engineering, Fourth edition, McGraw Hill.
2. William D. Callister, Introduction to Materials, John-Wiley & Sons.
3. Budinski, K.G, 2006, Engineering Materials Properties and Selection, 8th edition, Prentice Hall.
4. Shackeford, J.F, 2005, Introduction to Materials Science for Engineers,6th edition, Prentice Hall.
5. Mars G. Fontana, 1986, Corrosion Engineering, Third edition, McGraw Hill.

EPT 152/2
ENGINEERING DRAWING

Course Synopsis

This course introduces fundamental of engineering drawing, engineering graphic as language, basic drafting skill, applied geometry, shape description, basic dimensioning, tolerance, detail and assembly drawing based on BS308 part 1 and part 2.

References

1. Jensen C., Helsel J D., Short D R., 2007, Engineering Drawing & Design. 7th ed. Mc-Graw Hill.
2. Jensen C., Helsel J D., 1996. Fundamentals of Engineering Drawing. 4th ed. Mc-Graw Hill.
3. Kirkpatrick J M., 2003. Basic Drafting Using Pencil Sketches and AutoCAD. Prentice Hall.
4. Luzzader W. J., Duff J. M., 1993. Fundamentals of Engineering Drawing With an Introduction to Interactive Computer Graphics for Design and Production. 11th ed. Prentice Hall International.
5. Goetsch D L., Chalk W.S., Nelson J.A. Rickman R.L., 2005. Technical Drawing. 5th ed. Thomson Delmar Learning.

EPT 181/2
CAD/CAM

Course Synopsis

This course introduces the principles and application of CAD/CAM systems. It enables students to understand the theory, concept, and application of CAD/CAM as used in the industry. Students will use CAD software to illustrate parts, and CAM software to convert CAD files into numerical control (NC) codes.

References

1. P.N. Rao. *CAD/CAM Principles and Applications*. 2nd Edition. McGraw Hill. (2004)
2. Ibrahim Zeid. *Mastering CAD/CAM*.1st Edition. McGraw Hill International Edition. (2004)
3. Farid M. Amirouche. *Principles of Computer Aided Design and Manufacturing*. 2nd Edition. Prentice Hall. (2003)
4. Chris McMahon, Jimmie Browne. *CADCAM : From Principles to Practice*. Addison Wesley Publication. (1993)
5. Chris McMahon, Jimmie Browne.. *CADCAM : Principles, Practice and Manufacturing Management*. 2nd Edition. Prentice Hall. (1999)

EPT 182/3
MANUFACTURING PROCESS I

Course Synopsis

This course introduces students to the knowledge, understanding and synthesis of the basic processes in manufacturing such as metal-casting 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.
2. Kalpakjian S., 2001. *Manufacturing Engineering an Technology*, 5th Ed. Addision Wesley.
3. Schey J.A. 2000. *Introduction to Manufacturing Process*. 3rd Ed. MC Graw Hill.
4. 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 by 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.
3. Mikell P. Groover (2007), *Fundamentals of Modern Manufacturing.* 3rd ed. John Wiley & Sons, Inc.
4. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). *Materials and Processes in Manufacturing*. 8th ed., John Wiley & Sons, Inc.
5. *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

1. Serope Kalpakjian, Steven R. Schmid 2006. Manufacturing Engineering and Technology - 5th Edition in SI Units, Prentice-Hall.
2. 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.
2. Behrouz A. Forouzan and Richard F, Gilberg, 2001. Computer Science A Structured Programming Approach Using C, Second Edition, Brooks/Cole.
3. Jeri R. Hanly and Elliot B. Koffman, 2002. Problem Solving & Program Design in C, 3rd Edition, Addison Wesley.
4. Elice E. Fischer, David W. Eggert and Stephen M. Ross, 2001. Applied C: An Introduction and More, McGraw-Hill.
5. Harry H. Cheng, 2010. C for Engineers and Scientists: An Interpretive Approach, McGraw Hill.

EPT 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.
2. Stephen J. Chapman, “*Electric Machinery Fundamentals*”, 4th Edition, McGraw Hill, 2005.

3. 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.
5. 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.
3. J. L. Meriam and L. Glenn Kraige, 2003. Engineering Mechanics, Statics Fifth Edition, John Wiley & Sons, Inc.
4. Ferdinand P. Beer, E. Russell JohnsonJr and William E. Clausen, 2004. Vector Mechanics for Engineers Statics Seventh Edition. Mc-Graw Hill.
5. 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

1. Serope Kalpakjian, Steven R. Schmid 2006. Manufacturing Engineering and Technology - 5th Edition in SI Units, Prentice-Hall, Inc.
2. DeGarmo, Black and Kohser, 2006. Materials and Processes in Manufacturing. 9th Edition. Wiley, ISBN: 0-471-36679-X.
3. John A. Schey, 2000. Introduction to Manufacturing Processes, 3rd Edition, McGraw-Hill, Inc.
4. 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 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

1. 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.
3. 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.
3. Madhukar, Vable. 2002. *Mechanics of Materials*, Oxford University Press.
4. Barber, J.R . 2001. *Intermediate Mechanics of Materials*, McGraw-Hill.
5. 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 dynamic conditions. The course will be presented in two parts: kinematics, which treats only the geometric aspects of motion, and kinetics, which is the analysis of the forces causing the motion. To develop these principles, student learn the dynamics of a particle first, followed by topics in rigid-body dynamics in two and then three dimensions. Emphasis will be given on the kinematics and kinetics of a particle, planar kinematics and kinetics of a rigid body, three dimension kinematics and kinetics of a rigid body.

References

1. Beer, F. 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.
4. Meriam J.L. , Kraige L.G., 2007. *Engineering Mechanics, Dynamics*,
5. John Wiley.
6. 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.
3. 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 system 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

1. Kalpakjian S, Schmid S.R. *Manufacturing Engineering and Technology*, 4th ed., Prentice Hall Inc. 2001
2. Manek N.J. *Industrial Engineering*, Laxmi Publications (P) LTD. 2002
3. 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.
5. 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
2. Jon Stenerson, Kelly Curran, *Computer Numerical Control Operation and Programming*. 3rd ed., Prentice Hall, 2007.
3. Steve Krar, Arthur Gill, Peter Smid, *Computer Numerical Control Simplified,* 1st ed., Industrial Press Inc. New York, 2001.

4. By Stephen F. Krar, Arthur Gill, *Exploring Advanced Manufacturing Technologies,* Industrial Press Inc. New York, 2003.
5. *Manufacturing Processes And Materials*, George F. Schrader, Ahmad K. Elshennawy, Lawrence E. Doyle, Society Of Manufacturing Engineers, 2000

EPT 283/2
COMPUTER AIDED DESIGN

Course Synopsis

This course focuses on developing students' skills on the basis of 3D modeling and its application in engineering by using 3D Modeling software. It includes details on 3D modeling followed by producing 2D drawing, assembly drawing, exploded drawing, surface modeling, rendering and animation.

References

1. James H. Earle, "Engineering Design Graphics", IIth ed.,Pearson Prentice-Hall, 2004.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan, Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.
3. Farid M. Amirouche, Principles of Computer Aided Design and Manufacturing Prentice Hall; 2nd edition (January 22, 2004)
4. 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
7. 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

1. J.F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack, *Fluid Mechanics,* Fifth Edition, Prentice-Hall, 2005.
2. 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.
4. 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.
3. Stephen R. Turns, *Thermodynamics: Concepts and Applications ,* Cambridge University Press, 2006.
4. Michael J. Moran & Howard N. Shapiro , *Fundamentals of Engineering Thermodynamics*, 6 th Edition, Wiley, 2007.
5. Mohd Kamal Ariffin, " Termodinamik Asas", UTM Press, 2005. 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

1. Beckwith, T.G., Maragoni, R.D., Lienhard, J.H., Mechanical Measurement, 6th ed., Prentice Hall, 2006.
2. Bently, J. P., Priciple of Measurement System, 3rd ed., Logman, 1995
3. Figliola, R.S., Beasly, D.E., Theory and Design for Mechanical Measurements, 3rd ed. John Wiley, 2000
4. 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

1. Rudolph J. Eggert, "Engineering Design" New Jersey: Prentice Hall, 2005
2. Karl T. Ulrich and Steven D. Eppinger, "Product Design and Development" McGraw- Hill, 2008
3. Clive L. Dym and Patrick Little, "Engineering Design: A Project Based Introduction", John Wiley & Sons, 2008
4. Lance Bettencourt Service Innovation: How to Go from Customer Needs to Breakthrough Services, McGraw-Hill; 1 edition (May 26, 2010)
5. 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, flywheels and gyroscopes. Student will also learn the methods of balancing rotating masses and parts of a combustion engine. The concepts of vibration with respect to one-degree-of-freedom are also studied. At the end of this course, students should be able to solve problems related to various mechanical systems. In addition, they should be able to evaluate analytically the parameters of components of various machines under study.

References

1. Pennock Gordon R., Shigley Joseph E., Uicker John J., *Theory of Machines and Mechanisms*, OXFORD University Press, 2003
2. D. J. Inman, *Engineering Vibration*. Pearson Prentice Hall, 2001
3. S. S. Rao, *Mechanical Vibrations*. Pearson Prentice Hall, 2004
4. Che Abas Che Ismail, Mohd. Pauzi Abd. Ghani, Mohd. Yunus Abdullah, *Teori Getaran dengan Penggunaan*. Universiti Teknologi Malaysia, 1997
5. W. J. Palm, *Mechanical Vibration.* John Wiley, 2006

EPT 335
APPLIED THERMODYNAMICS

Course Synopsis

Applied Thermodynamics is designed to enhance and extend students' ability to apply thermodynamic principles, especially the first and second laws of thermodynamics, and the laws of conservation of mass, momentum and energy, to industrial systems. It covers the broad application of the theory to many engineering applications, and emphasizes the analysis of energy transfers during power generation, heating, air-conditioning and refrigeration processes. At the end of the course, students should be able to apply relevant thermodynamic and conservation principles and perform calculations to evaluate the performance of gas and vapor power cycles, various compressors, and the performance of air-conditioning, refrigeration and heat pump cycles. Students should also be able to perform thermodynamic analyses of gas mixtures and gas-vapor mixtures.

References

1. 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.
3. Stephen R. Turns, *Thermodynamics: Concepts and Applications* , Cambridge University Press, 2006.
4. Michael J. Moran & Howard N. Shapiro, *Fundamentals of Engineering Thermodynamics,* 6 th Edition, Wiley, 2007.
5. Mohd Kamal Ariffin, " Termodinamik Asas", UTM Press, 2005.
6. W.Z. Black and J.G.Hartley. (1996). *Thermodynamics*, English/SI Version.3rd Edition Prentice-Hall.

EPT 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

1. Hibbeler, R.C. 2005. *Mechanics of Materials,* 5th ed., Prentice Hall.
2. Raymond, Parnes. 2001. *Solid Mechanics in Engineering*, John Willey & Sons.
3. Madhukar, Vable. 2002. *Mechanics of Materials*, Oxford University Press.
4. Barber, J.R . 2001. *Intermediate Mechanics of Materials*, McGraw-Hill.
5. 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 manufacturing industries. Students will also learn control system concepts and methods commonly used in the industries. They will be able to apply 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.
2. 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.
4. K. Ogata, *Modern Control Engineering*, Prentice Hall, 4th edition, 2002.
5. W. Bolton, *Instrumentation and control*, Elsevier, 2004.

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)
3. Mahmud, che Mat Hadzer, Sistem Kawalan Automatik. USM (1999)
4. Ogata, K., Modern Control Engineering, 3rd Edition, Prentice Hall, (1997)
5. **5.** 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

1. Ivana Suchy. *Handbook of Die Design*. 2nd Edition, McGraw-Hill 2006.
2. Vukota Boljanovic J.R. Paquin. *Die Design Fundamentals*. 3rd Edition. Industrial Press Inc. 2006.
3. Szumera, Jim. *The Metal Stamping Process, Your product from concept to customer*. Industrial Press Inc. 2003.
4. David A. Smith. *Fundamentals of Pressworking*. Society of Manufacturing Engineers, Dearborn, Michigan. 1994.
5. 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.
2. James A. Rehg, Glenn J. Sartori, *Programmable Logic Controllers*, Prentice Hall. New Jersey, 2007.
3. 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
2. *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

5. *Process Quality Control: Troubleshooting And Interpretation Of Data*, 4th Edition, By Ellis Raymond Ott, Edward G. Schilling, Dean V. Neubauer, American Society For Qualit, 2005

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.

References

1. S.Kalpakjian, S.R.Schmid, *Manufacturing Engineering and Technology*. 5th ed., Prentice Hall International, 2006.
2. Mikell P. Groover, *Fundamentals of Modern Manufacturing*, 2nd ed. John Wiley & Sons, Inc., 2002.
3. Philip F. Ostwald, Jairo Munoz, *Manufacturing Processes and Systems*, 9th ed., John Wiley, 1997
4. 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

1. Rudolph J. Eggert, “Engineering Design” New Jersey: Prentice Hall, 2005
2. Karl T. Ulrich and Steven D. Eppinger, “Product Design and Development” McGraw- Hill, 2008
3. 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)
5. 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 design. It also looks into ergonomic hazard, safety analysis & prevention, and the product safety.

References

1. Green, W. S. and Jordan, P. W., "Human Factors in Product Design", Taylor & Francis, Florida, 1999.
2. 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
3. David L. Geotsch, Occupational Safety and Health for Technologists, Engineers and Manager, 4th Edition , 2002
4. Geaorge E. Dieter, Engineering Design, A materials and Processing Approach, 3rd Edition , university of Maryland. 2000
5. 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). 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, quadratic 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.
2. Zienkiewicz, O.C. & Taylor, 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.
4. Buchanan, G.R. 1995. *Theory 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 313
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 design parameters for any 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
2. Shigely, J. E and Mischke, C. R., *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 systems. 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)
2. Hannah, J. and Stephens, R.C. Mechanics of Machines. Elementary Theory and Examples, 4th eds., Edward Arnold, 1991
3. 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”, 2nd ed., Pearson-Prentice Hall., 1999.
2. R. Iserman, “Mechatronic Systems: Fundamental”, Springer,2003.
3. W.Bolton, Mechatronics: A Multidisciplinary Approach (4th Edition) Prentice Hall; 4 edition (June 1, 2009)
4. Sabri Cetinkunt, Mechatronics, Wiley; 1 edition (January 23, 2006)
5. W. Bolton, Programmable Logic Controllers, Fifth Edition, Newnes; 5th edition (August 7, 2009)

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
2. R.J. Crawford, “Plastic Engineering”, 2nd Edition, Pergamon Press, Unted Kingdom, 1990.
3. 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.

EPT 328/3
FLUID MECHANICS II

Course Synopsis

Fluid Mechanics II will enable students to analyse hydro dynamical flow fields. It will emphasise on the analysis and the 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 pump and turbine. At the end of the course, students should be able to demonstrate and apply the theory to solve problem related to flow of fluids.

References

1. J.F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack, *Fluid Mechanics*, Fifth Edition, Prentice-Hall, 2005.
2. 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.
4. 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 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*
3. Mathew, F.L., Rawlings, R.D (1998). *Composite Materials: Engineering and Science.* Chapman & Hall.
4. James F. Shackelford, *Introduction to Materials Science for Engineers*, 7th edition,Pearson Higher Education.2009

5. 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, hydraulic system 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.

References

1. 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.
3. Esposito A. 2000. *Fluid Power with Applications*. New Jersey: Prentice Hall Inc.
4. Norton R.L. 2005. *Machine Design: An Integrated Approach*. 3rd ed. New Jersey: Prentice Hall Inc.
5. 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, electro-pneumatics, 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
2. Croser P, Thomson J.,Basic Pnuematics textbook, 3rd edition, Festo Didactic, 2002
3. Exner H. Freitag R., Hydraulics: Basic Principle and Componets, volume 1, 3rd Edition, Bosch rexroth AG, 2002
4. 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)

EPT 415/3 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

1. Thompson, W.T., Theory of vibration with application, 6th Edition, New Jersey, Prentice Hall, 1993.
2. 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)
5. 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.

References

1. Yunus A. Cengel., 1998, *Heat transfer: A practical approach*. Mc-Graw Hill.
2. Tariq Muneer., Jorge Kubie., Thomal Grassie., 2003, *Heat transfer: A problem solving approach,* volume 1.
3. Jack Philip Holman., 2009, *Heat transfer.* Mc-Graw Hill Higher Education.
4. Adrian Bejan., 1993, *Heat transfer*. John Wiley & Sons, Inc.
5. Anthony F. Mills., 1999, *Heat transfer.* 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.
3. Taiichi Ohno, *Toyota Production System : Beyond Large-Scale Production,* Productivity Press; 1 Edition 1988.
4. Shigeo Shingo, *A Study of the Toyota Production System : From an Industrian Engineering Viewpoint*, Productivity Press ; 1st Edition 1989
5. 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.

References

1. *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
3. *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
5. *Operations Management* By C. Donald J. Waters, Donald Waters, Kogan Page Publishers, 1999

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.

References

1. 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
3. H. A. Eiselt and Carl-Louis Sandblom. *Operation Research:A Model Based Approach,*1st Edition. Springer, 2010.
4. David J. Rader, *Deterministic Operations Research : Models and Methods in Linear Optimization,* Wiley 2010.
5. Wayne L. Winston., *Operations Research : Applications and Algorithms*,4th Edition. Duxbury Press 2003.

PDT101/3
STATICS AND DYNAMICS

Course Synopsis

This course combines between static and dynamic modules. Static module consists of introduction to mechanics, force vector, equilibrium of particle, force system resultants, equilibrium of rigid body, structural analysis, friction, centroids and center of gravity. In dynamic module, students will learn the concepts of mechanics in dynamic conditions which comprises two main parts: kinematics, which treats only the geometric aspects of motion, and kinetics, which is the analysis of the forces causing the motion. Emphasis will be given on the kinematics and kinetics of a particle and a rigid body.

Course Outcomes

1. Ability to apply and analyse the concept of forces and moments.
2. Ability to apply and analyse the structures and frameworks problem.
3. Ability to apply and analyse the kinematics and kinetics of a particle problem.
4. Ability to apply and analyse the planar kinematics and kinetics of a rigid body.

References

1. R.C. Hibbeler, 2010. Engineering Mechanics Statics SI 12th Edition, Pearson Prentice-Hall, Inc.
2. Ferdinand P. Beer, E. Rusell JohnsonJr and William E. Clausen, 2004. Vector Mechanics for Engineers Statics Seventh Edition. Mc-Graw Hill.
3. Hibbler R. C., 2010. *Engineering Mechanics- Dynamics*, 12th ed. Prentice Hall.
4. Meriam J. L. & Kraige L.G., 2007. *Engineering Mechanics, Dynamics*, John Wiley & Sons, Inc.
5. Beer, F. P. & Johnston E. R., 1998. *Engineering Mechanics-Dynamics*, 4th ed. John Wiley & Sons, Inc.

PDT106/3
Engineering Graphics

Course Synopsis

Objective of this course is to provide exposure and skills to student in basic Engineering Drawing, Computer Aided Drafting (CAD) and its engineering applications. The course will cover the detail of Engineering

Drawing for beginners followed by projection systems, oblique and isometric sketches, before going on Computer Aided Drafting using appropriate software, which focus on product design in 2D. Knowledge in dimensioning and geometrical tolerance (GDT) will enhance student's ability in interpreting and assessing information from basic raw data of an engineering drawing.

Course Outcomes

1. To apply the basic drafting, sketching engineering components, and common term used in engineering drawing.
2. To apply orthographic, auxiliary view, cross section and isometric in engineering drawing.
3. To apply geometric, dimensioning, and tolerancing (GDT) in engineering drawing.
4. To apply detail and assembly drawing in engineering drawing.

References

1. Jensen C., Helsel J D., Short D R., 2007, Engineering Drawing & Design. 7th ed. Mc-Graw Hill.
2. James H. Earle, “Engineering Design Graphics”, IIth ed.,Pearson Prentice-Hall, 2004.
3. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, “Technical Drawing” 10th Ed., Prentice Hall, 2002.
4. R.K Dhawan, “Lukisan Mesin: Dalam Unjuran Sudut Pertama”, Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.
5. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak, “Engineering Graphics”, 8th edition, Pearson, 2004.
6. A. N. Zulkifli, M. H. Omar & F. F. Mohamed, “Computer Aided Drafting”, UUM.

PDT109/2
WORKSHOP PRACTICE

Course Synopsis

This course is a practice of manufacturing process that is used in the industry to transform from raw material to finished products such as sand casting, vacuum casting, rapid prototyping, powder metallurgy, injection molding and heat treatment processes which covers introduction, processes and application. Practical work will help students to gain effective understanding.

Course Outcomes

1. Ability to describe and understand the rules in manufacturing laboratory
2. Ability to perform in group/team to operate the machine and apply the safety precaution while working.
3. Ability to perform in group/team to produce finished product based on manufacturing technology.

References

1. Mikell P. Groover (2007). Fundamentals of Modern Manufacturing, 3rd ed. John Wiley & Sons, Inc.
2. S. Kalpakjian, S.R. Schmid (2001). *Manufacturing Engineering and Technology.* 4th Ed. Prentice Hall International.
3. John A. Schey. (2000). *Introduction to Manufacturing Processes.* Mc Graw Hill.
4. Philip F. Ostwald, Jairo Munoz (1997). *Manufacturing Processes and Systems.* 9th ed., John Wiley & Sons.
5. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). *Materials and Processes in Manufacturing*. 8th ed., John Wiley & Sons, Inc.
6. Steve F. Krar, Arthur R.Gill, Peter Smid. *Technology of Machine Tools*. 6th ed. Mc Graw Hill

PDT110/3
METROLOGY

Course Synopsis

This course introduces the basic knowledge of metrology, measurement standards and tolerance in measurement. The students will be exposed to metrology equipment as vernier calliper, micrometer, profile projector, gage block, coordinate measuring machine (CMM) and surface roughness tester. It covers measurement techniques for reference plane, angle measurement and surface measurement. Practical work will help students to gain effective understanding.

Course Outcomes

1. Ability to define and describe metrology principles, language and system of measurement and GD&T.
2. Ability to define, describe and apply concepts, tools and techniques in linear and angular measurement.
3. Ability to define, describe and apply concept, tools and techniques in surface measurement and coordinate measuring system.

References

1. Dotson, C.L. Fundamentals of Dimensional Metrology. 5th Edition, Unites States, Thomson Delmar Learning, 2006.
2. Placko, D. Fundamentals of Instrumentation and Measurement, London, United Kingdom, ISTE, 2007.
3. DeSilva, G.M.S., Basic Metrology for ISO 9000 Certification, Delhi, India, Butterworth-Heinemann, 2002.
4. S. Kalpakjian, S.R. Schmid. Manufacturing Engineering and Technology. 4th ed. Prentice Hall International, 2001.

PDT122/3
MATERIAL SCIENCE

Course Synopsis

This course introduces students to the engineering materials fundamentals including the engineering materials application, atomic bonding, crystal structure, mechanical and physical properties, corrosion mechanism, microstructural analysis, phase diagram, ferrous and non-ferrous alloys, polymer and advance materials.

Course Outcomes

1. Ability to explain and discuss the engineering materials applications.
2. Ability to explain and Illustrate the materials' atomic bonding and crystal structure.
3. Ability to explain and analyse the mechanical, physical properties of engineering materials and concept of corrosion.
4. Ability to explain and analyse the metal alloys microstructure, phase diagram and heat treatment processes.
5. Ability to explain and analyse ferrous and non-ferrous alloys microstructure, strengthening mechanism and its applications.
6. Ability to explain and analyse the polymeric materials and advanced materials classification, structure and properties.

References

1. William F. Smith, Javad Hashemi, 2006, Foundation of Materials Science and Engineering, Fourth edition, McGraw Hill.
2. William D. Callister, Introduction to Materials, John-Wiley & Sons.
3. Budinski, K.G, 2006, Engineering Materials Properties and Selection, 8th edition, Prentice Hall.
4. Shackeford, J.F, 2005, Introduction to Materials Science for Engineers, 6th edition, Prentice Hall.
5. Mars G. Fontana, 1986, Corrosion Engineering, Third edition, McGraw Hill

PDT111/3
MANUFACTURING PROCESS

Course Synopsis

This course explores the manufacturing process which used in industry to convert raw material into finished product. In the beginning, introduction to manufacturing technology will be given, followed by material selection in manufacturing and heat treatment process. Various metal casting processes will be introduced including sand casting, investment casting, vacuum casting and other casting processes. Overview of forming and shaping process will be given on rolling, forging, extrusion, drawing, sheet-metal forming, powder metallurgy, injection molding, and rapid prototyping process. Beside that, this course also include various joining process such as brazing, soldering, adhesive bonding, and mechanical fastening processes.

Course Outcomes

1. Ability to demonstrate knowledge and comprehension of concept & methodologies of manufacturing technology and fundamental of materials in manufacturing.
2. Ability to demonstrate knowledge and comprehension of concept & methodologies of solidification proceses and design simple mould for solidification proceses.
3. Ability to demonstrate knowledge and comprehension of concept & methodologies of metal forming and sheet metal working.
4. Ability to demonstrate knowledge and comprehension of concept & methodologies of Particulate Processing of Metals and Ceramics
5. Ability to demonstrate knowledge and comprehension of concept & methodologies of joining and assembly technology.
6. Ability to perform in group/team to define, describes, explains and evaluated product with suitable manufacturing process.

References

1. Mikell P. Groover (2007), *Fundamentals of Modern Manufacturing.* 3rd ed. John Wiley & Sons, Inc.
2. S. Kalpakjian, S.R. Schmid (2001). *Manufacturing Engineering and Technology*. 4th ed. Prentice Hall International.
3. John A. Schey. (2000). *Introduction to Manufacturing Processes.* Mc Graw Hill.
4. Philip F. Ostwald, Jairo Munoz (1997). *Manufacturing Processes and Systems.* 9th ed., John Wiley & Sons.
5. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). *Materials and Processes in Manufacturing*. 8th ed., John Wiley & Sons, Inc.

PDT107/2
COMPUTER AIDED DESIGN

Course Synopsis

This course focus on giving exposure and skill to students about basis of 3D modeling and its application in engineering field by using 3D Modeling software. This course include details on 3D modeling followed by producing 2D drawing, assembly drawing, exploded drawing, surface modeling, rendering and animation. All this skills will help student to apply its in engineering field to fulfill industry demand.

Course Outcomes

1. Design 3D model of components by using Unigraphics software
2. Apply and construct technical/2D drawing using Unigraphics software
3. Apply and construct assembly drawing and exploded drawing using Unigraphics software.
4. Apply and construct 3D animation and rendering for the components using Unigraphics software.

References

1. James H. Earle, “Engineering Design Graphics”, IIth ed., Pearson Prentice-Hall, 2004.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, “Technical Drawing” 10th Ed., Prentice Hall, 2002.
3. R.K Dhawan, “Lukisan Mesin: Dalam Unjuran Sudut Pertama”, Cetakan Pertama, Golden Books Centre Sdn. Bhd., 2002.

4. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak, “Engineering Graphics”, 8th edition, Pearson, 2004.
5. N. Zulkifli, M. H. Omar & F. F. Mohamed, “Computer Aided Drafting”, UUM.

PDT120/3
BASIC ELECTRICAL AND ELECTRONIC

Course Synopsis

The purpose of this course is to give introduction and exposure to student about the electronic devices which includes analog and digital device. The analog device topic includes the introduction to basic electronic components, semiconductor, PN junction, diodes, zener diodes, bipolar junction transistor (BJT) and operational amplifier. The digital device topic includes the introduction to digital electronic binary number system, Boolean algebra, logic gates, logic circuits, Boolean function and combinational logic circuits. Students will be exposed to the electronic basic, operation concept, analysis method including the usage of electronic device used in industry.

Second phase in this course are 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.

1. Ability to demonstrate knowledge and comprehension of concepts and principles of semiconductor, diodes, and zener diodes and apply the principles of electrical laws to solve the application circuits.
2. Ability to demonstrate knowledge and comprehension of concepts and principles of Bipolar Junction Transistor and apply principles of electrical laws to solve the application circuits.
3. Ability to demonstrate knowledge and comprehension of concepts and principles of Operational Amplifier and apply principles of electrical laws to solve the application circuits.
4. Ability to define and explain the terms and units used in basic electrical system.
5. Ability to analyse single phase and three phase a.c circuits for its impedance, voltage, current, power and power factors.
6. Ability to analyse the three phase induction motor including the determination of e.m.f generated, motor speed, losses and efficiency.

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.
3. Tocci, R.J. and, Widmer, N.S., Digital Systems: Principles and Applications. 8th ed. Prentice Hall, 2001.
4. Robert Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory,Prentice Hall,1996.
5. Malvino, Electronic Principles, 5th ed, Macmillan/McGraw-Hill, 1993

PDT 112/3
THEORY IN MACHINING

Course Synopsis

This course exposes overall aspects of theory and hands-on about hand-equipments, saw, drill, lathe, grinding and milling. The purpose of this course is to practise the students with machines in workshop. For grinding and lathe processes, the students need to enter programming into the machines manually. Lastly, the students are also exposed to digital computer control technology and other advanced machining technology which used nowadays.

Course Outcomes

1. Ability to practice and apply understanding of work ethics, morals and safety standard shop procedures.
2. Ability to demonstrate and operate safe operation of hand tools, power tools and specialized machine shop tools and equipment;
3. Ability to write and construct the set up and operation of manual lathes and mills programming;
4. Ability to analyze machining projects and develop a plan to achieve a finished product.

References

1. Richard R. Kibbe, Roland O. Meyer, John E. Neely, Warren T. White. Machine Tool Practices, 8th Edition, Prentice Hall, 2006.
2. Steve F. Krar, Arthur R. Gill, Peter Smid. Technology of Machine Tools, 6th Edition, McGraw-Hill, 2005.
3. P.H.Joshi. Machine Tools Handbook; Design and Operation, McGraw-Hill, 2008.
4. Richard R. Kibbe, Roland O. Meyer, John E. Neely, Warren T. White. Machine Tool Practices, 7th Edition, Prentice Hall, 2006.
5. John E. Neely. Basic Machine Tool Operation, Prentice Hall, 2000.
6. Steve F. Krar, Mario Rapisarda, Albert F. Cheek. Machine Tool and Manufacturing Technology, Dalman Publisher, 1998.

PDT209/3
INDUSTRIAL SAFETY

Course Synopsis

This course gives an exposure to students to understand industrial safety standards and guidelines, quality management concept and various quality tools that allow students to understand the general picture of both areas which are being practiced by industries. At the end of this course, students are expected to be able to identify suitable quality techniques and tools to be implemented in production management and can apply Industrial Safety standards in real industrial environment.

Course Outcomes

1. Ability to define and understand fundamentals of Industrial Safety and Quality Management.
2. Ability to apply techniques and tools of Quality Management.
3. Ability to analyze safety issues using Safety standards and tools.

References

1. David L. Goetsch, Quality Management – Introduction to Total Quality Management for Production, Processing, and Services. 5th Ed., Pearson Prantice Hall, 2006.
2. C. Ray Asfahl, Industrial Safety and Health Management, 5th Ed., Pearson Prantice Hall, 2003.
3. David L. Goetsch, Occupational Safety and Health, for Technologists, Engineering, and Managers., 4th ed., Prentice Hall. 2002.
4. Willie Hammer, Dennis Price, Occupational Safety Management and Engineering., 5th ed., Prentice Hall. 2001.
5. Howard S. Gitlow *et. al,*Quality Management, 3rd ed., McGraw-Hill. 2005

PDT210/4
CONVENTIONAL MACHINING

Course Sypnosis

This course introduce about safety aspects in workshop and fundamental of measurement technique followed by milling, lathe and grinding operation which consists of introduction to basic knowledge of various cutting tools, parts of machine and its functions, machine operations, and numerous calculations involving the operations. Students will practices the conventional machining process that is used in the industry to transform from raw material to finished products. Practical work will help students to gain effective understanding.

Course Outcomes

1. Define, describe and explain conventional machining operation (milling, turning and grinding).
2. Operate lathe machine, milling machine and grinding machine and apply the safety precaution while working.
3. Perform in group in order to convert raw materials to finished products using machining process.

References

1. Steve F. Krar, Arthur R. Gill, Peter Smid, *Technology of Machine Tools.* 6th ed. Mc Graw Hill
2. S. Kalpakjian, S.R. Schmid (2001). *Manufacturing Engineering and Technology.* 4th ed. Prentice Hall International.
3. Mikell P. Groover (2007), *Fundamentals of Modern Manufacturing.* 3rd ed. John Wiley & Sons, Inc.
4. E.Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). *Materials and Processes in Manufacturing*. 8th ed., John Wiley & Sons, Inc.
5. Zainal Abidin Ahmad. Proses Pembuatan. Jilid I. UTM: Cetak Ratu Sdn. Bhd, 1999.
6. Zainal Abidin Ahmad. Proses Pembuatan Jilid II. UTM: Cetak Ratu Sdn. Bhd, 1999.

PDT202/3
HEAT TRANSFER

Course Synopsis

The main objective of this course is to enable student to understand the concepts of conduction, convection and radiation which form the basics of heat transfer. Student will also perform theoretical calculations such as thermal conductivity, heat loss, and other important theories.

Course Outcomes

1. Ability to distinguish heat transfer mechanism of conduction, convection and radiation
2. Ability to solve problems in one-dimensional heat conduction
3. Ability to solve problems in heat transfer through finned surfaces
4. Ability to solve problems in convection and radiation.

References

1. Yunus A. Cengel., 2003, *Heat transfer: A practical approach.* Mc-Graw Hill.
2. Tariq Muneer., Jorge Kubie., Thomal Grassie., 2003, *Heat transfer: A problem solving approach,* volume 1.
3. Jack Philip Holman., 2009, *Heat transfer.* Mc-Graw Hill Higher Education.
4. Adrian Bejan., 1993, *Heat transfer.* John Wiley & Sons, Inc.
5. Anthony F. Mills., 1999, *Heat transfer.* Prentice Hall.

PDT203/3
NOISE AND VIBRATION

Course Synopsis

The objective of the course is to introduce the students with the skills and knowledge in vibrations disciplines. The syllabus covers the fundamental of vibration and oscillation motion, free vibration, force vibration, transient vibration, two degree of freedom systems and multiple degree of freedom systems. The students will be well prepared towards industrial application elements such as vibration control, vibration measurement and signal analysis methods.

Course Outcomes

1. Ability to describe basic concept of vibrations and its applications, analyze simple-harmonic motion, measure free and force vibration for single degree of freedom.
2. Ability to analyze and measure the response of various systems (two degree and multi degrees of freedom) to various inputs (free and force excitation).
3. Ability to analyze a model and assess vibration system parameter and calculate effectiveness of vibration isolation

4. Ability to analyze the operating measurement and vibration signals.

References

1. J.P. Den Hartog, Mechanical Vibrations, Third Edition, Mc Graw Hill (2008)
2. Singiresu S. Rao, Mechanical Vibration, Fourth Edition, Prentice Hall (2000)
3. W. Thomson, Theory of Vibration With Application, Prentice Hall (2004)
4. W. J. Palm III. Mechanical Vibration, John Wiley & Sons (2005).
5. G Genta, Vibration of Structures and Machines (Practical Aspects), Third Edition, Springer (1998)

PDT206/3
JIGS AND FIXTURES DESIGN

Course Synopsis

This course provides concept and understanding to allow students to find suitable designs for components in designing machine system, jig and fixtures. It focuses on basics of power transmission system, motors, fasteners and fundamental principles of jig and fixtures. Students will be exposed with simple design problems before being assigned to compute design parameters. At the end of this course, students will be analyzed simple designs of machine components by using CAD Aided Engineering (CAE) software.

Course Outcomes

1. Define and apply fundamental components in designning machine element.
2. Define and apply the basic principles in designning jig and fixtures.
3. Analyze simple design problems by using basic mechanical analysis.
4. Perform in group/team to analyze simple design problems by using CAE software.

References

1. Robert L. Mortt. Machine Elements in Mechanical Design. 4th Edition. Pearson Prantice Hall, 2004.
2. Edward G. Hoffman. Jig and Fixture Design. 4th Edition. Delmar Publishers, 1996.
3. Norton, Robert L. Design of Machinery. 3rd Edition. McGraw-Hill, 2004.
4. Robert C. Juvinall and Kurt M. Marshek. Fundamental of Machine Components Design. 4th Edition. John Wiley & Sons, 2005.
5. Richard Budynass, Joseph E. Shigley and Charles R. Mischke. Mechanical Engineering Design. 7th Edition. McGraw-Hill, 2004.
6. Erik K.Henriksen. Jig and Fixture Design manual. Industrial Press INC, 1973.

PDT 211/4
ADVANCED MACHINING TECHNOLOGY I

Course Synopsis

This course enables students to understand the use of conventional and modern machining processes. The course begins with an introduction to machining processes, followed by analyses of machine tools. Then, students are taught about CNC programming, CNC processes, tools and control systems. Students will perform machining processes and learn how to develop programming and solve problems related with it.

Course Outcomes

1. Ability to demonstrate knowledge and comprehension of machining processes, tools, and parameters.
2. Ability to analise and apply the basic concept of turning operations and hole making process
3. Ability to analise and apply the basic concept of milling operations and demonstrate comprehension on other conventional machining process.

4. Ability to demonstrate comprehension of CNC machining concept and interpret CNC tool.
5. Ability to construct CNC milling program and translate it into machining operations.
6. Ability to construct CNC turning program and translate it into machining operations.

References

1. Jon Stenerson, Kelly Curran, Computer Numerical Control Operation and Programming. 3rd ed., Prentice Hall, 2007.
2. By Stephen F. Krar, Arthur Gill, Exploring Advanced Manufacturing Technologies, Industrial Press Inc. New York, 2003.
3. P.N. Rao, CAD/CAM Principles and Applications, 2nd ed., Mc Graw Hill, 2002.
4. Smid, CNC Programming Handbook, 2nd ed., Industrial Press, 2002.
5. Mikell P. Groover, Fundamentals of Modern Manufacturing, 3rd ed., John Wiley & Sons, Inc., 2007.
6. S.Kalpakjian, S.R.Schmid, Manufacturing Engineering and Technology. 4th ed., Prentice Hall International, 2001.

PDT212/3 GEOMETRIC, DIMENSIONING AND TOLERANCING

Course Synopsis

This course introduces the basic knowledge of Geometric Dimensioning and Tolerancing (GD&T) and apply to the drawing. Students will be exposed to GD&T fundamentals, symbols, terms, rules, profile, technique, and strategy for tolerancing parts.

References

1. Gene R. Cogorno, Geometric Dimensioning and Tolerancing for Mechanical Design, McGraw-Hill, 2006.
2. Dotson, C.L. Fundamentals of Dimensional Metrology. 5th Edition, Unites States, Thomson Delmar Learning, 2006.

PDT309/3 MANUFACTURING ECONOMICS

Course Synopsis

This course addresses a systematic evaluation of proposed solution to engineering problems. It evaluates the monetory consequences of products, projects and processes that engineers design. The course introduces students to fundamental economics consideration and costs involve in decision making for a production or a project which will be economically acceptable and demonstrate a positive balance of long term benefits over long term costs. The students learn about fundamental cost concepts and costs involve in a production process. Then, money-time relationship (also called time value of money) and concept of equivalence expose students to the value of investment by estimating future costs or revenues. The application of money-time relationship in comparing different alternatives help to choose best solution before investing.

Course Outcomes

1. Explain engineering economy and cost accounting concept and their role in decision making
2. Apply engineering and cost accounting methods in solving cash flow problems
3. Provide suitable solution for discrete cash flow problems and analyze money-time relationship.
4. Compare and get effective investment return.

References

1. Sullivan, W. G., Wicks, E. M. & Luxhoj, J. T. “Engineering Economy”, 13/E, Prentice Hall, 2006.
2. Park, C.S. “Fundamental of Engineering Economics”, Prentice Hall, 2004.
3. Park, C. S. “Contemporary Engineering Economics”, 4/E, Prentice Hall, 2007.

4. Newnan, D. G., Eschenbach, T. G. and Lavelle, J. P. “Engineering Economics Analysis”, Oxford, 2004.
5. Blank, L. and Tarquin, A. “Engineering Economy”, 6/E, McGraw Hill, 2005.

PDT311/4
ADVANCE MACHINING TECHNOLOGY II

Course Synopsis

This course is the introduction for EDM technology (Electrical Discharge Machining) which is used in industries nowadays. It includes topics about introduction to EDM technology, wire-cut and Ram (die-sinker) machining. Students are involved with system and process for both type of machining. Besides that, students are also exposed to other types of EDM process.

Course Outcomes

1. Ability to explain and response to the fundamental and concept of electrical discharge machining (EDM).
2. Ability to explain, illustrates and apply the concept of EDM which include the wire-cut and Ram EDM machining
3. Ability to explain, illustrates and applies the system and process of wire-cut and Ram EDM machining.

References

1. Carl Sommer, Steve Sommer, Complete EDM Handbook, Advance Pub., 2005
2. Elman C. Jameson. Electrical Discharge Machining, Society of Manufacturing Engineers and Machining Technology Association, 2001
3. E. Bud Guitrau. The EDM Handbook, Hanser Gardner Publications, 1997.
4. Carl Sommer, Steve Sommer. Wire EDM Handbook, Advance Publ., 2000
5. P N Rao. Manufacturing Technology: Metal Cutting & Machine Tools, Mc Graw Hill, 2000.
6. Carl Sommer. Non-Traditional Machining Handbook, Advance Pub, 2001.

PDT 312/3
COMPUTER AIDED MANUFACTURING

Course Synopsis

This course introduces principles and application of CAD/CAM system. This course enables student to understand the theory, concept, and application of CAD/CAM in an industry. Students will be exposed to CAD software to illustrate parts and then using CAM software to convert CAD file into numerical control (NC) codes.

Course Outcomes

1. Ability to define, describe and explain on CAD/CAM systems and its application in product development process.
2. Ability to apply and demonstrate CAD/CAM system as part of product development process.
3. Ability to apply, illustrate and construct CAD drawing & modeling for CAM system.
4. Ability to generate, practice and transfer part programming for machining process based on CAD file.
5. Ability to perform in group/teams to construct part programming for Computer Numerical Control machining.
6. Ability to perform in group/teams to modify and edit part programming in CNC machining controller.

References

1. P.N. Rao. (2004). CAD/CAM Principles and Applications. 2nd Edition. McGraw Hill.
2. Ibrahim Zeid (2004). Mastering CAD/CAM.1st Edition. McGraw Hill International Edition.
3. Farid M. Amirouche. (2003). Principles of Computer Aided Design and Manufacturing. 2nd Edition. Prentice Hall.
4. Kunwoo Lee (1999). Principles of CAD/CAM/CAE. 1st Edition. Prentice Hall.
5. Chris McMahon and Jimmy Brown (1999). CAD/CAM: Principles, Practice and

Manufacturing Management. 2nd Edition. Prentice Hall.

PDT310/3
QUALITY CONTROL

Course Synopsis

This course is offered to introduce quality assurance which refers to all systematic and planned activities in quality systems that are proved to be sufficient enough to build up proper confidence in meeting quality requirements whether for products or services which meet or exceed customer expectations. In this course student will learn the quality management as the key for quality assurance achievement. This course comprise of the quality management's philosophy and concepts and application of quality tools and techniques in order to achieve quality assurance. By understanding the entire contents of this course, students will be able to interpret the standard for quality assurance and quality management systems, and able to develop, formulate, and organize their works or organization effectively.

Course Outcomes

1. Ability to explain the philosophy and concepts of quality management and quality assurance.
2. Ability to analyze and apply the best practice of quality assurance system's to determine their adequacy and effectiveness.
3. Ability to judge and predict the direction of the product, service, or organization, based on the application of quality assurance and management systems.

References

1. David L. Goetsch, Stanley B. Davis, Quality Management: Introduction to Total Quality Management for Production, Processing, and Services, 5th ed., Pearson Prentice Hall, 2006.
2. Melissa G. Hartman, Fundamental Concepts of Quality Improvement, 1st ed., ASQ Quality Press, Milwaukee, Wisconsin, 2002.
3. Stephen B. Vardeman, J. Marcus Jobe, Statistical Quality Assurance Methods For Engineers, !st Ed., John Wiley & Sons, Inc., 1999.
4. Fred Owen, Derek Maidment, Quality assurance: A guide to the application of ISO 9001 to process plant projects, 2nd ed,. IChemE, 1996.

PDT 313/4
FINAL YEAR PROJECT

Course Synopsis

A projects based course that exposes students to solve, analyze, design and research engineering problems in the field of manufacturing engineering, machining or product design.

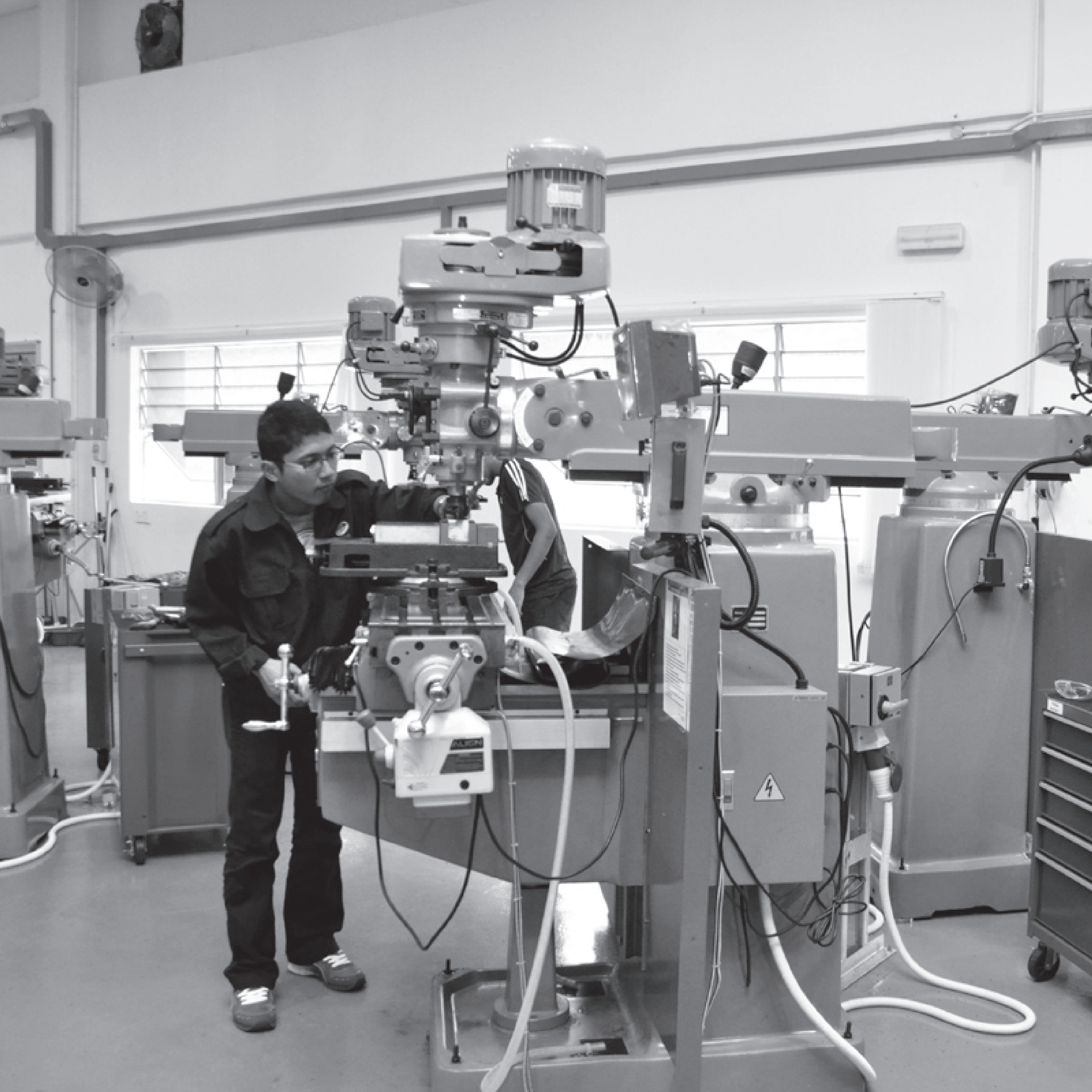
Course Outcomes

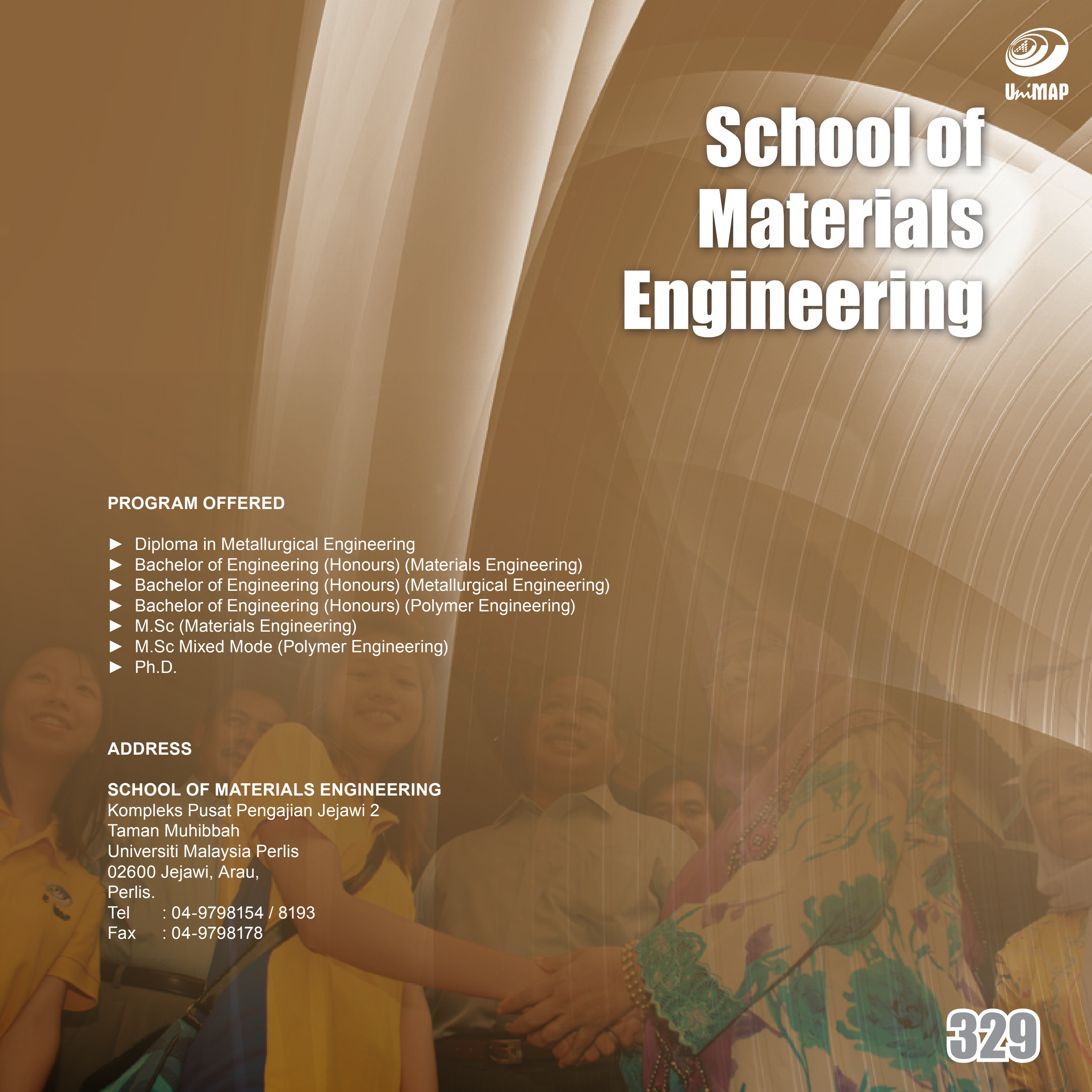
1. Ability to apply and integrate theories and lab, known how that has been learnt to solve engineering problems.
2. Ability to produce either a new design or toimprove on an existing design.
3. Ability to choose a suitable research methodology for the research project being undertaken.
4. Ability to write. Present and defend the technical report (desertation) for the projects undertaken.

UniMAP

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 (Honours) (Materials Engineering)
- Bachelor of Engineering (Honours) (Metallurgical Engineering)
- Bachelor of Engineering (Honours) (Polymer Engineering)
- M.Sc (Materials Engineering)
- M.Sc Mixed Mode (Polymer Engineering)
- Ph.D.

ADDRESS

SCHOOL OF MATERIALS ENGINEERING
Kompleks Pusat Pengajian Jejawi 2
Taman Muhibbah
Universiti Malaysia Perlis
02600 Jejawi, Arau,
Perlis.
Tel : 04-9798154 / 8193
Fax : 04-9798178

Introduction

Materials Engineering, Metallurgical Engineering and Polymer Engineering are related to the structure and properties of materials that have engineering applications. Materials Engineer, Metallurgical Engineer and Polymer Engineer are responsible for designing, producing, inspecting and testing of engineering materials such as metal alloys, semiconductors, superconductors, ceramics, polymers, plastics and composites. All three programs emphasize learning and practical courses in all courses offered.

In accordance with the requirements of industrial needs and also Vision 2020, we strive to produce professionals in Materials Engineering, Metallurgical Engineering and Polymer Engineering that are required in various industries that utilize advanced manufacturing technology and production.Thus, these programs aims to produce human resources or professional with proficiency and have strong knowledge in the field of Materials Engineering, Metallurgical Engineering and Polymer Engineering.

Staff Directory

DEAN
DR. KHAIREL RAFEZI AHMAD
e-mail: rafezi@unimap.edu.my

DEPUTY DEAN (ACADEMIC AND RESEARCH)
PROF. MADYA DR. ABDULLAH BIN CHIK
E-mail : abdullahchik@unimap.edu.my

DEPUTY DEAN (STUDENT DEVELOPMENT AND ALUMNI)
DR. LUQMAN MUSA
e-mail: luqman@unimap.edu.my

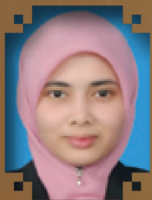
CHAIRPERSON of DEGREE PROGRAMME (MATERIALS ENGINEERING)
MR. MOHD ARIF ANUAR MOHD SALLEH
e-mail: arifanuar@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (METALLURGICAL ENGINEERING)
DR. DEWI SURIYANI CHE HALIN
e-mail: dewisuriyani@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (POLYMER ENGINEERING)
DR. FIRUZ ZAINUDDIN
E-mail : firuz@unimap.edu.my

ACTING CHAIRPERSON of DIPLOMA PROGRAMME (METALLURGICAL ENGINEERING)
MR. MURIZAM DARUS
Tel: 04-9798478
e-mail: murizam@unimap.edu.my

COORDINATOR FOR INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
DR. YEOH CHEOW KEAT
E-mail: ckyeoh@unimap.edu.my



ASSISTANT REGISTRAR
MS. NUR MAJIDAH MAJEMI
E-mail: majidah@unimap.edu.my

Lecturers

Brig. Jen. Dato' Prof. Dr. Kamarudin Hussin
Ph.D., M.Sc., B.Sc. (USM),
Tel : 04-9798001
e-mail : kamarudin@unimap.edu.my

Prof. Dr. Shamsul Baharin Jamaludin
Ph.D.(Leeds), M.Sc., B.App.Sc. (USM),
Tel : 04-9798610
e-mail : sbaharin@unimap.edu.my

Prof. Dr. Mohd Noor Ahmad
Ph.D. (Uni. New Castle, UK), BSc. (Uni. Gajah Mada, Indonesia), Dip. in Education (UM)
Tel : 04-9798897
e-mail : mohdnoor@unimap.edu.my

Prof. Madya Dr. Azmi Rahmat
Ph.D (Nottingham Uni. U.K), M.Sc (Ranfield Uni. U.K) B.Sc (USM)
Tel : 04-9798178
e-mail : azmirahmat@unimap.edu.my

Prof. Madya Dr. Abdullah Chik
Ph.D (UPM),
B.Sc (Lamar Uni. USA), M.Sc (USM)
Tel : 04-9798365
e-mail : abdullahchik@unimap.edu.my

Prof. Madya Che Mohd Ruzaidi Ghazali
M.Sc., B. Tech., (USM), MPRIM,
Tel : 04-9798614
e-mail : ruzaidi@unimap.edu.my

Prof. Madya Dr. Salmah Husseinsyah
Ph.D., M.Sc. (USM), B.Sc. (Universiti Sumatera Utara)
Tel : 04-9798612
e-mail : irsalmah@unimap.edu.my

Prof. Madya Dr. Supri Abdul Ghani
Ph.D. (USM), M.Sc. (Institut Teknologi Bandung), B.Sc. (Universiti Sumatera Utara),
Tel : 04-9798611
e-mail : supri@unimap.edu.my

Dr. Banjuraizah Johar
Ph.D, M.Sc., B.Eng. (USM),
e-mail : banjuraizah@unimap.edu.my

Dr. Dewi Suriyani Che Halin
Ph.D.(UKM), M.Sc.,B.Eng. (USM)
Tel : 04-9798154
e-mail : dewisuriyani@unimap.edu.my

Dr. Du Ngoc Uy Lan
Ph.D. (USM, Kyoto Uni.), M.Sc. (USM), B.Eng. (HCMUT)
Tel : 04-9798921
e-mail : uylan@unimap.edu.my

Dr. Firuz Bt Zainuddin
Ph.D (UKM),
B.Eng, M.Sc (USM)
Tel : 04-9798668
e-mail : firuz@unimap.edu.my

Dr. Hakimah Osman
Ph. D., MSc., B.Tech. (USM),
Tel : 04-9798605
e-mail : hakimah@unimap.edu.my

Dr. Irwana Nainggolan
Ph.D, MSc., (UKM), BSc. (USU, Indonesia)
Tel : 04-9898940
e-mail : irwana@unimap.edu.my

Dr. Kahtan S Muhammed
Ph.D. (USM), M.Sc (U.M.I.S.T) Manchester U.K
Tel : 04-9798178
e-mail : kahtan@unimap.edu.my

Dr. Khairel Rafezi Ahmad
Ph.D., M.Sc., B.Eng. (USM),
Tel : 04-9798190 / 8624
e-mail : rafezi@unimap.edu.my

Dr. Luqman Musa
Ph.D., MSc. B.Sc. (USM)
Tel : 04-9798949
e-mail : luqman@unimap.edu.my

Dr. Mazlee Mohd Noor
Ph.D., (UniMAP) M.Sc., B.Eng. (USM), Dip.Eng. (UTM),
Tel : 04-9798619
e-mail : mazlee@unimap.edu.my

Dr. Md. Fazlul Bari
Ph.D. (USM), M.Sc., B.Sc. (University Of Rajshahi, Bangladesh)
Tel : 04-9798608
e-mail : fazlul@unimap.edu.my

Dr. Mohd Nazree Derman
Ph.D., M.Sc., B.Eng. (USM),
Tel : 04-9798659
e-mail : nazree@unimap.edu.my

Dr. Mst. Noorzahan Begum
Ph.D (UniMAP), M.Sc., B.Sc. (University of Rajshahi, Bangladesh)
Tel : 04-9798929
e-mail : noorzahan@unimap.edu.my

Dr. Muhammad Asri Idris
Ph.D (UNSW) ,M.Eng., B.Eng. (Ehime, Japan)
Tel :04-9798178
e-mail : asri@unimap.edu.my

Dr. Nik Noriman Bin Zulkepli
PhD. M.Sc., B.Eng. (USM),
Tel : 04-9798661
e-mail : niknoriman@unimap.edu.my

Dr. Norzilah Abdul Halif
Ph.D. (UPM), M.Sc.(UM), B.Eng. (UM)
Tel : 04-9798178
e-mail : norzilah_halif@yahoo.com

Dr. Ong Hui Lin
Ph.D., M.Sc., B.Tech. (USM)
Tel : 012-7118069
e-mail : hlong@unimap.edu.my

Dr. Rozyanty Rahman
Ph.D, M.Sc., B.Tech (USM)
Tel : 04-9796336
e-mail : rozyanty@unimap.edu.my

Dr. Sharifah Shahnaz Syed Abu Bakar
Ph.D (UNSW), M.Sc., B.Eng (USM)
Tel : 04-9798660
e-mail : shahnaz@unimap.edu.my

Dr. Teh Pei Leng
Ph.D., M.Sc., B.Tech. (USM),
Tel : 04-9798920
e-mail : plteh@unimap.edu.my

Dr. Zuraidawani Che Daud
Ph.D (UniMAP), M.Sc., B.Eng (USM)
Tel : -
e-mail : zuraidawani@unimap.edu.my

Dr. Norainiza Saud
Ph.D (UKM), M.Sc., B.Eng (USM)
Tel : 04-9798667
e-mail : norainiza@unimap.edu.my

Dr. Sri Rajeswari Munusamy
Ph.D, M.Sc, B.Eng (USM)
Tel : 04-9797933
e-mail : rajeswari@unimap.edu.my

Mrs. Aimi Noorliyana Hashim
B.Eng, M.Sc. (UniMAP)
Tel : 04-9768222
e-mail : aimiliyana@unimap.edu.my

Miss Alida Abdullah
M.Sc. , B.Eng, (UniMAP)
e-mail : alida@unimap.edu.my

Mrs. Marliza Mostapha @ Zakaria
M.Sc., B.Eng, (UniMAP)
e-mail : marliza@unimap.edu.my

Dr. Yeoh Cheow Keat
Ph.D., M.Sc.(USM), B.Eng. (UTM),
Tel : 04-9798933
e-mail : ckyeoh@unimap.edu.my

Mrs. Haiza Haroon
M.Sc., B.Eng (USM)
Tel : 04-979 7763
e-mail : haizaharoon@unimap.edu.my

Mr. Ismail Ibrahim,
B. Eng (UniMAP), Dip. Eng. Mechanical (POLIMAS), MSc (UniMAP)
Tel : 04-9798648
e-mail : ismailibrahim@unimap.edu.my

Mrs. Jalilah Abdul Jalil
M.Sc. (Nara Institute of Science & Tech),
B.Eng (Kyoto Institute of Tech),
Tel : 04-9798620
e-mail : jalilahjalil@unimap.edu.my

Miss Juyana A Wahab
B.Eng., MSc. (UniMAP)
Tel : 04-976 6296
e-mail : norazura@unimap.edu.my

Mr. Mohd Arif Anuar Mohd Salleh
M.Eng., B.Eng. (UTHM),
Tel : 04-9798198/04-9798668
e-mail : arifanuar@unimap.edu.my

Mr. Muhammad Salihin Zakaria
M.Sc., B.Sc. (UNIMAP),
Tel : 04-9798661
e-mail : salihin@unimap.edu.my

Miss Muthmirah Ibrahim
M.Sc., B.Eng (UTM)
Tel : 04-9798620
e-mail : muthmirah@unimap.edu.

Mrs. Noorina Hidayu Jamil
M.Sc. (USM), B.Eng.(USM)
Tel : 04-9797765
e-mail : noorinahidayu@unimap.edu.my

Mrs. Nor Azura Abdul Rahim
B.Eng., MSc. (USM)
Tel : 04-9792096
e-mail : norazura@unimap.edu.my

Mrs. Nur Hidayah Ahmad Zaidi
M.Sc. (UniMAP), B.Sc. (UTHM)
Tel : 04-9798623
e-mail : hidayah@unimap.edu.my

Mrs. Nurulhuda Bashirom
M.Sc (USM)., B.Eng. (UniMAP)
Tel : 04-9798605
e-mail : hudabashirom@unimap.edu.my

Miss Rohaya Abdul Malek
M.Sc.,B.Eng.(UniMAP)
Tel : -
e-mail : rohayamalek@unimap.edu.my

Mrs. Salmie Suhana Che Abdullah
MSc. (Tottori Uni. Japan), B.Eng.
Tel : 04-979 8918
e-mail : salmie@unimap.edu.my

Mr. Shahrizam Saad
M.Sc., B.Eng., (USM)
Tel : 04-9798657
e-mail : shahrizamsaad@unimap.edu.my

Mrs. Syarifah Nuraqmar Syed Mahamud
M.Sc., B.Eng. (UTM)
Tel : 04-9798667
e-mail : nuraqmar@unimap.edu.my

Mrs. Siti Hawa Bt. Mohd Salleh
M.Sc (UKM), B.Eng (UniMAP)
Siti Hawa Mohd salleh
Tel : 04-979 8855
e-mail : sitihawa@unimap.edu.my

Mrs. Sinar Arzuria Adnan
MSc. (UTM), B.Eng (UniMAP)
Tel : 04-9798605
e-mail : sinar@unimap.edu.my

Mr. Suhardy Daud
M.Sc., B.Sc.Ed (UTM),
Tel : 04-9798609
e-mail : suhardy@unimap.edu.my

Mrs. Yusrina Mat Daud
M.Sc.(UTM), B.Eng. (UNIMAP),
Tel : 04-9798932
e-mail : yusrina@unimap.edu.my

Dr. Mohd Sobri Idris
Ph.D (Sheffield), M.Sc. (UniMAP), B.Eng. (USM)
Tel : 04-9798178
e-mail : sobri@unimap.edu.my

Mrs. Nur Maizatul Shima Adzali,
M.Sc. (Sheffield), B.Eng.(USM),
e-mail : shima@unimap.edu.my

Vocational Training Officers

Mr. Ahmad Azreem Azmi
B.Eng. (UniMAP),
Tel : 04-9798648
e-mail : azreem@unimap.edu.my

Miss Azida Azmi
B.Eng. (UM)
Tel : 04-9798178
e-mail : azida@unimap.edu.my

Mr. Azmi Kamardin
B.Sc. (University of Washington, USA)
Tel : 04-9798178
e-mail : azmikamardin@unimap.edu.my

Mrs. Noor Mariamadzliza Mohd Nan
B.Eng. (USM)
Tel : 04-9798178
e-mail : maria@unimap.edu.my

Mrs. Kamrosni Abd Razak
B. Eng. (UKM)
Tel : 04-9798178
e-mail : kamrosni@unimap.edu.my

Mrs. Liyana Jamaludin
B.Eng (UniMAP)
Tel : 012-9275510
e-mail : liyanajamaludin@unimap.edu.my

Mr. Lokman Hakim Ibrahim
B.Eng. (UniMAP),
Tel : 04-9798859,
e-mail : lokmanh@unimap.edu.my

Mr. Mohamed Faisol Bin Mohamed Nor
B.Eng(UniMAP), Dip.Eng(PoliPD), Cert. Eng(PoliSAS)
Tel : 04-9798154
e-mail : faisol@unimap.edu.my

Mr. Muhamad Hafiz Zan @ Hazizi
B. Eng. (UTHM)
Tel : 04-9798858
e-mail : hafizhazizi@unimap.edu.my

Mr. Mohammad Tamizi Selimin
B.Eng. (UiTM), Dip. Eng (UiTM),
Tel : 04-9798859
e-mail : tamizi@unimap.edu.my

Mr. Muhamad Qauyum Zawawi Ahamad Suffin
B.Eng. (UniMAP),
Tel : 04-9798648
e-mail : qauyum@unimap.edu.my

Mr. Mohd Tajuddin Mohd Idris
B.Eng. (UniMAP), Dip. Eng. Electromechanical (PUO)
Tel : 04-9798178
e-mail : tajuddin@unimap.edu.my

Mr. Murizam Darus
MSc. (UniMAP), B.Eng. (UKM),
Tel : 04-9798858
e-mail : murizam@unimap.edu.my

Mrs. Noor Azira Mohd Noor
MSc. (UniMAP), B.Eng. (UKM)
Tel : 04-9798178
e-mail : noorazira@unimap.edu.my

Mr. Saiful Nizwan Bin Mhd Salleh
B.Eng. (UniMAP),
Tel : 04-9798648
e-mail : nizwan@unimap.edu.my

Miss Siti Sarah Ibrahim
B.Eng. (UKM),
Tel : 04-9798178
e-mail : sitisarah@unimap.edu.my

Mr. Wan Mohd Arif Wan Ibrahim,
B.Eng (USM),
Tel : 04-9798648
e-mail : wanarif@unimap.edu.my

Study Leave

Mr. Shaiful Rizam Shamsudin
M. Sc., B.Sc. (UKM),
e-mail : shaiful@unimap.edu.my

Mr. Syed Nuzul Fadzli Syed Adam
M.Sc. (USM), B.Sc. (UKM),
e-mail : syed.nuzul@unimap.edu.my

Mr. Mohd Mustafa Al Bakri Abdullah,
M.Sc., B.Eng. (USM),
Tel : 04-9798657 / 2233
e-mail : mustafa_albakri@unimap.edu.my

Mr. Mohd Fitri Mohamad Wahid,
M.Sc. (Liverpool), B.Eng. (USM),
e-mail : fitri@unimap.edu.my

Mrs. Nor Azwin Ahad,
M.Sc., B.Eng. (USM),
e-mail : norazwin@unimap.edu.my

Mrs. Norsuria Mahmed,
M.Sc., B.Eng. (USM),
e-mail : norsuria@unimap.edu.my

Prof. Madya Ir. Mohabattul Zaman S NS Bukhari,
M.Sc. (UPM) , B.Eng. (USM),
e-mail : mzaman@unimap.edu.my

Miss Noraziana Parimin,
M.Sc., B.Eng. (USM),
e-mail : noraziana@unimap.edu.my

Mrs. Azlin Fazlina Osman,
M.Sc., B.Eng. (USM),
e-mail : azlin@unimap.edu.my

Mr. Mohd Zaheruddin Kasmuin,
M.Sc., B.Eng. (USM),
e-mail : zaheruddin@unimap.edu.my

Mr. Faizul Che Pa,
M.Sc., B.Eng. (USM),
e-mail : faizul@unimap.edu.my

Mr. Ruhiyuddin Mohd Zaki,
M.Sc., B.Eng. (USM),
e-mail : ruhiyuddin@unimap.edu.my

Mrs. Sri Asliza Md. Amin,
M.Sc., B.Eng., (USM),
e-mail : sriasliza@unimap.edu.my

Mrs. Kamrosni Abd Razak,
B. Eng. (UKM),
e-mail : kamrosni@unimap.edu.my

Mr. Mohd Nazry Salleh,
M.Sc. (UniMAP), B.Sc. (UKM),
e-mail : nazry@unimap.edu.my

Miss Farah Farhana Bt. Zainal
B.Eng. (UniMAP)
e-mail : farahfarhana@unimap.edu.my

Sabbatical

Dr. Ho Li Ngee
PhD. (Oita Uni. Japan), BSc. Hons. (USM)
e-mail : lnho@unimap.edu.my

Technical Assistant

Mr. Chek Idrus Omar,
Tel : 04-9798125
e-mail : idrus@unimap.edu.my

Technicians

Mr. Ahmad Hadzrul Iqwan Jalaludin,
Tel : 04-9798603,
e-mail : hadzrul@unimap.edu.my

Mr. Azmi Aziz,
Tel : 04-9798125,
e-mail : azmiaziz@unimap.edu.my

Mr. Ku Hasrin Ku Abdul Rahman
Tel : 04-9798600,
e-mail : kuhasrin@unimap.edu.my

Mr. Mohamad Safwan Isa
Tel : 04-9798600
e-mail : safwan@unimap.edu.my

Mr. Mohd Nasir Haji Ibrahim
Tel : 04-9798602,
e-mail : nasir@unimap.edu.my

Mr. Mohd Mujahidin Suhaimi
Tel : 04-9798125,
e-mail : mujahidin@unimap.edu.my

Mr. Norzaidi Zainol
Tel : 04-9798600,
e-mail : norzaidi@unimap.edu.my

Mr. Rosmawadi Othman
Tel : 04-9798125,
e-mail : rosmawadi@unimap.edu.my

Mohammed Faisal Rusli
Tel : 04-9798178
e-mail : faisalrusli@unimap.edu.my

Foreman K1

Mr. Mohd Aizat Abdul Rahman,
Tel : 04-9798600
e-mail : mohdaizat@unimap.edu.my

Administrative Staffs

Miss Nur Majidah Majemi
Pegawai Tadbir
Tel : 04-9798193
e-mail : majidah@unimap.edu.my

Miss Norasmira Othman
Pembantu Tadbir (K)
Tel : 04-9798154
e-mail : norasmira@unimap.edu.my

Mrs. Azilawati Abdullah
Pembantu Tadbir (P/O)
Tel : 04-9798197
e-mail : azilawati@unimap.edu.my

Mr. Saiful Akmal Nordin
Pembantu Tadbir (P/O)
Tel : 04-9798154
e-mail : saifullnordin@unimap.edu.my

Mr. Sazali Saad
Pembantu Tadbir (P/O)
Tel : 04-9798195
e-mail : sazali@unimap.edu.my

Mr. Hasmizul Hashim
Pembantu Am Pejabat
Tel : 04-9798198
e-mail : hasmizul@unimap.edu.my

Materials Engineering Programme 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 life long learning or continous education opportunities

Programme Educational Objective 4
Graduates who contributrre 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.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices

PO 06
Ability to demonstrate the social, cultural, global and environmental responsibilities of a professional engineer.

PO 07
Ability to demonstrate entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO 08
Understanding of professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding 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 Programme)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engineering Core	EBT151/3 Engineering Drawing	EBT109/3 Quality Control	EBT207/4 Materials Structure & Properties	EBT254/3 Transportation Phenomenon in Materials Processing	EBT312/3 Engineering Fluid Mechanics	EBT303/3 Process Control	EIT 300/6 Industrial Training & Engineering Innovation	#EBT401/3 Non Destructive Testing OR #EBT428/3 Materials for Energy Application	#EBT422/3 Composite Materials OR #EBT426/3 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	EBT423/4 Materials Selection & Design
	EKT150/3 Computer Programming	EPT112/3 Statics	EBT252/4 Strength of Materials	EBT222/4 Fundamentals of Ceramics	EBT326/4 Polymer Properties	EBT322/3 Polymer Processing		#EBT421/3 Advanced Material Engineering OR #EBT424/3 Construction Materials	EBT446/4 Final Year Project 2
	EQT101/3 Engineering Mathematics I	EQT102/3 Engineering Mathematics II	EPT212/3 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				EBT445/2 Final Year Project 1	
Non Engineering	EUT122/2 Skill & Technology in Communication					EUT440/3 Engineer in Society			EUT443/2 Engineering Management
University Required	EUWXXX/2 Option Subject	UUW114/2 University Malay Language	UUW223/2 University English	UUW224/2 Engineering Entrepreneurship	UUW235/2 Ethnic Relation	UUW233/2 TITAS			
	EUWXXX/1 Co-Curriculum	UUW322/2 Thinking Skill							
120	15	12	17	17	14	14	4	14	13
15	University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject								
Total Units for Graduation 135									

* Course begins in the first semester but total credits are given upon completion of the second semester.
# Elective Subject

Metallurgical Engineering Programme 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 continous education opportunities

Programme Educational Objective 4
Graduates who contributrre 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.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices

PO 06
Ability to demonstrate the social, cultural, global and environmental responsibilities of a professional engineer.

PO 07
Ability to demonstrate entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO 08
Understanding of professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding of the need for, and an ability to engage in life-long learning.

PO 12
Demonstrate understanding of project management and finance principles.

School of Materials Engineering

Curriculum Structure for Bachelor of Engineering (Honours) (Metallurgical Engineering Programme)

YEAR		FIRST		SECOND			THIRD			FOURTH	
SEMESTER		I	II	III	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	EIT300/6 Industrial Training & Engineering Innovation	#EBT401/3 Non Destructive Testing OR #EBT413/3 Welding Metallurgy	EBT412/3 Applied Metallurgy
		EET103/4 Electrical Technology	ECT112/3 Engineering Skills	EBT251/3 Engineering Materials Chemistry	EBT213/4 Extractive Metallurgy I		EBT312/3 Engineering Fluid Mechanics	EBT314/3 Metallurgical Thermodynamics		EBT402/3 Corrosion Engineering	EBT415/4 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	EPT212/3 Dynamics	EBT254/3 Transportation Phenomenon in Materials Processing		EBT351/3 Electronic Materials Engineering	EBT316/3 Metallurgical Design		EBT417/3 Extractive Metallurgy II	
				EQT203/3 Engineering Mathematics III	EQT271/3 Statistic For Engineer					EBT445/2 Final Year Project 1	
Non Engineering		EUT122/2 Skills & Technology in Communication						EUT440/3 Engineer in Society			EUT 443/2 Engineering Management
University Required		UUWXXX/2 Kursus Opsyen	UUW 114/2 Bahasa Melayu Universiti	UUW223/2 Bahasa Inggeris Universiti	UUW224/2 Keusahawanan Kejuruteraan		UUW235/2 Hubungan Etnik	UUW233/2 Titas			
		EUWXXX/1 Co-Curriculum	UUW322/2 Kemahiran Berfikir								
120		15	12	17	17		14	14	4	14	13
15		University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject									
Total Units for Graduation 135											

* Course begins in the first semester but total credits are given upon completion of the second semester.
# Elective Subject

Polymer Engineering Programme 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 life long learning or continous education opportunities

Programme Educational Objective 4
Graduates who contributrre 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 polymer engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for engineering practices

PO 06
Ability to demonstrate the social, cultural, global and environmental responsibilities of a professional engineer.

PO 07
Ability to demonstrate entrepreneurship, the process of innovation and the need for sustainable development of the environment.

PO 08
Understanding of professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

PO 11
Understanding 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 Programme)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	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	EBT312/3 Engineering Fluid Mechanics	EBT303/3 Process Control	EIT302/4 Industrial Training & Engineering Innovation	EBT435/3 Polymer in Electronic Application	# EBTXXX/3 Elective
Engineering Core	EET103/4 Electrical Technology	EBT 131/3 Engineering Mechanics	EBT 233/4 Plastic Materials	EBT231/4 Elastomeric Materials	EBT334/4 Polymer Testing & Characterization	EBT 333/4 Rubber Processing		EBT437/3 Polymer Composites	EBT446/4 Final Year Project 2
Engineering Core	EKT150/3 Computer Programming	EBT 106/4 Introduction to Polymer	EBT232/4 Polymer Synthesis	EBT 235/3 Structure & Polymer Properties	EBT 335/4 Polymer Blend & Alloys	EBT337/4 Mass & Heat Transfer in Polymer		EBT441/3 Polymer Engineering Design	EBT 431/3 Polymer Engineering Product
Engineering Core	EBT105/4 Organic Chemistry	ECT112/3 Engineering Skills	EBT 238/3 Physical Chemistry	EQT271/3 Engineering Statistics	EBT336/4 Thermoplastic & Thermoset Processing	EBT338/4 Latex Processing			
Engineering Core				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	UUW114/2 Bahasa Melayu Universiti	UUW223/2 Bahasa Inggeris Universiti	UUW224/2 Keusahawanan Kejuruteraan		UUW233/2 Titas			
University Required (15)	EUWXXX/1 Co-Currriculum	UUW322/2 Kemahiran Berfikir	EUW235/2 Hubungan Etnik						
120	19	17	18	19	15	17	4	13	13
15	University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject								
Total Units for Graduation 135									
# Elective: EBT 433/3 Polymer Adhesive & Coating; EBT434/3 Environmental Friendly Polymer									

School of Materials Engineering

Course Synopsis

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

1. Paula, Y. B., 'Organic Chemistry', 4th ed., Person Education International, 2004.
2. John Mc Murry., 'Organic Chemistry', 6th ed., Thomson Learning, Inc., 2004.
3. Janice Gorzynski Smith, 'Organic Chemistry, second Edition, McGraw. Hill International Edition, 2006.
4. Solomons, T.W.G, Craig B.F. 2011. Organic Chemistry, International Student Version, Tenth Edition, John Wiley & Sons, Inc.
5. Harold Hart. 1991. Organic Chemistry: A Short Course Eighth Edition, Houghton Mifflin Company, Boston.

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

1. 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.
3. Paul C, Michall, M.C., 'Fundamental of Polymer Science', CRC press, 2000.
4. Sperling, L. H., 'Introduction to Physical Polymer Science', 4th ed., Wiley-Interscience, 2006.

EBT 109/3
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

1. Douglas C. Montgomery. (2004). *Introduction to Statistical Quality Control*. 4th Edition Wiley.
2. Dale H. Besterfield. (2001). *Quality Control*, 7 th edition, Prentice Hall.
3. Juran J.M. and Gryna F.M. (1988). Juran's Quality Control Handbook. 4th Ed. Singapore: McGraw-Hill.
4. Ishikawa K. (1986). Guide to Quality Control. 2nd Ed. Tokyo: Asian Productivity Organization.
5. Shewhart W.A. (1986). Statistical Method from the Viewpoint of Quality Control. New York: Dover Publications.

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

1. Beer, F.P., Johnston, E.R. Jr. & Eisenberg, E.R., Vector Mechanics for Engineers: Statics. 7th ed. In SI Units, Canada, McGraw-Hill, 2004.
2. Beer, F.P., Johnston, E.R. Jr. & Eisenberg, E.R., Vector Mechanics for Engineers: Dynamics. 7th ed. In SI Units, Canada, McGraw-Hill. 2004.
3. Hibbeler, R.C., Engineering Mechanics: Statics. 3rd ed., Singapore, Prentice Hall, 2004.
4. Hibbeler, R.C., Engineering Mechanics: Dynamics. 3rd ed., Singapore, Prentice Hall, 2004.
5. Meriam, J.L. & Kragie, L.G., Engineering Mechanics: Statics. 5th ed. USA, SI ver. Wiley, 2003.
6. 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, Identifying Symbols, Hidden Surface and Edges, Inclined Surface, Circular Features, Oblique Surface. **Pictorial Drawing** - Isometric Drawing, Nonisometric Drawing, Dimensioning isometric Drawing. **Auxiliary** - Primary Auxiliary View, Secondary Auxiliary View. **Sections** - Sectional Views, Cutting-Plane Lines, Full Sections, Section Lining, Half Sectioning. **Computer-Aided Drawing (CAD)** - AutoCAD, IronCAD, CAD Mould, Plotting/Printing

References

1. Cecil Jensen, Jay D. Helsesl and Dennis R. Short, (2008). *Engineering Drawing & Design*. 7th Edition. New York: McGraw-Hill.
2. Shah, M. B., (2005). *Engineering drawing*. New Delhi: Pearson Education.
3. Boundy, A. W., Albert William, (2002). *Engineering drawing.* Boston: McGraw-Hill.
4. Madsen D.A. (2006). Engineering Drawing and Design. 4th Ed. Stamford: Cengage Learning
5. Marelli R. and McCuistion P. (2001). Geometric Tolerancing: A Text-Workbook. 6th Ed. Singapore: McGraw Hill.

EBT 207/4
MATERIALS STRUCTURE & PROPERTIES

Course Synopsis

This course will introduce student to historical perspective, materials science and engineering, materials classification. Atomic structure: fundamental concepts, electron in atoms, atomic number and mass, atomic structure with periodic table. Atomic bonding in solids: bonding forces and energies, primary interatomic bonds, secondary bonding or Van de Waals bonding, molecules. Crystal structure: fundamental concepts, unit cells, metallic crystal structures, bulk density, polymorphism, allotropy crystal systems, crystallographic directions, crystallographic planes, linear and planar atomic densities, close-packed crystal structure. **Crystalline and Non Crystalline Materials** - Single crystals, polycrystalline materials, anisotropy, microstructure specimen preparation, optical microscope, x-ray diffraction and its application; determination of crystal structure, non-crystalline solids. **Imperfection in Solids** - Point defects in metals, point defects in ceramic, impurities in solids, defects in polymer, Dislocations (linear defects), interfacial defects, bulk or volume defect, atomic vibrations. **Introduction to Diffusion** - Diffusion mechanism, steady state diffusion, non steady-state diffusion, factors that influence diffusion, other diffusion paths, diffusion in ionic materials and polymer.

Mechanical Properties of Materials - Stress-strain behaviour, non elastic and elastic properties of materials. Compression property, shear, fatigue, creep, and flexural strength. Hardness of materials. **Electrical Properties** - Ohm's law, electrical conductivity, electronic and ionic conduction, electrical properties using Ohm's Law, energy band structure, conduction in terms of band and atomic bonding models, electron motion, semiconductivity, electrical conduction in materials. **Thermal Properties** - Heat capacity, thermal expansion, thermal conductivity, thermal stresses. **Magnetic Properties** - Diamagnetism, paramagnetisme, ferromagnetisme, antiferromagnetisme, temperature effect on the magnetic behaviour, domain and hysteresis, hard and soft magnets, superconductor.

Optical Properties - Electromagnetic ray, solid and light interaction, atomic and electronic interaction, optical properties of metals and non metals, refraction, reflection, absorption, transmission, applications of optical phenomena - laser, fibre optic in communication.

References

1. Callister, W.D. Jr. (2000). *Materials Science and Engineering: An Introduction*. 5th Ed. New York: John Wiley.
2. Smith, W.F., (1990). *Principles of Materials Science and Engineerings*. 2nd Ed. Singapore: McGraw Hill.
3. Donald R. Askeland & Pradeep P. Phule, (2003). *The Science and ngineering of Materials*. 4th Ed. Thomson Brooks/Cole.
4. Brick R.M. et al. (1977). Structure and Properties of Engineering Materials. Singapore: McGraw-Hill.
5. Hayden H.W. et al. (1965). The Structure and Properties of Materials, Volume 3: Mechanical Behavior. New York: John Wiley & Sons.

EBT 211/4
PHYSICAL METALLURGY

Course Synopsis

This course will introduce student to Differentiate between process or extractive metallurgy and physical metallurgy. General characteristic of metals, physical and mechanical properties of metals, atomic structure and bonding of metals. Phase transformation concepts in metals. Phase stability, categories of phase transformation, and kinetics of phase transformation. **Solidification Process** - Process of solidification and two energy involved in solidification process, distinguish between equiaxed and columnar grains. **Imperfections in Solid** - Imperfection in solid metals and deformation mechanism for metals (edge and screw dislocation, plastic and elastic deformation). Slip: concept of slip, dislocations, twins, and their role in plastic deformation of single crystal. Critical slip system in FCC, BCC and HCP single crystal. Resolved shear stress by using Schmid Law.

Brief Introduction to Phase Diagram - Binary isomorphous system and binary eutectic system, phase diagram with intermediate phase or compound. Iron- iron carbide phase diagram, microstructure development in Fe-C alloy. Basic concept, solid state reaction kinetics, multiphase transformation, microstructure changes, and Fe-C properties. **Introduction to IT Diagram** - Isothermal transformation diagram (IT) and continuous cooling transformation (CCT) diagram.

Strengthening Mechanism - Grain size reduction, Solid solution strengthening, Strain hardening, Dispersion strengthening by phase transformation, interfacial energy, age/precipitation hardening, and microstructural development in age hardening. **Hardenability** - Mechanical behaviour of Fe-C alloy, tempered martensite, hardenability, jominy test, effect of alloying to hardenability, cold work. Recovery, recrystallization and grain growth. Procedure of steel heat treatment: austenitizing, annealing, full annealing, normalizing, quenching, tempering. **Surface Heat Treatment** - Introduction, types of treatment (carburizing, nitriding, carbonitriding and cyaniding). Diffusion- steady and non steady state diffusion. **Non Ferous Alloys** - Classification, heat treatability, microstructure and general properties of aluminum alloys, copper alloys, magnesium alloys, titanium alloys, nickel alloys. **Metallography Quantitative** - Grain size by metallography quantitative, ASTM grain size number and average grain size diameter. Important of grain size on the behaviour of crystalline metals.

References

1. John E. Neely, Thomas J. Bertone, (2000). *Practical Metallurgy and Materials for Industry*.
2. L. Carl Love. (1985). *Principles of Metallurgy*. Reston.
3. Verhoeven J.D. (1975). Fundamentals of Physical Metallurgy. New York: Wiley
4. Smallman R.E. and Ngan A.H.W. (2007). Physical Metallurgy and Advanced Materials. 7th Ed. Oxford: Butterworth-Heinemann.
5. Abbaschian R. and Reed-Hill R.E. (2008). Physical Metallurgy Principles. Stamford: CL-Engineering.

EBT 213/4
EXTRACTIVE METALLURGY I

Course Synopsis

This course will introduce student to **Mineral Processing** - Advantages of mineral processing. Crushing: definition, type of crusher and its characteristics, selection of crusher. Grinding: grinding mills, mill liners, grinding action, critical speed. Laboratory Sizing Control: Sizing methods (screening, sedimentation), sizing scales. Industrial sizing: type of industrial screening, screening efficiency. Gravity concentration: gravity concentration methods (heavy medium separation, jigging, sluicing). Magnetic and Electrostatic Separation: Principles, type of separators. Flotation: process, flotation reagents, conditioning and flotation circuits. **Hydrometallurgy** - Ore processing using hydrometallurgy method. Kinetic of heterogeneous reaction. Leaching process. Mode and leaching techniques. Solution Purification: Solvent extraction, solvent components (extraction mechanism), counter-current extraction, and application of solvent extraction in industrial worldwide. Purification of pregnant solution: ion exchange and activated carbon. **Electrometallurgy** - Galvanics: Redox reactions, Electrochemical cells, reactions, and EmF, Cell EmF, Standard EmFs and electrode potentials. Cell types. Electrolytic cells Electrowinning, Electrorefining, Electroextraction, Electroleaching, Electrosynthesis. Metal and metal compound recovery: crystallization, cementation, hydrogen gas reduction. Thermodynamic and hydrogen reduction kinetics.

References

1. A.R. Burkin, (2001). *Chemical Hydrometallurgy :Theory and principle*. London Imperial College Press.
2. Samsul Bahar Sadli, (1998). *Asas Proses Metalurgi*. Dewan Bahasa dan Pustaka, Kuala Lumpur.
3. Fathi Habashi, (1997). *Handbook of Extractive Metallurgy, Volume II.* Wiley-VCH.
4. Chiranjib Kumar Gupta, (2003). *Chemical Metallurgy.* Wiley-VCH.
5. Rosenqvist T. (2004). Principles of Extractive Metallurgy. 2nd Ed. Trondheim: Tapir Academic Press.

EBT 222/4
FUNDAMENTALS OF CERAMICS

Course Synopsis

Student will be exposed with 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 synthetically 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. **Forming Technique** - 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. **Drying 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. Solid-state sintering and microstructure changes in initial, intermediate and final stages of sintering.

References

1. Michel Barsoum, (1997). *Fundamentals of Ceramics.* McGraw-Hill New York.
2. James S. Reed, (1995). *Principles of Ceramics Processing, 2nd ed*. John Wiley and Son Inc New York.
3. Allen Dinsdale diterjemah oleh Prof. Dr. Radzali Othman dan Prof. Madya Dr. Ahmad Fauzi Mohd Noor, (1993). *Sains Tembikar:Bahan, Proses dan Hasilan*. Penerbit USM P.Pinang.
4. Lawrence H. Van Vlack diterjemahkan oleh Zainal Arifin Ahmad. *Seramik Fizik Untuk Jurutera.*
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

1. Nagdi, K., ‘Rubber As An Engineering Materials: Guide For Users, Hanser Publisher, 1993.
2. Ciesielski, A., ‘An Introduction To Rubber Technology’, Rapra Technology Ltd., 2001.
3. Crompton, Roy, ‘Determination of Additives in Polymers and Rubbers’, Rapra Technology, 2007.
4. Wood, P.R., ‘Mixing of Vulcanisable Rubbers and and Thermoplastic Elastomers’, Rapra Technology, 2004.
5. Chandra, R., Mishra, S., ‘ Rubber and Plastic Technology’, CBS Publishers & Distributors, 1995.

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

1. Braun, D., Chandra, H. Ritter, H., ’Polymer Synthetic, Theory and Practice’, 3rd ed. 2001, Germany.

2. Harry R.A. Frederic K.W.L, James E.M., 'Contempory Polymer Chemistry', 3rd ed., Person Education, 2003.
3. Braun, D., Cherdron, H., Ritter, H., 'Polymer Synthesis: Theory and Practice: Fundamentals. Methods, Experiments', 4th ed., Springer, 2005.
4. Malcom P.S, 1997. Polymer Chemistry, Universitiy of Hartford, Oxford University Press, Inc. New York.
5. 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

1. Brydson, J.A., 'Plastic Materials', 7th ed., Oxford: Butterworth –Heinemann, 1999.
2. Henry, S. Pascault, P. C., 'Thermosetting Polymers', Marcel Dekker,Inc., 2003.
3. Charles, A. H., 'Modern Plastic Handbook', Mc Graw Hill, Inc., 2000.
4. Sidney H. Goodman, 'Handbook of Thermoset Plastics', 2nd ed., RAPRA Tech., 2003.
5. Domininghaus, H.,'Plastic for Engineers: Materials, Properties, Applications', Hanser Pub., 2003.

EBT 235/3
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.
3. Allcock, H.R., Lampe, F.W.and Mark, J.E., 'Contemporary Polymer Chemistry', 3rd ed., Pearson Education, Inc.: Prentice Hall, 2003.
4. Domininghaus, H., 'Plastic for Engineers: Materials, Properties, Applications', Hanser Pub., 1993.
5. 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

1. 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

1. Irving M. K and Robert M, R (2005), Chemical Thermodynamics, Wiley & Sons, Inc., Publication, United State (USA).
2. Myron Kaufman (2002), Principles of Thermodynamic, Marcel Dekker, Inc, New York.
3. Rastogy R.P and RR Misra, (1978), An Introduction to Chemical Thermodynamics, Vikas Publishing House, New Delhi
4. Utracki, L.A., ‘Polymer Blends’, Rapra Technology, 2002.
5. Ronald P. Danner, Martin S (1993). Handbook of Polymer Solution Thermodynamics, Wiley.

EBT 251/3
ENGINEERING MATERIALS CHEMISTRY

Course Synopsis

Introduction to Thermodynamics - First law of thermodynamics, expansion and contraction of work, enthalpy, heat capacity, thermochemistry and it application in metallurgy. **Second Law of Thermodynamics** - Differentiate entropy function, cyclic process, several relations of thermodynamics which involving Gibbs Free Energy, relationship between equilibrium constant and temperature in reaction. **Reaction Kinetics** - Effect of reactants and products concentration, determination of order and velocity constant of reaction, effect of temperature for reaction, theory of absolute reaction rates for catalyst, diffusion in solid state. **Electrochemistry** - Electrolytes, electrolytic conduction, electrode potentials, galvanic cell, calculation of e.m.f. and cell potential, reduction and oxidation potential, standard electrode potential series. **Interface Phenomenon** - Surface energy and surface tensions, interfacial energy except gas/ liquid interface, interfacial of three phases, absorption and colloid.

References

1. Azizan Aziz dan Kamarudin Hussin. (2000). *Pengenalan Kimia Metalurgi*. Pulau Pinang: Penerbit USM.
2. Moore, J.J. (1998). *Chemical Metallurgy*. 2nd Edition. London: Butterworths.
3. Fahlman B.D. (2007). Materials Chemistry. 2nd Ed. New York: Springer.
4. Allcock H.R. (2008).Introduction to Materials Chemistry. New York: Wiley.
5. West A.R. (1999). Basic Solid State Chemistry. 2nd Ed. New York: Wiley.

EBT 252/4
STRENGTH OF MATERIALS

Course Synopsis

Stress analysis, stress theory, strain analysis, strain theory, relationship of stress- strain and stress- strain temperature. Axial load, torsional loading, bend loading, bending stress, strain deflection. **Failure Criterion** - Elastic deflection failure, excessive yielding failure, fracture failure, excessive deflection failure, and progressive failure. **Statically Indeterminate Beam Analysis** - Method of integration, moment- area method, method of superposition, energy method, and plastic analysis. **Combined Loading** - Combined axial and bending load, combined axial, bending and torsion load. **Column** - Buckling of column, end- support conditions, empirical formula. **Joint** - Rivet and bolt analysis (average shear strength and tensile strength), welding, and connection analysis.

References

1. Ferdinand P. Beer, E. Russell Johnston, Jr., John T. DeWolf. (2004). *Mechanics of Materials.* 3rd, McGraw Hill.
2. Hibbeler, R. C. (2003). *Mechanics of Materials*. 5th Edition, Prentice Hall.
3. Megson, T. H. G. (2002). *Structural and Stress Analysis*. Butterworth: Heinemann.
4. Shackelford, J.F. (2008). Introduction to Materials Science for Engineers. 7th Ed. New York: Prentice Hall.
5. Askeland, D.R. et al. (2010). The Science and Engineering of Materials. 6th Ed. Stamford: Cengage Learning.

EBT 253/3
ANALYTICAL CHEMISTRY

Course Synopsis

The main purpose of the Course is to provide students with a strong theoretical and practical grounding in the principles and practices of Analytical Chemistry. Basically student will learn Analytical objective, Stoichiometric Calculations, General Concept of Equilibrium, Gravimetric Analysis, Complexometric Titrations, Precipitation Reactions and Titrations, Redox and Potentiometric Titrations, Chromatographic methods and Environmental Analysis. Student will undertake Analytical Chemistry Laboratory for helping student to further develop hands-on skills.

References

1. Christian, Gary. D., (1994). *Analytical Chemistry, Fifth Edition*. University of Washington: John Wiley & Sons, inc.
2. Skoog, Douglas. A., West, Donald. M et al,. (2004). *Fundamentals of Analytical Chemistry, Eigth Edition*. Stanford University, San Jose State University, University of Kentucky and Michigan University: Thomson Learning Academic Resources Center.
3. Higson, Seamus. P. J., (2004). *Analytical Chemistry*. Oxford University: Oxford University Press.

EBT 254/3
TRANSPORTATION PHENOMENON IN MATERIALS PROCESSING

Course Synopsis

Heat Transfer - Fourier's law and thermal conductivity, thermal conductivity of gases, thermal conductivity of solids, thermal conductivity of liquids, thermal conductivity of bulk materials, heat transfer and the energy equation, quenching heat transfer coefficient, heat transfer coefficient in forging. **Solidification of Metals** - Solidification in sand moulds, solidification in metal moulds, continuous casting, crystal growth. **Radiation Heat Transfer** - Basic characteristic, the black radiator and emissivity, the energy distribution and the emissive power, gray bodies and adsorptivity, radiation combine with convection, radiation from gases. **Fick's Law and Diffusion in Materials** - Definition of fluxes, Fick's first law, diffusion in solids, diffusion under composition gradient effect, Darken's equation, diffusion based on temperature in solids, diffusion in ceramic materials, diffusion in semiconductor materials, diffusion in liquids, diffusion in gases. **Diffusion in Solids** - Steady state diffusion experiments, microelectronic diffusion processing, homogenization of alloys, formation of surface layers. **Mass Transfer in Fluid Systems** - Diffusion through a stagnant gas film, diffusion in moving gas stream, the mass transfer coefficient, mass transfer in chemical vapor deposition. **Interphase Mass Transfer** - Two-resistance mass transfer theory, mixed control in gas-solid reactions, iron carbonization with surface reaction and diffusion as control factor, transportation in gas phase and diffusion as control factor, silicon oxidation, alloys vaporizing during melting.

References

1. James R. Welty, Charles E. Wick, Robert E. Wilson, Gregory Rorrer. (2001). *Fundamentals of Momentum, Heat Transfer and Mass Transfer.* 4th Edition, John Wiley.
2. Poirier, D.R., Geiger, G.H. (1994). *Transport Phenomena in Material Processing.* A Publication of TMS.
3. Thomson W.J. (2000). Introduction to Transport Phenomena. New York: Prentice Hall.
4. Deen W.M. (1998). Analysis of Transport Phenomena (Topics in Chemical Engineering). USA: Oxford University Press.
5. Bird R.B. (2006). Transport Phenomena. 2nd Ed. New York: John Wiley & Sons.

EBT 303/3
PROCESS CONTROL

Course Synopsis

Basic concept for process control system, continuous and batch control. Application of computer software is extended in order to implement control algorithm for selected processes. Instrumentation selection is introduced for process control. Managing and implementing project. Designing and implementing process control.

References

1. Dorf, R.C., Bishop, R.H.(1998). *Modern control system.* Addision Wesley.
2. Coughanow, D.R. (1991). *Process System Analysis And Control.* McGraw Hill.
3. Dunn W. (2005). Fundamentals of Industrial Instrumentation and Process Control. Singapore: McGraw-Hill.
4. Johnson C.D. (2005). Process Control Instrumentation Technology. New York: Prentice Hall.
5. Chau P.C. (2002). Process Control: A First Course with MATLAB. Cambridge: Cambridge University Press.

EBT 311/4
MECHANICAL METALLURGY

Course Synopsis

This course is designed to introduce the students various aspects of Mechanical Metallurgy such as elastic plastic behaviour, stress concept, tensile deformation of ductile metal, ductile and brittle behaviour, elastic stress-strain relations, Mohr'circle of stress, stress tensor, calculation of stresses from elastic strain, strain energy, stress concentration, finite element method. Elements of the theory of plasticity such as flow curve, true stress-strain, Von Mises yielding criterion, maximum shear stress or Tresca criterion. Plastic Deformation of Single Crystals such as concept of crystal geometry, lattice defects, deformation by slip, slip in a perfect lattice, slip by dislocation movement, critical resolved shear stress for slip, deformation by twinning, stacking faults. Dislocation theory; Burgers vector, dislocation loop, dislocation in face-centered cubic lattice, intersection of dislocation, dislocation sources, multiplications of dislocations, dislocation pile-ups. Fracture mechanics theory such as fracture toughness test, design aspects for fracture mechanics. Fatigue of metals such as effect of mean stress on fatigue, cycle stress-strain curve, low-cycle fatigue, crack propogation. Design aspects for low-cycle fatigue. Creep such as creep mechanism, design aspects for creep behaviour. Failure analysis such as techniques for failure analysis, equipments for failure analysis, metallographic sample preparation for failure analysis, excessive load, wear, wear protection, corrosion, brittle fracture at low temperature, shear fracture, failure of heat treatment, fatigue, fracture mode identification, design consideration, type of fatigue fracture.

References

1. John E. Neely, Thomas J. Bertone, (2003). *Practical Metallurgy and Materials for Industry.* 6th Edition. Prentice Hall.
2. Schaffer, Saxena, Antolovich, Sanders & Warner, (1999). *The Science and Design of Engineering Materials.* 2nd Edition. Mc Graw Hill.
3. George E. Dieter. (1988). *Mechanical Metallurgy*. SI Metric Edition.Mc-Graw Hill.
4. Meyers M.A. (1983). Mechanical Metallurgy: Principles and Applications. New York: Prentice Hall.
5. May I.L. (1981). Principles of Mechanical Metallurgy. Amsterdam: Elsevier

EBT 312/3
ENGINEERING FLUID MECHANICS

Course Synopsis

Course will be concentrate with fluid properties, fluid classification and force types in fluids. Thus, students will be learning about fluid properties in two different conditions, static and dynamic condition. Student also will learn momentum principles including basic equations for controlled system and volume, and then basic equations in differential form. The students will see in fluid application in flow topic in pipes and turbo-machine. The course also concentrates flow measurement aspect, like as tools and procedures which used in flow measurement.

References

1. Clayton T, Crowe, Donald F, Elger, John A. Roberson. (2001). *Engineering fluid Mechanics.* 7th Edition. John Wiley.
2. James R. Welty, Charles E. Wick, Robert E. Wilson, Gregory Rorrer. (2001). *Fundamental of momentum, heat transfer, and mass transfer.* 4th edition. John Wiley.
3. Munson B.R. et al. (2009). Fundamentals of Fluid Mechanics. New York: Wiley.
4. Fox R.W. et al. (2008). Introduction to Fluid Mechanics. New York: Wiley.
5. Mott R.L. (2005). Applied Fluid Mechanics. 6th Ed. 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.
4. Marc De Graef (2003). *Introduction to conventional transmission electron microscopy.* Cambridge University Press.
5. Paolo Samori (2006). *Scanning Probe Microscope Betond Imaging, Manipulation of Molecules and Nanostructures.*

EBT 314/3
METALLURGICAL THERMODYNAMICS

Course Synopsis

This course is design to review of First and Second laws of thermodynamics. **Chemical Equilibrium** - Activity, equilibrium constant, Le-Chatelier's principle, chemical potential, law of mass action. Effect of temperature and pressure on equilibrium constant, Vant Hoff's isotherm. Free energy-temperature diagrams, oxygen potential and oxygen dissociation pressure. Measurement of activity, Gibb's phase rule and its applications, Free energy composition diagram. **Solution Chemistry** - Partial molar quantities, Ideal solutions, Rault's law, non ideal solutions, Gibbs-Duhem equation. Free energy of formation of solution, regular solutions. Excess thermodynamic quantities. **Electrochemistry** - Electrochemical cell, determination of thermodynamic quantities using reversible electrochemical cell, EMF cell, electrode potential, electrode potential-pH diagrams and their applications. Thermodynamics laws to metallurgical systems with special emphasis on roasting, sintering, smelting and refining processes. Introductory theoretical treatment of alloying and alloy systems. Application of thermodynamic data to phase diagram.

References

1. Ahindra Ghosh, (2004). *Textbook of Materials & Metallurgical Thermodynamics*. Prentice Hall of India.
2. R.H. Tupkary, (1995). *Metallurgical Thermodynamics.* TU Publishers, Nagpur.
3. D.R. Gaskell, (1981). *Introduction to Metallurgical Thermodynamics.* McGraw-Hill Book Co. Inc., New York.
4. Yunus A. Cengel & Michael A. Boles, (2005). *Thermodynamics: An Engineering Approach*. McGraw-Hill.
5. Eric Brian Smith, (2004). *Basic Chemical Thermodynamics.* Imperial College Press.

EBT 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.
2. Jones D.A. (1995). Principles and Prevention of Corrosion. 2nd Ed. New York: Prentice Hall.
3. A.W. Batchelor, Loh Nee Lam, Andrew William Batchelor & Margam Chandrasekaran, (2000).*Materials Degradation and Its Control by Surface Engineering*. Publisher: Imperial College Press.
4. Fontana, M.G. & Greene, N.D. (1986). *Corrosion Engineering.* 3rd Ed. New York: McGraw-Hill.
5. Wranglen, Gosta. (1985). *Introduction to Corrosion and Protection of Metals*. London: Chapman & Hall.

EBT 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 priority. The course integrates vertically and horizontally concepts from all areas of Metallurgical Engineering into a practical design project designed to train the students in the design practice. Fundamentals of the design process, specifications, decision-making, materials selection, materials process, experimental design, statistic process control and preliminary design are the focus. This course consists in the students playing the role of apprentices to design by teaming up with the interdisciplinary students in the s design projects.

References

1. George E. Dieter, (2000). *Engineering Design, a Materials and Processing Approach, Third Edition.* McGraw-Hill Company.
2. Atila Ertas and Jesse C. Jones, (1993). *The Engineering Design Process.* John Wiley & Sons, Inc.
3. Ashby M.F. and Johnson K. (2009). Materials and Design, Second Edition: The Art and Science of Material Selection in Product Design. 2nd Ed. Oxford: Butterworth-Heinemann.
4. Schaffer J.P. (1998). The Science and Design of Engineering Materials. 2nd Ed. Singapore: McGraw-Hill.
5. Pickering F.B. (1978). Physical Metallurgy and the Design of Steels. London: Applied Science Publishers.

EBT 322/3
POLYMER 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

1. Callister, W.D. Jr. (2000). *Materials Science and Engineering: An Introduction.* 5th Ed. New York: John Wiley.
2. Budinski, KG. Budinski, M.K. (1999). *Engineering Materials: Properties and Selection.* 6th Edition. Prentice Hall.
3. Peter, C. Powell, (1999). *Kejuruteraan dengan polimer.* Terjemahan Azman Hassan et al, Penerbit UTM.
4. Baird D.G, Collias D.I. (1998). *Polymer Processing- Principles and Design.* John Wiley & Sons, Inc.
5. Richard, C.P, (1993). *Polymer Engineering Principles, Properties, Processes, Test for Design.* Hanser Publication.

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,.
2. Douglas A. Skoog & James J. Leary. (1992). Principles of Instrumental Analysis, 4th Ed. Sounders College Publishing.
3. Larry, G., Harges (1988). Analytical Chemistry: Principles and Techniques, Prentice Hall.
4. Gary, D., Cristian (1986). Analytical Chemistry, 4th Edition, John Wiley & sons.
5. John Edward Gentle (1982).Atomic Absorption Spectrometry, Elsevier.

EBT 324/3
MATERIALS THERMODYNAMICS

Course Synopsis

Summarised revision on thermodynamic; Phase transformation; Solid state-Reaction. Thermodynamic of the phase diagram; Consideration of the free energy, transformation kinetics - Thermodynamic and kinetics in the glass formation system, precipitation of the different phases at different composition from matrix.

References

1. Boris S. Bokstein, Mikhail I. Mendelev, (2005). *Thermodynamics and Kinetics in Materials Science.* Oxford University Press.
2. Svein Stolen & Tor Grande, (2004). *Chemical Thermodynamics of Materials.* John Wiley & Sons.
3. H.G. Lee, (1999). *Chemical Thermodynamics for Metals and Materials.* Imperial College Press.
4. Yunus A. Cengel & Michael A. Boles, (2005). *Thermodynamics: An Engineering Approach*. McGraw-Hill.
5. J. Susanto, (1988). *Termodinamik Gunaan: Masalah dan Contoh Penyelesaian*. Dewan Bahasa dan Pustaka.

EBT 326/4
POLYMER PROPERTIES

Course Synopsis

The course is designed to introduce 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.

References

1. Gottfried W.E. (2001). *Polymeric Materials – Structure-Properties-Application*. Hanser Gardner.
2. Callister, W.D. Jr. (2000). *Materials Science and Engineering: An Introduction.* 5th Ed. New York: John Wiley.
3. Vishu Shah. (1998). *Handbook of Plastics Testing Technology*. John Wiley & Sons, Inc.
4. Richard, C.P, (1993). *Polymer Engineering Principles, Properties, Processes, Test for Design.* Hanser Publication.
5. F.W. Billmeyer.(1984). *Textbook of Polymer Science*. John Wiley & Sons, Inc.

EBT 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.
2. Mark, J. E.,' The Science and Technology of Rubber', 3rd ed.,Elsevier Inc., 2005.
3. Brown, R.,' Physical Testing of Rubber', 4th ed., Springer, 2006.
4. Harry, L., 'Basic Compounding and Processing of Rubber', Rubber Division, American Chemical Society Inc., 1985.
5. Rodgers, B., 'Rubber Compounding: Chemistry and Applications', Marcel Dekker, 2004.

EBT 334/4
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.

References

1. Ghottfried W. Ehrenstein, Gabriela Riedel, Pia Trawiel, 'Thermal Analysis of Plastic', Hanser, 2004.
2. Hatakayama, T., Zhenlai, L., 'Handbook of Thermal Analysis', John Wiley and Sons., Inc., 1998.

3. Vishu Shah, 'Handbook of Plastics Testing Technology', 2nd ed., John Wiley and Sons, Inc., 1998.
4. Naranjo, Noriega, Osswald, Roland-Alteza, Sierra. Plastic Testing and Characterization. Hanser, Germany.

EBT 335/4
POLYMER BLEND AND ALLOYS

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

1. Paul, D. R & Bucknall, C. B., 'Polymers Blends', John Wiley and Sons, Inc., 2000.
2. Gabriel, O. Shoinake, George, P. S., 'Polymer Blends and Alloys', Marcel Dekker, 1999.
3. Vasile, C.,Kulshrestha, A. K., 'Blends and Composites', Rapra Publisher, 2003
4. Utracki, L.A., 'Polymer Blends', Rapra Technology, 2002.
5. Long, Yu, 'Biodegradable Polymer Blends and Composites From Renewable Resources', Wiley, 2008.

EBT 336/4
THERMOPLASTIC AND THERMOSET 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

1. Baird D. G, Collias D. I.,'Polymer Processing-Principles and Design', John Wiley & Sons, Inc., 1998.
2. Andrew Ciesielski, 'An introduction to rubber Technology', Rapra Technology Ltd, 1999.
3. Tim A. Osswald, 'Polymer Proccesing Fudamentals', Hanser Publishers, 1998.
4. Strong, A. Brent, 'Plastics: Materials and Processing', 2nd ed., Prentice Hall, 2000.
5. 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.

References

1. James R. Welty *et all* (2007) Fundamental of momentum, Heat, and Mass Transfer, 5th Edition, Jhon Wiley & Son, Inc. USA.
2. Hans Dieter Baehr – Karl Stephan (2006) Heat and Mass Transfer 2nd Edition (revision, Springer, Germany.
3. Coulson & Richardson's (1999) Chemical Engineering, Sixth Edition (Reprint 2009) " Fluid Flow, Heat and Mass Transfer", Elsevier, Great Britain (UK).
4. Henning Bockhorn, Dieter Mewes, Wolfgang Peukert and Hans-Joachim Warnecke (2010)

Heat and Mass Transfer – Micro and Macro Mixing: Analysis, Simulation and Numerical Calculation, Springer-Verlag Berlin Heidelberg
5. Rong Zheng, Roger I. Tanner, Xi-Jun Fan (2011) Injection Molding: Integration of Theory and Modeling Methods, Springer Heidelberg Dordrecht London New York
6. Rachid Bennacer (2007) Numerical Methods for Heat & Fluid Flow, International Conference on Computational Heat and Mass Transfer, Emerald Group Publishing Limited 0961-5539

EBT 338/4
LATEX PROCESSING

Course Synopsis

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

1. Blackley, D. C.,'Polymer Latices: Science and Technology', 2nd Edition, Vol. 1 – 3, Chapman & Hall, 1997.
2. Warson, H. and Finch, C. A.,'Application of Synthetic Resin Latices : Fundamental Chemistry of Latices and Applications in Adhesives', John Wiley & Sons, Ltd., 2001.
3. Dunn, David J., 'Natural and Synthetic Latex Polymers: Market report', Rapra Technology, 2002.
4. Vikas Mittal, ' Advances in Polymer Latex Technology', Nova Science Publishers, 2009.
5. 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

1. S.O. Kasap , Principles of Electronic Materials and Devices, Second Edition, McGraw Hill Higher education, 2002.
2. Rao R. Tummale, Fundamentals of Microsystems Packaging, McGrawhill, 2001.
3. Gardner, Julian W., Microsensors MEMS and Smart Devices, John Wiley , c2001.
4. Harper C. (2009). Electronic Materials and Processes Handbook. Singapore: McGraw-Hill.
5. Kasap S. (2005). Principles of Electronic Materials and Devices. 3rd Ed. Singapore: McGraw-Hill.

EBT 401/3
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, eddy current, ultrasonic, and radiography technique.

References

1. B. Raj, T. Jay Kumar & M. Thavasimuthu. (2002). *Practical Non-Destructive Testing, Woodhead Publishing and Alpha Science International Ltd.*2nd Edition. New Delhi: India.
2. J. S. Peter. (2002). ,*Non-destructive Evaluation: Theory, Techniques and Applications.* Marcel Dekker Incorporation, New York: USA.
3. F. Kojima, T. Takagi, S.S. Udpa and J. Pavo. (2002). *Electromagnetic Non-destructive Evaluation, IOS Press.* Amsterdam: Netherland.
4. J. H. Charles. (2001). *Handbook of Non-destructive Evaluation.* McGraw-Hill, New York: USA.
5. E. B. Don and K. S. Roderic. (1997). *Non-destructive Evaluation, A Tool in design, manufacturing, and service,* CRC Press Incorporation, Boca Raton: Florida.

EBT 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.
2. Jones D.A. (1995). Principles and Prevention of Corrosion. 2nd Ed. New York: Prentice Hall.
3. A.W. Batchelor, Loh Nee Lam, Andrew William Batchelor & Margam Chandrasekaran, (2000).*Materials Degradation and Its Control by Surface Engineering*. Publisher: Imperial College Press.
4. Fontana, M.G. & Greene, N.D. (1986). *Corrosion Engineering.* 3rd Ed. New York: McGraw-Hill.
5. Wranglen, Gosta. (1985). *Introduction to Corrosion and Protection of Metals*. London: Chapman & Hall.

EBT 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.

References

1. William Smith.(1993). *Structure and properties of engineering alloys*. 2th Edition, McGraw Hill.
2. J. R Davis. (2001). *Alloying: Understanding the Basics.* ASM International.
3. Mathew, F.L, Rawlings, R.D. (1998). *Composite Materials: Engineering and Science*. Chapman & Hall,
4. Ronal F.G. (1994). *Principle of Composite Materials Mechanics.* McGraw-Hill.
5. Suresh, S., Mortensen, A., Needleman, A., (1993). *Fundamentals of Metal-Matrix Composite.* Elsevier.

EBT 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 quality and casting defects. Characterization of engineering powders. Production of metallic powders . Conventional pressing and sintering. Alternative pressing and sintering techniques. Matereials and products for Powder Metallurgy. Overview of metal forming. Material behaviour. Bulk deformation process in metal working, rolling, forging, extrution bar and wire drawing. Cutting and bending operation, drawing, shear metal forming operation. Mechanics of metal cutting and chip formation. Power and energy relationship in machining.

References

1. Peter Beeley. (2001). *Foundry Technology*. 2nd Ed. Oxford:Butterworth/Heinemann.
2. John E. Neely, Thomas J. Bertone. (2000). *Practical Metallurgy and materials for Industry*.
3. J. Beddoes, M. Bibby. (1999). *Principle of Metal Manufacturing Process.* Butterworth-Heinemann.
4. Serope Kalpakjian. (1991). *Manufacturing processes for Engineering Materials.* Addison Wesley.
5. Degarmo, Black and Koser. (1988). *Material and Processes in Manufacturing.*

EBT 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

1. Lancaster J.F. (1999). Metallurgy of Welding. 6th Ed. UK: Abington Publishing.
2. Easterling. K, (1993). *Introduction to Physical Metallurgy of Welding.* Butterworth: Heinemann.
3. Granjon H. (1991). Fundamentals of Welding Metallurgy. UK: Abington Publishing.
4. Kou. S.(1987). *Welding Metallurgy.* John Wiley & Sons.
5. Linnert G.E. (1965) Welding metallurgy;: Carbon and alloy steels. Volume 1: fundamentals. 3rd Ed. USA: American Welding Society.

EBT 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 solderability. Solder joint and intermetallic formation. Reliability and failure mechanisms. Applications and metallization in flip chip technology and tape-automated bonding. **Processing Technologies** - Metal deposition techniques commonly used in microelectronic packaging processes including evaporation, sputtering and elctro- and electroless plating which are used in the fabrication of corrosion-resistant metal pads on IC packages. Advantages and disadvantages of the technique used. Patterning process. Metal-to-metal joining process. **Package**

Construction - Application of metals in base, lead frames and lids construction.

References

1. Harper C. (2009). Electronic Materials and Processes Handbook. Singapore: McGraw-Hill.
2. Kasap S. (2005). Principles of Electronic Materials and Devices. 3rd Ed. Singapore: McGraw-Hill.
3. J.H. Westbrook, R.L. Fleischer. (2000). *Magnetic, Electrical, and Optical Properties and Applications of Intermetallic Compounds*. Volume 4. Publisher: Wiley.
4. George G. Harman. (1997). *Wire Bonding in Microelectronics: Materials, Processes and Equipment*. Publisher: McGraw-Hill Professional.
5. Mayer J.W. and Lau S.S. (1989). Electronic Materials Science: For Integrated Circuits in SI and GaAs. New York: Prentice Hall.

EBT 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
3. McEvily, A.J., (2002). *Metal Failures: Mechanisms, Analysis, Prevention.* John Wiley & Sons. New York
4. Mobley, R. K., (1999). *Root Cause Failure Analysis.* Butterworth-Heinemann. Woburn
5. Tawancy, H.M., Nureddin., A. U. Abbas. M., (2004). *Practical Engineering Failure Analysis.* Taylor & Francis. New York

EBT 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.

References

1. Chiranjib Kumar Gupta, “Chemical Metallurgy”, Wiley-VCH, ISBN 3527303766 (2003).
2. Fathi Habashi, “Textbook of Pyrometallurgy” Métallurgie Extractive Québec, ISBN 2922686051 (2002)
3. Samsul Bahar Sadli, “Asas Proses Metalurgi”, Dewan Bahasa dan Pustaka, ISBN 9836256350 (1998).
4. Fathi Habashi, “Handbook of Extractive Metallurgy, Volume II”, Wiley-VCH, (1997).
5. Colin Bodsworth, “The Extraction and Refining of Metals” CRC Press ISBN 0849344336 (1994)

EBT 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

1. Smallman R.E. and Ngan A.H.W. (2007). Physical Metallurgy and Advanced Materials. 7th Ed. Oxford: Butterworth-Heinemann.
2. Hari Singh Nalwa. (2002). *Nanostructred Materials and Nanotechnology.* Academic Press,
3. El-Eskandarany. S.M. (2001). *Mechanical Alloying For Fabrication Of Advanced Engineering Materials.* Noyes Publication,
4. Bernier P, S lefrant, G Bidan. (1999). *Advance In Synthetics Metals.*Elsevier.
5. Edelstein. A, Cammarata R. S. (1996). *Nanomaterial: Synthesis, Properties And Application.*

EBT 422/3
COMPOSITE MATERIALS

Course Synopsis

This course is focusing on three major types of composite materials which are Ceramic Matrix Composite (CMC), Polymer Matrix Composite (PMC), and Metal Matrix Composite (MMC). Lectures cover on several important aspects of composite materials. This includes the introductions, classifications, properties, applications and characterizations of composite materials, matrix and reinforcement phase, manufacturing and processing methods, types and influence of different reinforcement, inter-phase properties, 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

1. Mathew, F.L., Rawlings, R.D. (1998). *Composite Materials: Engineering and Science.* Chapman & Hall.
2. Ronal F.G. (1994). *Principles of Composite Material Mechanic*. Mc Graw-Hill.
3. Schwartz, M.M, Composite Materials Handbook, McGraw-Hill, 1992.

EBT 423/3
MATERIALS SELECTION AND DESIGN

Course Synopsis

This course builds an understanding of the inter-relationship between selection, materials processing, product design (material, design and processing) and product performance to develop a holistic approach to optimum selection of materials for engineering and industrial applications. The cause of product/ component failure in metals, polymers, ceramics, composites and its alleviation is studied in detail through case studies. The module also provides hands-on testing experience of measuring important mechanical properties through mini project. The course content are as follows; general methodology of design, practical issues in engineering design, practical issues in engineering design, practical issues in engineering design, materials and component failures and selection for the specific purposes.

References

1. Michael, F. Ashby. (1999). *Materials Selection in Mechanical Design.* Butterworth: HeinMann.
2. Pat. L. Mangonon. (1999). *The principles of Materials Selection for Engineering Design.* Prentice Hall.

3. Schaffer, Saxena, Antolovich, Sanders, Warner. (1999). *The Science and Design of Engineering Materials*. Mc Graw Hill.
4. Michael, F. Ashby & David, R. H. Jones. (1996). *Bahan Kejuruteraan: Pengenalan Sifat dan Kegunaan.* USM.
5. Mahmoud M. Farag. (1989). *Selection of Materials and Manufacturing Process for Engineering Design.* Prentice 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, *Engineering Material*, S. Chand & Company Ltd, 2000.
3. J. Newman, *Advanced Concrete Technology: Constituent Materials*, Butterworth, Heinemann, 2004.
4. Theodore W. Marotta, *Basic Construction Materials*, Prentice Hall, 7 Editions, 2005.
5. Sidney Mindess, J. Francis Young, David Darwin, *Concrete*, Prentice Hall, 2 Editions, 2003.

EBT 428/3
MATERIALS FOR ENERGY APPLICATIONS

Course Synopsis

In this course, student will be exposed to several materials associate with energy conversion and storage. This includes the properties of materials, fundamental of reaction involved, extended issue and challenges towards green technology. The course will dwells also on the energy needs, type of energy and applicable materials for energy application. The advanced materials development to the energy conversion in energy storage such as Li-ion batteries and energy conversion devices such as solar cell, fuel cell and thermoelectric cooler and generator will be introduced. There will be also discussion in parallel to the harvestable energy sources.

References

1. Richard J. D. Tilley (2004) Understanding Solids: The Science of Materials, John-Wiley and Sons
2. A.R.West (1984) Solid state chemistry and its applications, John-Wiley and Sons
3. C.C. Sorrell, Sunao Sugihara, Janusz Nowotny (2005) Materials for energy conversion devices, Woodhead Publishing Ltd.
4. George G. Libowitz, M. S. Whittingham (1979) Materials science in energy technology, Academic Press.
5. David L Andrew, Energy Harvesting Materials, World Scientific

EBT 426/3
ADVANCED ELECTRONIC PACKAGING

Course Synopsis

In this course, students will be exposed to the following: Introduction to few types of electronic packages such as Ball Grid Array (BGA), Land Grid Array (LGA), Flip Chip (FC), Chip Scale Package (CSP), Wafer Level-Chip Scale Package (WL-CSP), Direct Chip Attach (DCA) etc. The advantages, disadvantages and challenges of each of the above packages towards meeting the needs of the nanometre range, needs of new devices and market will be shared. On further, the types of materials used such as polymer, ceramic, metal etc. will be shared. The existence of the thermo-mechanical stresses in electronic packages and the suitable design to overcome it will be shared. Electrical, mechanical, optical, physical properties etc. including the reliability of the electronic packages and its material will be shared. Thermal management: heat transfer theory, thermal & cooling design and thermal measurement methodology that involved the software and hardware will be shared. Soldering technology: alloy, soldering technique, microstructure, interconnection, no-clean solder, lead-free solder and lead-free plating will be shared. Interconnection technology: Surface Mount Technology (SMT), Multichip Module (MCM), MEMS, sequential build-up substrate technologies, which enable connection to high-density IC packages with unique trace/via interconnection constraint will be shared. Embedded passive and active components, which significantly reduce the product size that need advanced footprint creation, placement and analysis capabilities will also be shared. Wireless industry-based driven products such as custom ASICs, off-the-shelf ICs; mixed signal, RF, and digital circuitry on the same substrate, Systems-in-package (SiPs) integration of multiple interconnect and devices technologies on a single substrate and lastly stacked die with incredible design densities which pose challenges with localized wirebonding and trace routing density will be shared.

References

1. S.O Kasap. (2002). *Principles of Electronic Materials and Devices*. 2nd Edition. Publisher: McGraw-Hill.
2. Ken Gilleo. (2001). *Area Array Packaging Handbook*. 1st Edition. Publisher: McGraw-Hill.
3. Charles A. Harper. (2000). *Electronic Packaging and Interconnection Handbook*. 3rd Edition.Publisher: McGraw-Hill.
4. John H. Lau. (2000). *Low Cost Flip Chip Technologies for DCA, WLCSP, and PBGA Assemblies*. Publisher: McGraw-Hill.
5. John Lau, S.W. Ricky Lee. (1999). *Chip Scale Package – Design, Materials, Process, Reliability, and Applications.* Publisher: McGraw-Hill.

EBT 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

1. Bengisu, M (2001). *Engineering Materials: Engineering Ceramics*. Springer, New York.
2. Lawrence H. Van Vlack diterjemahkan oleh Zainal Arifin Ahmad. *Seramik Fizik Untuk Jurutera*.
3. Kenneth, G. B., Michael, K. B (1999). *Engineering Materials: Properties and Selection. 6th ed.* Prentice Hall International Inc. UK.
4. Ganguly C. et al. (1991). Advanced Ceramics (Key Engineering Materials) Switzerland: Trans Tech Publications.
5. Hench L.L. and West (1990). J.K. Principles of Electronic Ceramics. New York: Wiley-Interscience.

EBT 431/3
POLYMER ENGINEERING PRODUCT

Course Synopsis

To introduce the basic knowledge of polymer engineering product development. Promote an understanding on the concepts of engineering product and requirements. Provide knowledge on characterization, selection principles and application of polymer engineering product.

References

1. Charles, A. H. , ‘Handbook of Plastics, Elastomers & Composite’, 4th ed., Mc Graw Hill Companies, Inc., 2001.2. Charles, A. H. , ‘Handbook of Plastics, Elastomers & Composite’, 4th ed., Mc Graw Hill Companies, Inc., 2001.
2. Rosato, D. V., ‘Plastics Product Material and Process selection Handbook’, Elsevier Ltd, 2004.
3. E. Alfredo Campo. 2006. The Complete Part Design Handbook. Hanser Publishers, Munich.
4. E. Alfredo Campo. 2008. Selection of Polymeric Materials. William Andrew Publisher. USA.

EBT 433/3
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.

References

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.
3. Pillard, D. A., Pocius, A. V., ‘Adhesion Science and Engineering’, vol. 1-2, Elsevier, 2002.
4. Raymond H. Fernando, Li-piin Sung, ‘Nanotechnology Applications in Coatings’, American Chemical Society, 2009.
5. Walter Brockmann, Paul Ludwiq Geil, Jurgen Klingen, K. Bernhard Schroder, Bettina Mikhail, ‘Adhesive Bonding: Materials, Applications and Technology’, Wiley-VCH, 2009.

EBT 434/3
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.

References

1. 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.

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

1. S. O. Kasap, 'Principles of Electronic Materials and Devices', 2nd ed., Mc Graw Hill, 2002.
2. Charles A. Harper, 'Electronic Packaging and Interconnection Handbook', 4th ed., Mc Graw Hill, 2005.
3. 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.

References

1. Deborah, D. L. Chung, 'Composites Materials: Science and Application', Springer-Verlag, Ltd, 2003.
2. 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

1. 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).
3. H. F. Rase, Chemical Reactor Design for Process Plants, Volumes I & II, J. Wiley & Sons, Inc., New York (1977).
4. Micheali, W (1992) Extrusion Dies for plastics and rubber: Design and Engineering. Munich: Hanser Publishers.
5. Michaeli, W.; Greif, H.; Kretzschmar, G.; Ehrig, F. (2001) Training in Injection Molding. Munich: Hanser Publishers
6. Rosato, D.V, Rosato, D.V, Rosato, M.G (2000) Plastic design handbook. Massachusetts: Kluwer Academic Publishers.
7. Osswald, T.A, Hernandiz-Ortiz, J. P (2006) Polymer Processing: Model and simulation. Munich: Hanser Publishers.

8. Campo, E. A (2006) The complete part design handbook: For injection molding of thermoplastics. Munich: Hanser Publishers.

EBT 445/2 & EBT 446/4
FINAL YEAR PROJECT

Course Outcomes

- 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.

Career Opportunities

Graduates with a Bachelor of Engineering (materials Engineering), (Metallurgical Engineering) and (Polymer Engineering) has 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.
- 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.
- Negotiation and Site Engineer.
- Research Officer.
- Lecturer for Polytechnic / College Community.
- Teaching Engineer


KELUAR

School of Bioprocess Engineering

PROGRAMMES OFFERED

- ► Bachelor of Engineering (Honours) (Bioprocess Engineering)
- ► Bachelor of Engineering (Honours) (Biosystems Engineering)
- ► Bachelor of Chemical Engineering Technology (Honours) (Industrial Biotechnology)
- ► Bachelor of Mechanical Engineering Technology (Honours) (Agricultural Systems)
- ► Master of Science (Bioprocess Engineering)
- ► Doctor of Philosophy

ADDRESS

SCHOOL OF BIOPROCESS ENGINEERING
Universiti Malaysia Perlis (UniMAP),
Kompleks Pusat Pengajian Jejawi 3 (KPPJ3),
Kawasan Perindustrian Jejawi,
02600, Arau,
Perlis
Tel : 604-9798751
Fax : 604-9798755
e-mail : dean_bioprocess@unimap.edu.my

Introduction

The School of Bioprocess Engineering (SBE) was first established in October 2005 after approval from the Ministry of Higher Education.

SBE currently offers four (2) Bachelor's Degree programmes namely Bachelor of Engineering (Honours) (Bioprocess Engineering), Bachelor of Engineering (Honours) (Biosystems Engineering), Bachelor of Chemical Engineering Technology (Honours)(Industrial Biotechnology) and Bachelor of Mechanical Engineering Technology (Honours) (Agricultural Systems)

The field of Bioprocess Engineering, Biosystems Engineering, Industrial Biotechnology and Agricultural Systems play a significant role in industrialized countries. Generally, the curricula are designed to enhance student's theoretical knowledge. The primary purpose is to produce holistic graduate engineers who posses not only the technical knowledge and critical skills but also equipped with skills in information technology, communication, entrepreneurship, and also ethics. Hence, the structures of the curricula are designed to deliver these important knowledge and skills.

BACHELOR OF ENGINEERING (HONOURS) (BIOPROCESS ENGINEERING)

Bioprocess Engineering is a specialization of biological processes and Biotechnology in Chemical Engineering field. It deals with the design and development of equipment and processes for the manufacturing of bio-based products such as food, feed, pharmaceuticals, nutraceuticals, chemicals, polymers, and etc, from biological materials. Bioprocess engineering is a conglomerate of mathematics, biology and chemical design,and consists of various spectrums like studying of fermentors (mode of operations etc.), large scale production of biological product, optimization of yield in the end-product and the quality of end-product and microorganism cellular-based productions.

BACHELOR OF ENGINEERING (HONOURS) (BIOSYSTEMS ENGINEERING)

UniMAP's Biosystems Engineering is considered as the biology-focused evolution of typical Agricultural Engineering programme and applies to all living organism systems with an exception of human. It is an engineering programme that "applies and integrates knowledge in sciences, mathematics, applied biological, environmental and agricultural 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.

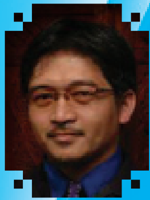
BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONOURS) (INDUSTRIAL BIOTECHNOLOGY

Bachelor of Chemical Engineering Technology (Hons) (Industrial Biotechnology) is a program specifically designed to provide students with blended knowledge and skills in biotechnology-based disciplines such as microbiology, fermentation technology and engineering principles for an industrial oriented profession. Those disciplines are integrated into Chemical Engineering Technology education system that emphasizes on intensive practical skills besides providing adequate communication and soft skills that could equip the graduates to serve in the biotechnology–based industries such as biofuels, biopharmaceuticals, enzymes, biomaterials and bioenergy that ensures sustainability and optimization of resources used.

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (AGRICULTURAL SYSTEMS)

The programme aims to generate engineering technologists who are competent and posses a sound and balanced skill in integrating biological, engineering, and management principles. The courses are delivered based on the practical approach covering basic and applied engineering subjects, crops and animal applied biology as well as basic principles in economics and management. Among the engineering courses offered are Engineering Mechanics, Agricultural Mechanics and Workshop Technology, Mechanics of Material, Geodetics Engineering, Farm Power and Machinery, Controlled Environment Agriculture and Food Technology. The students are also exposed to agro-industrial know-how through courses such as Agricultural Economics, Agricultural Production Systems, Principles of Agronomy, Agribusiness Management, Water Resources Management, Advances in Agrotechnology and Food and Herbal Crops Production Technology. The final semester of the programme is dedicated to the industrial training activity attaching students to the relevant industries mainly to enhance their capability and skill in accordance to market needs.

Staff Directory



DEAN
DR. MUHAMMAD SYARHABIL AHMAD
Email: syarhabil@unimap.edu.my

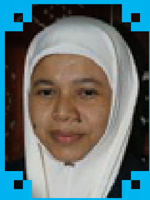
DEPUTY DEAN (ACADEMIC AND RESEARCH)
DR. MOHD IRFAN HATIM MOHAMED DZAHIR
Email : irfan@unimap.edu.my

DEPUTY DEAN (STUDENT DEVELOPMENT & ALUMNI)
MISS MISMISURAYA MEOR AHMAD
Email: mismisuraya@unimap.edu.my

HEAD OF DEPARTMENT (ENGINEERING TECHNOLOGY)
PROF. DR. ZAKARIA WAHAB
E-mail : zakariawahab@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (BIOPROCESS ENGINEERING)
MR. HUZAIRY HASSAN
Email: huzairyhassan@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (BIOSYSTEMS ENGINEERING)
MRS. RASHIDAH RUSLAN
Email: rashidahruslan@unimap.edu.my



CHAIRPERSON of DEGREE PROGRAMME (CHEMICAL ENGINEERING TECHNOLOGY) (INDUSTRIAL BIOTECHNOLOGY)
DR. ZARINA ZAKARIA
Email: zarinaz@unimap.edu.my

CHAIRPERSON of POSTGRADUATE PROGRAMME
PROF. IR. DR. IBNI HAJAR HAJI RUKUNUDIN
Email : ibnihajar@unimap.edu.my

COORDINATOR FOR INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
MR. LEE BOON BENG
Email: bblee@unimap.edu.my

ASSISTANT REGISTRAR
MRS. WARDAH HANIM MD NOR
Email: wardah@unimap.edu.my

Lecturers

Prof. Ir. Dr. Hj. Rezuwan bin Hj. Kamaruddin
PhD (Structural and Building Environmental Engineering), Cranfield University, UK
M. Sc. (Structural Engineering), UPM
B. Eng. (Agricultural Engineering), UPM
Tel : 04 979 8026 /04-9798822
Fax : 04 9798689/ 04-9798755
e-mail : rezuwan@unimap.edu.my

Prof. Dr. Zakaria Wahab
PhD (Plant Physiology/Plant Nutrition), University of Bristol, England
M.Sc (Crop Production & Physiology), Iowa State University, USA
B.Sc (Agronomy), Iowa State University, USA
Tel : 04-9798592
Fax : 04-9798755
e-mail : zakariawahab@unimap.edu.my

Prof. Ir. Dr. Ibni Hajar bin Haji Rukunudin
Ph D (Agricultural Engineering), Iowa State University, Ames, Iowa, USA
M. App. Sc (Food Engineering), New South Wales University, Sydney, Australia
B.Eng. (Agricultural), UPM
Tel : 04-9798846
Fax : 04-9798755
e-mail : ibnihajar@unimap.edu.my

Prof. Dr. Abdul Razak Shaari
Ph.D. (Plant Physiology), University of Wales, Abersytwyth, United Kingdom
B.Sc. (Botany), UKM
Tel : 04-9798851
Fax : 04-9798755
e-mail : razakshaari@unimap.edu.my

Prof. Dr. Awang Soh @ Yusoff Mamat
PhD (Plant Physiology), Louisiana State University, USA
B.Sc (Horticulture Science), Louisiana State University, USA
Tel : 019-9050078
Fax : 04-9798755
e-mail : awang@unimap.edu.my

Prof. Dr. Ridzwan Abdul Rahman
PhD (Marine Biology), University Newcastle Upon Thyne, United Kingdom
M.Sc (Marine Biology), San Jose State University, California, USA
B.Sc (Forestry), Louisiana State University, USA
Tel : 013-8887117
Fax : 04-9456603
e-mail : ridzwanrahman@unimap.edu.my

Associate Professor Dr. Dachyar Arbain
PhD (Biotechnology-Biosensor Technology), Imperial College, University of London, United Kingdom
Drs & B.sc. (Chemistry), Universiti Gadjah Mada, Yogyakarta, Indonesia
Tel : 04-9798845
Fax : 04-9798755
e-mail : dachyar@unimap.edu.my

Associate Professor Dr. Harbant Singh
Ph. D. (Plant Virology), University of Manchester, United Kingdom
M.Sc. (Plant Pathology), Punjab Agricultural University, Ludhiana
B.Sc. (Agriculture), Punjab Agricultural University, Ludhiana
Tel : 04-9798828
Fax : 04-9798755
e-mail : harbant@unimap.edu.my

Associate Professor Dr. Kassim Mohamad K Hashim,
Ph. D. (Super Critical Fluid Technology), University of Birmingham
M.Sc. (Mechanics of Wet Steam), University of Birmingham
B.Sc. (Mechanical Engineering), University of Baghdad
Tel : 04-9798844
Fax : 04-9798755
e-mail : qassim@unimap.edu.my

Associate Professor Dr.
Mahmad Nor Jaafar
PhD (Agronomy), Kansas State University , USA
M.Sc (Soil Physics), Kansas State University , USA
B.Sc (Agriculture), Louisana State University, USA
Tel : 04-9798826/04-9456614
Fax : 04-9798755/04-9456603
e-mail : mahmad@unimap.edu.my

Associate Professor Dr.
Mohamed Zulkali Mohamed Daud
PhD. (Chemical Engineering), Birmingham, UK
Tel : 604-9798843
Fax : 04-9798755
e-mail : zulkali@unimap.edu.my

Associate Professor Dr.
Mohammud Che Husain
PhD (Soil & Water Engineering), Cranfield University, UK
M.Sc. (Irrigation Water Management), Cranfield Institute of Technology, UK
B. Eng. (Agricultural Engineering), UPM
Fax : 04-9798755
e-mail : mohammudhusain@unimap.edu.my

Associate Professor Dr.
Othman bin Hashim
PhD. (Plant and Soil Science-Water Relations), Lincoln College, University of Canterbury, New Zealand
M. Agr. Dev. (Agricultural Project Development), State University of Ghent, Belgium
B. Agr. Sc. (Agronomy), Universitas Gadjah Mada, Jogjakarta, Indonesia
Tel : 049798751
Fax : 04-9798755
e-mail : othmanhashim@unimap.edu.my

Associate Professor Dr.
Zainab Hamzah
PhD. (Soil & Plant Chemistry), University of Canterbury, New Zeland,
M.Sc., State University of Ghent
B.Sc., State University of Ghent
Tel : 04-9798512
Fax : 04-9798755
e-mail : zainab@unimap.edu.my

Dr. A.K.M Shafiqul Islam
PhD. (Analytical Chemistry), USM
M.Sc. (Pharmaceutical), USM
Tel : 04-9798824
Fax : 04-9798755
e-mail : shafiqul@unimap.edu.my

Dr. Muhammad Syarhabil Ahmad
Ph.D. (Organometallic Chiral Catalysis Design and Organic Syntheses), University of Wisconsin @ Milwaukee WI, USA
B.Sc. (Chemical Engineering), Purdue University IN,USA
Tel : 04-9798751
Fax : 04-9798755
e-mail : syarhabil@unimap.edu.my

Dr. Mohd Irfan Hatim
Mohamed Dzahir
PhD., DIC (Chemical Engineering), Imperial College London
M.Eng.Sc. (Combustion), UM
B.Eng. (Chemical Engineering), UTM
Tel : 04-9798838
Fax : 04-9798755
e-mail : irfan@unimap.edu.my

Dr. Zarina Zakaria
PhD (Biotechnology/Plant Tissue Culture), USM
M.Sc. (Tropical Forest Resource Management), UPM
B.Sc(Hons. -Botany), UM
Tel : 04-9798820
Fax : 04-9798755
e-mail : zarinaz@unimap.edu.my

Dr. Sam Sung Ting
PhD (Polymer Engineering), USM
M.Sc (Polymer Engineering), USM
B.Eng (Chemical Engineering), UTM
Tel : 04-9382155
Fax : 04-9798755
e-mail : stsam@unimap.edu.my

Engr. Dr. Midhat Nabil Ahmad Salimi
PhD (Supercritical Fluid Processing/Nanoparticles), University of Birmingham, UK
M.Sc. (Biochemical Engineering), University of Birmingham, UK
B. Eng. (Chemical Engineering, First Class Honors), Universiti Teknologi MARA
Tel : 04-9798513
Fax : 04-9798755
e-mail : nabil@unimap.edu.my

Mr. Hirun Azaman Ismail
MBA(Management), Mississippi, State University, USA
BSc. (Agricultural Engineering), Mississippi, State University, USA
Tel : 04-9794164
Fax : 04-9798755
e-mail : hirun@unimap.edu.my

Mr. Huzairy Hassan
M.Sc. (Chemical Engineering), USM
B.Eng. (Biotechnology-Biochemical Engineering), UIAM
Tel : 04-9798595
Fax : 04-9798755
e-mail : huzairyhassan@unimap.edu.my

Mrs. Rashidah Ruslan
M. Eng. (Agricultural and Biological), University of Florida, USA
B. Eng. (Biological and Agricultural), UPM
Tel : 04-9798840/4164
Fax : 04-9798755
e-mail : rashidahruslan@unimap.edu.my

Mrs. Khadijah Hanim Abdul Rahman
M. Sc. (Biotechnology), USM
B.Sc. (Biotechnology), UPM
Tel : 04-9768190
Fax : 04-9798755
e-mail : khadijahhanim@unimap.edu.my

Mr. Lee Boon Beng
M. Eng. (Chemical), UMS
B. Eng. (Chemical), UMS
Tel : 04-9798594
Fax : 04-9798755
e-mail: bblee@unimap.edu.my

Miss Mismisuraya Meor Ahmad
M.Sc. (Fuel Cell), UKM
B.Eng. (Hons)(Chemical & Process), UKM
Tel : 04-9798585/4216
Fax : 04-9798755
e-mail : mismisuraya@unimap.edu.my

Mr. Mohamad Fahrurrazi Tompang
M. Sc. (Biotechnology Engineering), UIAM,
B. Eng (Biotechnology-Biochemical Engineering), UIAM
Tel : 04-9798590
Fax : 04-9798755
e-mail : fahrurrazi@unimap.edu.my

Miss Munira Mohamed Nazari
M. Eng. (Mechanical Eng), UTM
B. Eng. (Manufacturing Engineering), UTeM
Tel : 04-9768192
Fax : 04-9798755
e-mail : muniranazari@unimap.edu.my

Mrs. Noor Shazliana Aizee Abidin
M. Sc. (Food Technology), USM
B. Sc. (Food Technology), USM
Tel : 04-9798584
Fax : 04-9798755
e-mail : shazliana@unimap.edu.my

Mrs. Noorulnajwa Diyana Binti Yaacob
M.Sc (Bioprocess Engineering), UniMAP
B.Sc (Biotechnology), UPM
Fax : 04-9798755
e-mail : noorulnajwa@unimap.edu.my

Miss Nor Fauziah Zainudin
M.Sc. (Chemical Engineering), USM
B.Eng. (Chemical Engineering), USM
Tel : 04-9768357
Fax : 04-9798755
e-mail : norfauziah@unimap.edu.my

Mrs. Nurul Ain Harmiza Abdullah
M. Sc. (Biotechnology Engineering), UIAM
B. Eng (Biotechnology-Biochemical Engineering), UIAM
Tel : 04-9768353
Fax : 04-9798755
e-mail : ainharmiza@unimap.edu.my

Miss Rahimah Othman
M.Sc (Membrane Separation Technology), UKM
B.Sc (Chemical & Process Engineering), UKM
Tel : 04-9798583
Fax : 04-9798755
e-mail : rahimah@unimap.edu.my

Miss Rozaini Abdullah
M.Sc. (Chemistry), UKM
B. Sc. (Oleochemistry), UKM
Tel : 04-9763245
Fax : 04-9798755
e-mail : rozainiabdullah@unimap.edu.my

Miss Samera Samsuddin Sah
M.Eng (Civil-Hydraulics and Hydrology), UTM
B.Eng (Civil), UTM
Tel : 04-9798835
Fax : 04-9798755
e-mail : samera@unimap.edu.my

Mrs. Siti Jamilah Hanim Mohd Yusof
M. Sc. (Chemical Engineering), UKM
B.Eng. (Chemical Engineering), UKM
Tel : 04-9766320
Fax : 04-9798755
e-mail : jamilahhanim@unimap.edu.my

Mrs. Siti Kamariah Md Sa'at
M.Eng (Civil-Wastewater Engineering), UTM
B.Eng (Civil-Environmental), UTM
Fax : 04-9798755
e-mail : sitikamariah@unimap.edu.my

Mrs. Syazni Zainul Kamal
M.Sc. (Industrial Biotechnology), USM
B.Sc. (Biotechnology), UM
Tel : 049798588
Fax : 049798755
e-mail : syazni@unimap.edu.my

Mr. Zulfakar Mokhtar
M.Sc. (Chemical Engineering), USM
B.Eng. (Chemical Engineering), USM
Tel : 04-9798839
Fax : 04-9798755
e-mail : zulfakar@unimap.edu.my

Miss Nor Helya Iman Kamaludin
M.Sc. (Chemical Engineering),USM
B.Eng. (Bioprocess Engineering), UniMAP
Tel : 04-9798837
Fax : 04-9798755
e-mail : helya@unimap.edu.my

Mr. Zulkarnain Mohamed Idris
M.Sc.(Biotechnology Engineering), UIA
B.Eng.(Biochemical-Biotechnology, UIA
Tel : 04-9798842
Fax : 04-9798755
e-mail : zulkarnainidris@unimap.edu.my

Mr. Farizul Hafiz Kasim
M.Eng. (Chemical Engineering), UTM
B.Eng. (Chemical Engineering), UTM
Tel : 04-9798841
Fax : 04-9798755
e-mail : farizul@unimap.edu.my

Study Leave

Mrs. Ku Syahidah Ku Ismail
M. Sc. (Chemical Engineering), USM
B. Eng. (Chemical Engineering), USM
Tel : 04-9798832
Fax : 04-9798755
e-mail : kusyahidah@unimap.edu.my

Mrs. Nora Jullok
M. Eng (Chemical Engineering), UTM
B. Eng (Chemical Engineering), UTM
Tel : 04-9798842
Fax : 04-9798755
e-mail : norajullok@unimap.edu.my

Miss Khairul Farihan Kasim
M.Sc. (Biotechnology), USM
B.Sc (Biology – Botany), USM
e-mail : khairulfarihan@unimap.edu.*my*

Mr. Akmal Hadi Ma'Radzi
B.Eng (Biotechnology and Applied Chemistry), Fukui
M.Eng (Biotechnology and Applied Chemistry), Fukui
Tel : 04-9798849
Fax : 04-9798755
e-mail : akmalhadi@unimap.edu.my

Mrs. Alina Rahayu Mohamed
M.Sc. (Chemistry), UTM
B.Sc. (Chemistry), Sheffield, United Kingdom
Tel : 04-9798823
Fax : 04-9798755
e-mail : alina@unimap.edu.my

Mrs. Hafiza Shukor
M.Sc. (Chemical Engineering), USM
B. Eng (Chemical Engineering), USM
Tel : 04-9798593
Fax : 04-9798755
e-mail : hafizashukor@unimap.edu.my

Mrs. Hairul Nazirah Abdul Halim
M.Sc. (Chemical Engineering), USM
B. Eng (Chemical Engineering), USM
Fax : 04-9798755
e-mail : hairulnazirah@unimap.edu.my

Mrs. Noor Hasyierah Mohd Salleh
M. Sc (Bioprocess Engineering), UniMAP
B. Eng. (Biochemical Engineering), UKM
Tel : 04-9798829
Fax : 04-9798755
e-mail : hasyierah@unimap.edu.my

Mrs. Sriyana Abdullah
B. Eng (Chemical Engineering), UM
Tel : 04-9798827
Fax : 04-9798755
e-mail : sriyana@unimap.edu.my

Vocational Training Officers

Mr. Ahmad Anas Nagoor Gunny
M.Sc.(Bioprocess Engineering), UniMAP
B.Eng.(Hons.)(Biochemical-Biotechnology), UIAM
Tel : 04-9798847
Fax : 04-9798755
e-mail : ahmadanas@unimap.edu.my

Mr. Ahmad Radi Wan Yaakub
B. Eng (Chemical Engineering), UTM
Tel : 04-9798825
Fax : 04-9798755
e-mail : ahmadradi@unimap.edu.my

Miss Hafizah Mohd Johar
B. Eng (Chemical Engineering), University of Minnesota, Twin Cities, USA
Tel : 04-9798821
Fax : 04-9798755
e-mail : hafizahjohar@unimap.edu.my

Miss. Khalilah Mohd Yusuff
B. Eng (Biochemical-Biotechnology), UIAM
Tel : 04-9798835
Fax : 04-9798755
e-mail : khalilah@unimap.edu.my

Mr. Mahfuz Affif Mohd Ruslan
B.Eng (Chemical Engineering), USM
Tel : 04-9798848
Fax : 04-9798755
e-mail : mahfuz@unimap.edu.my

Mr. Md Nabil Ab Adzim Saifuddin
M.Sc. (Chemical Engineering), USM
B. Eng (Chemical Engineering), USM
Tel : 04-9798834
Fax : 04-9798755
e-mail : mdnabil@unimap.edu.my

Mr. Mohd Qalani Che Kasim
B.Eng (Chemical Engineering), UTM
Tel : 04-9798825
Fax : 04-9798755
e-mail : qalani@unimap.edu.my

Mr. Mohd Sani Jamailudin
B. Eng (Mechanical Eng), UiTM
Tel : 04-9798825
Fax : 04-9798755
e-mail : mohdsani@unimap.edu.my

Mr. Razif Omar
B.Eng (Mechanical)
Tel : 04-9798836
Fax : 04-9798755
e-mail : razif@unimap.edu.my

Science Officer

Miss Rohazita Bahari
M. Sc. (Environmental Engineering), UPM
B. Sc. (Petroleum Chemistry), UPM
Tel : 04-9798834
Fax : 04-9798755
e-mail : rohazita@unimap.edu.my

Technicians

Mr. Mohammad Fahmi Ramli
Certificate in Mechanical Engineering
Fax : 04-9798755
e-mail : rfahmi@unimap.edu.my

Mr. Muhammad Hafizal Fazil
Certificate in Mechanical Engineering
Fax : 04-9798755
e-mail : mhafizal@unimap.edu.my

Mr. Mohd Humaidi Samsuddin
Certificate in Mechanical Engineering
Fax : 04-9798755
e-mail : humaidi@unimap.edu.my

Mr. Mohamad Fauzi Mirdukhim @ Mustapa
Certificate in Mechanical Engineering
Fax : 04-9798755
e-mail : fauzimustapa@unimap.edu.my

Mr. Muhamad Fairul Sawal
Certificate in Mechanical Engineering
Fax : 04-9798755
e-mail : fairulsawal@unimap.edu.my

Mr. Imran Ismail
Certificate in Computer & Support System
Fax : 04-9798755
e-mail : imranismail@unimap.edu.my

Mr. Mohamad Zaim Mohamad Zain
Certificate in Mechanical Engineering
Fax : 04-9798755
e-mail : zaimzain@unimap.edu.my

Administrative Staff

Mrs. Wardah Hanim Md Nor
Assistant Registrar
Tel : 04-9798752
Fax : 04-9798755
e-mail : wardah@unimap.edu.my

Miss Atikah Nurain Abdul Hamid
Office Secretary
Diploma in Science Secretarial
Tel : 04-9798751
Fax : 04-9798755
e-mail : atikahnurain@unimap.edu.my

Miss Julaila Helwa Hamdan
Administrative Assistant (Clerical/Operation)
Tel : 04-9798653
Fax : 04-9798755
e-mail : julaila@unimap.edu.my

Miss Nur Hanisah Abdul Rahman
Administrative Assistant (Clerical/Operation)
Tel : 04-9798652
Fax : 04-9798755
e-mail : hanisah@unimap.edu.my

Mr. Saiful Ammar Marzuki,
Administrative Assistant (Clerical/Operation)
Tel : 04-9798653
Fax : 04-9798755
e-mail : ammar@unimap.edu.my

Mrs. Faizah Binti Ahmad
Administrative Assistant (Clerical/Operation)
Tel : 04-9798652
Fax : 04-9798755
e-mail : faizahahmad@unimap.edu.my

Mr. Rohisham Che Idrus
General Office Assistant,
Tel : 04-9798653
Fax : 04-9798755
e-mail : rohisham@unimap.edu.my

Programme Educational Objectives (PEO) for Bachelor of Engineering (Bioprocess Engineering)

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) for Bachelor of Engineering (Bioprocess Engineering)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in chemical engineering discipline.

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

PO3
Ability to design a system, component or process to meet desired needs.

PO4
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO5
Ability to use techniques, skills and modern engineering tools necessary for engineering practices

PO6
Ability to understand the social, cultural, global and environmental responsibilities of a professional engineer.

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

PO8
Understanding of professional and ethical responsibilities and commitment to the society.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively.

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

PO12
Demonstrate understanding of project management and finance principles

UniMAP

Curriculum Srtucture for Bachelor of Engineering (Honours) (Bioprocess Engineering)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	I	II	III	IV	V	VI		VII	VIII
Engeneering Core (87)	ERT 105/3 Electrical Technology	ECT 112/3 Engineering Skills	ERT 213/3 Process Instrumentations	ERT 206/4 Thermodynamics	ERT 316/3 Reaction Engineering	ERT 320/3 Bioseparation Engineering	EIT 302/4 Industrial Training	ERT 445/2 Final Year Project 1	ERT 446/4 Final Year Project 2
		EKT 120/4 Computer Programming	ERT 214/4 Material and Energy Balance	ERT 215/3 Fluid Mechanics	ERT 317/4 Biochemical Engineering	ERT 321/4 Process Control & Dynamics		ERT 424/3 Bioprocess Plant Design I	ERT 428/4 Bioprocess Plant Design II
			EQT 203/3 Engineering Mathematics III	ERT 216/4 Heat & Mass Transfer	ERT 318/4 Unit operations	ERT 314/4 Bioreactor System		ERT 425/3 Good Manufacturing Practice For Bioprocess Industries	#ERT4XX/3 Elective II
					ERT 319/3 Industrial Waste Treatment	ERT 322/3 Safety & Loss Prevention		#ERT 4XX/3 Elective I	
						ERT 323/2 Simulation for Bioprocess Engineering			
Non Engineering (33)	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II	ERT207/4 Analytical Chemistry	EQT 271/3 Engineering Statistics				EUT443/2 Engineering Management	EUT 440/3 Engineers in Society
	ERT 106/3 Biochemistry	ERT107/3 Microbiology for Bioprocess Engineering							
	ERT 102/4 Organic Chemistry	ERT 108/3 Physical Chemistry							
		EUT 122/2 Skills & Technology in Communication							
University Required (15)	UUW 114/2 University Malay Language		UUW 224/2 Engineering Entrepreneurship	UUW 223/2 University English Language	UUW 322/2 Thinking Skills				
	EUW 1XX/1 Co-Curricular Activity		UUW 233/2 Islamic & Asian Civilizations	UUW XXX/2 Option Subjects	UUW 235/2 Ethnic Relation				
135	16	18	18	18	18	16	4	13	14
University Required	University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject								
Total Units for Graduation 135									

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

Programme Educational Objectives (PEO) for Bachelor of Engineering (Biosystems Engineering)

PEO1
Graduates who are leaders in the field of agricultural/ biosystems engineering or chosen field as demonstrated via career advancement

PEO2
Graduates who are members of and contribute to professional society

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

PEO4
Graduates who contribute towards research and development

PEO5
Graduates who are entrepreneurial engineers

Program Outcomes (PO) for Bachelor of Engineering (Biosystems Engineering)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in agricultural/biosystems engineering discipline.

PO2
Ability to identify, formulate and solve agricultural/ biosystems engineering problems.

PO3
Ability to design a system, component or process to meet desired needs.

PO4
Ability to design and conduct experiments, as well as to analyze and interpret data

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

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

PO7
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO8
Understanding of professional and ethical responsibilities and commitment to the community.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively.

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 Srtucture For Bachelor Of Engineering (Honours) (Biosystems Engineering)

YEAR	FIRST		SECOND		THIRD			FOURTH	
SEMESTER	**I**	**II**	**III**	**IV**	**V**	**VI**		**VII**	**VIII**
Engineering Core (94)	ERT 141/4 Fundamentals of Biosystems Engineering	ERT 146/3 Engineering Mechanics	ERT205/4 Fluid Mechanic Engineering	EQT 271/3 Engineering Statistics	ERT 349/4 Soil And Water Engineering	ERT 452/3 Vibration	EIT 302/4 Industrial Training	ERT 445/2 Final Year Project 1	ERT446/4 Final Year Project 2
	EET103/4 Electrical Technology		ERT 249/4 Computer Aided Engineering Design For Biosystems Engineering	ERT 246/4 Hydrology And Water Resources Engineering	ERT 245/4 Heat And Mass Transfer In Biological Systems	ERT 348/3 Farm Structures		ERT 454/3 Controlled Environment Engineering	ERT 457/3 Design of Automation Systems
			ERT 247/4 Geomatic Engineering	ERT248/4 Thermodynamics For Biosystems Engineering	ERT 350/3 Instrumentation, Measurement And Control In Biosystems	ERT 244/4 Energy And Power In Biosystems		ERT 453/4 Design Of Machine & System	#ERT XXX/3 Elective 2
				ERT 142/4 Engineering Properties of Biological Materials		ERT 351/3 Sustainable Agrosystems Engineering		#ERT XXX/4 Elective 1	EUT 440/3 Engineers in Society
								EUT 443/2 Engineering Management	
Non Engineering (26)	ERT101/4 Biochemistry	ECT 112/3 Engineering Skills	EQT203/3 Engineering Mathematics III						
	EQT101/3 Engineering Mathematics I	EKT120/4 Computer Programming							
		ERT144/4 Microbiology for Biosystems Engineering							
		EQT102/3 Engineering Mathematics II							
		EUT122/2 Skills & Technology in Communication							
University Required (15)	EUW 1XX/1 Co-Curricular Activity		UUW233/2 Islamic & Asian Civilizations		UUW 322/2 Thinking Skills	UUW XXX/2 Option Subject			
	UUW 114/2 University Malay Language		UUW 224/2 Engineering Entrepreneurship	UUW 223/2 University English Language	UUW 235/2 Ethnic Relation				
135	**18**	**19**	**19**	**17**	**15**	**15**	**4**	**15**	**13**
	University English, Engineering Entrepreneurship, TITAS, Ethnic Relation, Thinking Skill, University Malay Language, Co-Curiculum, Option Subject								
Total Units for Graduation 135									

Elective :
Elective I : ERT 455/4 Manufacturing And Production Of Biological Products ,ERT458/4 Irrigation and Drainage System
Elective II: ERT 456/3 Post Harvest Engineering , ERT 459/3 Waste Management and Utilization Engineering, ERT308/3 Food Engineering

Programme Educational Objectives (PEO)

PEO1
Graduates who are able to apply knowledge and technical skills in providing practical engineering solutions

PEO2
Graduates who are able to demonstrate professionalism and leadership and contribute to team success and manage projects in a multi-disciplinary environment.

PEO3
Graduates who are able to advance in their career through adopting the advancements in engineering and technology as part of life-long learning experiences through ever changing environment.

Program Outcomes (PO)

PO1
Apply Knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies.

PO2
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their disciplines or area of specialization.

PO3
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.

PO4
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.

PO 5
Select and apply appropriate techniques, resources and modern engineering tools with an understanding of their limitations.

PO6
Function effectively as individuals, and as members or leaders in diverse technical teams.

PO7
Communicate effectively with the engineering community and society at large.

PO8
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.

PO9
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.

PO10
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

PO11
Demonstrate an awareness of management, business practices and entrepreneurship.

PO12
Recognise the need for professional development and to engage inindependent and lifelong learning.

Curriculum Structure for Bachelor of Chemical Engineering Technology (Honours) (Industrial Biotechnology)

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	VIII
DISCIPLINE CORE (105)	ERT 105/3 Electrical Technology	PTT 105/3 Engineering graphic	PTT 201/4 Thermodynamics	PTT 204/3 Applied Fluid Mechanics	PTT 301/3 Safety and Health in Biological Process	PTT 308/4 Final Year Project I	PTT 401/6 Final Year Project II	PTT 406/12 Industrial Training
	PTT 102//3 Organic Chemistry 1	PTT 106/3 Microbiology	PTT 202/3 Organic Chemistry for Biotechnology	PTT 205/4 Heat & Mass Transfer	PTT 302/3 Downstream Processing Technology	PTT 309/3 Food Technology	PTT 402/3 Biotechnology Facility Design	
	PTT 103/3 Biochemistry	PTT 107/3 Physical chemistry	PTT 203/3 Biochemical Engineering	PTT 206/2 Instrumentation, Measurement and Control	PTT 303/2 Process Modeling and Simulation	PTT 310/2 Waste Management and Utilization	PTT 403/2 Biotechnology Products Commercialization	
	PTT 104/2 Introduction to Biotechnology	PTT 108/4 Mass & Energy Balance		PTT 207/4 Biomolecular and Genetic Engineering	PTT 304/3 Fermentation Technology	PTT 311/3 Enzyme Technology	Elective III/3 Elective A (A3) / Elective B (B3)	
					PTT 305/3 Cell & Tissue Culture Technology	Elective II/3 Elective A (A2) / Elective B (B2)		
					Elective I/3 Elective A (A1) / Elective B (B1)			
COMMON CORE (18)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II	PQT 213/3 Statistics for Engineering Technology					
	EMT 110/3 Engineering Material					EUT 443/3 Engineering Management	EUT 440/3 Engineers in Society	
UNIVERSITY REQUIRED (17)	UUW 223/2 University English Language	UUW 114/2 University Malay Language	EUT122/2 Skills & Technology in Communication	UUW 224/2 Engineering Entrepreneurship				
		EUW 1XX/1 Co-Curricular Activity	UUW 233/2 Islamic Civilization and Asia Civilization	UUW 235/2 Ethnic Relation				
			UUW 322/2 Thinking Skill	UUW XXX/2 Option subjects				
140	19	19	19	19	17	18	17	12
Total Units for Graduation 140								

Elective A (Specialty Products) A1: Nutraceuticals Processing Technology PTT 306/3
A2: Bioactive Compounds ExtractionTechnology PTT 312/3
A3: Biopharmaceutical Technology PTT 404/3

Elective B (Bio-catalysts)
B1: Industrial Microbiology PTT 307/3
B2: Bioenergy Production Technology PTT 313/3
B3: Bioremediation PTT 405/3

Programme Educational Objectives (PEO)

PEO01
Graduates competent in the application of mathematics and sciences in engineering technology in managing agricultural production and natural resources.

PEO02
Graduates capable of addressing issues of ethics, safety, professionalism, cultural diversity, globalization, environmental impact, and social and economic impact in their careers.

PEO03
Graduates capable of managing technology and systems including capabilities to think creatively and innovatively solve problems and communicate effectively.

PEO04
Graduates who can work collaboratively, have people skills and continually engaged in lifelong learning.

Programme Outcomes (PO)

PO01
Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies;

PO02
Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization;

PO03
Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns;

PO04
Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources;

PO05
Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations;

PO06
Function effectively as individuals, and as members or leaders in diverse technical teams;

PO07
Communicate effectively with the engineering community and society at large;

PO08
Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities;

PO09
Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices;

PO10
Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development;

PO11
Demonstrate an awareness of management, business practices and entrepreneurship; and

PO12
Recognize the need for professional development and to engage in independent and lifelong learning.

Curriculum Structure for Bachelor of Mechanical Engineering Technology (Honours) (Agricultural Systems)

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	I	II	III	IV	V	VI	VII	
Discipline Core (96)	PDT 176/2 Computer Aided Drafting	PDT 181/3 Engineering Mechanics	PDT 276/3 Mechanics of Material	PDT 281/3 Instrumentations and Control	PDT 376/3 Farm Power and Machinery	PDT 381/4 Final Year Project 1	PDT 476/6 Final Year Project 2	INDUSTRIAL TRAINING (12)
	PDT 177/2 Applied Chemistry	PDT 182/3 Electronic Application in Agriculture	PDT 277/3 Applied Thermodynamics	PDT 282/3 Applied Fluid mechanics	PDT 377/3 Applied Heat and Mass Transfer/	PDT 382/3 Controlled Environment Agriculture	PDT 477/3 Post-Harvest Technology	
	PDT 178/2 Applied Biology	PDT 183/2 Agricultural Mechanics and Workshop Technology	PDT 278/2 Geodetics Engineering	PDT 283/2 Agribusiness Management	PDT 378/2 Precision Agriculture Technology	PDT 383/3 Renewable Energy	PDT 478/3 Agricultural Waste Management and Utilization Eng.	
	PDT 179/3 Agricultural Economics	PDT 184/4 Agricultural Production Systems	PDT 279/4 Principles of Agronomy	PDT 284/2 Agro-ecosystems and Sustainability	PDT 379/3 Water Resources Management	PDT 384/3 Food Technology	PDT479/3 **or** PDT480/3 Elective 2/3 Option A2 **or** Option B2	
	PDT 180/3 Engineering Science		PDT 280/2 Fundamentals of Agribusiness Accounting and Finance		PDT 380/3 Automations in Agricultural Systems	PDT 385/3 **or** PDT386/3 Elective 1/3 Option A1 **or** Option B1	PDT481/3 **or** PDT482/3 Elective 3/3 Option A3 **or** Option B3	
Common Core (15)	PQT 111/3 Mathematics for Engineering Technology I	PQT 112/3 Mathematics for Engineering Technology II		PQT 271/3 Statistics for Engineering Technology				
					EUT XXX/3 Technology Management	EUT XXX/3 Technologist and Society		
University Required (17)	EUW 1XX/1 Co-Curricular Activity	EUT 122/2 Skills & Technology in Communication	UUW 233/2 Islamic & Asian Civilizations	UUW 322/2 Thinking Skills				
	UUW 114/2 University Malay Language	UUW XXX/2 Option Subject	UUW 224/2 Engineering Entrepreneurship	UUW 223/2 University English Language	UUW 235/2 Ethnic Relation			
140	18	19	18	17	19	19	18	

Electives Option 1 (Green Technology):
A1: PDT 385/3 Bio-Material Engineering
A2: PDT 479/3 Bio-renewable System
A3: PDT 481/3 Advances in Agrotechnology

Electives Option 2 (Agricultural Production Technology):
B1: PDT 386/3 Integrated Agrosystems
B2: PDT 480/3 Food Processing Engineering
B3: PDT 482/3 Food and Herbal Crops Production Technology

Course Syllabus

ERT 101/4
BIOCHEMISTRY

Course Synopsis

The topics covered in this course include the origin of life and structure of prokaryotes and eukaryotes cells. It also covers the 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 are featured in the course. Electron transportation, citric acid cycle and photosynthesis in biological processes are briefly highlighted in this course.

Course Outcomes

1. Ability to define and describe the biochemical concepts and terms associated with life.
2. Ability to define, explain and differentiate the structure, classification and function of carbohydrates, lipids and nucleic acids.
3. Ability to define, describe and differentiate the role of proteins in biochemistry and purification of proteins. To introduce enzymes.
4. Ability to define, describe and illustrate electron transportation, citric acid cycle and photosynthesis in biological processes.

References

1. McKee, T., McKee, J. (2003). *Biochemistry.* 3rd Ed. McGraw Hill.
2. Voet, D.; Voet, J. G. and Pratt, W. C. (2002).*Fundamentals of Biochemistry*. Upgrade Edition. John Wiley
3. Elliott, W.H. & Elloitt, D.C. (2005). *Biochemistry.* 3rd Edition. Oford University Press.
4. Campbell, M.K. & Farrell, S.O. (2006). *Biochemistry.* CA: Belmont
5. Mathews, C.K., Van Holde, K.E. & Ahern, K.G. (2000). *Biochemistry.* 3rd Edition. San Francisco: Benjamin Cumming.

ERT 102/4
ORGANIC CHEMISTRY

Course Synopsis

This course introduces the fundamental theories (atomic orbital, molecular orbital and hybridization theories) and the application of hybridization theory in reactions involving alkynes and alkenes. Then, focusing on conformational analysis of alkanes and emphasizing on the nucleophilic substitution reactions of alkylhalides. The course also covers on physical and chemical properties, and chemical reactions involving alcohol and ester, aldehyde and ketone, carboxylic acid and aromatic compound. The application of organic chemical process is discussed in terms of biofuel and biopharmaceutical production.

Course Outcomes

1. Ability to explain the basic concepts theoretically and apply the knowledge of the physical and chemical properties of each functional group.
2. Ability to explain theoretical organic chemical reactions of alkenes, alkynes and alkyhalides at molecular level.
3. Ability to demonstrate the reactions involving alcohol, ether, aldehyde, ketone, carboxylic acid and aromatic compounds.
4. Ability to formulate the knowledge of organic chemical process in industry such as production of biopharmaceuticals.

References

1. Bruice, P.Y. (2004). *Organic Chemistry.* 4th. Edition. Prentice Hall.
2. John McMurry, Organic Chemistry 5th Edition, Brooks/ Cole, 2000.

3. T.W.G., Solomons and C.B., Fryhle .(2008). *Organic Chemistry.* 9th Ed. John Wiley.
4. Goerge, T. Austin. *Shreve's Chemical Process Industries.* 5th Edition. McGraw Hill International
5. Bruice, P.Y. ((2006). *Esential Organic Chemistry.* Pearson International Edition, Pearson Prentice Hall.
6. Groggins, P.H. (2001). *Unit Processes in Organic Chemistry Synthesis.* Tata McGraw Hill

ERT 105/3
ELECTRICAL TECHNOLOGY

Course Synopsis

This course is intended to provide students with clear understanding of the DC and AC circuits, basic principles of 3-phase AC circuits, electro-magnetism and magnetic circuits. They will also gain an understanding of the basic operating principles and performance analysis of three most commonly used electric machines, namely, transformers, dc machines, and induction motors.

Course Outcomes

1. Ability to explain the principle elements of DC and AC circuits such as current, voltage, power, energy, nodes, branches etc.
2. Ability to analyze the DC and AC circuits by using Ohm's Law, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Source Transformation and Thevenin's theorem.
3. Ability to calculate and analyze parameters of three phase AC system for Wye and Delta connection.
4. Ability to explain the basic concept of magnetism and electromagnetism and its application in DC and AC machines.

References

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

ERT 106/3
BIOCHEMISTRY

Course Synopsis

The topics covered in this course include the origin of life and structure of prokaryotes and eukaryotes cells, properties of water and structure, classification and function of biomolecules such as carbohydrates, lipids and amino acids. The role of proteins and enzymes in biochemistry, purification of protein, molecular biology and genetics will be featured in the course. Electron transportation, citric acid cycle and photosynthesis in biological processes will also be briefly highlighted in this course.

Course Outcomes

1. Ability to define and describe the biochemical concepts and terms associated with life.
2. Ability to define, explain and differentiate the structure, classification and function of carbohydrates, lipids and nucleic acids.
3. Ability to define, describe and differentiate the role of proteins in biochemistry and purification of proteins. To introduce enzymes.
4. Ability to define, describe and illustrate electron transportation, citric acid cycle and photosynthesis in biological processes.

References

1. McKee, T. & McKee, J. 2003. Biochemistry, 3rd Edition, McGraw Hill. New York.
2. Voet D. & Voet, J.G. 2004. Biochemistry 3rd Edition, Wiley International Edition, New York.

3. Elliott, W.H. & Elliott, D.C. 2005. Biochemistry 3rd Edition. Oxford University Press
4. Campbell, M.K. & Farrell, S.O. 2006. Biochemistry 5th Edition. Belmont, CA.
5. Mathews, C.K., van Holde, K.E. & Ahern, K.G. 2000. Biochemistry 3rd Edition. Benjamin Cumming, San Francisco.

ERT 107/3
MICROBIOLOGY FOR BIOPROCESS ENGINEERING

Course Synopsis

This course covers the role of bacteria, fungi and virus in bioprocess industries. Comparison of prokaryotes and eukaryotes; microbial metabolism; microbial growth kinetics and fermentation process; and factors contributing to productivity, spoilage and preservation in food and industrial microbiology are also discussed.

Course Outcomes

1. Ability to define and describe important concepts and terminology in microbes and their metabolism.
2. Ability to demonstrate practices in microscopy, staining, sterilization, isolation and identification of bacteria and fungi.
3. Ability to define, describe and apply microbial growth in fermentation and biological process.

References

1. Prescott, L. M., Harley, J. S & A. Klein, D. A. 2005. *Microbiology*. McGraw Hill.
2. Bauman, R. 2006. *Microbiology with diseases by taxonomy 2nd Edition.* Pearson Education, Prentice Hall.
3. Cowan, M.K. 2006. *Microbiology: a systems approach 1st edition.* McGraw-Hill Higher Education.
4. Black, J.G. 2005. *Microbiology: principles and explorations 5th edition.* John Wiley, New York.
5. Waites, M.J., Morgan, N.L., Rockey, J.S. & Higton, G.H. 2001. *Industrial Microbiology: An Introduction.* Blackwell Science, United Kingdom.

ERT 108/3
PHYSICAL CHEMISTRY

Course Synopsis

This course is designed to prepare engineering students for advance knowledge in chemistry such as thermodynamics, chemical equilibria and chemical kinetics.

Course Outcomes

1. Ability to define and apply the phenomena, basic concepts, laws and principles in physical chemistry.
2. Ability to calculate and solve a problem concerning physical chemistry.
3. Ability to illustrate various fundamental laws in physical chemistry.

References

1. Atkins, P and de Paula, Julia. 2006. *Physical Chemistry*. Oxford University Press, 8th Edition.
2. Bahl, B.S.; Bahl, Arun & Tuli, G.D. 2006. *Essentials of Physical Chemistry*. S. Chand, New Delhi.
3. Paul Monk, 2004. *Physical Chemistry*, John Wiley & Sons.
4. Levine I. N. , 2002. Physical Chemistry, McGraw Hill, 5th Edition.
5. Silbey R. J., Alberty R. A., Bawendi M. G. 2005. Physical Chemistry, John Wiley & Son, Inc., 4th Edition.

ERT 141/4
FUNDAMENTAL OF BIOSYSTEMS ENGINEERING

Course Synopsis

This course introduces students to the concepts of biosystems engineering and their applications in the biosphere, the ecosystem and the biological systems involving microbes, plants and animals. Students will learn the systems methodologies, life cycle assessment, growth and feedback, biological models and data measurement and analysis. The applications of conservation of mass and energy in determining the input , process and output components in agrosystems are also covered.

Course Outcomes

1. Ability to define, explain the scope of Biosystems engineering & application to sustainable development.
2. Ability to identify and describe systemic properties of biological systems; applied the system methodologies and engineering principles to evaluate the productivity of the biosystems.
3. Ability to integrate the physical and biological information for engineering analytical framework & design.
4. Ability to evaluate the interfacing effect of bio and physical systems in term of efficiency of production.

References

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
4. 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 142/4
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.
2. 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.
4. 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 144/4
MICROBIOLOGY FOR BIOSYSTEM ENGINEERING

Course Synopsis

This course covers the fundamental concepts, historical aspects and the relationship among human, microorganisms and the environment with particular emphasis on the characteristic and taxonomy of bacteria, fungi, virus and protozoa. Basic microbiological and microscopy techniques, harmful effects of microorganisms to plants and animals and their roles in food and industrial application are also discussed.

Course Outcomes

1. Ability to infer historical aspect and explain fundamental concepts of microbiology
2. Ability to classify the characteristics of bacteria, fungi, virus and protozoa
3. Ability to apply and follow basic microbiological techniques
4. Ability to discuss the role of microorganisms in food and industrial application and their harmful effects to plants and animals

References

1. Black, J.G. 2008. *Microbiology: principles and explorations 6th edition.* John Wiley, New York.
2. Bauman, R. 2007. *Microbiology with diseases by taxonomy 2nd Edition.* Pearson Education, Prentice Hall.
3. Cowan, M.K. 2006. *Microbiology: a systems approach 1st edition.* McGraw-Hill Higher Education.
4. Tortora, G.J., Funke, B.R. & Case, C.L. (2007). Microbiology: An Introduction. 9th Edition, The Benjamin Cummings, San Francisco, California, USA.
5. Brock, T.D., Madigan, M.T., Martinko, J.M. & Parker, J. (2003). Biology of microorganisms, 10th Edition. Prentice Hall Englewood Califfs, New Jersey.
6. Pollack, R.A., Findlay, L., Mondschein, W. & Modesto, R.R. (2002). Laboratory exercises in microbiology, John Wiley & Sons, Inc.

ERT 146/3
ENGINEERING MECHANICS

Course Synopsis

This course covers vector representation of forces, moments and couples of static equilibrium of particles, rigid bodies, and engineering structures, together with analysis of external and internal forces in structures via the methods of free-body diagrams and properties of cross-sectional areas. In addition, the course also elaborates on kinematics and kinetics of system of particles and of rigid bodies in two and three-dimensional spaces covering force and acceleration, linear and angular momentum, and energy conservation.

Course Outcomes

1. Ability to apply the basic principles of statics and dynamics on mechanism and bodies
2. Ability to analyze systems/ problems related to forces, loads, displacement for bodies at rest
3. Ability to analyze systems/ problems related to forces, loads, displacement for bodies in motion

References

1. Bedford and Fowler, Engineering Mechanics: Statics and Dynamics, 5th Edition, Pearson-Prentice Hall, 2007.
2. R.C. Hibbler, Engineering Mechanics: Statics and Dynamics, 11th Edition, Peason Prentice Hall, 2006.
3. S.D. Sheppard and B.H. Tongue, Statics. Analysis and design of systems in equilibrium, Wiley, 2005.

4. B.H. Tongue and S.D. Sheppard, Dynamics. Analysis and design of systems in motion, Wiley, 2005.
5. F.P. Beer and E.R. Johnston, Vector mechanics for engineers: statics and dynamics, 8th edition, 2006.

PTT 102/3
ORGANIC CHEMISTRY 1

Course Synopsis

This course covers the theories, structure, bonding, nomenclature, properties, reaction, synthesis and the importance of the various classes of organic compounds. The course then builds upon this information and explores the mechanisms of a number of organic reactions involving the studied functional groups. It provides a firm foundation for further studies in organic, biological, and biochemistry. The central theme of this course is the chemistry of the principal functional groups. The application of organic chemical process is discussed in terms of biotechnology industry.

Course Outcomes

1. Ability to explain and differentiate the chemical and physical properties of each functional groups carry out theoretical reaction mechanism at molecular level.
2. Ability to explain and differentiate the chemical, physical properties and reactions of alcohol, ether, aldehyde, ketone and carboxylic acids.
3. Ability to apply the knowledge of organic chemical process in biotechnology industry.

References

1. Bruice, P.Y. (2007). Organic Chemistry 5th Edition. Pearson Prentice Hall.
2. John Macmurray. (2000). Organic Chemistry 5th . Brooks/ Cole.
3. T.W.G. Solomon and C.B.Fryhe. (2008). Organic Chemistry. 9th Edition. John Wuley and Son. Inc.
4. George, T. Austin, Shreve. (2006). Chemical Process Industries. 5th Edition. McGraw Hill International.
5. Bruice, P.Y. (2006). Essential Organic Chemistry. Pearson International. Prentice Hall.
6. Groggins, P.H. (2001). Unit Processes in Organic Chemistry Synthesis, Tata McGraw Hill.

PTT 103/3
BIOCHEMISTRY

Course Synopsis

The topics covered in this course include the 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 and electron transportation, citric acid cycle and photosynthesis in biological processes will also be emphasized in this course.

Course Outcomes

1. Ability to demonstrate basic structure, properties, functions and classification of important biomolecules.
2. Ability to discuss structure, function and kinetic properties of enzymes and their roles in metabolism
3. Ability to illustrate electron transportation, citric acid cycle, and photosynthesis in biological processes.
4. Ability to describe enzymes and nucleic acids extraction and isolation.

References

1. Campbell, M.K. & Farrell, S.O. (2006). Biochemistry 5th Edition. Belmont, CA.
2. Voet D. & Voet, J.G. (2004). Biochemistry 3rd Edition, Wiley International Edition, New York.
3. McKee, T. & McKee, J. (2003). Biochemistry, 3rd Edition, McGraw Hill. New York.
4. Elliott, W.H. & Elliott, D.C. (2005). Biochemistry 3rd Edition. Oxford University Press

5. Mathews, C.K., van Holde, K.E. & Ahern, K.G. (2000). Biochemistry 3rd Edition. Benjamin Cumming, San Francisco.

PTT 104/2
INTRODUCTION TO BIOTECHNOLOGY

Course Synopsis

This course provides an overview of biotechnology industry, from the traditional to the recent high-technology industries. The course also highlights important and recent advances in methods and applications of biotechnology with regards to microorganisms and plants. The importance major biotechnological streams; industrial biotechnology, agricultural biotechnology, medical biotechnology and environmental biotechnology will be discussed, including recent advances and modern processes. Aspects on ethical implications, safety and intellectual will also be covered.

Course Outcomes

1. Ability to explain foundations of modern biotechnology.
2. Ability to demonstrate important recent advances in methods and applications of biotechnology with regards to microorganisms and plants.
3. Ability to differentiate scopes and importance of various biotechnological streams.
4. Ability to demonstrate understanding on ethical implications of biotechnology.

References

1. William J.T. and Michael A.P. (2009). Introduction to Biotechnology. 2nd Edition. Pearson Benjamin Cummings.
2. Susan R. Barnum. (2005). Biotechnology an introduction. 2nd edition. Thomson, Brooks/Cole Publication.
3. Acquaah, G. (2004). *Understanding Biotechnology*. Pearson. Prentice Hall.
4. Bougaize, D., Jewell, T.R. and Buiser, R.G. (2000). *Biotechnology; Demystifying the Concept*. Benjamin-Cummings Publication.
5. Rene Fester Kratz PhD, Donna Rae Siegfried**.** (2010). Biology For Dummies. Second Edition.
6. R.C. Sobti and Suparna S. Pachauri (2009). Essential of biotechnology. CRC press, US.

PTT 105/3
ENGINEERING GRAPHIC

Course Synopsis

This course introduces the use of technical drawing in an effective way for communicating and integrating with engineering concept. Students will learn engineering drawing to interpret design, using graphics method such as geometry, parallel projections, sectional drawing, machines drawing and working drawing. The primary software used in this course is AutoCAD.

Course Outcomes

1. Ability to use the computer to produce complete drawing based on well define technical graphic standard.
2. Ability to apply basic geometric construction techniques to create engineering drawing using computer aided design (CAD).

References

1. Cecil, J. J., Helsel, D., and Dennis R. S. (2008). Engineering Drawing & Design, 7th ed. McGraw-Hill.
2. Wai-Kai Chen. (2009).Computer Aided Design and Design Automation (The Circuits and Filters Handbook), CRC.
3. Alexandre C. Dimian, Costin Sorin Bildea. (2008).Chemical Process Design: Computer-Aided Case Studies, Wiley-VCH.
4. Luke Achenie, Venkat Venkatasubramanian, Rafiqul Gani. (2002). Computer Aided Molecular Design: Theory and Practice (Computer Aided Chemical Engineering), Elsevier Science.

5. Lee Ambrosius. (2007). AutoCAD 2008 3D Modeling Workbook For Dummies, For Dummies Publ.

PTT 106/3
MICROBIOLOGY

Course Synopsis

This course introduces to student the microbial world and its relationship with man and the environment. Emphasizing on the basic concepts in microbiology, aseptic techniques and microscopy. It also encompasses bacteria, fungi and virus groups, and their taxonomy. Structure and function of prokaryote and eukaryote cells, metabolism of microbes and microbial growth kinetics and fermentation process are featured in the course. Food and industrial microbiology are also featured with reference to factors contributing to productivity, spoilage and preservation.

Course Outcomes

1. Ability to categorize classes of microorganisms according to diversity.
2. Ability to use practical skills in fundamental microbiological techniques.
3. Ability to demonstrate microbial growth and metabolism, and compare physical and chemical methods to control growth.
4. Ability to compare the role of microorganisms in industrial, food and medical biotechnology.

References

1. Lansing M. Prescott, John S. Harley and Donald A. Klein. (2005). Microbiology, McGraw Hill.
2. Robert Bauman. (2006). Microbiology With Diseases by Taxonomy Second Edition, Pearson Education. Prentice Hall.
3. Cowan, M.K. (2006). Microbiology: a systems approach 1st edition. McGraw-Hill Higher Education.
4. Black, J.G. (2005). Microbiology: principles and explorations 5th edition. John Wiley, New York.
5. Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. (1993). Microbiology: concepts and applications. McGraw-Hill, Boston.

PTT 107/3
PHYSICAL CHEMISTRY

Course Synopsis

A one-semester course designed to prepare engineering students for advance knowledge in physical chemistry such as thermodynamics, chemical equilibria and chemical kinetics.

Course Outcomes

1. Ability to explain and calculate the basic concepts, laws and principles in physical chemistry.
2. Ability to calculate and solve a problem concerning material equilibrium, standard thermodynamic function and reaction equilibrium in ideal gas mixture.
3. Ability to illustrate and solve problems concerning chemical kinetics, phase diagrams and electrochemistry.

References

1. Levine I. N. (2002). Physical Chemistry, McGraw Hill, 5th Edition.
2. Atkins, P and de Paula, Julia. (2006). *Physical Chemistry*. Oxford University Press, 8th Edition.
3. Bahl, B.S.; Bahl, Arun & Tuli, G.D. (2006). *Essentials of Physical Chemistry*. S. Chand, New Delhi.
4. Paul Monk. (2004). *Physical Chemistry*, John Wiley & Sons.
5. Silbey R. J., Alberty R. A., Bawendi M. G. (2005). Physical Chemistry, 4th edition. John Wiley & Son, Inc.
6. Thomas, E & Reid P. (2010). Physical Chemistry. Pearson Prentice Hall, Second Edition.

PTT 108/4
MASS AND ENERGY BALANCE

Course Synopsis

The aims of this course is to expose students on the knowledge of how they should formulate and solve materials balances in various processing systems. Essentially, the material and energy which goes into the process will be converted by physical and chemical processes, whilst some may remain unconverted. The task for the chemical and biological technologies engineer to create a process statement which identifies all the materials and energy entering, remaining and leaves the systems.

Course Outcomes

1. Ability to calculate mass balance in chemical and biological process
2. Ability to calculate energy balance of in chemical and biological process; calculate heat of reaction for bioprocess reaction.
3. Ability to calculate mass balance in recycle, multistage and fed-batch system
4. Ability to calculate mass and energy balances unsteady state condition

References

1. Himmelblau, M. D. & Riggs, J. B. (2004).“Basic Principles and Calculations in Chemical Engineering”, 7th edition.Upper Saddle River : Prentice Hall.
2. Doran, P. M.(2006). “Bioprocess Engineering Principles” London: Academic Press.
3. Felder, R. M. & Rousseau, R. W. (2005).“Elementary Principles of Chemical Processes” John-Wiley, 3rd Update Edition.
4. Richardson J.F.(1994). “Chemical Engineering, Volume 3” Prentice Hall.
5. Reklaitis G.V. (1983). “Introduction to Material and Energy Balance” John Wiley.

PDT176/2
COMPUTER AIDED DRAFTING

Course Synopsis

This course introduces the application of drafting and modelling techniques commonly used in mechanical and civil designs computer graphics, 2-D and 3-D geometry related to drafting and design of mechanical and structural components and/or systems. The primary software used in this course is AUTODESK AutoCAD.

Course Outcomes

1. Ability to apply basic drafting skills using computer aided drafting software.
2. Ability to construct and interpret drawings in orthographic projection.
3. Ability to construct a working drawing for an engineering product or device using a CAD system.
4. Ability to accurately interpret and construct standard engineering drawings and schematic diagram.

References

1. Ibrahim Zeid. 2002. CAD/CAM Theory and Practice, McGraw Hill International, NY.
2. David G. Ullman. 2003. The Mechanical Design Process. 3rd Edition. McGraw-Hill.
3. Simon D. 2004. The Complete Guide to Digital 3D Design. Cambridge: ILEX.
4. Julien M. C. 2005. Best of 3D Virtual Product Design. Singapore: Page One Publishing Private Ltd.
5. Bruce H. 2004. Becoming a Product Designer. John Wiley and Sons. New York.

PDT177/2
APPLIED CHEMISTRY

Course Synopsis

The course covers pure chemistry (chemical elements, atoms and molecules), water and the fitness of environment, carbon and functional groups, structure and function of macromolecules and analytical chemistry (stoichiometric calculations and chemical equilibrium which comprises of acid base equilibrium, acid base titrations and reactions, and precipitation titrations).

Course Outcomes

1. Ability to apply the concepts and principles of general chemistry and analytical chemistry.
2. Ability to solve the problems in chemical reactions and calculations.
3. Ability to recognise and analyze the data from various types of chemistry of life and problem solving in analytical chemistry.

References

1. Steven, S. Z. and Susan A. Z. (2008) Chemistry 8th Edition. Cengage. USA.
2. Skoog, D. A. 2004. Fundamentals of Analytical Chemistry 8th Edition. Thomson-Brooks/Cole, Miami.
3. Gesser, H. D. (2002). Applied Chemistry : A Textbook for Engineers and Technologists Kluwer Academic, New York.
4. Wan Saime Wan Ngah and Che Sofiah Saidin (2007). Basic Analytical Chemistry 2nd Ed. Pearson Prentice Hall.
5. Campbell, N.A, Reece, J.B. 2008. Biology, 9th ed. Pearson Cummings, San Francisco

PDT178/2
APPLIED BIOLOGY

Course Synopsis

This course introduces the general concepts of biology as related to agricultural technology, the molecular and cellular aspects of living things, structure and function of plants and animals, plant and animal diversity, principles of classification and ecological relationships in organisms, and the role of genetics in organism variation and adaptation.

Course Outcomes

1. Ability to illustrate important traits in living organisms with reference to: evolution, classification and ecology
2. Ability to interpret growth in living organisms with reference to: physiology and genetics.

References

1. Campbell, N.A, Reece, J.B. 2008. Biology, 9th ed. Pearson Cummings, San Francisco
2. Alters, S. and Alters, B., .2006. Biology: Understanding Life. Wiley, New York.
3. Campbell, N.A., Williamson, B., and Heyden, R.J. 2004. Biology Exploring Life. Prentice Hall, London.
4. Collen,B., and Virginia. 2007. Biology Science for Life. 2nd Ed. Prentice Hall,
5. Sylvia, S.M. 2007. Biology. 9th Ed. McGraw Hill, London.

PDT179/3
AGRICULTURAL ECONOMICS

Course Synopsis

The course introduces to the study of economic principles with respect to supply-demand, finance and marketing of agricultural products related to food and fiber production with special references to Malaysian conditions and policies.

Course Outcomes

1. Ability to apply economic development and agriculture, with specific context of Malaysia's economy and the agriculture sector.
2. Ability to analyze consumer behavior, market supply-demand equilibrium, and elasticity.

3. Ability to analyze business behavior and market supply-demand equilibrium.
4. Ability to apply macroeconomics of agriculture with respect to international agricultural trades and exchange rates and policies.

References

1. John B. Penson, Jr. Oral T. Capps, Jr. (2010), Introduction to Agricultural Economics, 5th Ed., Prentice Hall, New York, NY.
2. Nellis, J.G. and Parker, D. (2008), Principles of Business Economics, 2nd Ed., Prentice Hall, New York, NY.
3. Richard, L.K. and Joseph, N.U. (2001),Marketing of Agricultural Products, 9th Ed. McGraw Hill, New York, NY.
4. Won, W.K. and Kennedy, P.L. (2003), International Trades and Agriculture: Theory and Practices, Wiley-Blackwell, New York, NY.
5. Gail, L.C. , Jensen, C.W. and Dauglas, D.S. (2001), Agricultural Economics, John Wiley, New York, NY.

PDT180/3
ENGINEERING SCIENCE

Course Synopsis

The course covers foundations of quantity and units of measurement, vectors, particle dynamics, work, power and momentum. Additional coverage includes forces on objects and introduction to electrical circuit.

Course Outcomes

1. Ability to analyze problems related to units of measurements, and scalar and vector quantities.
2. Ability to analyze particles in motion, energy, work, power, and momentum.
3. Ability to analyze forces acting on objects.
4. Ability to analyze basic electrical circuitry.

References

1. Raymond, A. S. and John, W. J. (2010), Physics For Scientists and Engineers, 8th Ed., Thompson Higher Education, Belmont, CA.
2. Dauglas, C.G.(2010), Physics: Principles with Applications, 6th Ed., Pearson, New York, NY.
3. Hibbler, R.C. (2010), Engineering Mechanics: Statics and Dynamics, 12th Edition, Peason Prentice Hall, Singapore.
4. Richard, J.F. (2008), Electricity Principles and Applications, 7th Ed., McGraw Hill, New York, NY.
5. Huges, E. (2005), Electrical and Electronics Technology, 9th Ed., Prentice Hall, New York, NY.

PDT181/3
ENGINEERING MECHANICS

Course Synopsis

This course covers vector representation of forces, moments and static equilibrium of particles, rigid bodies, and engineering structures, analysis of external and internal forces in structures via the methods of free-body diagrams and properties of cross-sectional areas, kinematics and kinetics of system of particles and of rigid bodies in two and three-dimensional spaces covering force and acceleration, linear and angular momentum, and energy conservation.

Course Outcomes

1. Ability to interpret the basic principles of statics and dynamics on mechanism and bodies.
2. Ability to apply the basic principles of statics and dynamics on mechanism and bodies.
3. Ability to solve problem related forces, loads, displacement, velocity and acceleration of a body or mechanism.

References

1. Hibbler R.C. 2010.Engineering Mechanics: Statics, 12th Edition, Peason Prentice Hall, Singapore

2. Bedford, A. and Fowler, W. 2007.Engineering Mechanics: Statics and Dynamics, 5th Edition, Pearson-Prentice Hall,
3. Sheppard S.D. and Tongue B.H. 2005.Statics. Analysis and design of systems in equilibrium, Wiley, N.Y
4. Tongue B.H. and Sheppard S.D. 2005. Dynamics. Analysis and design of systems in motion, Wiley, N.Y
5. Beer, F.P. and Johnston, E.R. 2006.Vector mechanics for engineers: Statics and Dynamics, 8th edition, McGraw Hill, N.Y

PDT182/3
ELECTRONICS APPLICATION IN AGRICULTURE

Course Synopsis

This course introduces basic electrical circuit theory and analogue electronics, basic DC and AC circuits and fundamental of electronic components such as operational amplifiers and semiconductor diodes.

Course Outcomes

1. Ability to demonstrate application of the key principles of DC circuit theory including Kirchhoff's laws of current and voltage, and rules for current and voltage division.
2. Ability to apply ideal and non-ideal operational amplifier circuits.
3. Ability to analyze simple AC series and parallel circuits using phasors and complex numbers.

References

1. Bird, J. 2010. Electrical Circuit Theory and Technology. 4th Edition. Elsevier
2. Boylestad, R. 2010 Introductory Circuit Analysis. 12th Edition. Pearson
3. Harry,F.L and John, B. S. 2007. Introduction to Agricultural Engineering Technology, 3rd Edition.
4. Bishop, O. 2010 Electronics Circuits and Systems. 3rd Edition Elsevier
5. Donald,C. 2004.Standard Handbook Electronic Engineering, McGraw-Hill Professional

PDT183/2
AGRICULTURAL MECHANICS AND WORKSHOP TECHNOLOGY

Course Synopsis

This laboratory course is designed to provide students with introductory level experiences in selected major areas of agricultural mechanics technology which may include small engine maintenance and repair, metal fabrication, concrete construction, building construction, plumbing, electrical wiring, maintenance of agricultural machinery, equipment and tractors.

Course Outcomes

1. Ability to follow safety procedures in the agricultural mechanics shop.
2. Ability to sketch drawings of simple projects, layout projects from drawings, creates a bill of materials for organizing agricultural mechanics shop projects.
3. Ability to identify tools and materials common to agricultural mechanics shop.
4. Ability to demonstrate basic shop skills common to agricultural mechanics shop through the construction of an agricultural mechanics project.

References

1. Herren, R. V.2006. Agricultural Mechanics: Fundamentals & Applications. 5th Edition. Thomson/Delmar Learning. Clifton Park, NY
2. John, K. C. 2010. Mechanical Workshop Practice", PHI Learning Private Limited
3. Bawa, H. S. 2007. Workshop Practice. 3rd Edition, Tata McGraw-Hill
4. Garg, S.K. 2006. Workshop Technology: Manufacturing Processes. 2nd Edition, Laxmi Publication
5. Carl, B. and Stanley, R. B. 2006. Modern Agricultural Mechanics. 3rd Edition. Pearson/ Prentice Hall Interstate.

PDT184/4
AGRICULTURAL PRODUCTION SYSTEMS

Course Synopsis

The course covers the various facets of agricultural production systems and practices, dynamism within the soil-plant-atmosphere continuum involving living organisms related to crops and fauna, components in agricultural production systems and good agricultural practices and sustainability approaches.

Course Outcomes

1. Ability to define and interpret the basic principles and processes involved in agricultural production systems.
2. Ability to solve systems/ problems related to aspects in agricultural production systems.
3. Ability to choose systems related to good agricultural practices and sustainable farming

References

1. Benckiser, G. and Schnell, S. 2007. Biodiversity in Agricultural Production Systems. CRC Press /Taylor and Francis, Florida, USA.
2. Akinyemi, O. M. 2007. Agricultural Production; Organic and Conventional. Science Publishers,Inc.,USA.
3. Martins, J.H., Leonard, W.H., Stamp, D.L. and Waldren, R.P. 2005. Principles of Field Crop Production. Prentice Hall, NewYork.
4. Fageria, N.K. Baligar, V.C. and Ralph B.C. 2006. Physiology of Crop Production. Haworth Press, New York, USA.
5. Hans J. M. 2005. Globalization and Agricultural Trade Policy. Lynne Rienner Publishers, USA.

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.
2. Ability to calculate pressures, forces, and stability in static fluid systems and identify whether a flow is steady or unsteady, uniform or non-uniform, laminar of turbulent and flow rate in dynamic fluid system and distinguish the link between conserved quantities and the equations of fluid mechanics.
3. Ability to analyze 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
3. Crowe, C.T., Elger, D.F., Robertson, J.A.(2005). " Engineering Fluid Mechanics", John Wiley, 8th Edition
4. Bruce, R.M., Donald , F.Y. and Okishi, T.H. (1990), Fundamentals of Fluid Mechanics, John Wiley and Sons.
5. Dauglas, J.R. (1991). Fluid Mechanics, 3rd Ed. , Pitman.

ERT 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. Analyze the fundamentals properties of thermodynamics and apply the law of thermodynamics in engineering systems.
2. Calculate heat, work and other thermodynamics properties ideal fluid and manage to solve problems for real fluids using volumetric equations of state.
3. Analyze the theory of the solution thermodynamics as well as the equation of state for pure and mixture fluids and to calculate phase equilibrium and chemical reaction equilibrium calculations.

References

1. Smith, J.M., Van Ness, H.C. and Abbort, M.M., introduction to Chemical Engineering Thermodynamics, Seventh Edition, McGraw-Hill, 2005.
2. Cengel, Y.A. and Boles, M.A., Thermodynamics-An engineering Approach, 6th edition, McGraw-Hill, 2007.
3. Daubert, Thomas E, Chemical engineering Thermodynamics, McGraw-Hill, 1985.
4. (The book is in bahasa version available at the library, translated by Prof. Mashitah Hassan, 1990)
5. K. Iynkaran, J. David and Tandy, Basic Thermodynamics – Applications and Pollution Control, 2nd edition, Pearson Prentice Hall, 2004.

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 calculate and perform the correct statistical method for data analytical and to remember the steps in quantitative analysis.
2. Ability to classify and use separation techniques and gravimetric methods for mass determination.
3. Ability to differentiate and to calculate concentration of analytes of various titrimetic methods (acid-base, complexation, redox and precipitation).
4. Ability to apply the chromatography principles and to interpret and calculate peak height for concentration determination.
5. Ability to understand the spectroscopic principles and to calculate concentration.

References

1. Gary D. Christian (2004). *Analytical chemistry*. 6th Edition. Publisher: John Wiley & Sons, Inc.
2. David Harvey (2000). Modern Analytical Chemistry. Publisher: McGraw-Hill
3. D. Keeley and P.J. Haines (2002). *Analytical Chemistry*. Publisher: Oxford: Bios Scientific.
4. D.A. Skoog, D.M. West and F.J. Holler (1996). *Fundamentals of Analytical Chemistry*. Publisher: Saunders College Publication.

ERT 213/3
PROCESS INSTRUMENTATIONS

Course Synopsis

The course objective is to prepare the students with the necessary skills in the process industry. The course begins with introduction to process measurements involved in the process industries, followed by introduction to fundamental of industrial valves. Students then will be taught about ISA symbology, where students will be taught with the universal symbols used in process industry. Students then will be taught how to write the identification letter as well as the tag numbers for unit operation and piping. To complete the course, students will learn how to read and develop process flow diagram (PFD) and also piping and instrumentation diagram (P & ID).

Course Outcomes

1. Ability to 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 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., Principles and Practice of Automatic Process Control, Third Edition, John Wiley, 2006.
2. McCabe W.L., Smith J.C. and Harriott P., Unit Operations of Chemical Engineering, Seventh Edition,McGraw-Hill, 2005.
3. Skousen P.L., *Valve Handbook, Second Edition,* McGraw-Hill, 2004**.**
4. Perry R.H. and Green D.W., Perry's Chemical Engineers' Handbook, Seventh Edition, McGraw-Hill, 1997.
5. Murrill P.W., Fundamentals of Process Control Theory, Third Edition, ISA, 2000.
6. McAvinew T. and Mulley R., Control System Documentation: Applying Symbols and Identification, Second Edition, ISA, 2005.
7. Meier F.A., and Meier C.A*., Instrumentation and Control Systems Documentation,* ISA, 2004*.*

ERT 214/4
MATERIAL AND ENERGY BALANCE

Course Synopsis

This course starts with engineering calculations. Students are taught to interpret series of data and to interpret graphs. Material balance as well as energy balance also will be covered in the course. The course will be completed with the introduction of several methods in calculating material balance and energy balance in a system.

Course Outcomes

1. Ability to solve basic engineering calculations, convert units in the same dimensions and scientifically interpret series of data.
2. Ability to identify single unit and multiple unit processes, distinguish parameters given in order to find a solution. Students are able to discuss mass balance concept and solve material balance problems.
3. Ability to measure parameters, solve energy balance problems and discuss energy balance concepts.
4. Ability to apply 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, Rousseau "Elementary Principles of Chemical Processes" John-Wiley, 3rd Update Edition,2005.
2. Himmelblau, Riggs " Basic Principles and Calculations in Chemical Engineering, Prentice Hall, 7th Edition

3. Bailey and Ollis "Biochemical Engineering Fundamentals" McGraw Hill,2nd Edition, 2005
4. 2004Pauline Doran "Bioprocess Engineering Principles" Elsevier Science, 1995.
5. J.F. Richardson "Chemical Engineering, Volume 3" Prentice Hall, 1994
6. G.V. Reklaitis "Introduction to Material and Energy Balance" John Wiley, 1983.

ERT 215/3
FLUID MECHANICS

Course Synopsis

This course emphasizes fundamental concepts and problem-solving techniques. Topics to be covered include fluid properties, static and kinematics, control volume analysis, momentum analysis of flow system, dimensional analysis, internal flows (pipe flows), differential analysis, and external flows (lift and drag).

Course Outcomes

1. Ability to analyze the essential parameters describing a fluid system and recognize the common devices used in measuring pressure and flow rates, and turbo machineries.
2. Ability to calculate pressures, forces, and stability in static fluid systems and identify whether a flow is steady or unsteady, uniform or non-uniform, laminar of turbulent and flow rate in dynamic fluid system and distinguish the link between conserved quantities and the equations of fluid mechanics.
3. Ability to analyze 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
3. Crowe, C.T., Elger, D.F., Robertson, J.A.(2005). "Engineering Fluid Mechanics", John Wiley, 8th Edition
4. Bruce, R.M., Donald , F.Y. and Okishi, T.H. (1990), Fundamentals of Fluid Mechanics, John Wiley and Sons.
5. Dauglas, J.R. (1991). Fluid Mechanics, 3rd Ed. , Pitman.

ERT 216/4
HEAT & MASS TRANSFER

Course Synopsis

This course covers the modes of heat transfer, which are conduction, convection and radiation, the application of the principle in various unit operations in plant. The principle of mass transfer will also be discussed. The application of mass transfer will be covered in the next course called bioseparation engineering and unit operation.

Course Outcomes

1. Ability to calculate mode of heat transferred.
2. Ability to calculate mode of mass transferred.
3. Ability to analyze 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. Pauline M. Doran (2006). " Bioprocess Engineering Principles" Academic Press, London
5. Incropera, FP & De Witt, DP 2006, *Fundamentals of heat and mass transfer*, 6th edn, Wiley, New York

ERT 244/4
ENERGY AND POWER IN BIOSYSTEMS

Course Synopsis

The course discusses the application of various energy resources to generate power useful for processing biological materials. It focuses on the technology, production process and engineering of renewable sources of energy which includes solar, wind, wave, and energy from biomass.

Course Outcomes

1. Ability to indentify factors environmental influences on biological systems including animals, plants, and harvested produce.
2. Ability to analyse physical and energy requirements of engineering systems to enhance efficiencies of biological systems.
3. Analysis and design of energy generation, transmission, and utilization in the production and processing of biological materials.
4. Ability to evaluate feasibility of various energy alternatives.

References

1. Ayhan Demirbas, Green Energy and Technology, Springer-Verlag London Ltd, 2009
2. Caye M.Drapcho, Nghiem Phu Nhuan, Terry H. Walker, , Biofuels Engineering Process Technology, The McGraw-Hill Companies, 2008
3. Da Rosa, A. (2009). Fundamnetals of Renewable Energy Process, Academic Press, Elsevier Inc.
4. Rosillo.F, C. (2002). industrial uses of biomass energy, Taylor & Francis, London.
5. Roger H. C · Charles W. F. (2009). Ocean Energy : Tide and Tidal Power., Springer-Verlag Berlin Heidelberg.

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.
2. Ability to understand and apply the principles and basic calculations of heat transfer by conduction, convection and radiation are featured.
3. Ability to apply the heat exchange equipment such as heat exchangers and single and multiple effect evaporators are also included.

References

1. 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.
3. Holman, J.P. (2002). Heat Transfer, 9th Ed., McGraw Hill, New York.
4. Incropera, F.P. (2002). Introduction to Heat and Mass Transfer, 4th Ed., John Wiley and Sons, New York.
5. 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 resoources and implication to biosystems.

References

1. Bedient B. P; Huber W.C and Vieux B.E,. (2008) Hydrology Floodplain Analysis, 4th Ed. Prentice-Hall, Inc, Upper Saddle River, NJ 07458
2. Subramaya K. (2008), Engineering Hydrology, 3rd Ed. McGraw Hill, New York, N.Y
3. 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
5. Ward, A.D. and Trimble, S.W. (2004), Environmental Hydrology, 2nd Ed., Lewis Publisher.

ERT 247/4
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

1. 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.

References

1. 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
3. 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 248/4
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
3. 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.
2. Smith, J.M., Van Ness, H.C., Abbott, M. M. (2005). “Introduction to Chemical Engineering Thermodynamics”, 7th Edition,McGraw - Hill
3. Sandler, S., Chemical, Biochemical, and Engineering Thermodynamics, Wiley, 2006
4. Wark,K., and Richards, D.E., (1999), Thermodynamics, 6th Edition., McGraw-Hill.
5. Eastop, T.D. and McConkey, A. (2000), Applied Thermodynamics for Engineering Technologist, 4th Ed., Longman.

ERT 249/4
COMPUTER AIDED ENGINEERING DESIGN FOR BIOSYSTEM ENGINEERING

Course Synopsis

This course introduces and elaborates the use of drafting and modeling and acquire knowledge of computer graphics, 2-D and 3-D geometry related to drafting and design of mechanical and structural components and/or systems. The primary software used in this course is AUTODESK AutoCAD.

Course Outcomes

This course is a companion for the course of mechanical design. In this course the proper knowledge of mechanical design will be emphasized on the strength of design analysis and optimization.

References

1. Ibrahim Zeid. (2002). CAD/CAM Theory and Practice, McGraw Hill International
2. David G. Ullman (2003). The Mechanical Design Process. 3rd Edition. McGraw-Hill.
3. Simon Dnaher (2004). The Complete Guide to Digital 3D Design. Cambridge: ILEX.
4. Julien M. Calmettes (2005). Best of 3D Virtual Product Design. Singapore: Page One Publishing Private Ltd.
5. Bruce Hannah (2004). Becoming a Product Designer. John Wiley and Sons.

PTT 201/4
THERMODYNAMICS

Course Synopsis

This course introduces students to the basic thermodynamics for engineering application and problem solving. The course covers first and second laws of thermodynamics, substances properties, closed system energy, entropy and engineering applications of gas power cycles, refrigeration, compression and heat pumps, and chemical reactions.

Course Outcomes

1. Ability to recognize and apply the fundamental basic properties, as well as the law of thermodynamics.
2. Ability to calculate heat, work and other thermodynamics properties ideal fluid in given processes.
3. Ability to solve problems for real fluids using volumetric equations of state.
4. Ability to apply thermodynamics properties from available data by using appropriate tools.
5. Ability to examine specific equations of state or correlations that are appropriate for treating given problems.

References

1. Cengel, Y.A. and M.A.Boles, (2007). Thermodynamics-An engineering Approach, 36th edition, McGraw-Hill.
2. Wark,K., and Richards, D.E., (1999), Thermodynamics, 6th Edition., McGraw-Hill.
3. Smith, J.M., Van Ness, H.C., Abbott, M. M. (2005). "Introduction to Chemical Engineering Thermodynamics", 7th Edition,McGraw – Hill
4. Sandler, S., Chemical, Biochemical, and Engineering Thermodynamics, Wiley, 2006
5. Theodore, L., Ricci, F.,Van Vliet, T. (2009). Thermodynamics for the Practicing Engineers, Wiley.

PTT 202/3
ORGANIC CHEMISTRY FOR BIOTECHNOLOGY

Course Synopsis

This course covers the bioorganic compound and analytical techniques commonly used in biochemical works and categorized under spectroscopy, chromatography and electro analytical methods. This course also discusses proteins, lipid and other substances which may be necessary to detect and measure bioorganic compound or which can be very useful in variety of analytical methods. This course is complemented by explanation on chemical nature and methods of analysis of carbohydrates, amino acids, proteins and lipids.

Course Outcomes

1. Ability to demonstrate the mechanism and synthesis of bio organics compound.
2. Ability to describe the utilization of biological materials for analytical purposes.
3. Ability to discuss analytical methods for the isolation and purification of biomolecules.

References

1. Bruice, P.Y.(2007). Organic Chemistry 5th Edition. Pearson Prentice Hall.
2. A. Manz, N. Pamme and D. Iossifidis. (2004). Bioanalytical Chemistry, Imperial College Press.
3. T. G. M. Schalkhammer (Ed.). (2002). Analytical Biotechnology, 1st Edition, Birkhäuser Basel.
4. R. H. Garrett and C. M. Grisham. (2010). Biochemistry, 4th Edition, Thomson Brooks/Cole.
5. D. J. Holme and H. Peck. (1998). Analytical Biochemistry, 3rd. Edition, New York, Addison Wesley Longman.

PTT 203/3
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. Kinetics of growth, death and metabolism are also covered. Batch and continuous fermentation and enzyme technology are included. The laboratory exercises introduce students to the fundamental practices in biochemical engineering.

Course Outcomes

1. Ability to differentiate types of enzymes and calculate enzyme kinetics Ability to interpret ingredients and nutrition in food.
2. Ability to illustrate the immobilization of enzyme process and discuss application of enzyme catalysis.
3. Ability to calculate the microorganism growth kinetics in batch and continuous culture.
4. Ability to calculate the stoichiometry of growth and product formation.

References

1. Shuler, Michael L., and Fikret Kargi. (2001). Bioprocess Engineering: Basic Concepts. 2nd ed. Upper Saddle River,

NJ: Prentice Hall PTR. ISBN: 0130819085.
2. Henry C. Vogel and Celeste C. Tadaro, William Andrew. (2007). Fermentation and Buochemical Engineering Handboo,2 edition.
3. Jens N., John E. and Gunner L. (2003). Bioreaction Engineering Principles. New York, Kluwer Academics/Plenum Publisher.
4. Blanch, Harvey W., and D. S. Clark, eds. (1997). Biochemical Engineering. New York, NY: Marcel Dekker Incorporated. ISBN: 0824700996.
5. Shigeo Katoh and Fumitake Yushida. (2009). Biochemical Engineering: A Textbook for Engineers, Chemist and Biologist, Wiley-VCH.

PTT 204/3
APPLIED FLUID MECHANICS

Course Synopsis

This course emphasizes fundamental concepts and problem-solving techniques. Topics to be covered include fluid properties, static and kinematics, control volume analysis, momentum analysis of flow system, dimensional analysis, internal flows (pipe flows), differential analysis, and external flows (lift and drag).

Course Outcomes

1. Ability to demonstrate the essential parameters describing a fluid system and recognize the common devices used in measuring pressure and flow rates and turbo machineries.
2. Ability to calculate pressures, forces, and stability in static fluid systems and distinguish the link between conserved quantities and the equations of fluid mechanics.
3. Ability to calculate control volumes and surfaces for developing the equations of fluid mechanics.

References

1. Cengel, Y. A. Cimbala, J. M. (2006). “Fluid Mechanics: Fundamental and Applications, First edition in SI units” McGraw-Hill.
2. Mott, R.L.(2006). “Applied Fluid Mechanics”, 6th Edition, Prentice Hall
3. Crowe, C.T., Elger, D.F., Robertson, J.A. (2005). “ Engineering Fluid Mechanics”, John Wiley, 8th Edition
4. R. Gatignol, R. Prud’Homme. (2001). Mechanic and Thermodynamic Modeling of Fluid Interfaces, World Scientific Publishing Company.
5. Mark Levi. (2009). The Mathematical Mechanic: Using Physical Reasoning to Solve Problems Princeton University Press.

PTT 205/4
HEAT AND MASS TRANSFER

Course Synopsis

This course introduces mechanisms by which heat is transferred from one body to another. This course introduces the principles of steady and unsteady heat conductions; radiation phenomena; natural and force convections; heat transport coefficients; dimensional analysis and boundary layer. The course covers heat conduction, convection and radiation, also mass transfer with special address on biological systems. Emphases are placed on formulation and application of respective mathematical models of heat and mass transfer across both physical and biological bodies.

Course Outcomes

1. Ability to illustrate the conservation laws that control mass and heat transfer.
2. Ability to solve the ordinary and partial differential equations that result from the application of the conservation laws in biological systems.
3. Ability to apply and solve mathematical models for physical and biological situations.

References

1. Incropera, F. P., DeWitt, D. P. (2002), Fundamental of Heat and Mass Transfer, John Wiley & Sons, Inc.
2. Cengel, Yunus A. (2003), Heat Transfer, A Practical Approach, McGraw-Hill, Inc.
3. Bird, R. B., Steward, W.E., Lightfoot, E. N. (2002), Transport Phenomena, Second Edition, John Wiley & Sons, Inc.
4. Thompson, W. J. (2000), Introduction to Transport Phenomena, Prentice Hall, Inc.
5. Yunus Cengel. (2006). Heat and Mass Transfer: A Practical Approach , McGraw-Hill Science/Engineering/Math.

PTT 206/2 INSTRUMENTATION, MEASUREMENT AND CONTROL

Course Synopsis

The course deals with a number of advanced techniques, data interpretation and control of biotechnological processes. It covers modern on-line hardware sensors such are FIA, viable biomass measurement, membrane inlet mass spectrometry, flow cytometry, microcalorimetry. It also discusses model-based process diagnosis and control techniques including advances in bioprocess modeling and identification, data processing, software sensor design, and on-line control algorithms.

Course Outcomes

1. Ability to illustrate the working principles of hardware sensors commonly used in biotechnological processes.
2. Ability to interpret model based-process diagnosis in biotechnological processes modelling.
3. Ability to use and analyze adaptive and predictive *Control techniques* in biotechnological processes.

References

1. Manabendra Bhuyan. (2006). Measurement and Control in Food Processing, CRC.
2. Kevin James. (2000). PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, .Newnes.
3. Walt Boyes Principal in Spitzer and Boyes LLC. (2009). Instrumentation Reference Book, Fourth Edition Butterworth-Heinemann.
4. Paul Regtien, F. van der Heijden, M. J. Korsten, W Otthius. (2004). Measurement Science for Engineers Butterworth-Heinemann.
5. John Park, Steve Mackay. (2003). Practical Data Acquisition for Instrumentation and Control Systems (IDC Technology), Newnes.

PTT 207/4 BIOMOLECULAR AND GENETIC ENGINEERING

Course Synopsis

The course focuses on the molecular mechanisms that underlie the regulated expression of genes, including transcription and translation, as well as basic mechanisms of DNA replication, mutations and repair. Emphasize will be on the molecular mechanisms of DNA replication, repair, transcription, protein synthesis, and gene regulation in different organisms. Facilitates basic knowledge in gene manipulation based on current researches and development in the field of genetic engineering. Characterization and development of cloning vector will also be covered. Among other things to be included will be DNA isolation, the types of enzymes used in molecular biology, insertion of foreign DNA, preparation of host cell, transformation and screening of cloned DNA as well as the making of genomic and cDNA library.

Course Outcomes

1. Ability to differentiate the mechanisms of DNA replication, transcription, and translation in prokaryotic and eukaryotic cells.
2. Ability to demonstrate types of mutations and their repair mechanisms as well as to discuss gene regulation activity in prokaryotes and eukaryotes.

3. Ability to analyze relevant information and experimental data in genetic engineering.

References

1. Malacinski, G. M. (2003) Essentials of Molecular Biology. 4th edition. Jones and Bartlett Publishers.
2. Karp, G. (2002) Cell and Molecular Biology- Concepts and Experiments. 3rd edition. John Wiley & Sons, Inc.
3. Walker, J. M. and Rapley, R. (2009) Molecular Biology and Biotechnology. 5th edition. RSC Publishing.
4. Brown, T. A. (2006). Gene Cloning: an introduction. 3rd edition. Stanley Thornes (Publishers) Ltd.
5. J.D. Watson, N.H. Hopkins, J.W Roberts, J. A. Seitz & A.M. Weiner. (2007). Molecular Biology of the Gene, 6th Edition, Benjamin Cummings Publishing Company Inc.

PDT276/3
MECHANICS OF MATERIAL

Course Synopsis

This course covers analysis of stresses due to various loading conditions, stresses and strains at a point, stress-strain relationships, theories of failure, energy methods, shear center, unsymmetrical bending, curved beams, torsion, and buckling problems.

Course Outcomes

1. Ability to analyze the basic concepts of mechanics of materials in design consideration.
2. Ability to analyze stress and strain by using Mohr's Circle and Hooke's Law plane stress in pressure vessels and beams.
3. Ability to use the superposition method or moments-area method to analyze the deflections of beams.
4. Ability to analyze buckling and stability for Columns and in designing columns.

References

1. Hibbeler,R.C. 2010. Mechanics of Materials. Pearson Prentice Hall, NY
2. Ugural, A. C. 2008.Mechanics of Materials 3rd Edition, Wiley, USA
3. James, M. G., Barry, J. G. 2009 Mechanics of Materials, 7th Edition, Cengage Learning Inc.
4. Ferdinand, B. P.,John, T. D. 2008.Mechanics of Materials, 8th Edition, McGraw Hill, NY
5. Cristopher, R. J., Sanjeev V. K. 2010.Mechanics of Mateials 10th Edition, Elsevier Inc, NY

PDT277/3
APPLIED THERMODYNAMICS

Course Synopsis

Thermodynamics is the study of heat related to matter in motion. The First Law of Thermodynamics involves the conversion of energy from one form to another while the Second Law determines the direction of heat flow, and the availability of energy to do work. This course, covers the terminology, principles, theory, and practical application of the First and Second Law of engineering thermodynamics.

Course Outcomes

1. Ability to discuss basic concept of thermodynamic and energy transformation in the system.
2. Ability to apply the concepts of thermodynamics systems such as processes, cycles and working fluid in engineering field.
3. Ability to solve thermodynamics system performance problem analytically.
4. Ability to analyze thermodynamics system such as steam power cycles and refrigeration cycles.

References

1. Cengel, Y.A and Boles, M.A. 2008. Thermodynamics: An Engineering Approach", 6th Edition, McGraw-Hill, NY

\

2. Nag, P.K, 2010. Basic and Applied Thermodynamics 2nd Edition, McGraw Hill, NY
3. Robert, T. B. 2010.Modern Engineering Thermodynamics. Elsevier Inc, NY
4. Rajput, R.K, 2010. Engineering Thermodynamics, 3rd Edition, Jones and Bartlett
5. Srivastava, R. C 2007. Thermodynamics, 3rd Edition, Prentice Hall, London

PDT278/2
GEODETICS ENGINEERING

Course Synopsis

This course emphasizes on knowledge and skills using surveying equipments such as leveling, theodolite and GPS. Topics discussed include are traversing, tacheometry, mapping, setting out, triangulation, geometric design, vertical and horizontal alignment, and volume of earthwork.

Course Outcomes

1. Ability to apply concepts and principles of geodetic surveying.
2. Ability to perform surveying tasks and procedures.
3. Ability to analyze data from various types of geodetics surveying.

References

1. Uren, J and Price, W.F., (2006). Surveying for engineers 4th Edition, Palgrave Macmillan, McMillan, London.
2. Kavanagh, B.F. (2009), Surveying: Principles and applications, 8th Ed. Prentice Hall, New York, NY.
3. McCormack, J. (2004), Surveying, 5th Ed., John Wiley and Sons, New York, NY.
4. Nathanson, J., Lanzafama, M. T. dan Kissam, P. 2006. Surveying Fundamentals and Practices, 5 th Edition, Person Prentice Hall, New Jersey.
5. Irvine, W. and Maclennan, F. 2006, Surveying For Construction, 5th Ed., McGraw-Hill, London.

PDT279/4
PRINCIPLES OF AGRONOMY

Course Synopsis

A foundation course in agronomy applying crop, soil, and environmental sciences in understanding agricultural systems. Topics include crop morphology and classification, soils and soil water management, mineral nutrition of crops, pest management, plant breeding, seed and grain quality and sustainable aspects of crop production.

Course Outcomes

1. Ability to relate the science and principles of agricultural crop production systems and the importance of crops to our society.
2. Ability to apply crop production principles to crop production practices.
3. Ability to demonstrate sustainable practices for agricultural crops.

References

1. Mullen R.E. 2008. Plant Production Systems, 5th edition, Kendall-Hunt Publishing, Dubuque, Iowa.
2. Gardiner, D.T. and Miller, R.W. 2008. Soils in Our Environment. 11th edition. Upper Saddle River: Pearson Prentice Hall.
3. Jones Jr., J.B. 2002. Agronomic Handbook. Boca Raton: CRC Press.
4. Anderson, W.P. 2007. Weed Science: Principles and Application. Long Grove: Waveland Inc.
5. Mauseth, J.D. 2008. Botany: An Introduction to Plant Biology, 4th edition. Ontario: Jones & Bartlett Publications.

PDT280/2
FUNDAMENTALS OF AGRIBUSINESS ACCOUNTING AND FINANCE

Course Synopsis

This course covers fundamentals of the double-entry accounting cycle as it relates to partnerships and sole proprietorships operating in the agricultural sector including the use of automated accounting software the application of an agribusiness firm.

Course Outcomes

1. Ability to apply transactions into debit and credit parts.
2. Ability to apply accounts as assets, liabilities, or owner's equity.
3. Ability to prepare and analyze a balance sheet, an income statement, and statement of owner's equity.

References

1. Silva, U.H. and Judy, U.H.(2009): Fundamentals of Agribusiness Accounting, Rex Bookstore Inc, Philippines.
2. Albrect, W.S. and Stice, J.D. (2007): Accounting: Concepts and Applications. Thompson, Mason, OH.
3. McLaney, E. and Atrill, P. (2007): Accounting: An Introduction, Prentice Hall, New York, NY.
4. Ralph, W.B. and Robert, C.T. (2008): Fundamentals of Agribusiness Finance, Iowa State University Press, Ames, IA.
5. Bamber, L.S. and Harrison, W.T. (2009): Managerial Accounting, Prentice Hall, New York, NY.

PDT281/3
INSTRUMENTATIONS AND CONTROL

Course Synopsis

The course covers the general concept of instrumentation, various measuring devices, manipulation, transmission, and recording of data, measurement standards, data analysis, calibration methods and software simulation to design and solve problems in measurement and automation systems.

Course Outcomes

1. Ability to differentiate main components in instrumentation, measurement, their integration and working principle of various measurement devices.
2. Ability to differentiate roles and features of appropriate instruments for various agricultural technology and applications.
3. Ability to solve connectivity and interfacing of different instrumentation.

References

1. David Alciatore and Michael B. Hisband. 2011. Introduction to Mechatronics & Measurement Systems 4th edition. McGraw-Hill Publishing.
2. John G. W. 1998. Measurement, Instrumentation & Sensors Handbook.
3. Douglas V.H. 1992. Microprocessors and Interfacing. McGraw-Hill Publishing.
4. John P. and Steve M. 2003. Practical Data Acquisition for Instrumentation and Control Systems. Newnes.
5. Campbell, M. 1996. Sensor Systems for Environmental Monitoring, Thomson Science and Professional. Glaslow.

PDT282/3
APPLIED FLUID MECHANICS

Course Synopsis

This course emphasizes fundamental concepts and problem-solving techniques in fluid properties, static and kinematics, control volume analysis, momentum analysis of flow system, dimensional analysis, internal flows (pipe flows), differential analysis, and external flows (lift and drag).

Course Outcomes

1. Ability to analyze the essential parameters describing a fluid system and common devices used in measuring pressure and flow rates and turbo machineries.
2. Ability to analyze pressures, forces, and energy in fluid systems.
3. Ability to calculate pressure, forces and flow rates in dynamic fluid system.

References

1. Cengel, Y. A. Cimbala, J. M. 2010. Fluid Mechanics: Fundamental and Applications, 2nd edition in SI units. McGraw-Hill, New York.
2. Mott, R.L. 2006. Applied Fluid Mechanics, 6th Edition, Prentice Hall, London.
3. Crowe, C.T., Elger, D.F., and Robertson, J.A.2005. Engineering Fluid Mechanics, 8th Edition. John Wiley, New York.
4. Pijush K. K., Ira M. C., David R. D. 2011. Fluid Mechanics with Multimedia DVD 5th ed.
5. Bruce R. M. 2009. Fundamental of Fluid Mechanics. 6th ed. John Wiley, NY

PDT283/2
AGRIBUSINESS MANAGEMENT

Course Synopsis

As farming becomes more complex and global, and that the economic pressure on farming increases, future farm managers need to be equipped with knowledge in management and business strategies. This course covers strategy, marketing, financial, operations quality, risks, human resources, and organizational management.

Course Outcomes

1. Ability to apply various management functions to agribusiness entity.
2 Ability to analyze business process improvement using quality tools.
3. Ability to analyze time-value of money.

References

1. Kent, D.O. (2008). Farm Management: Principles and Strategies, Iowa State Press, Ames, IA.
2. Rickettes, C. (2008). Agribusiness: Fundamentals and Applications, Delmar Cengage Learning.
3. Rawlins, N.O. (2004) Introduction to Agribusiness, Thompson Learning, OH
4. Ralph, W.B. and Robert, C.T. (2008) Fundamentals of Agribusiness Finance, Iowa State University Press, Ames, IA.
5. Bamber, L.S. and Harrison, W.T. (2009) Managerial Accounting, Prentice Hall, New York, NY

PDT284/2
AGRO-ECOSYSTEMS AND SUSTAINABILITY

Course Synopsis

This course discusses important components of sustainability for agrosystems which can be optimized through suitable application of engineering principles to reinforce the conventional wisdom of agrosystems production. Important engineering approaches invoking current practices and design are covered.

Course Outcomes

1. Ability to distinguish agrosystems practices and sustainability indicators which include soil, water, biomass and waste.
2. Ability to apply and formulate mathematical model for sustainable agrosystems.
3. Ability to design components and processes of sustainable agrosystems.

References

1. Lynch, D. R.2009. Sustainable natural resource management for scientists and engineers, Cambridge University Press, New York
2. Michel D.L. and Luc D. 2008. Sustainable management of natural resources: Mathematical models and method, Springer-Verlag Berlin Heidelberg
3. Mason.J. 2003Sustainable Agriculture. 2nd Edition. Landlinks Press, Collingwood Vic. Australia.
4. Gliessman, S. R. 2001. Agroecosystem sustainability: developing practical strategies, CRC Press, Washington.
5. Anil S. and David C.2004. New Dimension in Agroecology. CRC Press. USA.

ERT 308/3
FOOD ENGINEERING

Course Synopsis

This course covers multidisciplinary field of applied physical sciences which combines science, microbiology, and engineering education for food and related industries. Topics to be covered include introduction to food engineering, food ingredients, nutrition, nutritional information, spoilage, food production systems, preservation processes, freezing, drying, direct-heating, radiation, extrusion and packaging.

Course Outcomes

1. Ability to interpret ingredients and nutrition in food.
2. Ability to differentiate the principle of food engineering operation.
3. Ability to analyze the problem that involved in food engineering operation.

References

1. R. Paul Singh, Dennis R. Heldman. (2009). Introduction to Food Engineering, Fourth Edition (Food Science and Technology). Academic Press. Elsevier.
2. Side, Catherine “Food Product Development : Based on Experience”, Wiley-Blackwell, 2008.
3. Barbosa-Cánovas, Gustavo V. Schmidt, Shelly Fontana, Anthony **“**Water Activity in Foods : Fundamentals and Applications**”,** Wiley-Blackwell, 2008.
4. Williams, C.**, “**Improving the Fat Content of Foods**”** Woodhead Publishing, Limited, 2006.

ERT 314/4
BIOREACTOR SYSTEM

Course Synopsis

This course will provide an introduction to the fundamental ideas of the bioreactor design and operations. It will also develop students’ knowledge and understanding the important principles and techniques that are used in the design and analysis of various types of bioreactor system for microbial, animal and plant cell cultures. It also covers relevant issues in bioreactor system such as scaling up/down, instrumentation and control of bioreactor as well as sterilization.

Course Outcomes

1. Ability to design and formulate fermentation media and decide on the types of carbon and nitrogen source.
2. Ability to recognize, compare and draw the schematic diagram for specific types of bioreactors.
3. Ability to design a stirred tank bioreactor according to the specific application.
4. Ability to develop scale up based on geometric similarities or constant power number.

References

1. Shuler, M. L. and Kargi, F. Bioprocess Engineering: Basic Concepts. 2nd Ed. Upper Saddle River, NJ: Prentice Hall PTR, 2001.
2. Doran, P. M. Bioprocess Engineering Principles” London: Academic Press, 2006.
3. Asenjo, J. A. and Merchuk, J. A. Bioreactor System Design. New York: Marcel Dekker Inc, 1995.

4. Najafpour, G.A. Biochemical Engineering and Biotechnology. Amsterdam: Elsevier B.V., 2007.
5. Scragg, A. H. Bioreactors in Biotechnology: A Practical Approach. Ellis Horwood, 1992.
6. Mitchell, D. A., Krieger, N. and Berovic, M. Solid-state fermentation bioreactors: Fundamentals of design and operation. Springer Berlin Heidelberg, 2006.
7. Stanbury, S.F. and Whitaker, A. Principle of Fermentation Technology. New York: Pergamon Press, 1984.

ERT 316/3
REACTION ENGINEERING

Course Synopsis

Reaction Engineering is concerned with the exploitation of reactions on a commercial scale. Its goal is to familiarize with different designs of reactors. It also emphasizes qualitative arguments, simple reactor sizing method, graphical procedures, and frequent comparison of capabilities of the major reactor types. Simple ideas are treated first, and then extended to more complex problems.

Course Outcomes

1. Ability to categorize design equation for most common industrial reactors and calculate the rate law and rate law parameters.
2. Ability to describe and calculate Residence Time Distribution (RTD) functions in non-ideal reactors.
3. Ability to calculate conversion and sizing for chemical reactors and to explain steady-state isothermal reactor.
4. Ability to investigate catalysis and catalytic reactions.

References

1. H.Scott Fogler. Elements of Chemical Reaction Engineering, 4th ed., Prentice Hall Inc. 2006
2. Levenspiel, O., Chemical Reaction Engineering, john-Wiley, 3rd edition, 2001.
3. Davis, M.E, Davis, R.J. Fundamentals of Chemical Reaction Engineering,1st edition,Mc Graw Hilll, 2002.

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

1. Bailey, James E., and David F. Ollis. Biochemical Engineering Fundamentals. New York, NY: McGraw-Hill Education, 1986. ISBN:0070666016.
2. Blanch, Harvey W., and D. S. Clark, eds. Biochemical Engineering. New York, NY: Marcel Dekker Incorporated, 1997. ISBN: 0824700996.
3. McKee, T. and McKee, J.R. (2003). Biochemistry: The Molecular Basis of Life, 3rd Edition, McGraw Hill.

4. Shuler, Michael L., and Fikret Kargi. Bioprocess Engineering: Basic Concepts. 2nd ed. Upper Saddle River, NJ: Prentice Hall PTR, 2001. ISBN: 0130819085.

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 apply principles; develop a basic design for gas-liquid separation equipment (Gas Absorber) and vapor-liquid separation equipment (Distillation Column).
2. Ability to apply principles; develop a basic design for liquid-liquid separation equipment (Extractor) and fluid-solid separation equipments (Adsorber and Leaching Equipment).
3. Ability to apply and calculate based on principles of membrane separation process and mechanical - physical separation process (filtration and centrifugation).

References

1. McCabe, W. L., Smith, J. C. and Harriott, P., Unit Operations of Chemical Engineering, McGraw-Hill, 2004.
2. Geankoplis, C.J., Transport Processes and Separation Process Principles, Prentice Hall, 2003.
3. Seeder, J.D. and Henly, E. J., Separation Process Principles, John Wiley and Son, 2006.
4. Wankat, P. C., Separation Process Engineering, Pearson Education, 2006.
5. Benitez, J. Principles and Modern Applications of Mass Transfer Operations, John Wiley and Son, 2009

ERT 319/3
INDUSTRIAL WASTE TREATMENT

Course Synopsis

This course covers waste treatment methods that are commonly used in industries. It's introduced to the terms that are related to *waste* and how to calculate the properties such as *biological oxygen demand* (BOD), *chemical oxygen demand* (COD) and *total carbon* (TOC). From these calculations and other given information, basic unit operations involved in the treatment of waste can be design. This course also give an understanding on the processes involved in waste treatment for different industries keeping in view of the Environmental Impact Assessment (EIA), Life Cycle Assessment (LCA) and legal framework.

Course Outcomes

1. Ability to explain, interpret, and calculate the physical, chemical, and biological properties of waste material and describe its toxicology.
2. Ability to calculate and design the basic structure of waste treatment unit operations.
3. Ability to interpret compare, justify and choose the correct method for a particular waste for treatment.
4. Ability to interpret, justify, and propose the common waste management practice in industry and describe the legal framework structure.

References

1. Wastewater Engineering: Treatment and Reuse, Metcalf & Eddy, Inc, 4th Ed. (or latest edition if available) Mc Graw-Hill (2003).
2. Introduction to Environmental Engineering, 3rd Ed., M.L. Davis and D.A. Cornwell, Mc Graw-Hill, 1998.
3. Waste Treatment and Disposal, Paul T. Williams, 2nd Ed., John Wiley (2005).

School of Bioprocess Engineering

4. Theory and Practice of water and wastewater treatment, R.L. Droste John Wiley (1997).
5. Industrial Waste Treatment, Nelson Leonard Nemerow, Elsevier Science & Technology Books (2006).
6. Waste Treatment in The Food Industry, L. K. Wang, Y.T. Hung, H.H. Lo and C. Yapijakis, Taylor and Francis (2006).
7. Waste Treatment in the Process Industries, L. K. Wang, Y.T. Hung, H.H. Lo and C. Yapijakis, Taylor and Francis (2006).
8. Handbook of Pollution Control and Waste Minimization, Abdul Ghasem.

ERT 320/3
BIOSEPARATION ENGINEERING

Course Synopsis

This course focuses on the the recovery, isolation, purification and polishing of products synthesized by biotechnological processes like r-DNA technology, conventional microbial fermentation and enzyme technology. The principles, advantages and limitations of certain purification units also discussed. At the end of this course, students are able to understand the process involved in bio separation and propose a suitable process for different types of product in integration of bio separation schemes.

Course Outcomes

1. Ability to describe basic principles involved in bio separation processing and calculate certain parameter involved in bio separations units.
2. Ability to compare, justify and use a correct process for a particular bio separation unit to meet product requirements.
3. Ability to discuss and propose the Bio separation techniques/ processes and RIPP (Recovery, Isolation, Purification and Polishing) scheme.

References

1. Harrison, R.G. Todd, P., Rudge S.R. and Petrides D.P., Bioseparations Science and Engineering, Oxford University Press, 2003.
2. Rajni Hatti-Kaul et al. Isolation and Purification of proteins (Biotechnology and Bioprocessing), Marcel Dekker Ltd. 2003.
3. Sabramanian Ganapathy, Bioseparation and Bioprocessing. A handbook, 2nd Edition, Wiley 1998.
4. Paul A. Belter, E.L. Clussler, Wei-Shou Hu, Bioseparations: Downstream Processing for Biotechnology, Wiley 1998.
5. Michael S. Verral. Downstream Processing of Natural Products, A Practical Handbook, Wiley 1996.
6. Sivasankar, B., Bioseparations: Principles and Technique, Prentice Hall, 2006.
7. Ladisch, M. R., Bioseparations Engineering: Principles, Practice and Economics, Wiley-Interscience, 2001

ERT 321/4
PROCESS CONTROL & DYNAMICS

Course Synopsis

This course includes an introduction to process control and dynamics, feedback controllers, control system instrumentation, overview of control system design, theoretical models, dynamic behavior of processes, PID controller design and troubleshooting. The theory is supported by performing laboratory experiments.

Course Outcomes

1. Ability to derive and develop theoretical model of chemical processes, analyze Laplace transform techniques to simplify first order and second order processes and creat transfer functions and state space models.
2. Ability to derive and develop dynamic behavior of first and second order processes, analyze dynamic response characteristics of more complicated processes and

development of empirical models from process data.
3. Ability to analyze control system instrumentation and propose feedback control system for bioprocess and chemical processes.
4. Ability to calculate and analyze dynamic behavior of closed-loop control system.

References

1. Seborg, D.E., Edgar, T.F., Mellicamp D.A.(2003).”Process Dynamic and Control” John-Wiley, 2nd Edition
2. Bequette,. B.W.(2003). “Process Control;Modelling, Design, and Simulation” Prentice Hall
3. Marlin, T.,(2002) “Process Control: Designing Processes and ControlSystem for Dynamic Performance” McGraw-Hill
4. Coughonowr (1991). “Process system, Analysis and Control” McGraw-Hill

ERT 322/3
SAFETY & LOSS PREVENTION IN BIOPROCESS

Course Synopsis

This course covers the fundamental of process safety specifically toxicology, industrial hygiene, sources model, fires and explosions as wells as relief concept design. The students are also exposed to hazard identification, risk assessment and accident investigation. The course will be concluded with biohazard and biosafety in bioprocess.

Course Outcomes

1. Ability to analyze the source, toxic release and dispersion models and evaluate the significance of the events.
2. Ability to distinguish fires and explosion as well as examine ways to prevent it.
3. Ability to analyze relief concepts as well as calculate or sizing the relief system.
4. Ability to analyze and evaluate process safety to identify the hazard and risk in the industry.

References

1. Crowl, D. A., Louvar, J. F. (2002). “Chemical Process Safety; Fundamentals with Applications”. Prentice Hall, Second Edition. New Jersey
2. Frank, P.L, (1980) “Loss and Prevention in the process industries”, Volume 1&2, London, Butterworth
3. Coulson, J.M and Richardson, J.F, (1983)“Chemical Engineering”, Volume 6, Pergamon Press, Oxford
4. Sanders, R. E. (2005). “Chemical Process Safety; Learning From Case Histories”. Elsevier Butterworth Heinemann, Third Edition. Amsterdam

ERT 323/2
SIMULATION FOR BIOPROCESS ENGINEERING

Course Synopsis

The course covers introduction of simulation of bioprocess, material and energy balances, equipment sizing and costing, and environmental impact assessment. Students are exposed to the usage of SuperPro design software for modeling and simulation purposes. Subsequently, sustainability assessment will be introduced, emphasizing on economic and profitability analysis.

Course Outcomes

1. Ability to apply and analyze engineering calculation like mass and energy balance, stoichiometry, and kinetics of the bioprocess.
2. Ability to analyze process and organize unit operation in bioprocess using simulation software.
3. Ability to analyze, collect and organize economic process data and apply environmental impact and sustainability assessment.

References

1. Heinzle, E. Biwer, A. P. and Cooney C. L. (2007). Development of Sustainable Bioprocesses: Modelling and Assessment. Wiley

2. Dunn, Irving J., Heinzle, Elmar, Ingham, John, and Prenosil, Jiri E. (2003). Biological Reaction Engineering Dynamic Modelling Fundamentals with Simulation Examples 2nd Edition. John Wiley
3. Shuler, M.L. (2001). Bioprocess Engineering: Basic Concepts. 2nd Edition. Prentice-Hall

ERT 348/3
FARM STRUCTURES

Course Synopsis

This course provides students with theory and application of various methods of statically determinate as well as indeterminate structural analysis as it applies to trusses, beams, and frames. This course emphasizes structural analysis applied to designing appropriate structures for agricultural produce storage, structures for animal husbandry, structures where the environment is specifically controlled to enhance animal comfort and increase productivity in agricultural practices.

References

1. R.C. Hibbeler: Structural Analysis, 6 ed., Pearson, Prentice Hall, 2006.
2. Lindley, J.A. and J. H. Whitaker, Agricultural Buildings and Structures. ASAE Publication, St. Joseph, MI, 1996.
3. Reddy, C.S.: Basic Structural Analysis, Tata McGraw-Hill, 1996.
4. Yuan-yu Hsieh and S.T. Mau: Elementary Theory of Structures, Prentice Hall, 1996.
5. Smith J.C.; Structural Analysis, Harper and Row, 1988.

ERT 349/4
SOIL AND WATER 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 conservtion practices.

Course Outcomes

1. Ability to understand the principle of soil-water-plant relationships.
2. Ability to apply soil and water engineering principle to water management irrigation practice.
3. Ability to do land surveying and develop contour mapping and with application of GIS & GPS.
4. Ability to apply knowledge of water management to management of natural and engineered biosystems.

References

1. 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.
2. Gardiner,D.T, Miller, R.W. 2008. Soils in Our Environment.11th edition. Pearson Education, Inc.,Upper Saddle River, New Jersey 07458
3. Subramaya,K. 2000. Flow in Open Channel. 2nd edition. Tata McGraw Hill, Delhi,India.
4. 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.

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 use, suits of instruments and protocol for accurate measurement, monitoring and control (MMC) in Biosystems.
2. Ability to understand and operate the automatic wheather station, water measuring stations and other recent automation system applied to biosystems.
3. Ability to assemble system (MMC) for specific biosystems use.

References

1. Nakra, B.C. and Chaudhry, K.K., Instrumentation,Measurement and Analysis, Second Edition, Tata McGraw Hill, 2004. (3rd edition in print)
2. 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.
4. Morris, A.S. (2001), Measurements and Instrumentation Principles, 3rd Ed., Butterworth-Heinemann.
5. 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 understand and apply the engineering principles to the limitation of biological systems productions.
2. Ability to apply the engineering principle requirement for zero waste management.
3. Ability to design systems for processing and utilization of by-products generated by the bioresource industries, including primary agriculture, food processing, and forestry.
4. Ability to analyse pollution problems caused by these industries.
5. Ability to identify the opportunities for recycling and utilization of by-products.

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.
3. Mason.J., *Sustainable agriculture.2nd ed.*, Landlinks Press, Collingwood Vic. Australia, 2003.
4. Gliessman, Stephen R., *Agroecosystem sustainability : developing practical strategies,* CRC Press, Washington, 2001.
5. Pretty.J. (2008). Sustainable Agriculture and Food, Earthscan, London, UK.

PTT 301/3 SAFETY AND HEALTH IN BIOLOGICAL PROCESS

Course Synopsis

This course covers the regulatory procedure dealing with biological process. The students are also exposed to hazard identification, risk assessment, biosafety level and health surveillance program. Besides, the students also will be taught on fundamental aspect in emergency response plan relevant to biological process.

Course Outcomes

1. Ability to categorize the different laboratory levels and class of biosafety.
2. Ability to analyze process safety to identify the biohazard and risk in the industry.
3. Ability to write and describe health surveillance program.
4. Ability to use emergency response plan and biological waste decontamination guideline relevant to biological process.

References

1. US Department of Health and Human Services. (2009). Biosafety in Microbiological and Biomedical laboratories.5th edition.
2. Biosafety Manual for Texas Tech Univeristy (2005).
3. Martha J. Boss, Dennis W. Day (2003). Biological risk engineering handbook: infection control and decontamination. Lewis Publication.
4. Biological Safety: Principles and Practices, (2000) Third Edition. do Fleming & dl Hunt, Eds. ASM Press.
5. Sanders, R. E. (2005). *Chemical Process Safety; Learning From Case Histories*. Elsevier Butterworth Heinemann, Third Edition. Amsterdam

PTT 302/3
DOWNSTREAM PROCESSING TECHNOLOGY

Course Synopsis

This course introduces basic and advanced skills in separation technology related to biotechnology. The course covers common separation techniques which include precipitation, centrifugation, solvent extraction and different types of chromatographic techniques. Other important separation processes will also be covered.

Course Outcomes

1. Ability to demonstrate methods to purify biologically processed materials.
2. Ability to choose equipment and steps required in bio separation systems.
3. Ability to analyze and compare alternative separation approaches and systems.
4. Ability to choose appropriate instrumentation for bio separation applications.

References

1. McCabe, W. L., Smith, J. C. and Harriott, P. (2004). Unit Operations of Chemical Engineering, McGraw-HilL.
2. Harrison, R.G. Todd, P., Rudge S.R. and Petrides D.P. (2003). Bioseparations Science and Engineering, Oxford University Press.
3. Geankoplis, C.J. (2003). Transport Processes and Separation Process Principles, Prentice Hall.
4. Sivasankar, B. (2006). Bioseparations: Principles and Technique, Prentice Hall.
5. Ladisch, M. R. (2001). Bioseparations Engineering: Principles, Practice and Economics, Wiley-Interscience.

PTT 303/2
PROCESS MODELLING AND SIMULATION

Course Synopsis

The course covers material and energy balances, equipment sizing, and costing, environmental impact assessment and process design for single and continuous processes. Students are exposed to the usage of SuperPro design software for modeling and simulation purposes. Subsequently, sustainability assessment, emphasizing on economic and profitability analysis will also be covered.

Course Outcomes

1. Ability to solve engineering calculation like mass and energy balance, stoichiometry, and kinetics of the bioprocess.
2. Ability to apply process and differentiate unit operation in bioprocess using simulation software.

3. Ability to analyze economic data and apply environmental impact and sustainability assessment.

References

1. Heinzle, E. Biwer, A. P. and Cooney C. L. (2007). Development of Sustainable Bioprocesses: Modelling and Assessment. Wiley.
2. Dunn, Irving J., Heinzle, Elmar, Ingham, John, and Prenosil, Jiri E. (2003). Biological Reaction Engineering Dynamic Modelling Fundamentals with Simulation Examples 2nd Edition. John Wiley.
3. Shuler, M.L. (2001). Bioprocess Engineering: Basic Concepts. 2nd Edition. Prentice-Hall.
4. Biegler, L. T., Grossmann, E. I. & Westerberg, A. W. (1997). Systematic Methods of Chemical Process Design. London: Prentice-Hall International.
5. Coulson, J.M.(John Metcalfe), Richardson, Jon Francis and Sinnott, R.K. (1999). Chemical Engineering Design" Vol.6, 3rd Edition, Butterworth-Heinemann.

PTT 304/3
FERMENTATION TECHNOLOGY

Course Synopsis

This course covers both theoretical and practical aspects of fermentation and bioprocess technology. It also describes several fermentation processes involved in the production of industrial chemical metabolites such as alcohol, organic acids, proteins, enzymes and antibodies.

Course Outcomes

1. Ability to differentiate various fermentation methods including the control parameters
2. Ability to calculate mass balances stoichiometry and microbial growth kinetics in batch, fed-batch and continuous fermentations.
3. Ability to calculate sterilization times, aeration requirement and capacities of batch, fed-batch and continuous fermentation.
4. Ability to illustrate the principles of up and down-scaling of fermentation processes and primary recovery methods.

References

1. Elmansi E.M.T, Bryce C.F.A, Demain and A.L, Allman A.R (2007). Fermentation Microbiology and Biotechnology. 2nd edition CRC.
2. Stanbury, P.F., Whitacker, A. and Hall, S.J. (1999) Principle of Fermentation Technology. 3rd ed. Pergamon Press.
3. Scragg, A.H. (1991) Bioreactors in Biotechnology: A Practical Approach. 1st ed. Ellis Horwood Limited.
4. Micheal L. Shuler & Fikret kargi (2006).Bioprocess Engineering; basic Concepts 2 Ed. Prentice Hall.
5. Stanbury, P.F, S Whitake, A. (1984). Principles of Fermentation Technology. Pergamon Press: Oxford.

PTT 305/3
CELL AND TISSUE CULTURE TECHNOLOGY

Course Synopsis

This course will introduce the students to the basic knowledge of plant and animal cell culture. The course will cover on the media preparation, aseptic techniques and sterilization, techniques of cultivation as well as applications of plant and animal cell culture.

Course Outcomes

1. Ability to operate laboratory equipments, media and sterilization methods for plant and animal culture.
2. Ability to differentiate techniques involved in animal and plant tissue culture.
3. Ability to apply the principle of plant and animal tissue culture technology in industrial biotechnology.

References

1. Sathyanarayana, B. N. and Varghase, D. B. (2007) Plant tissue culture: Practices and new experimental protocols. I. K. International Pvt. Ltd.
2. Razdan, M. K. (2003) Introduction to plant tissue culture. Science Publishers.
3. Freshney, R. I. (2000) Culture of animal cells: A manual basic techniques, fifth edition. New Jersey.
4. Karl-Hermann Neumann, Ashwani Kumar, Jafargholi Imani. (2009). Plant Cell and Tissue Culture - A Tool in Biotechnology: Basics and Application (Principles and Practice), Springer.
5. Edwin F. George, Michael A. Hall, Geert-Jan De Klerk (Editors). 92007). Plant Propagation by Tissue Culture, Springer.

PTT 306/3
NUTRACEUTICALS PROCESSING TECHNOLOGY

Course Synopsis

The subject covers a broad spectrum of functional foods and nutraceuticals from biological material, applications of engineering techniques in functional food production, process engineering and modeling, functional food bioavailability, to product quality. The emphasis is on (1) applications of various techniques such as high pressure, supercritical fluid, membrane, microencapsulation, and molecular distillation in the processing of functional foods; (2) stability of bioactive components and antioxidative properties during processing and shelf life; (3) improvement in bioavailability of bioactive components by physical and chemical methods; and (4) mechanisms of antioxidant action and clinical and epidemiological evidence of functionality.

Course Outcomes

1. Ability to apply techniques in the processing of functional foods and nutraceuticals.
2. Abilitity to analyze stability of bioactive components and antioxidative properties during processing and shelf life.
3. Ability to analyze and test bioprocessing technology for production of nutraceutical compounds.

References

1. Shi.J. (2007).Functional food ingredients and nutraceuticals, Taylor & Francis Group LLC.
2. Lambert M. Surhone, Miriam T. Timpledon, Susan F. Marseken. (2010). Nutraceutical, Betascript Publishers.
3. Francisco Delgado-Vargas, Octavio Paredes-López. (2003). Natural colorants for food and nutraceutical uses, CRC Press.
4. Yoshinori Mine, Fereidoon Shahidi. (2006). Nutraceutical proteins and peptides in health and disease, CRC/Taylor and Francis.
5. Vazhiyil Venugopal. (2008). Marine products for healthcare: functional and bioactive nutraceutical compounds from the ocean, CRC Press/Taylor & Francis.

PTT 307/3
INDUSTRIAL MICROBIOLOGY

Course Synopsis

This course explores microbiological industry development, scope of microbiological industries, microbes in microbiological industries, biomass and metabolite production, microbes in bioremediation and in waste treatment industries. The course also refreshes microbial fundamentals and strain improvement for new products and productivity improvement.

Course Outcomes

1. Ability to apply fundamentals of microbial physiology and metabolisms in the production processes of industrial products.
2. Ability to classify microbiological processes involved in applications production of a range of industrial products.

3. Ability to illustrate current development trends in the field of industrial microbiology and biotechnology.

References

1. Waites, M. J., Morgan, N. L., Rockey, J. S. and Higton, J. (2001). Industrial Microbiology: An Introduction. Ist Edition, Blackwell Science
2. Dolye, M. P., Beuchat, L. R. and Montville, T. J. (2007). Food Microbiology: Fundamentals and Frontiers 3rd Edition. American Society Microbiology.
3. Pepper, I. L. and Gerba, C.P. (2004). Environmental Microbiology: a Laboratory Manual. 2nd Edition, Academic Press.
4. Nduka Okafor. (2007). Modern Industrial Microbiology and Biotechnology, Science Publishers.
5. James M. Jay. (2000). Modern Food Microbiology (Aspen Food Science Text Series), Springer.

PTT 308/4
FINAL YEAR PROJECT 1

Course Synopsis

A short-termed research project that inclined towards engineering operations for producing new biotechnological products is necessary for a 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 mainly on fermentation, enzyme technology, bioconversion and natural products and nutraceuticals technologies.

Course Outcomes

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to present and defend effectively project proposal to selected audience.
4. Ability to identify commercialization potential for proposed project.

References

1. Lydersen, B. K., D'elia, N.A., and Nelson, K.L., (1994) Bioprocess Engineering: System, Equipment and Facilities. John Wiley and Sons, Inc., USA.
2. Stephanopolous, G., (1993) Biotechnology. Vol. 3 (Bioprocessing). VCH, Germany.
3. Andrew A. Signore and Terry Jacobs (2005). Good Design Practices for GMP Pharmaceutical Facilities. Taylor & Francis.
4. Anurag Singh Rathore, Gail Sofer, G. K. Sofer. (2005).Process Validation in Manufacturing og Biopharmaceuticals: guidelines, current practices, and industrial case studies. Taylor & Francis.
5. Vogel, H.C., and Tadaro, C.L. (1997). Fermentation and Biochemical Engineering Handbook: Principles, Process Design, and Equipment. 2nd Edition. Noyes Publications. New Jersey.

PTT 309/3
FOOD TECHNOLOGY

Course Synopsis

This course covers multidisciplinary field of applied physical sciences combines science, microbiology, and engineering education for food and related industries. Topics to be covered include introduction to food engineering, food ingredients, nutrition, nutritional information, spoilage, food production systems, preservation processes, freezing, drying, direct-heating, radiation, extrusion and packaging, freezing, texturization, mechanical separation and food biotechnology.

Course Outcomes

1. Ability to differentiate the principles of food engineering operations.
2. Ability to interpret ingredients and nutrition in food.

3. Ability to analyze problems involved in food engineering operations.
4. Ability to analyze genes involved in plant development and reproduction and improvement of quality and productivity of food materials.

References

1. Food Processing Technology: Principles & Practice. Ellis-Harwood Ltd., Chichester, England. 2nd Edition 2000
2. Heller. K.J, Genetically Engineered Food :Methods and Detection.Second, Updated and Enlarged Edition, WILEY-VCH Verlag GmbH & Co. KgaA, Weinheim, 2006
3. M. Angela A. Meireles, Extracting bioactive compounds for food products, CRC Press, 2009
4. Jose L. Martinez., Supercritical fluid extraction of nutraceuticals and bioactive compounds, CRC Press, 2008.
5. Food Process Engineering - Heldman, D. R. and Singh, R. P.

PTT 310/2
WASTE MANAGEMENT AND UTILIZATION

Course Synopsis

The subject covers the main aspects of utilization of the food industry waste and the treatments necessary to discard waste to environmental acceptors. Emphasize will be on the exigency for utilization and treatment of food waste according to the ISO 14001. The technology of anaerobic fermentation for biogas production, specific degradation of solid wastes including their direct practical applicability, as well as composting of agricultural and food waste are will be addressed accordingly.

Course Outcomes

1. Ability to demonstrate methods to purify biologically processed materials.
2. Ability to choose equipment and steps required in bio separation systems.
3. Ability to analyze and compare alternative separation approaches and systems.
4. Ability to choose appropriate instrumentation for bio separation applications.

References

1. McCabe, W. L., Smith, J. C. and Harriott, P. (2004). Unit Operations of Chemical Engineering, McGraw-Hill.
2. Harrison, R.G. Todd, P., Rudge S.R. and Petrides D.P. (2003). Bioseparations Science and Engineering, Oxford University Press.
3. Geankoplis, C.J. (2003). Transport Processes and Separation Process Principles, Prentice Hall.
4. Sivasankar, B. (2006). Bioseparations: Principles and Technique, Prentice Hall.
5. Ladisch, M. R. (2001) Bioseparations Engineering: Principles, Practice and Economics, Wiley-Interscience.

PTT 311/3
ENZYME TECHNOLOGY

Course Synopsis

The course covers basic enzymology, including properties, classification, kinetics and action mechanisms and immobilization of enzyme. This course also introduces principles and techniques of enzyme extraction and purification. Topic on utilization of enzymes in industrial and medical field will also be introduced.

Course Outcomes

1. Ability to explain fundamentals of enzyme kinetics.
2. Ability to discuss the current and future trends of enzymes applications in bio-analysis, biotechnology and industrial sectors.
3. Ability to choose appropriate techniques for extraction and purification of enzymes/ proteins.
4. Ability to demonstrate methods for enzyme immobilization and the characterization of immobilized enzymes kinetics.

References

1. Wolfgang Aehle. (2007) Enzymes in Industry. John Wiley & Sons.
2. Andr´es Illanes (2008) Enzyme Biocatalysis. Springer Science + Business Media B.V.
3. Marangoni A.G. (2003) Enzyme Kinetics: A Modern Approach. John Wiley and Sons Incoperation. New York.
4. Bisswanger, H (2004) Practical Enzymology Wiley-VCH. Weinheim, Germany.
5. Cook, P.F. and Cleland, W.W (2007) Enzyme Kinetics and Mechanism. Garland Publishing Inc, US.

PTT 312/3
BIOACTIVE COMPOUNDS EXTRACTION TECHNOLOGY

Course Synopsis

The course discusses different types of extraction methods for extraction of bioactive compounds from plants. It also covers overview of the fundamentals of heat and mass transfer as well as the thermodynamics of the processes of steam distillation, distillation, low-pressure solvent extraction (solid–liquid) from vegetable matrices, high-pressure extraction from vegetable matrices, and liquid–liquid extraction and adsorption, which are processes used to obtain high-quality bioactive extracts and purified compounds from botanical sources.

Course Outcomes

1. Ability to distinguish different extraction methods of bioactive compounds from plant materials.
2. Ability to analyze and test various types of extraction methods
3. Ability to demonstrate various bioactive compound extraction methods.

References

1. M. Angela A. Meireles. (2009). Extracting bioactive compounds for food products, CRC Press.
2. Jose L. Martinez. (2008). Supercritical fluid extraction of nutraceuticals and bioactive compounds, CRC Press.
3. Steven M. Colegate, Russell J. Molyneux. (2007). Bioactive Natural Products: Detection, Isolation, and Structural Determination, Second Edition, CRC.
4. Manuel Aguilar, Jose Luis Cortina. (2008). Solvent Extraction and Liquid Membranes: Fundamentals and Applications in New Materials (Ion Exchange and Solvent Extraction), CRC.
5. EugÃ¨ne Vorobiev. (2008) Electrotechnologies for Extraction from Food Plants and Biomaterials (Food Engineering Series), Springer.

PTT 313/3
BIOENERGY PRODUCTION TECHNOLOGY

Course Synopsis

The course explains in detail global energy sources, fossil fuels, and renewables, Biomass Feedstocks, biofuels. processing conditions and alternative applications of biorenewable feedstocks. Liquid and Gaseous Biofuels, including main liquid biofuels such as bioethanol, biodiesel, biogas, biohydrogen, liquid and gaseous fuels from the Fischer–Tropsch synthesis are addressed in detail. Discussion on Thermochemical Conversion Processes covers the utilization of biorenewables, Biofuel Economy and Biofuel Policy are also included.

Course Outcomes

1. Ability to differentiate different sources and types of bioenergy.
2. Ability to analyze economic and environmental impact of bioenergy.
3. Ability to demonstrate production process of bioenergy.

References

1. Ayhan Demirbas. (2009). Green Energy and Technology, Springer-Verlag London Ltd.

2. Caye M.Drapcho, Nghiem Phu Nhuan, Terry H. Walker. (2008) Biofuels Engineering Process Technology, The McGraw-Hill Companies.
3. Wilfred Vermerris. (2008). Genetic Improvement of Bioenergy Crops, Springer.
4. Frano Barbir, Sergio Ulgiati. (2008). Sustainable Energy Production and Consumption: Benefits, Strategies and Environmental Costing, Springer.
5. Dwight Tomes, Prakash Lakshmanan, David Songstad. (2010). Biofuels: Global Impact on Renewable Energy, Production Agriculture, and Technological Advancements, Springer.

PDT376/3
FARM POWER AND MACHINERY

Course Synopsis

The course covers the basic of machines and the importance of mechanization for various farm operations, selection of appropriate machines and its maintenance and the management of farm machineries.

Course Outcomes

1. Ability to apply the basic principles, construction and working of farm machinery for different crops and livestocks.
2. Ability to select and assemble appropriate machinery, use, repair and maintenance.
3. Ability to manage agro machinery service centre.

References

1. Brian,B. 2005. Farm Machinery, Fifth Edition, Old Pond Publishing Ltd,
2. Hunt, D. 2001. Farm Power and Machinery,Management. Tenth Edition. Blackwell Publishing Professional. United State of America.
3. Bello, S. R. Adegbulugbe, T. A. and Odey, S.O. 2010. *Farm* Power and Machinery Practical workbook.
4. Goering, C. E. and Handerson, A. C. 2004. Engine and Tractor Power. ASME.
5. Culpin, C. 2008. Farm Machinery, Fourth Edition. Hesperides Press.

PDT377/3
APPLIED HEAT AND MASS TRANSFER

Course Synopsis

The course covers the application of various energy resources to generate power useful for processing biological materials and focuses on the technology, production process and engineering of renewable sources of energy which includes solar, wind, wave, and energy from biomass.

Course Outcomes

1. Ability to discuss mechanisms and characteristics of heat and mass transfer.
2. Ability to apply mathematical models of various heat transfer mechanisms.
3. Ability to analyze different types of heat exchangers, heat transfer coefficient for heat exchanger and energy analysis on heat exchanger.
4. Ability to analyze and calculate physical mechanism of mass transfer, the rate of mass diffusion, and simultaneous heat and mass transfer.

References

1. Yunus A. Cengel (2006). Heat and Mass Transfer: A Practical Approach, 3rd Ed., McGraw Hill, New York, . Pearson, Prentice-Hall.
2. Incropera, F. P. DeWitt, D. P. (2007). Fundamentals of Heat and Mass Transfer. John Wiley Inc.. London.
3. Holman, J.P. (2002) Heat Transfer, 8th SI Metric Edition. McGraw-Hill. New York.
4. Baehr, H. D. Stephan, K. (2006). Heat and Mass Transfer. 2nd Edition. Springer. New York.
5. Welty, J. R. Wicks, C.E. Wilson,R.E. Rorrer, G. (2008). Fundamentals of Momentum, Heat and Mass Transfer. John Wiley & Sons, New York.

PDT378/2
PRECISION AGRICULTURE TECHNOLOGY

Course Synopsis

This course covers the essential aspects of Precision Agriculture (PA) concepts including soil/ landscape and crop spatial variability, GIS, DEM, GPS, sensors, variable rate machinery, PA software, remote sensing; geostatistics, sampling, experimental designs, precision integrated crop management, data acquisition, processing, and management and socio-economical and e-marketing aspects.

Course Outcomes

1. Ability to illustrate the concept, component and application of precision farming in agriculture.
2. Ability to apply spatial information and precision agriculture technologies to improve soil and crop management, environmental and socio-economical aspects.
3. Ability to analyze geo-referenced data using spatial information technologies.

References

1. Morgan M. and D. Ess. (2003). The precision-farming guide for agriculturists. 2nd Ed. John Deere Publishing. Moline, Illinois, USA.
2. Heywood, I. Cornelius S. and Carver, S. (2006). An Introduction to Geographical Information Systems 3rd Ed., Pearson Education Limited. England.
3. Lilesand, T.M. and Keifer, R.W. (2007). Remote Sensing and Image Interpretation, John Wiley & Sons, University of California.
4. Thurston, J., Poiker, T. dan Moore, J. (2003). Integrated Geospatial Technologies – A Guide to GPS, GIS and Data Logging, Canada: John Wiley & Sons, Inc.
5. Kavanagh, B.F. (2009), Surveying: Principles and applications, 8th Ed. Prentice Hall, New York, NY.

PDT379/3
WATER RESOURCES MANAGEMENT

Course Synopsis

This course introduces principles of surface and ground water hydrology and their applications in water resources engineering, descriptive and quantitative applications of the hydrologic cycle, weather system, precipitation, evaporation, transpiration, surface and subsurface waters, stream flow hydrographs and flood routing. The course also covers water resources management principles, regulatory issues, management of water resources for sustainable development, tools for water resources management; economic analysis, water supply, water demand, climate change and water resources management, extremes (floods and droughts), water management in the Malaysia practices and use of computer-based tools in solving water resources management problems.

Course Outcomes

1. Ability to analyze principle of water resources, planning and management.
2. Ability to infer the components of hydrologic cycle and the affect to human daily lives.
3. Ability to analyze hydrologic data for engineering design and management.

References

1. Chin, D.A., (2006) Water-resources Engineering, Prentice Hall, Upper Saddle River, NJ,
2. Thomas V.C. (2009) Principles of Water Resources: History, Development, Management, and Policy 3rd Edition, John Wiley. United State of America.
3. Simonovic, S.P. (2009) Managing water resources: Methods and tools for a systems approach, Earthscan, London.
4. Mays, L.W. (2005) Water Resources Engineering, John Wiley. United State of America.
5. Cech, T. V., (2002) Principles of Water Resources, John Wiley & Sons, Inc. Durbin.

PDT380/3
AUTOMATIONS IN AGRICULTURAL SYSTEMS

Course Synopsis

This course covers advanced study on instrumentation with emphasis on selection of measurement techniques and transducers to sense physical properties of biological materials with application to agricultural, food processing industries and biological system. Application of biosensors in agriculture, design of automation system and machine/gentry for agricultural systems.

Course Outcomes

1. Ability to identify and apply the concepts of automated machines and equipment and to agricultural related problems.
2. Ability to operate with existing biosensor systems and transducers, as well as to design new sensors.
3. Ability to identify and assemble industrial sensors in farming system

References

1. Mikell, P. G. (2008). Automation*,* Production Systems and Computer-Integrated Manufacturing . Pearson, Prentice-Hall. United State of America
2. Considine, D.M. editor in chief. (1986). Standard Handbook of Industrial Automation. Chapman and Hall. New York.
3. Lansky, Z.J. Schrader, L.F. (1986). Industrial Pnuematic Control. Marcel-Dekker. New York.
4. Rehg, J. A. (2002). Introduction to Robotics in CIM Systems.5th Edition. Prentice Hall. University of Michigan
5. Dunn, I. J. Heinzle, E. Ingham, J. Prenosil, J. E. (2003). Biological Reaction Engineering Dynamic Modelling Fundamentals with Simulation Examples. 2nd Edition, John Wiley. Federal Republic of Germany.

PDT381/4
Final year Project 1

Course Synopsis

A short-term research project in engineering operations for producing agricultural systems and technologies including research writing and presentation of the research outcome in the form of thesis and seminar.

Course Outcomes

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to present and defend effectively project proposal to selected audience.

References

1. Buku Panduan Projek Tahun Akhir UniMAP

PDT382/3
CONTROLLED ENVIRONMENT AGRICULTURE

Course Synopsis

The course covers design of controlled environment agricultural structures which include thermal and environmental engineering analyses appropriate for controlled environment agricultural production facilities for plants and animals. Major topics include psychrometrics, heat transfer, ventilation and heating, air distribution within buildings, and control systems.

Course Outcomes

1. Ability to analyze heat and mass transfer of plants and animals structures.
2. Ability to analyze natural and forced cooling and heating for plants and animals structures.
3. Ability to analyze mechanical and natural ventilation for plants and animal structures.

References

1. Albright, L.D. (2005). Environmental Control for Plants and Animals, American Society of Agricultural and Biological Engineers, St. Joseph, MI.
2. Incropera, F.P. (2002). Introduction to Heat and Mass Transfer, 4th Ed., John Wiley and Sons, New York.
3. Bartok, J. W. (2001). Energy Conservation for Commercial Greenhouses, NRAES, New York.
4. Ibrahim, D. (2002), Microcontroller Based Temperature Monitoring & Control, Newnes, Oxford.
5. Tiwari, G.N. (2003). Greenhouse Technology for Controlled Environment, Alpha Science, New York.

PDT383/3 RENEWABLE ENERGY

Course Synopsis

The course covers the application of various energy resources to generate power useful for processing biological materials and focuses on the technology, production process and engineering of renewable sources of energy which includes solar, wind, wave, and energy from biomass.

Course Outcomes

1. Ability to explain technologies used in generating mechanical and electrical power for biosystems
2. Ability to demonstrate the concepts of renewable energy conversion suitable for production and processing of biological materials.
3. Ability to evaluate the efficiency and performance of different renewable energy generating systems.

References

1. Aldo, V. D. R. (2009). Fundamentals of Renewable Energy Processes. Elsevier Academic Press. Amsterdam.
2. Freris, L.L. and Infield, D.G. (2008). Renewable Energy in Power Systems. John Wiley. D G Infield Publisher: Chichester, U.K
3. Sorensen, B. (2011). Renewable Energy. Academic Press. Britain.
4. Thumann, A. and Mehta, D.P. (2008). Handbook of Energy Engineering, Sixth Edition. The Fairmont Press Inc. United State of America.
5. Nelson, C.V. (2009). Wind Energy : Renewable Energy and The Environment. CRC Press. United State of America.

PDT384/3 FOOD TECHNOLOGY

Course Synopsis

This course covers multidisciplinary field of food technology and related industries. Topics covered include food science, food ingredients, nutrition, nutritional information, food spoilage, food production systems, preservation processes, freezing, drying, direct-heating, radiation, extrusion and packaging, freezing, texturization, mechanical separation and food biotechnology.

Course Outcomes

1. Ability to differentiate the principles of food technology.
2. Ability to interpret ingredients and nutrition in food.
3. Ability to solve problems involved in food production.

References

1. Meireles, A. 2009. Extracting bioactive compounds for food products, CRC Press, NY
2. Campbell-Platt, G. 2009. Food Science and Technology. John Wiley, New York.
3. Martinez, J.L. 2008. Supercritical fluid extraction of nutraceuticals and bioactive compounds, CRC Press, NY.
4. Heldman, D.R. and Singh, R.P. Food Process Engineering.
5. Toledo, R.T. Fundamental of Food Process Engineering.

PDT385/3
BIOMATERIAL ENGINEERING
(Elective)

Course Synopsis

This course covers structure and properties of biomaterial and related solids, physical and chemical bases for properties exhibited by materials, polymeric biomaterials, metallic biomaterials, ceramic biomaterials and composite materials. Material properties including mechanical, electrical, magnetic and thermal behaviour, applications of biomaterials in agricultural systems, relationship between physical and chemical structure of materials and biological system response, selection, fabrication and modification of materials for specific applications, biomaterials processing and degradation, implant requirements, host-implants reactions including wound healing response and inflammatory response, physiological and biomechanical basis for soft-tissue implants, design of modified biomaterials, bulk and surface characterization of materials and regulatory and ethical concerns dealing with the implementation and commercialisation of biomaterials.

Course Outcomes

1. Ability to analyze the biomaterial physical, chemical and biological properties.
2. Ability to design the processing system for a biomaterial.
3. Ability to recommend the commercialization potential of biomaterial

References

1. Chu P K and Liu X . 2008. Biomaterials Fabrication and Processing Handbook. CRC Press
2. J. A. Schey. 2000. Introduction to Manufacturing Processes, Third Edition. McGraw-Hill Higher Education: Boston.
3. Stroshine,R. 2007. Physical Properties of Agricultural Materials and Food Products, Purdue University.
4. Nuri, N. 2007. Physical Properties of plant and animal materials, Taylor and Francis.
5. Rao,M.A. and Rizvi, S. S. H. 2005. Engineering Properties of Foods. Taylor and Francis.

PDT386/3
INTEGRATED AGROSYSTEMS
(Elective)

Course Synopsis

An advanced course integrating principles of crop production, animal husbandry, aquaculture, soils and environmental sciences in agricultural systems. Topics include concept and principles of biologically integrated farms, components, interactions, techniques and energy flows of integrated farms.

Course Outcomes

1. Ability to compare and contrast between integrated farming and conventional farming.
2. Ability to categorize the components, interactions and energy flows in an integrated farming system.
3. Ability to demonstrate sustainable practices of integrated farming systems.

References

1. Panda, S.C. 2006. Crop Management and Integrated Farming.Agrobios.
2. Gardiner, D.T. and Miller, R.W. 2008. Soils in Our Environment. 11th edition. Upper Saddle River: Pearson Prentice Hall.
3. Taylor, R.E. and Field, T.G. 2007. Scientific Farm Animal Production, 9th edition. Upper Saddle River: Prentice Hall
4. Anderson, W.P. 2007. Weed Science: Principles and Application. Long Grove: Waveland Inc.
5. Southgate, P. And Lucas, J.S. 2003. Aquaculture: Farming Aquatic Animals. Ames, Iowa: Iowa State University Press.

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.
2. Ability to design a suitable unit operation in a bioprocess plant based on bioprocess system involved.
3. Ability to develop and solve unit operation design using modern simulation and create the Process Flow Diagram (PFD) for bioprocess plant.

References

1. 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)
3. Coulson, J.M.(John Metcalfe), Richardson, Jon Francis and Sinnott, R.K. "Chemical Engineering Design" Vol.6, 3rd Edition, Butterworth-Heinemann, 1999.
4. Peters, M.S. and Timmerhaus, K.D., 'Plant Design And Economics For Chemical Engineers', 5th Edition, New York, McGraw-Hill, 2002.
5. Turton, Richard, Bailie, Richard C., Whiting Wallace B. and Shaeiwitz, Joseph A., 'Analysis, Synthesis And Design Of Chemical Processes', Prentice Hall 1997.
6. 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 apply the concepts and analyze the requirements of GMP and Validation in bioprocess production area and develop Standard Operation Procedure (SOP).
2. Ability to analyze the GMP requirement and develop and evaluate primary and secondary bioprocess engineering products, together with their Safety, Health and Environment (SHE) aspects.
3. Ability to analyze the GMP requirement and HACCP and design and evaluate the Laboratory, Process Development Facilities, Pilot Manufacturing Facilities and Manufacture of food and Biopharmaceutical products.

References

1. Nally.J.D (Ed).,Good Manufacturing Practices for Pharmaceuticals, Sixth Edition, Informa Healthcare Inc, New York, USA,2007
2. Alli, I., Food, Quality Assurance, CRC PRESS, New York, 2004
3. Bliesner.D.M, ESTABLISHING A CGMP LABORATORY AUDIT SYSTEM A Practical Guide, John Wiley & Sons, Inc., Hoboken, New Jersey, 2006
4. Bjorn K. Lydersen, Nancy A. D'elia & Kim L. Nelson (Editors). Bioprocess Engineering: Systems, Equipment and Facilities, John Wiley & Sons, Inc, 1994

5. Bennet.B. Pharmaceutical Production: an Engineering guide., Institution of Chemical Engineers (IChemE), Warwickshire, UK, 2003
6. WHO Guidelines, Quality assurance of pharmaceuticals, Good manufacturing practicesand inspection, WHO Press, World Health Organization, Geneva, Switzerland, 2007

ERT 426/3
FOOD ENGINEERING

Course Synopsis

This course covers multidisciplinary field of applied physical sciences which combines science, microbiology, and engineering education for food and related industries. Topics to be covered include introduction to food engineering, food ingredients, nutrition, nutritional information, spoilage, food production systems, preservation processes, freezing, drying, direct-heating, radiation, extrusion and packaging.

Course Outcomes

1. Ability to interpret ingredients and nutrition in food.
2. Ability to differentiate the principle of food engineering operation.
3. Ability to analyze the problem that involved in food engineering operation.

References

1. R. Paul Singh, Dennis R. Heldman. (2009). Introduction to Food Engineering, Fourth Edition (Food Science and Technology). Academic Press. Elsevier.
2. Side, Catherine “Food Product Development : Based on Experience”, Wiley-Blackwell, 2008.
3. Barbosa-Cánovas, Gustavo V. Schmidt, Shelly Fontana, Anthony “Water Activity in Foods : Fundamentals and Applications”, Wiley-Blackwell, 2008.
4. Williams, C., “Improving the Fat Content of Foods” Woodhead Publishing, Limited, 2006.

ERT 427/3
PHARMACEUTICAL PROCESS ENGINEERING

Course Synopsis

The aim of present course is to describe the principles of drug pharmacokinetics: absorption, distribution, metabolism and excretion of drugs. This course describes the scientific and technological aspects of the designing and manufacturing of pharmaceutical products.

Course Outcomes

1. Explain the basic concept of drug absorption and disposition and evaluate related pharmacokinetics.
2. Ability to design and demonstrate pharmaceutical production facilities.
3. Ability to formulate and evaluate the pharmaceutical engineering processes in pharmaceutical formulation and production.

References

1. Bennet, B. and Cole, G. Pharmaceutical Production: An Engineering Guide. Warwickshire: Institution of Chemical Engineers (IChemE), 2003.
2. Anthony J. Hickey, David Ganderton. Pharmaceutical Process Engineering: 2nd Edition. New York: Informa Healthcare. 2009.
3. K. Sambamurthy. Pharmaceutical Engineering. New Delhi: New Age International Publishers. 2005.
4. L. Shargel, S. Wu-Pong & A.B.C. Yu. Applied Biopharmaceutics & Pharmacokinetics. McGraw Hill. 2005.
5. M. E. Aulton, Pharmaceutics. The science of dosage form design. 2nd Edition. London: Churchill Livingstone. 2002.
6. Crommelin, D.J.A., & Sindelar, R.D. Pharmaceutical Biotechnology. An Introduction

for Pharmacist and Pharmaceutical Scientist. (2nd ed). London: Taylor and Francis. 2002.
7. Glick, B. R., & Pasternak, J.J. Molecular Biotechnology: Principles and Application of Recombinant DNA (2nd ed.). Washington D.C.: ASM Press. 2003.

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 apply the technique used for estimation of plant economics and Compare economic feasibility of the process plant for project evaluation and process optimization.

References

1. Coulson, J.M.(John Metcalfe), Richardson, Jon Francis and Sinnott, R.K. "Chemical Engineering Design" Vol.6, 3rd Edition, Butterworth-Heinemann, (Latest).
2. Seider, W.D., Seader, J.D. and Lewin, D.R., "Process Design Principles: Synthesis, Analysis and Evaluation'', New York, (Latest)
3. Douglas, J.M., ''The Conceptual Design of Chemical Processes", New York, McGraw-Hill (Latest).
4. Peters, M.S. and Timmerhaus, K.D., 'Plant Design And Economics For Chemical Engineers', 5th Edition, New York, McGraw-Hill, 2002.

ERT 429/3
ENERGY FROM BIORESOURCES

Course Synopsis

The aim of this course is to introduce and develop the energy that can be generated from bioresources or biomass which is the alternative way of producing energy from fossil-based fuels. This course intends to teach the students of emphasizing the use of more environmental-friendly technologies which can lead to reduction of pollution, sustain and maintain the ecology system. This course starts with the introduction of biomass resources and the characteristics of biofuels followed by the analysis of the biological processes in producing ethanol and butanol. In the subsequent weeks, the students will be taught the chemical and thermochemical processes in producing biodiesel, biohydrogen and methane biogas. This course ends with the proposal of production of biofuels from microalgae and seaweeds.

Course Outcomes

1. Ability to analyze and develop the biomass resources and characteristics of biofuels. Develop ethanol and butanol production through biological processes.
2. Ability to design and evaluate the thermochemical and chemical conversion of biomass to power and biofuels. Develop chemical conversion process for biodiesel production.
3. Ability to evaluate the production of biohydrogen and the utilization of methane biogas. Design and evaluate the biofuels production from microalgae and seaweeds.

References

1. J. Cheng, Biomass to Renewable Energy Processes, 2010, CRC Press.
2. A. Vertes, N. Qureshi, H. P. Blaschek and H. Yukawa, Biomass to Biofuels: Strategy for Global Industries, 2010, John Wiley & Sons, Ltd.
3. A. Pandey, Handbook of Plant-based Biofuels, 2009, CRC Press.
4. R. C. Brown, Biorenewable Resources: Engineering New Products From Agriculture, 2003, Iowa State Press.
5. S. Lee, J. G. Speight and S. K. Loyalka, Handbook of Alternative Fuel Technologies, 2007, CRC Press.

ERT 430/3
DESIGN OF EXPERIMENTS

Course Synopsis

The course begins with the strategy of experimentation and introduction to basic statistical approach, then exposure to factorial design. Calculation on analysis of variance is also included as well as 2^k factorial design and 2^{k-p} fractional factorial design. Elaborate learning on Response Surface Methods (RSM) such as Central Composite Design (CCD) and Box-Behnken design for fitting a second order model. The incorporation of Design of Expert software version 7 or 8 in analyzing the chemical or biochemical process will make the students learning more effective. Finally, introduction to Taguchi approach to process optimization is discussed in brief.

Course Outcomes

1. Ability to discuss general principles of factorial design.
2. Ability to analyze and calculate analysis of variance and residual analysis model.
3. Ability to design and calculate for fitting first order and second order model using response surface methodology.

References

1. Douglas C.Montgomery, “Design and analysis of experiments, Fourth edition”, Wiley and sons inc., 1997.
2. Raymond H.Myers, Douglas C.Montgomery, “Response Surface Methodology, Process and product optimization using designed experiments”, John Wiley and sons inc., 1995.
3. Douglas C.Montgomery, George C.Runger, “Applied Statistics and probability for engineers fifth edition”, John Wiley and sons inc., 2011.

ERT 445/2
FINAL YEAR PROJECT 1

Course Synopsis

This is an individual research project in connection with a special engineering problem and under the guidance of an academic staff. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. In this subject, the students will be taught on how to prepare the research proposal. Besides that, student will be also exposed to earlier part of thesis writing such as introduction, literature review and methodology.

Course Outcomes

1. Ability to identify and create research objective also problem statement.
2. Ability to review information source then recognize, construct and justify the suitable research information.
3. Ability to report and perform the information in the form of dissertation format.
4. Ability to describe, explain and defend effectively in the form of proposal defends.

References

1. Donald H. McBurney and Theresa L. White, (2007). Research Methods, 7th Edition, Thomson Wadsworth.
2. Daniel Holtom & Elizabeth Fisher, (1999). Enjoy Writing Your Science Thesis or Dissertation, Imperial College Press.
3. Leo Finkelstein, Jr., (2008). Pocket Book of Technical Writing for Engineers and Scientist. 3rd Edition, McGraw Hill.
4. Acedemic Journals.

ERT 446/4
FINAL YEAR PROJECT 2

Course Synopsis

This is an individual research project in connection with a special engineering problem and under the guidance of an academic staff. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. In this subject, the students will be taught on how to discuss the research findings and determine the conclusion based on findings. In the end of this course, students will present the research findings and submit hardcover thesis.

Course Outcomes

1. Ability to identify the methodology of the research then organize and demonstrate experiments to collect research data.
2. Ability to choose the suitable research data and synthesize the data.
3. Ability to explain the data findings then describe, discuss and justify based on academic source.
4. Ability to originate, explain and defend effectively in the form of thesis requirement.

References

1. Pentz, M.and Shott,M,"Handling Experimental Data' Open University, Philadelphia.
2. Eisenberg, A., "Effetcive Technical Communication", Mc Graw-Hill, New York, 1991
3. Huckin, T., "Technical Writing and Professional Communication for Non-Native Speakers',Mc Graw-Hill, New York, 1991

ERT 452/3
VIBRATION

Course Synopsis

Introduction to the fundamental of vibration, Derivation of equation of motion. Principles of work-energy. Vibration of mechnical systems. Derivation of equivalent mass equation, rigidity and damping of mechanical systems. Vibration of free single-degree of freedom systems. Harmonic excitation of single-degree-of-freedom systems. Response of single-degree-of-freedom systems on the harmonic and periodic excitation. Vibration of transient single-degree-of-freedom systems. Derivation of equation of motion for single-undamped free vibration system. Multi-degree-of-freedom systems, Derivation of differential equation Newton's equation, Lagrange, matrix formulations, free-vibration of multi degree of freedom systems. Forced-vibration of multi-degree-of-freedom systems. String, beam and rod continuous vibration system, Rayleigh and Rayleigh-RTitz's rules. Application of finite element rules in vibration. Non linear vibration.

Course Outcomes

1. Ability to apply the knowledge of frequency analysis as applicable to rotating machinery and structural vibration.
2. Ability to apply on appreciate the various vibration modelling approaches applicable for Engineering systems.
3. Ability to apply vibration theory in post harvest handling and other biosystems.

References

1. W. J. Palm III. (2005). *Mechanical Vibration.* John Wiley & Sons.
2. L. Meirovitch. (2001). *Fundamentals of Vibration.* McGraw-Hill.
3. D. J. Inman. (2001). *Engineering Vibration.* Prentice-Hall.
4. S.G. Kelly. (2000). *Fundamentals of Mechanical Vibration.* 2nd ed. McGraw-Hill.
5. Thompson, W. (2004). Mechanical Vibration, John Wiley and Sons.

ERT 453/4
DESIGN OF MACHINE SYSTEM IN BIOSYSTEMS

Course Synopsis

Study of agricultural and other off-road machinery with special attention to the functional design requirements of various machine operations, cost analysis, machinery selection and testing. Topics 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, application of computer aided design and finite element method in design analysis. Interactions of machines with biological systems. Application of agricultural machinery for optimal selection, operation and performance, and management of farm machinery. Viz: Tractors, tillage, seeding, chemical application, biomass and grain/fruit harvesting.

Course Outcomes

1. Ability to appreciate and familiar to specialized components and analyses relevant to mechanized systems for production and processing of biological materials.
2. Ability to understanding the function of components within systems.
3. Ability to integrate machine and biological systems.
4. Ability to apply machine components in a variety of situations and will develop conceptual designs for some of the components.

References

1. W. L. Cleghorn. (2005). *Mechanics of Machines.* ISBN 10:0195154525.
2. Pennock, G.R. (2003). Theory of Machines and Mechanisms, Oxford University Press.
3. Low, K.H. (2003). Mechanics of Mechanisms, Prentice Hall.
4. Kenneth, J.W. and Gary, L.K. (2004). Kinematics, Dynamics of Machinery, 2nd Ed., John Wiley and Sons.
5. Robert, L. (2004). Design of Machinery, 3rd Ed., McGraw Hill.

ERT 454/3
CONTROLLED ENVIRONMENT DESIGN II

Course Synopsis

A professional course on engineering design and analysis of structures and environmental systems common to agricultural and commercial buildings. The course involves the two broad subject areas common to a Structures and Environment program of study. The first subject area consists of wood and concrete structural design, structural load estimation, introduction to applicable building codes, grain bin storage and fastener selection. The second subject area provides an introduction to thermal environmental engineering design appropriate for agricultural production facilities, including psychrometrics, heat transfer, ventilation and heating, air distribution within buildings, control systems, and thermal loads on facilities. Upon successful completion of this course, a student shall demonstrate engineering competence in: Structural design in agriculture, with emphasis on load estimation, light timber and concrete, granular materials storage, and fasteners. Psychrometrics, physical environment for animals and plants, design of thermal environment systems. Emphasis on plant and animal interaction with the building thermal environment. Heating, ventilating, cooling and interior air distribution.

Course Outcomes

1. Ability to apply basic structural engineering in planning and development of agriculture production systems under controlled environment.
2. Ability to design and evaluation of farm infrastructures, agriculture buildings, greenhouses and livestock housings.
3. Ability to analyse and synthesis the desicion making on the controlled environment, mechanization, automation and facility requirements of crop and livestock productions.
4. Ability to integrate controlled environment and natural biosystems.

References

1. Light Agricultural and Industrial Structures. 1988 Nelson, Manbeck and Meador. Van Nostrand Reinhold, NY; (2) Environment Control for Animals and Plants. 1990 Albright. ASAE Publications, MI.
2. Bartok, J. W. (2001). *Energy Conservation for Commercial Greenhouses*, NRAES, New York.
3. Ibrahim, D. (20023), *Microcontroller Based Temperature Monitoring & Control*, Newnes, Oxford.
4. Tiwari, G.N. (2003). *Greenhouse Technology for Controlled Environment*, Alpha Science, New York.
5. Ifeacor, E.C. and Jervis, B.W. (2002). Digital Signal Processing: A Practical Approach, 2nd Ed., Prentice Hall.

ERT 455/4
MANUFACTURING AND PRODUCTION OF BIOLOGICAL PRODUCTS

Course Synopsis

Studies basic systems used in food processing including facilities, power requirements, equipment for primary and secondary processes. The specific unit operations and equipment studies include pumps and blowers, heat exchangers, drying, freezing, absorption, distillation, size reduction, and mixing. Discusses materials of construction for food process equipment and the layout of plant equipment. Principle in produck development from bio-resources will be emphasis.

Course Outcomes

1. Ability to understand and apply the fundamental aspects of Good Manufacturing Practice (GMP) and their pertinent features.
2. Abilitly to analyse and design of machines and machine systems for production and processing of biological materials. Including Principles of Food and Feed processing equipment.
3. Ability to apply quality control procedure for production.

References

1. WHO GMP Guidelines.
2. CODEX Alimenterius – Guidelines for Standards, Switzerland. (2004). *Good Pharmaceutical Manufacturing Practice: Rational and Compliance*. John Sharp. John Sharp International, Woodley, BERKSHIRE, UK.

ERT 456/3
POST HARVEST ENGINEERING

Course Synopsis

Principles of size reduction, sorting and grading, dehydration, refrigeration, and air handling. Equipment and systems for materials handling, drying, and storage. Management of grain drying complex, fruits and vegetable product under local condition and related activities will be emphasis.

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.
3. 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

Advance study on instrumentation. Emphasis on selection of measurement techniques and transducers to sense physical properties of biological materials. Application to agricultural, food processing industries and biological system. Application of biosensors in biosystems. Design of automation system and machine/ gentry for biological system. Design project is required.

Course Outcomes

1. Analysis of transducers for on-line measurement and control of biological processes.
2. Wireless system for application farm management and biosystems.
3. Ability to apply of system analysis to biologically related problems.
4. Ability to use computer modeling and simulations optimization method, and decision support systems. Ability to do in silico study crop growth and interaction with variable parameters in system.

References

1. Considine, D.M. editor in chief. (1986). *Standard Handbook of Industrial Automation.* Chapman and Hall.
2. Warnock, I.G. (1986). *Programmable Controllers: Operation and Application.* Prentice-Hall.
3. Gupton, J.A. (1986). *Computer Controlled Industrial Machines Process and Robots.* Prentice-Hall.
4. Lansky, Z.J. et al. (1986). *Industrial Pnuematic Control.* Marcel-Dekker.
5. James A. Rehg. *Introduction to Robotics in CIM Systems.*
6. Dunn, Irving J. / Heinzle, Elmar / Ingham, John / Prenosil, Jiri E. (2003). *Biological Reaction Engineering Dynamic Modelling Fundamentals with Simulation Examples.* 2nd Edition, John Wiley.

PTT 401/6
FINAL YEAR PROJECT II

Course Synopsis

A short-termed research project that inclined towards engineering operations for producing new biotechnological products is necessary for a 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 mainly on fermentation, enzyme technology, bioconversion and natural products and nutraceuticals technologies.

Course Outcomes

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to present and defend effectively project proposal to selected audience.

4. Ability to identify commercialization potential for proposed project.

References

1. Lydersen, B. K., D'elia, N.A., and Nelson, K.L., (1994) Bioprocess Engineering: System, Equipment and Facilities. John Wiley and Sons, Inc., USA.
2. Stephanopolous, G., (1993) Biotechnology. Vol. 3 (Bioprocessing). VCH, Germany.
3. Andrew A. Signore and Terry Jacobs (2005). Good Design Practices for GMP Pharmaceutical Facilities. Taylor & Francis.
4. Anurag Singh Rathore, Gail Sofer, G. K. Sofer. (2005).Process Validation in Manufacturing of Biopharmaceuticals: guidelines, current practices, and industrial case studies. Taylor & Francis.
5. Vogel, H.C., and Tadaro, C.L. (1997). Fermentation and Biochemical Engineering Handbook: Principles, Process Design, and Equipment. 2nd Edition. Noyes Publications. New Jersey.

PTT 402/3
BIOTECHNOLOGY FACILITY DESIGN

Course Synopsis

This course gives complete overview on the biotechnology facilities design. Topics included in this course are the processing equipment, cleaning of process design and utilities system. This course also introduces current Good Manufacturing Practices (cGMP), regulatory features affecting process and building design and documentation for validation of biotechnology facilities.

Course Outcomes

1. Ability to discuss the current and future bioprocess facility based on industry demand.
2. Ability to apply cGMP regulations in biotechnology facility.
3. Ability to design a bioprocess facility, undertake problem identification and solution.

References

1. Lydersen, B. K., D'elia, N.A., and Nelson, K.L., (1994). Bioprocess Engineering: System, Equipment and Facilities. John Wiley and Sons, Inc., USA.
2. Stephanopolous, G., (1993) Biotechnology. Vol. 3 (Bioprocessing). VCH, Germany.
3. Andrew A. Signore and Terry Jacobs (2005). Good Design Practices for GMP Pharmaceutical Facilities. Taylor & Francis.
4. Anurag Singh Rathore, Gail Sofer, G. K. Sofer. (2005).Process Validation in Manufacturing of Biopharmaceuticals: guidelines, current practices, and industrial case studies. Taylor & Francis.
5. Vogel, H.C., and Tadaro, C.L. (1997). Fermentation and Biochemical Engineering Handbook: Principles, Process Design, and Equipment. 2nd Edition. Noyes Publications. New Jersey.

PTT 403/2
BIOTECHNOLOGY PRODUCTS COMMERCIALIZATION

Course Synopsis

The course covers on the current status in biotechnology research and commercialization aspects of biotechnology products. Students will also learn about current issues of patenting, intellectual property and licensing of biotechnology products as well as developing business plans to meet the market needs.

Course Outcomes

1. Ability to illustrate the commercial aspects of biotechnology products.

2. Ability to select a potential product and prepare a business plan for that particular product.
3. Ability to practice costing of biotechnology projects.

References

1. Journals of Biotechnology
2. Trends in Biotechnology
3. Lawton Robert Burns, The Business of Healthcare Innovation, Cambridge University Press, 2005
4. Shreefal S. Mehta. (2008). Commercializing Successful Biomedical Technologies: Basic Principles for the Development of Drugs, Diagnostics and Devices, Cambridge University Press.
5. Maureen D. McKelvey, Annika Rickne, Jens Laage-Hellman. (2004). The Economic Dynamics Of Modern Biotechnology, Edward Elgar Publishing.

PTT 404/3
BIOPHARMACEUTICAL TECHNOLOGY

Course Synopsis

This course attempts to provide a balanced overview of the biopharmaceutical industry, in terms of categorizing the products currently available, and also illustrating how these drugs are produced and brought to market. It focuses on several 'traditional' pharmaceutical substances isolated from biological sources, and recently developed biopharmaceutica products. Polypeptide-based therapeutic agents, and the potential of nucleic acid-based drugs, biopharmaceutical drug delivery, genomics and proteomics are also discussed.

Course Outcomes

1. Ability to categorize various biopharmaceuticals and illustrating how these drugs are produced and brought to market.
2. Ability to demonstrate production process of biopharmaceuticals.
3. Ability to evaluate the application of biotechnology in the development of biopharmaceuticals.

References

1. Walsh.G. (2003). Biopharmaceuticals: Biochemistry and biotechnology, John Wiley & Sons Lt.
2. Walsh, G. (2007). Pharmaceutical biotechnology: Concepts and Applications, John Wiley & Sons Ltd, Chichester, West Sussex , England.
3. Kathleen Laura Hefferon. (2009). Biopharmaceuticals in Plants: Toward the Next Century of Medicine, CRC Press.
4. Jörg Knäblein. (2005) Modern Biopharmaceuticals: Design, Development and Optimization, Wiley-VCH.
5. Feroz Jameel, Susan Hershenson. (2010). Formulation and Process Development Strategies for Manufacturing Biopharmaceuticals Wiley,.

PTT 405/3
BIOREMEDIATION

Course Synopsis

This course attempts to provide a balanced overview of the bioremediation. The topic s that covered in this courses are: type sources of contamination and pollution, bioremediation technologies in for soil and water, Types of bioremediation technologies, bioremediation of solid, liquid and gas phase and the last one is case studies for bioremediation.

Course Outcomes

1. Ability to analyze and distinguish the type of bioremediation.
2. Ability to illustrate and solve the design consideration on each type of bioremediation.

References

1. Ronald L. Crawford, et al (2005) Bioremediation: Principles and Applications (Biotechnology Research). Cambridge University Press; 1 edition.
2. Ronald M. Atlas, Jim Philp. (2005). Bioremediation: Applied Microbial Solutions for Real-World Environment Cleanup, ASM Press.
3. Environmental Biotechnology: Theory and Application, Gareth M. Evans, Judith C. Furlong, WILEY,2002
4. Shree N. Singh. (2006) Environmental Bioremediation Technologies, Springer.
5. Dennis M. Filler, Ian Snape, David L. Barnes. (2008) Bioremediation of Petroleum Hydrocarbons in Cold Regions, Cambridge University Press.

PDT476/6 FINAL YEAR PROJECT 2

Course Synopsis

A short-term research project in engineering operations for producing agricultural systems and technologies, including research writing and presentation of the research outcome in the form of thesis and seminar.

Course Outcomes

1. Ability to apply and integrate theory and practical to solve the engineering problem.
2. Ability to develop suitable research methodology for the project.
3. Ability to present and defend effectively project proposal to selected audience.
4. Ability to evaluate the commercialization potential for proposed project

References

1. Buku Panduan Projek Tahun Akhir UniMAP

PDT477/3 POST-HARVEST TECHNOLOGY

Course Synopsis

This course introduces the overview of post-harvest handling technology of selected commodities that emphasizes on the basic of pre-harvest, harvest factors and post harvest handling technology fresh production, post-harvest treatment and processing, packaging operation and appropriate equipment, post harvest pest management, quality assurance and preparation of fresh cuts, and socio-economics of post harvest.

Course Outcomes

1. Ability to analyze the physical properties of agricultural products in order to apply the appropriate post-harvest handling technology.
2. Ability to distinguish the packaging operation and propose the appropriate equipment for handling this operation.
3. Ability to differentiate the preharvest and harvest factors that affects on postharvest quality.

References

1. Ofelia,K.B and Elda,B.E. (2010). Postharvest Technology for Southeast Asian Perishable Crop, Second Edition, Philippines.
2. Chakraverty,A. (2006). Handbook of post-harvest technology: Cereals, Fruits, Vegetables, Tea and Spice, Marcel Dekker
3. Wills, R.B.H, Mc Glasson and Graham, (2007). Post Harvest and Introduction to the Physiology and Handling of Fruit, Vegetable and Ornamentals, University of New Jersey Word Press
4. Kays, S.J. (1998). Postharvest Physiology of Perishable Plant Products, CBC pub. New Delhi.
5. Knee,M. 2002. Fruit quality and Its Biological Basis. Sheffield Academic Press. UK.

PDT478/3
AGRICULTURAL WASTE MANAGEMENT AND UTILIZATION ENGINEERING

Course Synopsis

This course covers the agricultural sources of pollution (pesticides, commercial fertilizer, on-farm food processing wastes and animal manure) and their effect on the environment. Physical, chemical and biological properties of agricultural waste materials, treatment processes of agricultural wastes, methods of land application of agricultural wastes, and technologies for utilization of agricultural wastes for biogas production and animal feed.

Course Outcomes

1. Ability to recommend suitable physical, chemical and/or biological treatment of industrial and agricultural organic wastes.
2. Ability to design systems for the collection, handling, treatment and utilization of wastes.
3. Ability to propose suitable utilization technique for agricultural waste and wastewater to sustain an environmental

References

1. Liu, S. 2007. Food and Agricultural Wastewater Utilization and Treatment, Wiley-Blackwell.
2. Inc, M. E., Tchibanoglous, G. Burton, F.L. Stensel, H.D. 2003. Wastewater Engineering: Treatment, Disposal and Reuse 4th Edition. McGraw Hill,New Delhi.
3. Unger, P.W., 1994. Managing Agricultural Residues. Lewis Pub., USA.
4. William, T.P., 2005. Waste Treatment and Disposal. 2nd Edition, John Wiley, England.
5. Hammer, M.J and Hammer M.J Jr, 2008. Water and Wastewater Technology 6th Edition in SI Unit, Prentice Hall, Upper Saddle River, NJ.

PDT479/3
BIO-RENEWABLE SYSTEMS (Elective)

Course Synopsis

An in-depth introduction to bio-renewable concepts in relation to converting bio-renewable resources into bio-energy, bio-based products, feedstock production, economics, logistics and marketing of products and co-products.

Course Outcomes

1. Ability to differentiate biorenewable resources.
2. Ability to compare and contrast the products, co-products, production processes, economics and marketing of bio-renewable resources.
3. Ability to analyze conversion of bio-renewable resources into bio-energy and bio-based products.

References

1. Brown, R.C. and Stevens, C. (eds). 2011. Thermochemical Processing of Biomass: Conversion into Fuels, Chemicals and Power. Willey. New York.
2. Blaschek, H.P., Ezeji, T. and Scheffran, J. 2010. Biofuels from Agricultural Wastes and Byproducts. Wiley-Blackwell. New York.
3. Clark, J.H., E. Fabien and Deswarte, I. 2008. Introduction to Chemicals from Biomass. Wiley. New York.
4. Dewulf, J. and Langenhove, H.V. (eds). 2006. Renewables-Based Technology: Sustainability Assessment. Wiley. New York.
5. Zatzman, G. 2011. Sustainable Energy Pricing. Wiley. New York.

PDT480/3
FOOD PROCESSING ENGINEERING (Elective)

Course Synopsis

This course covers multidisciplinary field of applied physical sciences that combines science and engineering education for food and related industries. Topics covered include introduction to food engineering, fluid flow theory, heating and cooling processes for foods, thermal processes, food freezing and freeze concentration, evaporation and freeze concentration, food dehydration, filtration, sedimentation and centrifugation, membrane process, extrusion and cleaning and sanitation.

Course Outcomes

1. Ability to categorize the appropriate physical characteristic according to food processing.
2. Ability to differentiate the principles of food engineering operations.
3. Ability to analyze the problem that involved in food engineering operations and propose the solutions.

References

1. Singh, R. P. Heldman, D.R. (2009). Introduction to Food Engineering. 4th ed. Academic Press. Elsevier.
2. Heldman, D. R. and Singh, R. P. (1981). Food Process Engineering. AVI Publishing Co. Westport, CT.
3. Toledo, R.T. (2007). Fundamental of Food Process Engineering. 3rd ed. Aspen Publisher. New York.
4. P.G. Smith.(2011). Introduction to Food Process Engineering, 2nd Ed. Springer. New York.
5. Shafiur Rahman (2009). Food Properties Handbook, 2nd Ed., CRC Press. Boca Raton, FL.

PDT481/3
ADVANCES IN AGROTECHNOLOGY (Elective)

Course Synopsis

This course covers inventions, achievements, acceptance and challenges in the use of modern agricultural technologies to increase yield and quality of agricultural produce with emphasis on the application, transfer and management of technologies that regulate crop and soil quality in relation to social, technical and environmental conditions.

Course Outcomes

1. Ability to apply modern technologies in the production, handling and processing of agricultural products.
2. Ability to distinguish modern agricultural technologies that would improve quantity and quality of agricultural products.
3. Ability to experiment with new technologies and alternative solutions in agricultural production.

References

1. Burton, L.D. 1998. Agriscience and Technology. Thompson & Delmar Learning, NY.
2. Burton, L.D. 2002. Agriscience: Fundamentals and Application, Thompson & Delmar Learning, NY
3. Yeoshua, S. B. 2005. Environmentally Friendly Technologies for Agricultural Produce Quality. Boca Raton, FL: Taylor & Francis.
4. Field, H. L. and Solie, J. 2007. Introduction to Agricultural Engineering Technology: A Problem Solving Approach. New York, NY: Springer.
5. Prevost, P. 1997. Fundamentals of modern agriculture. Science Publisher Inc., New Hampshire.

PDT482/3
FOOD AND HERBAL CROP PRODUCTION TECHNOLOGY (Elective)

Course Synopsis

This course covers crop production practices of important food crops (paddy, maize/corn, sweet potato and cassava) in meeting the energy requirements and ensuring food security and food safety as well as selected herbal crops with pharmaceutical/nutraceutical/ medicinal properties

Course Outcomes

1. Ability to distinguish appropriate crop production technology.
2. Ability to apply good agricultural practices in food and herbal crop production.
3. Ability to select new technology to increase yield.

References

1. Hillocks, R.J.,Thresh, J.M. and Belloti, A. 2002. Cassava: Biology, production and utilization. CABI Publication, Oxford.
2. Oztekin, S. and Martinov, M. 2007. Medicinal and aromatic crops: harvesting, drying and processing. CRC Press, NY
3. Manrique, L.A. 1998. Sweet potato: Production principles and practices. Manrique International Agrotech, Honolulu.
4. Smith, C.W., Betran, J. and Runge, E.C.A. 2004. Corn: Origin, history, technology and production. Wiley, New Jersey.
5. Smith, C.W. and Dilday, R.H. 2002. Rice: origin, history, technology and production. Wiley, New Jersey.

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

PROGRAMMES OFFERED:

- Bachelor of Engineering (Honours) (Environmental Engineering)
- Bachelor of Engineering (Honours) (Building Engineering)
- M.Sc (Environmental Engineering)
- M.Sc (Building Engineering)
- PhD (Environmental Engineering)

ADDRESS:

Pusat Pengajian Kejuruteraan Alam Sekitar,
Universiti Malaysia Pelis,
Kompleks Pusat Pengajian Jejawi 3,
02600 Arau, PERLIS
Tel : 04- 9798626
Fax: 04- 9798636

Introduction

The School of Environmental Engineering (PPKAS) was established in January 2006 after approval from the Ministry of Higher Education on 27 October 2005. The environmental engineering programme was first offered in the 2006/2007 academic session. A total of 30 students enrolled into this programme at that time. The first cohort from Environmental Engineering graduated in August 2010.

In line with the national industrial growth, the School of Environmental Engineering currently offers two bachelor degree programmes i.e. Bachelor of Engineering (Honours) (Environmental Engineering) and Bachelor of Engineering (Honours) (Building Engineering). The Vision and Mission of School of Environmental Engineering are stated below:

Vision
An internationally recognized academic programme.

Mission
To support national industrial aspiration towards environmental protection.

Staff Directory

DEAN
ASSOCIATE PROFESSOR DR. KHAIRUL NIZAR BIN ISMAIL
E-mail : nizar@unimap.edu.my

DEPUTY DEAN (ACADEMIC AND RESEARCH)
DR. NASRUL BIN HAMIDIN
E-mail : nasrulhamidin@unimap.edu.my

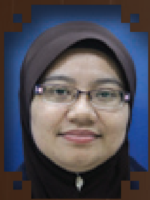
DEPUTY DEAN (STUDENT DEVELOPMENT AND ALUMNI)
MR. SALSUWANDA BIN SELAMAT
E-mail : salsuwanda@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (ENVIRONMENTAL ENGINEERING)
DR. TENGKU NURAITI BINTI TENGKU IZHAR
E-mail : nuraiti@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (BUILDING ENGINEERING)
MRS. NORLIA BINTI MOHD IBRAHIM
E-mail : norlia@unimap.edu.my

CHIRPERSON FOR POSTGRADUATE PROGRAMME
DR. FAHMI MUHAMMAD RIDWAN
E-mail : drfahmi@unimap.edu.my

COORDINATOR FOR INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
DR. IRNIS AZURA BINTI ZAKARYA
E-mail : irnis@unimap.edu.my



ASSISTANT REGISTRAR
MS. NORREN SHARIZA BINTI MOHAMED MOKHTAR
E-mail : norren@unimap.edu.my

Lecturers

**Associate Professor Dr.
Khairul Nizar Ismail**
PhD (USM)
M.Sc. Building Tech. (USM)
BSc. HBP, (USM)
Tel : 04- 9798630
Fax : 04-9798636
e-mail : nizar@unimap.edu.my

**Associate Professor Ir.
Shuib Sahudin**
M.Sc.(Mechanical Eng)(Univ. College of Swansea),
B.Sc.(Mechanical Eng)(Sunderland Univ.),
Dip in Mechanical Eng (UTM)
MIEM, P.Eng., APEC Eng., IntPE (MY)
e-mail : shuibmie@unimap.edu.my

Dr. Fahmi Muhammad Ridwan
PhD.(Env.Eng.),
M.Eng.(Env.)(Hiroshima),
B.Eng.(Chem.)(Sumatera Utara)
Tel : 04-9798981
e-mail : drfahmi@unimap.edu.my

Dr. Ong Soon An
PhD. (Env.Eng)(Oita University,Japan),
MSc,BSc. (USM)
Tel : 04-9798986
e-mail : saong@unimap.edu.my

Dr. Nasrul Hamidin
PhD (Griffith Univ., Australia),
Master of Industrial Safety Management (UKM),
BSc (Environment) (UPM)
Tel : 04-9798640
e-mail : nasrulhamidin@unimap.edu.my

Dr. Tengku Nuraiti Tengku Izhar
PhD (Solid Waste Management) (USM)
MSc (Env Eng)(USM),
BEng (Mineral Resources)(USM)
Tel : 04-9798987
e-mail : nuraiti@unimap.edu.my

Dr. Irnis Azura Zakarya
PhD (Solid Waste Management) (USM)
MSc (Env Eng)(USM),
BEng (Mineral Resources)(USM)
Tel : 04-9797769
e-mail : irnis@unimap.edu.my

Dr. Umi Fazara Md Ali
PhD (Chem Eng) (Imperial College),
M.Eng.(Seperation Tech.)(UM),
B.Eng.(Chem Eng.)
Tel : 04-9798993
e-mail : umifazara@unimap.edu.my

Dr. Farrah Aini Dahalan
M.Sc.(Mineral Resources)(USM)
B.Eng.(Mineral Resources),
Tel : 04-9798985
e-mail : farrahaini@unimap.edu.my

Dr. Sara Yasina Yusof
M.Sc.(Mineral Resources)(USM)
B.Eng.(Mineral Resources),
Tel : 04-9798979
e-mail : sarayasina@unimap.edu.my

**Ir Muhammad Arkam
Che Munaaim**
MSc. Building Technology (USM)
B. Eng. (Electrical) (UTM)
Dip. Elec. Engineering (Power) (UTM)
Tel : 04-9798988
e-mail : arkam@unimap.edu.my

Mrs. Masitah Hasan
M.Sc. (Chem.)(USM)
B.Eng (Chem),
Tel : 04-9798804
e-mail : masitah@unimap.edu.my

Mr. Md. Hadli Abu Hasan
M.Sc.(Civil Eng.),
B.Eng.(Civil),
Dip. In Civil Eng.(UiTM)
Tel : 04-9798973
e-mail : mdhadli@unimap.edu.my

Mrs. Norlia Mohamad Ibrahim
M.Sc.(Env.Eng.)
B.Eng.(Civil),(USM)
Tel : 04-9798980
e-mail : norlia@unimap.edu.my

**Mrs. Nor Wahidatul Azura
Zainon Najib**
M.Eng.(Env)(UKM)
B.Eng.(Mineral Resources)(USM)
Tel : 04-9798970
e-mail : norwahidatul@unimap.edu.my

Miss Nur Liza Rahim
M.Eng.(Civil Eng.),
B.Eng.(Civil Structural)(UKM)
e-mail : nurliza@unimap.edu.my

Mrs. Roshazita Che Amat
M.Sc.(Mineral Resources)(USM)
B.Eng.(Mineral Resources)
Tel : 04-9798976
e-mail : roshazita@unimap.edu.my

Mr. Salsuwanda Selamat
M.Eng.(Env.)(UPM),
B.Eng.(Chem)(UTM)
Tel : 04-9798977
e-mail : salsuwanda@unimap.edu.my

Mrs. Syakirah Afiza Mohammed
M.Sc. Civil Eng (Mineral Resources)(USM)
B.Eng.(Mineral Resources)
Tel : 04-9798514
e-mail : syakirahafiza@unimap.edu.my

Ms. Zaity Syazwani Mohd Odli
M.Eng. Civil Eng. (Environmental Management)(UTM)
B.Sc.(Remote Sensing) (UTM)
Tel : 04-9798587
e-mail : zaity@unimap.edu.my

Mrs. Shamshinar Salehuddin
M.Sc.(Mineral Resources)(USM)
B.Eng.(Mineral Resources)
e-mail : shamshinar@unimap.edu.my

Ms. Wan Amiza Amneera Wan Ahmad
M.Sc.(Mineral Resources)(USM)
B.Eng.(Mineral Resources)
Tel : 04-9798999
e-mail : amneera@unimap.edu.my

Mr. Mohd Zulham Affandi Mohd Zahid
M.Sc.(Civil Eng.) (USM)
B.Eng.(Civil Eng) (USM)
Tel : 04-9798587
e-mail : mohdzulham@unimap.edu.my

Mr. Zuhayr Md. Ghazaly
M.Eng.(Civil Eng)(UKM)
B.Eng.(Civil and Structure Eng.) (UKM)
Tel : 04-9798972
e-mail : zuhayr@unimap.edu.my

Mr. Mohd Faiz Mohammad Zaki
M.Eng.(Geotechnics)(UTM)
B.Eng.(Civil)(UTM)
e-mail : faizzaki@unimap.edu.my

Mr. Mustaqqim Abdul Rahim
MSc (Structural Eng and Constructions)(UPM)
BEng (Civil Eng)(UNIMAS)
e-mail : mustaqqim@unimap.edu.my

Mrs. Farah Naemah Mohd Saad
M.Sc.(Mineral Resources)(USM)
B.Eng.(Mineral Resources),
Tel : 04-9798598
e-mail : farahnaemah@unimap.edu.my

Vocational Training Officers

Mr. Razi Ahmad
MSc (Env Eng)(UniMAP), B.Eng (Chem) (UKM)
e-mail : razi@unimap.edu.my

Mr. Nazerry Rosmady Rahmat
B.Eng (Civil) (UTM)
Tel : 04-9798808
e-mail : nazerry@unimap.edu.my

Mr. Roshasmawi Abdul Wahab
B.Eng (Civil) (UTM)
Tel : 04-9798805
e-mail : roshasmawi@unimap.edu.my

Mr. Munif Bahatin
B.Eng (Civil) (UTM)
Tel : 04-9798801
e-mail : munifbahatin@unimap.edu.my

Mrs. Siti Hasmah Abd. Hamid
B.Eng.(Civil)(UKM)
Tel : 04-9798804
e-mail : sitihasmah@unimap.edu.my

Mr. Mokhzani Khair Ishak
B.Eng(Material Eng)(UniMAP)
Tel : 04-9797751
e-mail : mokhzani@unimap.edu.my

Mrs. Zuraini Mohamad Ideris
B.Eng.(Biochemical Eng.)(UKM)
Tel : 04-9798814
e-mail : zuraini@unimap.edu.my

Mr. Mohd Affandi Deraman
B.Eng.(Chemical)(UiTM)
Tel : 04- 9798801
e-mail : mohdaffandi@unimap.edu.my

Mr. Ahmad Faizal Mansor
B.Eng (Civil)(UiTM)
Tel : 04- 9794572
e-mail : faizalmansor@unimap.edu.my

Mrs. Nurul Huda Hashim
B.Eng.(Material Eng.),UniMAP
Tel : 04- 9797702
e-mail : nurulhuda@unimap.edu.my

Study Leave

Mr. Saiful Azhar Bin Saad
M.Sc.(Env. Eng.)(UPM), B.Eng(Hons)(Chemical)
e-mail : saifulazhar@unimap.edu.my

Mr. Ragunathan a/l Santiagoo
MSc (Env. Eng)(USM), B.Tech (Env), Cert. (Pub. Health)
e-mail : raguna@unimap.edu.my

Mr. Abdul Haqi Ibrahim
M.Sc (Env. Eng) (USM) ,B.Eng (Mineral Resources)
e-mail : abdulhaqi@unimap.edu.my

Miss Mahyun Ab. Wahab
M.Sc (Civil Eng.), B.Eng (Hons) (Civil Eng) (USM)
e-mail : mahyun@unimap.edu.my

Mrs. Norazian Mohamed Noor
M.Sc (Env. Eng), B.Eng (Chem. Eng) (USM)
e-mail : norazian@unimap.edu.my

Mr. Wan Mohd Sabki Wan Omar
M.Eng (Construction Eng.) (AIT), B.Eng (Civil Eng.) (UTM)
e-mail : wansabki@unimap.edu.my

Mrs. Ayu Wazira Azhari
M.Sc (Env Mgt) (UKM), B.Eng (Mineral Resources) (USM)
e-mail : ayuwazira@unimap.edu.my

Mrs. Naimah Ibrahim
M.Sc (Env. Eng), B.App. Sc (Analytical Chem). (USM)
e-mail : naimah@unimap.edu.my

Ms. Azlinda Abdul Ghani
M.Sc Env. (UPM),B.Tech Env. (USM)
e-mail : azlindaghani@unimap.edu.myr

Mrs. Nor Ashikin Ahmad
MSc (Queensland), BSc (Env) (UMS)
e-mail : ashikinahmad@unimap.edu.my

Mr. Umar Hassim
MSc (Town Planning)(USM), BSc (HBP)
e-mail : umar@unimap.edu.my

Mr. Khairuddin Md Isa
MSc (Env)(UPM), BEng (Bioproses) (UTM)
e-mail : khairudin@unimap.edu.my

Mrs. Roslaili Abdul Aziz
MSc (Env Eng)(USM), BSc (Env Tech)(UMT)
e-mail : roslaili@unimap.edu.my

Mrs. Salwa Mohd Zaini Makhtar
MSc (Env Eng)(USM), BEng (Civil)
e-mail : salwa@unimap.edu.my

Mr. Wong Yee Shian
MSc (Env Tech)(USM), BTech (Env)
e-mail : yswong@unimap.edu.my

Mrs. Nabilah Aminah Lutpi
MEng (Env)(Queensland), BEng (Env)(UM)
e-mail : nabilah@unimap.edu.my

Mrs. Ain Nihla Kamarudzaman
MEng (Civil-wastewater)(UTM), BEng (Civil)
e-mail : ainihla@unimap.edu.my

Mr. Che Zulzikrami Azner Abidin
B.Eng (Process) (UPM)
e-mail : zulzikrami@unimap.edu.my

Mr. Fatmawati Abdul Wahid
e-mail : fatmawati@unimap.edu.my

Mrs. Liyana Ahmad Sofri
B. Eng. (Civil)(UTM)
e-mail : liyanasofri@unimap.edu.my

Technicians

Mr. Andi Julaini Jasni
Tel : 04-9798812
e-mail : andijulaini@unimap.edu.my

Mr. Mohd Shukri Mohd Soid
Tel : 04-9797721
e-mail : mohdshukri@unimap.edu.my

Mr. Mohamad Zahir Hanafi
e-mail : zahirhanafi@unimap.edu.my

Mr. Syed Ahmad Rizman Syed Kamel
Tel : 04-9797721
e-mail : rizman@unimap.edu.my

Administrative Staffs

Ms. Norren Shariza Mohamed Mokhtar
Penolong Pendaftar
Tel : 04-9798629
e-mail : norren@unimap.edu.my

Mrs. Rushaniza Idawaty Ruslan
Pembantu Tadbir Kesetiausahaan
Tel : 04- 9798626
e-mail : rushaniza@unimap.edu.my

Mrs. Suzyyana Saafi Soo
Pembantu Tadbir Kewangan
Tel : 04-9798627
e-mail : suzy@unimap.edu.my

Mr. Ahmad Nazrin Hashim
Pembantu Tadbir Perkeranian dan Operasi
Tel : 04-9798628
e-mail : nazrihashim@unimap.edu.my

Mr. Mohd Shukri Ardzmi
Pembantu Am Pejabat
Tel : 04-9798628
e-mail : mshukri@unimap.edu.my

PEO Bachelor of Engineering (Environmental Engineering)

PEO1
Graduates are leaders in the field of environmental engineering or chosen field as demonstrated through career advancement

PEO2
Graduates who are members and contribute to professional society

PEO3
Graduates pursue continuing education opportunities

PEO4
Graduates make contributions through research and development

PEO5
Graduates who are entrepreneur

PO Bachelor of Engineering (Environmental Engineering)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in an environmental engineering discipline.

PO2
Ability to identify, formulate and solve engineering problems.

PO3
Ability to design a system, component or process to meet desired needs.

PO4
Ability to design and conduct experiments, as well as to analyze and interpret data.

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

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

PO7
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO8
Understanding of professional and ethical responsibilities and commitment to the community.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively.

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

Bachelor of Engineering (Honors) (Environmental Engineering)
Academic Session (2012/2013)

Year	First					Third			Fourth	
Semester	I	II		III	IV	V	VI		VII	VIII
ENGINEERING CORE	EET 103/4 Electrical Technology	EKT 120/4 Computer Programming	ECOLOGICAL CAMP	EAT 213/4 Fluid Mechanics and Hydrawlics	EAT 237/3 Water Supply Engineering	EAT 301/4 Air Pollution Engineering	EAT 342/3 Noise Pollution Engineering	EIT302/4 INDUSTRIAL TRAINING	EAT XXX/3 Elective I	EAT 433/3 Environmental Engineering Design
	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
	EAT 102/4 Mechanics and Material Engineering	EAT 104/4 Fundamental of Chemical Eng Processes		EAT 232/3 Fundamental of Environmental Engineering	EAT 235/3 Geo environmental Engineering	EAT 341/3 Solid and Hazardous Waste Engineering	EAT 344/3 Environmental Management System		EAT 461/2 Environmental Remediation	EAT463/3 Project Engineering Management
		ECT 112/3 Eng Skills		EAT 233/3 Environmental Engineering Skills		EAT 332/3 Environmental Impact Assessment	EAT 345/3 Hydrology		EAT461/2 Final Year Project I	
							EAT 346/4 Mass Transfer			
NON ENGINEERING	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II		EQT203/3 Engineering Mathematics III	EQT 271/3 Engineering Statistic					EUT440/2 Engineers in Society
	EUT 122/2 Skills and Technology in Communication									
UNIVERSITY REQUIREMENTS	EUW XXX/1 Co-curriculum			UUW 224/2 Engineering Entrepreneurship	UUW 223/2 University English	UUW 233/2 Islamic and Asian Civilizations	UUW 322/2 Thinking Skills			UUW 235/2 Ethnic Relations
					UUW 114/2 University Malay Language				UUWXXX/2 Option Subject	
135	18	18		18	16	16	18	4	13	14
TOTAL UNITS FOR GRADUATION IS 135										

ELECTIVES COURSES:

EAT XXX
SUBJECT WITH LABS

EATXXX
SUBJECTS WITHOUT LABS

EAT 447/3 Environmental Informatics, EAT 443/3 Built Environment,
EAT 449/3Environmental Process Control & Instrumentation, EAT 445/3 Remote Sensing

PEO Bachelor of Engineering (Building Engineering)

PEO1
Graduates are leaders in the field of building engineering or chosen field as demonstrated through career advancement

PEO2
Graduates who are members and contribute to professional society

PEO3
Graduates pursue continuing education opportunities

PEO4
Graduates make contributions through research and development

PEO5
Graduates who are engineers and demonstrate entrepreneurial skills

PO Bachelor of Engineering (Building Engineering)

PO1
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in building engineering discipline.

PO2
Ability to identify, formulate and solve engineering problems.

PO3
Ability to design a system, component or process to meet desired needs.

PO4
Ability to design and conduct experiments, as well as to analyze and interpret data.

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

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

PO7
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO8
Understanding of professional and ethical responsibilities and commitment to the community.

PO9
Ability to function on multi-disciplinary teams.

PO10
Ability to communicate effectively.

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

Bachelor Of Engineering (Honors) (Building Engneering)
Academic Session (2012/2013)

YEAR	FIRST			SECOND		THIRD			FOURTH	
SEMESTER	I	II		III	IV	V	VI		VII	VIII
ENGINEERING CORE	EET 103/4 Electrical Technology	EKT 120/4 Computer Programming	GEOMATIC CAMP	**EAT 251/3 Structural Theory**	**EAT258/3 Building Material Engineering**	**EAT 314/4 Geotechnical Engineering**	EAT 358/3 Highway & Traffic Engineering	EIT 302/4 INDUSTRIAL TRAINING	EAT XXX/3 Elective I	EAT XXX/3 Elective II
	EAT 102/4 Mechanics and Material Engineering	**EAT 113/4 Mechanics of Materials**		**EAT 252/4 Fluid Mechanics & Engineering**	EAT 208/3 Environmental Law, Health and Safety	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
	EAT151/3 Introduction to Building Engineering	**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	EAT 451/4 Integrated Design Project
		ECT 112/3 Eng Skills		**EAT 250/3 Building Engineering Skills**	**EAT 257/3 Building Services Engineering**	**EAT 356/4 Water & Wastewater Engineering**	**EAT 352/3 Concrete Building Design II**			
						EAT 375/3 Construction Management				
NON ENGINEERING	EQT 101/3 Engineering Mathematics I	EQT 102/3 Engineering Mathematics II		EQT 203/3 Engineering Mathematics III	EQT 271/3 Engineering Statistics					
	EUT 122/2 Skills and Technology in Communication								UUW 233/2 Islamic and Asian Civilizations	EUT XXX/2 Engineers in Society
UNIVERSITY REQUIRED	EUW XXX/1 Co-curriculum				UUW 223/2 University English		UUW 322/2 Thinking Skills			UUW 235/2 Ethnic Relations
							UUW 114/2 University Malay Language		UUW XXX/2 Option Subject	
									UUW 224/2 Engineering Entrepreneurship	
135	17	18		17	17	17	16	4	14	15
	Total Units for Graduation 135									

EAT XXX
SUBJECT WITH LABS

EATXXX
SUBJECTS WITHOUT LABS

Elective Courses:
Elective I : EAT454/3 Timber and Masonry Design OR EAT456/3 Foundation Engineering
Elective II: EAT 411/3 Advanced Concrete Building Design OR EAT 414/3 Construction Methods & Control
Elective III: EAT 453/3 Advanced Structural Analysis OR EAT 415/3 Advanced Steel Building Design

Course Syllabus

EAT101/4
BASIC ECOLOGY

Course Synopsis

Definition of ecology, ecosystems and component of basic ecology. Energy flow in ecosystems; Organism, environmental and food chain; Physical Environment; Population characteristic, population growth, factors in population growth, competition among species, symbiosis, relationship between human and nature of population; Community structure, dominant species comparison, community process development, community equivalent and parasitism; Global Environmental Changes.

Microbiology : Introduction, soil formation and composition, microbial ecology
Microorganisms : Culturing and staining methods for identification of microorganisms; microorganisms in the environment: eucaryotes and procaryotes, viruses, bacteria, viruses, algae, fungi, protozoa and worms; and microorganisms based on the sources of energy and carbon.
Biochemistry : biochemical pathways used by microorganisms for oxidation of carbohydrates, proteins, and fats in order to obtain energy for their life processes; i.e. *Embden-Meyerhof-Parnas* pathway; Tricarboxylic Cycle; Concept of energy; ADP and ATP; Aerobic and anaerobic metabolism; and principal microbial oxidation and reduction reactions.

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 biochemistry and metabolism pathways of microorganisms in water and wastewater treatment.

CO5:
Ability to describe the basic concepts of soil composition and metabolism pathways of microorganisms in soil.

References

1. Smith T.M. & Smith R.L.,*Elements of Ecology*, 6 th Edition. Pearson, 2006
2. David, E.V., *Environmental Biology for Engineer* and Scientist, Wiley. 2005.
3. Eugene Odum, Richard Brewer, Gary W. Barrett, Fundamentals of Ecology,
4. Ecology: From Individuals to Ecosystems Michael Begon Colin R. Townsend, John L. Harper
5. Peter Cotgreave, Irwin Forseth, Introductory ecology, Wiley-Blackwell, 2002

EAT102/4
MECHANICS AND MATERIAL ENGINEERING

Course Synopsis

Mechanics statics: Force Vector, Equilibrium of a particle, Friction, Properties of Sections: Center of Gravity and Centroid, Properties of Sections: Moment of Inertia. Mechanics dynamics: Kinematics of a Particle, and Kinetic of a Particle: Force and Acceleration, Work and Energy, Impulse and Momentum. Material: Introduction to Material Science and Engineering, The Structure of Crystalline Solids, Mechanical Properties of Metal, Phase Diagram

Labs

1. Equilibrium of beam
2. Tensile test
3. Rockwell Hardness Test

Course Outcomes

CO1:
Ability to add forces and resolve them into components using Parallelogram Law as well as Cartesian Vector

CO2:
Ability to solve particles and rigid body equilibrium problems using the equations of equilibrium

CO3:
Ability to draw shear force and bending moment diagram

CO4:
Ability to solve problems which relate to kinetic of a particle

CO5:
Ability to explain basic concepts of material strength as well as their mechanic properties

References

1. Hibbeler, R.C. Engineering Mechanics Statics. 12th Ed. , Prentice Hall, 2010.
2. Peter Schiavone, Hibbeler, R.C. Engineering Mechanics Statics Study Pack. 12th Ed. , Prentice Hall, 2010.
3. Hibbeler, R.C. Engineering Mechanics Dynamics. 12th Ed. , Prentice Hall, 2010.
4. Peter Schiavone, Hibbeler, R.C. Engineering Mechanics Dynamics Study Pack. 12th Ed. , Prentice Hall, 2010.
5. William D. Callister, Jr. Material Science and Engineering An Introduction, 5th Ed, 2000.

EAT104/4
FUNDAMENTAL OF CHEMICAL ENGINEERING PROCESSES

Course Synopsis

Introduction to chemical engineering calculation, process variables and material balance.
Introduction to chemical process engineering: Dimensions, units and conversions, process and process variables, process flow diagram and PID diagram, chemical compositions, temperature and pressure measurements, chemical reaction terminology and applications (stoichiometry, limiting reactant, % excess reactant, degree of conversion), process material balance calculation, recycling, bypassing and combustion reaction.

Energy balances
Form of energy, first law of thermodynamics, kinetic and potential energy, energy balance on closed and open system, Steam tables. Balance on nonreactive and reactive processes. Introduction to heat transfer.

Labs

1. HYSIS software for material balance
2. Temperature measurement
3. Heat conduction
4. Free and forced convection
5. Radiation

Course Outcomes

CO1:
Ability to understand, and solve problems related to all engineering calculation.

CO2:
Ability to understand, explain and solve problems on material balances.

CO3:
Ability to understand, explain the theory and solve calculation on energy balances and heat transfer.

References

1. Felder, RM and Rousseau, RW. (2000). *Elementary Principles of Chemical Processes*. 3rd Edition. : Wiley.
2. Himmelblau DM.(1996). *Basic Principles and Calculations in Chemical Engineering*. 6th Edition: Prentice-Hall.
3. Himmelblau , D.M.and Riggs, J.B. (1998) *Basic Principles and Calculations in Chemical Engineering.* 7th Ed.: Prentice Hall.
4. Jacob A. Moulijn, Michiel Makkee, Annelies van Diepen, Chemical process technology, John Wiley and Sons, 2001

5. Teh Fu Yen, Chemical processes for environmental engineering, Imperial College Press, 2007

EAT131/4
ENVIRONMENTAL CHEMISTRY

Course Synopsis

General chemistry
Stoichiometry, General Chemistry, Physical Chemistry, Organic Chemistry, Colloidal Chemistry

Water
Water chemistry: Properties of water and solutions, physical structure and properties of water and solutions, solution equilibria, solubility product, acids and bases, and buffer solutions. Water Quality Parameters : parameters use in water and wastewater analysis; i.e. COD, BOD, DO, hardness, nutrients, turbidity, color, alkalinity, solids, chloride, oil and grease, volatile acids, iron and manganese, fluoride, and sulphate.

Solid Waste
Soil chemistry: Inorganic and organic components of soil; chemical properties of soil, inorganic and organic geochemistry

Air
Atmospheric Chemistry (stratosphere , stratospheric perturbations, troposphere, tropospheric pollution, Airglow; the mesosphere)

Labs

1. Stoikiometry Lab 1
2. Stoikiometry Lab 2
3. Determination of alkalinity in natural waters
4. Determination of dissolved oxygen in water using the Winkler method
5. Humic soil content in water

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

1. Sawyer C.N., Mc Carty P.L. and Perkin G.F. *Chemistry for Environmental Engineering and Science*, 5th Ed., McGraw-Hill, 2003.
2. Manahan, Stanley E. *Environmental Chemistry*, 8th Ed., Boca Raton, Fla. ; London : CRC Press, 2005
3. Andrews, J. E. *An Introduction to Environmental Chemistry*, 2nd Ed., Malden, MA, Blackwell Science, 2004.
4. Dunnivant, F.M. *Environmental Laboratory Exercise for Instrumental Analysis and Environmental Chemistry*, Wiley-Interscience, 2004.
5. Colin Baird, Michael Cann, Environmental chemistry, W.H. Freeman, 2008

EAT208/3
ENVIRONMENTAL LAW, HEALTH AND SAFETY

Course Synopsis

General
Environmental Quality Act (EQA) 1974, Prohibition and Control of Pollution

Water and wastewater
(Sewage and Industrial Effluents) Regulations 1979

Air and Noise
(Clean Air) Regulation 1978, Malaysian Ambient Air Quality Guideline, (Motor Vehicle Noise) Regulations 1987, Factories and Machinery Act

Solid waste
(Scheduled Wastes) Regulations 2005,

Health and Safety
Occupational Safety and Health Act 1994 (Act 514), Use and Standards

of Exposure of Chemicals Hazardous to Health Regulations (USECHH) 2000, Control of Industrial Major Accident Hazards Regulations (CIMAH)1996, RCRA, USEPA and Classification, Packaging and Labelling of Hazardous Chemicals Regulations (CPL)1997, Material Safety Data Sheet, Industrial Hygiene, Toxicology, and Responsible Care Codes of Management Practices

Course Outcomes

CO1:
Ability to comprehend and explain the basic and legal requirement of Malaysian major laws related to environment.

CO2:
Ability to comprehend and discuss the major regulations of Occupational Safety and Health Act enforced in Malaysia.

CO3:
Ability to describe and outline the procedures in chemical handling and management at workplace.

CO4:
Ability to identify and utilize knowledge related to health and safety in working place.

References

1. Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders, 2007 (amended at 5th April), International Law Book Services, Malaysia.
2. Environmental Quality Act & Regulations, 2006 (amended up to April), MDC Publishers Sdn. Bhd., Malaysia.
3. Brock, N.W. (1994) Introduction to chemical exposure and risk assessment. Boca Raton : Lewis Publishers.
4. Stellman, J.M. et al. (1998) Encyclopedia of Occupational Health and Safety, 4th. Ed. International Labour Services, Geneva.
5. Nielsen, R.P. (2000) OSHA Regulations and Guidelines: A Guide for Health Care Providers. Albany: Delmar/ Thomson Learning.

EAT231/3
THERMODYNAMICS

Course Synopsis

Basic Concept of Thermodynamics
Introduction of thermodynamics system, properties of pure substance, heat and work, Laws of Thermodynamics (1st, and 2nd Law), entropy, power and refrigeration cycle.

Application of Environmental Thermodynamics
Air-Water Partitioning and Henry's Law, Air-Water Interfacial adsorption, Atmospheric Chemistry, Air-Water Equilibrium in wastewater system, Partitioning into Soil and Sediment from water, Water and Soil-Air Equilibrium, Colloid in soil and groundwater, Non-aqueous phase liquid in contaminanted aquifers, Application of Chemical Equilibrium and Chemical Kinetics

Labs

1. Marcet boiler
2. HYSYS
3. The saturation vapor pressure measurement.
4. Recirculating air conditioning trainer.

Course Outcomes

CO1:
Ability to comprehends the basic concept of Thermodynamics

CO2:
Ability to describe and calculate thermodynamics properties in phase equilibrium.

CO3:
Understand first and second law of thermodynamics, concept of entropy base through its application to ideal and irreversible processes, and know how to apply the knowledge.

CO4:
Ability to apply thermodynamics concept on Environmental Engineering Issues.

References

1. Cengel, Y.A. and M.A.Boles, Thermodynamics-An engineering Approach, 6th edition, McGraw-Hill, 2008.
2. Valsaraj, K. T. (2000). *Element of Environmental Engineering Thermodynamics and Kinetics*. 2nd Edition. Lewis Publisher – CRC Press
3. Smith J.M., Van Ness H.C (2001). *Introduction to Chemical Engineering Thermodynamics*. 6th edition. McGraw Hill
4. Kyle B. (1999). *Chemical and Process Thermodynamics*. 3rd edition. Prentice Hall
5. Thomas E., Chemical Engineering Thermodynamics, McGraw-Hill, 1985. (The bahasa version is available at the library, translated by Prof. Mashitah Hassan, 1990).

EAT232/4 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.

Water and wastewater
Water and wastewater parameters and analysis.

Solid waste
Elements of solid waste such municipal solid waste characterization, waste handling, generation rate, and disposal method

Air
Horizontal atmospheric motion, vertical motion in the atmosphere, wind, temperature inversion, fumigation, stagnation. Source of air pollution - oxidation and reduction process, stationary source, mobile source, area source

Course Outcomes

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

1. Norazian Mohamed Noor et al, Introduction to Environmental Engineering, 1st Ed., Penerbit UniMAP, 2009 2.
2. Davis M. L. and Masten S.J., Principles of Environmental Engineering. McGraw-Hill, 2004.
3. Peavy H. S., Rowe D.R., Tchobanoglous G., Environmental Engineering. McGraw-Hill, 1985.
4. Environmental Quality Act 1974 and Regulations. MDC Sdn. Bhd., 2002.
5. Mackenzie L.D. and David A.C., (2008) Introduction to Environmental Engineering 4th Edition , McGraw Hill

EAT233/3
ENVIRONMENTAL ENGINEERING SKILLS

Course Synopsis

Introduction to surveying. Covering in particular: surveying and setting out; level and levelling; traversing and distance measurement.
Introduction to AutoCAD software; Drawing and editing; Layer control and properties modification; Hatching and dimensioning; Text and template drawing.
Introduction to GIS and its components, basic GIS analysis, the output of GIS and finally application of GIS in environmental field.

Labs

Lab 1: Levelling
Lab 2: Distance Measurement and Traversing
Lab 3: GIS Overlaying
Lab 4: GIS Buffering
Lab 5: GIS Digitizing
Lab 6: Engineering Drawing using AutoCAD 1
Lab 7: Engineering Drawing using AutoCAD 2
Lab 8: Engineering Drawing using AutoCAD 3

Course Outcomes

CO1:
Ability to provide knowledge and perform surveying task and procedure.

CO2:
Ability to provide knowledge and practice AutoCAD software package.

CO3:
Able to produce mapping using Geographical Information System (GIS).

References

1. Bruce E Davis. GIS: A Visual Approach 2nd Ed. Thomson Learning, 2001
2. Kavanagh, B. F, *Surveying Principles and Application*, 4th Edition, Prentice Hall, 1996
3. Arthur Bannister, Stanley Raymond and Raymond Baker, *SURVEYING*, 7th Edition, Prentice Hall, 1998.
4. Timothy Sean Sykes. 2002. AutoCAD2002 one step at a time. Prentice Hall.
5. Ralph Grabowski. 2002. Using AutoCAD 2002. Thompson Learning.

EAT346/4
MASS TRANSFER

Course Synopsis

The study of mass transfer is of particular interest to environmental engineers which involves processes that move chemicals through the air, surface water, subsurface environment, or engineered systems. Transport processes move pollutants from the location at which they are generated, resulting in impacts that can be distant from the pollution source. In addition, environmental engineers make use of the contents of this course in the design of emission-control systems. In this course the lectures discuss some of the processes that transport pollutants in the environment and in engineered systems. The goals of this discussion are twofold: to provide and understanding of the processes that cause pollutant transport, and to present and apply the mathematical formulas used to calculate the resulting pollutant fluxes.

Labs

1. Determination of flooding point and loading point in gas absorption system
2. Absorption of carbon dioxide into water in gas absorption system
3. Filter press system
4. Liquid diffusion system
5. Evaporation system
6. Field trip to a selected facility related to mass transfer application

Course Outcomes

CO1:
Ability to understand and explain, and measure the diffusion processes in gases, liquids and solid in steady state

CO2:
Ability to understand, explain and measure mass transfer occurs in various phases and unsteady-state diffusion.

CO3:
Ability to apply knowledge of mass transfer in separation processes.

CO4:
Ability to understand and apply knowledge of transport and chemical substances within the three environmental geospheres: water, air and earthen solids.

References

1. Louis J. Thibodeaux. Environmental chemodynamics: movement of chemicals in air, water, and soil. 2nd Ed. John Wiley & Sons, 1996.
2. Warren Lee McCabe, Julian Cleveland Smith, Peter Harriott. Unit operations of chemical engineering, 7th Ed.
3. Harold F. Hemond and Elizabeth J. Fechner-Levy. Chemical Fate and Transport in the Environment, 2nd Ed. Academic Press, 1999.
4. Donald G Crosby. Environmental Toxicology and Chemistry, Oxford University Press, USA, 1998.
5. Christi J. Geankoplis. Transport Processes and Unit Operations, 3rd Ed. Prentice Hall International Editions , 1995.

EAT235/3 GEOENVIRONMENTAL ENGINEERING

Course Synopsis

This course presents the principles of geoenvironmental engineering. It covers the soil properties and groundwater flow. This course also discusses the subsurface contamination, site characterization, in-situ waste containment, waste containment liner system.

Course Outcomes

CO1:
Ability to discuss and determine the component and principle available in soil properties

CO2:
Ability to utilize and apply the knowledge of groundwater flow and transportationprocess in porous media.

CO3:
Ability to apply knowledge of mass transfer in separation process.

CO4:
Ability to understand and apply knowledge of transport and chemical substances within the three environmental geospheres

References

1. Hari D. Sharma and Krishna R. Reddy, *Geoenvironmental Engineering* , John Wiley & Sons, 2004
2. Sarsby, R. *Environmental Geotechnics*, Balkema, Rotterdam, 2000.
3. Tarbuck and Lutgens, *EARTH An Introduction to Physical Geology*, 8th Edition, Prentice Hall, 2005
4. Lakshmi N. Reddi, Hilary I. Inyang, Geoenvironmental engineering: principles and applications, Marcel Dekker. 2000
5. Raymond Nen Yong, Geoenvironmental engineering: contaminated soils, pollutant fate and mitigation, CRC Press LLC, 2001

EAT237/3 WATER SUPPLY ENGINEERING

Course Synopsis

This course will be focused on water sources and usage, method on estimating water demand, water quality characteristics and legislations, water treatment processes and also water distribution and reticulation system. Special focus will be given on the design of raw water treatment comprising pre-treatment, primary treatment (coagulation, flocculation, sedimentation, filtration, disinfection) and advance water treatment processes. From the course, students will also be exposed to the design guidelines of water supply system which is applied in Malaysia.

Course Outcomes

CO1:
Ability to identify water sources and consumption and to forecast water demand.

CO2:
Ability to describe and evaluate water quality required in water supply system.

CO3:
Ability to identify the technology of water treatment processes and design water treatment unit.

CO4:
Ability to describe and analyze water distribution system.

References

1. Qasim, S.R., Motley, E.M. and Zhu, G. Water Works Engineering: Planning, Design, and Operation. Prentice Hall PTR, 2000.
2. The Malaysian Water Association. MWA Design Guidelines for Water supply Systems, published by MWA, 2000.
3. McGhee, T.J. Water Supply and Sewerage. 6th Ed., McGraw-Hill, 1991.
4. Viessman, W. and Hammer, M.J. Water Supply and Pollution Control. 7th Ed., Prentice Hall, 2005.
5. Hammer, M.J. and Hammer, M.J. (Jr.) Water and Wastewater Technology. 5th Ed. Prentice Hall, 2004.

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, modeling the pollutant dispersion as well as designing air pollution control equipments.

Labs

1. Air Pollution Control Device – Cyclone
2. Air Pollution Control Device - ESP
3. Air Pollution Control Device – Scrubber
4. Air Pollution Control Device - Absorption

Course Outcomes

CO1:
Ability to apply air pollutant concentration model to solve problems relates to air pollution control.

CO2:
Ability to discuss the general ideas in air pollution control.

CO3:
Ability to identify and design suitable air pollution control device.

References

1. Noel De Nevers (2000) Air Pollution Control Engineering, International Edition, McGrawHill.
2. Karl B. Schnelle, Jr., Charles A. Brown. (2002) Air pollution control technology handbook CRCnetBASE, CRC Press
3. Wayne T. Davis (2000) Air pollution engineering manual / Air & Waste Management Association , Wiley.
4. Jon Ayres, Robert Maynard, Roy Richards (2006) Air Pollution and Health, World Scientific.
5. Godish, Thad. (2004) Air quality, Lewis Publishers.

EAT303/4
WASTE WATER ENGINEERING

Course Synopsis

The aim of this course is to enable the students to design 3 parts of wastewater treatment which is physical, chemical and biological unit operation. Student will be introduced about terms related to wastewater engineering, and how to calculate flowrate and population equivalent. From this calculation, student will be able to design the basic sewerage system. Student also will learn about physical, biological and chemical unit operation related to wastewater treatment. Finally, student will learn how to design wastewater treatment plant with applying all the knowledge in wastewater treatment theory learned before.

Labs

1. Lab 1: Chemical Oxygen Demand (COD)
2. Lab 2 : Biochemical Oxygen Demand (BOD)

Course Outcomes

CO1:
Ability to define, explain and design physical unit process applied in wastewater treatment

CO2:
Ability to explain and design biological unit process applied in wastewater treatment

CO3:
Ability to explain and design chemical unit process applied in wastewater treatment

CO4:
Ability to design basic structure of waste water treatment plan

References

1. Metcalf & Eddy, Inc (2003). *Wastewater Engineering: Treatment and Reuse.* 4th Ed. McGraw-Hill.
2. Thomas Joseph Casey (1997) Unit Treatment Processes in Water and Wastewater Engineering, Wiley
3. Hamidi Abdul Aziz, (1999) Kejuruteraan Air Sisa, Utusan Publication & Distributors Sdn Bhd.
4. George Tchobanoglous, Franklin L. Burton, H. David Stensel, Wastewater Engineering: Treatment and Reuse, McGraw-Hill, 2004
5. Syed R. Qasim, Wastewater treatment plants: planning, design, and operation, CRC Press, 1999

EAT 332/3
ENVIRONMENTAL IMPACT ASSESSMENTS

Course Synopsis

Introduction to Environmental Impact Assessment; Principle and perspective of EIA; Overview on EIA: Screening, Scoping & Term Of Reference, Impact Analysis, Mitigation & Impact Management; Prediction of environmental impacts; EIA Documentation and Environmental Management Plan (EMP) ; Aims & key components of EIA implementation and follow-up; Reviewing process in EIA; Decision making in the EIA process; Social impact assessment.

Course Outcomes

CO1:
Ability to understand the steps required in performing EIA report.

CO2:
Ability to understand and apply some of the basic tools available for predicting environmental impacts.

CO3:
Ability to apply the knowledge and prepare EIA documentation.

CO4:
Ability to apply the knowledge and prepare EMP documentation.

CO5:
Ability to analyze the social impact of project activities.

References

1. Canter, L.W. (1996). *Environmental Impact Assessment 2nd Ed.* McGraw Hill.
2. Department of Environment (1994). EIA: *Procedures and*

Requirements in Malaysia. Ministry of Science, Technology and the Environment, Malaysia
3. Department of Environment, (1995). *A Handbook of Environmental Impact Assessment Guidelines,* Department of Environment, Ministry of Science, Technology and the Environment, Malaysia.
4. John Glasson, Riki Therivel, Andrew Chadwick, Introduction to environmental impact assessment, Tylor and Francis Group, 2005
5. By Peter Morris, Riki Therivel, Methods of environmental impact assessment, Spoon Press, 2009

EAT 341/3
SOLID AND HAZARDOUS WASTE ENGINEERING

Course Synopsis

Students will be introduced to elements of solid waste such solid waste handling, storage, collection and transport; waste treatment and disposal methods, including biological and chemical treatment, incineration, pyrolysis, 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

Course Outcomes

CO1:
Ability to discuss current waste management practices

CO2:
Ability to describe and analyze the process of solid waste reduction and treatment.

CO3:
Ability to plan and design landfill facilities

CO4:
Ability to analyze treatment processes and design treatment facilities of hazardous waste

References

1. Tchobanoglous, Theisen and Vigil, Integrated Soild Waste Management: Principles & Management Issues,McGraw-Hill, 1993. ISBN : 0070632375
2. LaGrega, Buckingham & Evans, Hazardous Waste Management, 2^{nd} Edition,McGraw-Hill,2001. ISBN: 0070393656.
3. Cheremisinoff and Wu(editor),Hazardous Waste Management Handbook, Technology, Perception and Recycling. PTR Prentice Hall, 1994.
4. Pfeffer, Solid Waste Management Engineering. Prentice Hall, 1992
5. Vesilind P.A., Worrell W., Reinhart., Solid waste engineering. Brooks/Cole 2002.

EAT342/3
NOISE POLLUTION ENGINEERING

Course Synopsis

Characteristics of sound, Sources, effect and regulation of noise pollution, Measurement and Analyses of noise Noise control, Fundamentals and Basic Concepts of Vibration, Undamped and Damped Free Vibrations

Labs

1. Measurement and Analyses of Noise
2. Effect Noise in Building Materials
3. Pendulum System:
   (a) Simple Pendulum System
   (b) Compound Pendulum System

Course Outcomes

CO1:
Ability to explain and discuss the concept of noise control.

CO2:
Ability to ability to analyse what is noise and vibration.

CO3:
Ability to explain and analyse noise pollution level and know how to overcome it according to the law

CO4:
Ability to describe and compute different system of vibration.

CO5:
Ability to apply knowledge and concept of vibration in solving the problem.

References

1. Baranek, L. L. and Ver, L. L. (Editor), ‘Noise and Vibration Control Engineering: Principles and Applications’, John Wiley & Sons, 2005.
2. Ambekar, A.G., Mechanical Vibrations and Noise Engineering, Prentice-Hall of India, New Delhi, 2006.
3. Lawrence K. Wang, Norman C. Pereira, Yung-Tse Hung, Advanced air and noise pollution control, Volume 2, Human Press Inc, 2005
4. Agarwal, Noise Pollution Agarwal, S. B. Nangia, 2009
5. A. Lara Sáenz, Raymond William Barrow Stephens, International Council of Scientific Unions. Scientific Committee on Problems of the Environment, John Wiley, 1986

EAT343/3
PUBLIC HEALTH AND OCCUPATIONAL HYGIENE

Course Synopsis

General
Introduction to epidemiology

Water
Safe drinking water; dilemma in compliance; the relation between chemical contaminants in drinking water and public health, control of water-borne diseases.

Air and Noise
Air pollutants and its effect, indoor air pollution, heat and temperature extreme hazard, noise and and vibration hazard.

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

1. Mary-Jane Schneider. *“Introduction to Public Health”* 1st edition, Jones & Bartlett Publishers, 2003.
2. Bernard J. Turnock, Public health: what it is and how it works, 4th Edition, Jones and Bartlett, 2009
3. Bernard J. Turnock, Essentials of public health, Jones and Bartlett, 2007
4. Kerry Gardiner, J. Malcolm Harrington, Occupational hygiene, Blackwell Publising, 2007
5. By Megan Tranter, Occupational Hygiene and Risk Management, Megan Tranter, 2004.

EAT 344/3
ENVIRONMENTAL MANAGEMENT SYSTEM

Course Synopsis

Introduction; Design and implementation of ISO 14001; Types of environmental management standards – EMS, Environmental Audit, Environmental Labeling, Environmental Performance Evaluation, Life Cycle Analysis; Risk assessment, analysis and management; Cleaner production

Course Outcomes

CO1:
Ability to describe the requirements in implementing an ISO 14001, as well as EMS costing and audits.

CO2:
Ability to describe and outline the EIA process & methods in Malaysia.

CO3:
Ability to identify and describe the measuring instruments and calibration systems in environmental management.

CO4:
Ability to identify and explain the quantitative risk assessment.

References

1. Morris, A.S. (2003). *ISO 14000 Environmental Management Standards Engineering and Financial Aspects*. New York: John Wiley & Sons.
2. Hillary, R. (1997). *Environmental Management Systems and Cleaner Production.* John Wiley & Sons Ltd.
3. Muhammad Awang (1999). *Environmental Management Standards (ISO 14000) Towards a Sustainable Future*: UPM Publisher.
4. Sheldon, C. and Yoxon, M. (2006). *Environmental Management Systems: A Step-by- Step Guide to Implementation and Maintenance*. Sterling, VA : Earthscan, 3rd ed.
5. Aminatuzuhariah Megat Abdullah, Introduction to environmental management system, UTM, 2007

EAT 345/3
HYDROLOGY

Course Synopsis

Introduces the fundamental of hydrological process such as hydrologic cycle, atmospheric circulation, precipitation, evaporation, evapotranspiration and infiltration. Analysis in hydrologic will be covered including watershed concepts, rainfall-runoff, unit hydrograph and synthetic unit hydrograph. Focus will also be on the frequency analysis which cover the probability concepts, random variables and probability distribution, return period, common probabilistic models, graphical presentation of data and regional analysis. Apart of that, flood routing chapter will cover hydrologic routing, hydrologic river and reservoir routing, movement of flood wave and kinematic wave routing.

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

1. V. T Chow, David R, Larry M Mays, Applied Hydrology, McGraw – Hill International, 1988
2. Bedient, Huber, Hydrology and Floodplain Analysis 4th Edition, Pearson 2008
3. Ian Watson, Alister D. Burnett, Hydrology: an environmental approach, CRC Press, 1995
4. Wilfried Brutsaert, Hydrology: an introduction, University Press, Cambridge , 2005
5. Andrew D. Ward, Stanley Wayne Trimble, Environmental hydrology, 2nd Edition, 2003

EAT 433/3
ENVIRONMENTAL ENGINEERING DESIGN

Course Synopsis

Principles and design concepts of treatment units and processes, detailed and advanced design of environmental pollution control (i.e., treatment and disposal) systems for water, wastewater, air, noise, disposal of solid waste.

Labs

Integrated Environmental Engineering Design

Course Outcomes

CO1:
Ability to design processes for pollution treatment as well as pollution prevention.

CO2:
Ability to design treatment units complied to the standard practice in Malaysia

References.

1. Heinsohn, R.J. and Kabel, R.L (1999). *Sources , Control of Air Pollution*. New Jersey: Prentice Hall.
2. Metcalf & Eddy. (1991). *Wastewater Engineering, Treatment, Disposal and Reuse'*, 3rd edition. McGraw Hill.
3. *The Malaysian Water Association. MWA Design Guidelines for Water supply Systems, published by MWA, 2000.*
4. Susumu Kawamura, Integrated design and operation of water treatment facilities, 2nd Edition, John Wiley & Sons, 2000.
5. P. Aarne Vesilind, Wastewater treatment plant design, 2003, IWA

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 apply the concepts of bioremediation in soil, groundwater and contaminated site treatment.

CO2:
Ability to analyse the characteristics of contaminants

CO3:
Ability to determine the contaminants behaviors of soil and groundwater.

CO4:
Ability to apply the knowledge of bioremediation technology to recover the contaminants

References

1. J. Rusell Boulding and Jon S. Ginn. Soil, Vadose Zone, and Groundwater contamination. Lewis Publishers (2004).
2. Pedro J.J. Alvarez and Walter A. Illman. Bioremediation and natural attenuation. Wiley (2006)
3. Mukesh Doble and Anil Kumar. Bio-treatment of industrial effluents. Elsevier (2005)
4. Donald L. Wise, Debra J. Trantolo, Edward J. Cichon, Hilary I. Inyang and Ulrich Stottmeister. Bioremediation of contaminated soils. Marcel Dekker, Inc. (2000)
5. Jacques W. Delleur. The handbook of groundwater engineering. CRC Press. (2007)

EAT 463/3
PROJECT ENGINEERING MANAGEMENT

Course Synopsis

This course is designed to provide students with the knowledge of subject area; ability to apply tools in a project environment; demonstrate competence in learning and evidence generating to sustain competency. The syllabus comprises scope management including project authorization, scope definition, control and finalization. Cost management including project costing, resource planning, budgeting and controlling financial completion are also emphasized. In addition, this course will also expose students to the time management including activity sequencing, duration estimating, scheduling, progress control, monitoring and forecasting.

References

1. Gido & Clements., “Successful Project Management”, Second Edition. Thomson, South-Western, 2003
2. Harold Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, John Wiley & Sons, 2009.
3. James P. Lewis, Fundamentals of project management, AMACOM, 2007.
4. Dennis Lock, Project Management, Gower Publishing Limited, 2007
5. David I. Cleland, Lewis R. Ireland, Project management: strategic design and implementation, Mc-Graw – Hill, 2007

EAT 443/3
BUILT ENVIRONMENT

Course Synopsis

Introduction to built environment, thermal control concept, thermodynamic principal, thermal dynamics of building, loads calculation, building impact on the environment, active HVAC systems, passive methods, electrical system, architectural acoustics

Course Outcomes

CO1:
Ability to describe and analyze the concepts of thermal control through the building envelope

CO2:
Ability to analyze heat exchange mechanisms and compute the thermal interactions in building

CO3:
Ability to construct skills in designing sustainable building performance with respect to the energy efficiency

CO4:
Ability to select and evaluate the methods of active and passive control and design approaches in a physical building environment.

References

1. Mithraratne, N. (2007), Sustainable Living: The Role of Whole Life Costs and Values, 1st Ed, Butterworth-Heinemann (Elsevier Limited).
2. Khairuddin, A.R., and Abdul A.K.H. (2004), Sustainable Built Environment Through Management and Technology, Kulliyah of Architecture & Environmental Design, UIA.
3. Kibert, C.J. (2005), Sustainable Construction: Green Building Design and Delivery, 1st Ed, John Wiley & Sons, Inc.
4. Vaughn B. (2006). The Building Environment, Active & Passive Control Systems, 3rd Edition. John Wiley 5. Baird. G (2001) The architectural expression of environmental control systems. London: Spon Press.
5. Wendy Rule McClure, Tom J. Bartuska, The built environment: a collaborative inquiry into design and planning, John Wiley & Sons, 2007

EAT 461/2
FINAL YEAR PROJECT I

Course Synopsis

This is an individual research project in connection with a special engineering problem and under the guidance of an academic staff. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. In this subject. In this subject, the students will be taught on how to prepare the research proposal. Besides that, student will be also exposed to earlier part of thesis writing such as introduction, literature review and methodology..

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 problems in a systematic manner.;

CO3:
Ability to work independently in conducting and completing an academic project.

CO4:
Ability to present the final product orally and graphically.

EAT 462/4
FINAL YEAR PROJECT II

This subject is the continuity of Final Year Project I. In this subjects students will conduct experimental tasks which has been planned during the Final Year Project I. Students also will completing their thesis report during this subject. In this subject, students will be also exposed to journal writing.

EAT 447/3
ENVIRONMENTAL INFORMATICS

Course Synopsis

Overview of environmental informatics, environmental data and information management, environmental risk, environmental quality standard, modeling environmental process

Labs

1. Modelling software for air and water pollutants transport-dispersion.
2. Disper 3 for air dispersion problems
3. Hydraulic analysis using MODFLOW
4. Environmental data optimization
5. EIA data simulation.

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

CO5:
Expose and equip students to the latest waste treatment research technology for application in their career in the future

References

1. Nicholas M.Avouris and Page, Environmental Infromatics: Methodology and Applications of Environmental Infromatics Processing 2008.
2. Nicholas M. Avouris, Bernd Page, Environmental informatics: methodology and applications of environmental, Springer, 1995
3. Lorenz M. Hilty, Environmental informatics, Elsevier, 2006
4. Jorge Marx Gómez, Michael Sonnenschein, Martin Müller, Information Technologies in Environmental Engineering:ITEE 2007 - Third International ICSC Symposium
5. A. J. Jakeman, Alexey Voinov, Andrea Emilio Rizzoli, Environmental modelling, software and decision support: state of the art and new perspectives, Elsevier,

EAT 448/3
REMOTE SENSING

Course Synopsis

Concept and foundations of remote sensing; Introduction to electromagnetic energy; Introduction to visual image interpretation; Multispectral, thermal and hyperspectral sensing; satellite and sensors; digital image processing; Microwave and lidar sensing.

Labs

1. Interactive Display Function - ENVI
2. Classification Method - ENVI
3. Decision Tree Classification - ENVI
4. Data Fusion – ENVI

Course Outcomes

CO1:
Ability to define and describe the concept, component and application of remote sensing.

CO2:
Ability to identify and utilizes the tools required in visual image interpretation.

CO3:
Ability to analyse environmental data by using digital image processing.

CO4:
Ability to define and describe the concept, component and application of microwave and Lidar sensing

References

1. Lillesand, T. M., Kiefer, R. W. and Chipman, W. J. 2007. Remote Sensing and Image Interpretation. John Wiley & Sons.
2. A.M. Chandra & S.K. Ghosh. Remote Sensing and Geographical Information System. Alpha Science International Ltd., 2006.
3. Alan Steven Belward, Carlos R. Valenzuela., ‘Remote Sensing and Geographical Information Systems for Resource Management in Developing Countries,’ Kluwer Academic Publisher, 1991
4. Robert A. Schowengerdt, Remote sensing: models and methods for image processing, Academic Press, 2007
5. James B. Campbell, Introduction to remote sensing, Taylor & Francis, 2002

EAT 449/3
ENVIRONMENTAL PROCESS CONTROL & INSTRUMENTATION

Course Synopsis

The aim of this course is to enable the students to have the conceptual understanding on Process Control and Instrumentation that 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.

Labs

1. Review and application of Matlab/Simulink in Process Control
2. Solution of Environmental process control study case using Matlab/Simulink

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

CO4:
Ability to apply the process control strategies of typical chemical and biological process related to environmental engineering

References

1. J. B. Riggs and M. N. Karim "Chemical and Bio-Process Control", 3rd edition, Pearson International Edition (2007).
2. Coughanowr & Koppel, "*Process System Analysis and Control"*, McGraw Hill, 1991
3. D.E Seborg, T. F Edgar, D.A Mellichamp, Process Dynamics Control, John Wiley and Son (2003)
4. T.E Marlin, "Process Control: Designing Processes and Control Systems for Dynamics performance, McGraw Hill (2000)
5. B. Wayne Bequette, Process control: modeling, design, and simulation, Prentice Hall PTR, 2003

EAT102/4
MECHANICS AND MATERIAL ENGINEERING

Course Synopsis

Mechanics statics: Force Vector, Equilibrium of a particle, Friction, Properties of Sections: Center of Gravity and Centroid, Properties of Sections: Moment of Inertia. Mechanics dynamics: Kinematics of a Particle, and Kinetic of a Particle: Force and Acceleration, Work and Energy, Impulse and Momentum. Material: Introduction to Material Science and Engineering, The Structure of Crystalline Solids, Mechanical Properties of Metal, Phase Diagram.

Labs

1. Equilibrium of beam
2. Tensile test
3. Rockwell Hardness Test

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

1. Hibbeler, R.C. Engineering Mechanics Statics. 12th Ed. , Prentice Hall, 2010.
2. Peter Schiavone, Hibbeler, R.C. Engineering Mechanics Statics Study Pack. 12th Ed. , Prentice Hall, 2010.
3. Hibbeler, R.C. Engineering Mechanics Dynamics. 12th Ed. , Prentice Hall, 2010.
4. Peter Schiavone, Hibbeler, R.C. Engineering Mechanics Dynamics Study Pack. 12th Ed. , Prentice Hall, 2010.
5. William D. Callister, Jr. Material Science and Engineering An Introduction, 5th Ed, 2000.

EAT112/4
GEOMATIC ENGINEERING

Synopsis

In this course student will be introduce basic surveying involved in engineering. Starting from linear measurement on plane. Student will do leveling after they learn 2 different data logging. With their knowledge in tapping and leveling, they have to do traversing and tachymetry. From all the data they have, student will ask to transform all the data to map using engineering drawing and autoCAD. Lastly, student will be test in real work, in geomatic camp.

Labs

1. Introduction to Distance Measurement and Bearing
2. Introduction to Levelling Work (Collimation and Rise & Fall Method)
3. Introduction to Geomatic Instruments and Auto Level work (Sg. Batu Pahat)
4. Traversing With Compass and Theodolite
5. Introduction to Tacheometry
6. Introduction to Electronic Distance Measurement (EDM) With Total Station
7. Geomatic Camp

Course Outcomes

CO1:
Ability to understand basic concept of geomatic.

CO2:
Ability to perform surveying task and procedures.

CO3:
Ability to transform data to other format (e.g : map, excel and etc)

References

1. Ghilani Wolf., Elementary Surveying, An Introduction to Geomatics, Twelfth Edition, Pearson International Edition
2. Ab. Hamid Mohamed, Asas Ukur Kejuruteraan, Penerbit Universiti Teknologi Malaysia
3. Kavanagh, B. F., “Surveying: Principles and applications” 4th Ed, Prentice Hall, 1996.
4. Bannister, A. and Raymond, S., “Surveying” 6th Ed, Longman Scientific & Technical, 1992.
5. Jack McCormac, “Surveying” 5th Ed, John Wiley & Sons, 2004.

EAT113/4
MECHANICS OF MATERIALS

Course Synopsis

This course will be focused on mechanics of material which begins with the concept of stress and strain. The important mechanical properties of materials and separate treatments of axial load, shear, torsion, and bending are also discussed. The transverse shear along with a discussion on the state of stress results from combined loadings will be covered in this course, as well as the concepts for transforming multiaxial states of stress and in similar manner, the methods for strain transformation. For a further summary, student will be taught the applications of beams and shaft that cover on the design and deflection parts. Besides that the buckling of column also will be exposed to the student.

Labs

1. Torsion
2. Bending Moment
3. Strut Buckling
4. Bending Moment

Course Outcomes

CO1:
Ability to determine the stresses, strains and deformation of members in simple one-dimensional elastic system.

CO2:
Ability to analyze torque-loaded member and evaluate the values and distribution of bending and shear stresses in beam section.

CO3:
Ability to apply shear formula in beam or thin-walled and compute stress caused by combined loadings.

CO4:
Ability to construct Mohr’s Circle to calculate stresses on inclined planes and deduce the buckling load of columns with various types of support.

References

1. R.C Hibbeler’ “Mechanics of Materials” , 7th Ed, Prentice Hall, 2008
2. Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf.,”Mechanics of Materials”. 3rd Edition. McGraw Hill,2004.

3. Megson, T.H.G., “Structural and Stress Analysis”, Butterworth: Heinemann,2002.
4. E.Popov., “Mechanics of materials”, Prentice Hall, 1983
5. Gere, “Mechanics of materials, Thomson, Brookes/Cole, 2004

EAT151/3
INTRODUCTION TO BUILDING ENGINEERING

Course Synopsis

It analyses a building in terms of what is expected of it, the practical processes and typical methods used in its construction, the building team which implements the processes and the methods used for communicating information. With regard to maintenance and repair of existing buildings, traditional construction procedures will be given. In the beginning, the requirements of a building; appearance, durability, dimensional suitability, strength and stability, whether exclusion, sound control, thermal comfort, fire protection, lighting and ventilating, sanitation and drainage, security and cost will be given followed by building processes, building team and communication.

Course Outcomes

CO1:
Ability to describe a building in terms of what it is expected to do; its function and performance.

CO2:
Ability to discuss a building in terms of the processes required, the Building Team which implements them, and the methods used in communicating information

CO3:
Ability to comprehend a building in terms of typical construction methods, the interaction of components and the processes for assembly.

References

1. Osbourn, D. and Greeno, R., “Introduction to Building”, Fourth Edition, Pearson, Prentice-Hall, 2007.
2. Warszawski, A.,“Industrialized and Automated Building Systems: A managerial Approach”, second edition, Taylor & Francis , 2000.
3. David, V. Chadderton ,“Building Services Engineering”, Taylor & Francis , 2000.
4. K.N Derucher, G.P. Korfiatis, and A.S. Ezeldin,”Materials for Civil and Highway Engineers”, 1998 Edition, Prentice Hall, Inc., 1998
5. R.Barry, “The Construction of Buildings”. Fifth Edition, Wiley-Blackwell, 2001

EAT208/3
ENVIRONMENTAL LAW, HEALTH AND SAFETY

Course Synopsis

General
Environmental Quality Act (EQA) 1974, Prohibition and Control of Pollution

Water and wastewater
(Sewage and Industrial Effluents) Regulations 1979

Air and Noise
(Clean Air) Regulation 1978, Malaysian Ambient Air Quality Guideline, (Motor Vehicle Noise) Regulations 1987, Factories and Machinery Act

Solid waste
(Scheduled Wastes) Regulations 2005,

Health and Safety
Occupational Safety and Health Act 1994 (Act 514), Use and Standards of Exposure of Chemicals Hazardous to Health Regulations (USECHH) 2000, Control of Industrial Major Accident Hazards Regulations (CIMAH)1996, RCRA, USEPA and Classification, Packaging and Labelling of Hazardous Chemicals Regulations (CPL)1997, Material Safety Data Sheet, Industrial Hygiene, Toxicology, and Responsible Care Codes of Management Practices

Course Outcomes

CO1:
Ability to comprehend and explain the basic and legal requirement of Malaysian major laws related to environment.

CO2:
Ability to comprehend and discuss the major regulations of Occupational Safety and Health Act enforced in Malaysia.

CO3:
Ability to describe and outline the procedures in chemical handling and management at workplace.

CO4:
Ability to identify and utilize knowledge related to health and safety in working place.

References

1. Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders, 2007 (amended at 5th April), International Law Book Services, Malaysia.
2. Environmental Quality Act & Regulations, 2006 (amended up to April), MDC Publishers Sdn. Bhd., Malaysia.
3. Brock, N.W. (1994) Introduction to chemical exposure and risk assessment. Boca Raton : Lewis Publishers.
4. Stellman, J.M. et al. (1998) Encyclopedia of Occupational Health and Safety, 4th. Ed. International Labour Services, Geneva.
5. Nielsen, R.P. (2000) OSHA Regulations and Guidelines: A Guide for Health Care Providers. Albany: Delmar/ Thomson Learning.

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.

Labs

1. Sieve and Hydrometer Analysis
2. Liquid Limit and Plastic Limit Test
3. Constant Head Permeability Test
4. Standard Proctor Compaction Test
5. Direct Shear Test on Sand

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 one-dimensional consolidation theory.

References

1. R. F. Craig, ‘Soil Mechanics’ , E & FN Spon, 1997.
2. M. Budhu, ‘Soil Mechanics & Foundations’, Wiley, 1999.
3. David F. McCarthy,”Essentials of Soil Mechanicsand Foundations: Basic Geotechnics”, 7th Edition. Prentice Hall,2006.

4. Das, B.M.,"Fundamentalis M Geotech Engineering", PWS-KENT Publishing,1999.
5. Das, B.M.,Principle of Geotechnical Engineering, 2nd Edition. PWS-KENT Publishing,1990.

EAT252 FLUID MECHANICS ENGINEERING

Course Synopsis

This course presents the study of the mechanics of water. In fluid mechanics, other fluids, including oil and gasses are studied. The student will be taught about properties of fluids, fluid static and kinematics, Bernoulli's equation, momentum equation, analysis of flow in open channel and pipeline system. This course will also cover the transportation and metering of fluids such as pumps and turbines. At the end of the course, students should be able to apply the theory to solve problem related to flow of fluids.

Labs

1. Velocity pattern
2. One Dimensional flow principles
3. Flow measurements
4. Resistance to flow of fluids
5. Flow in closed conduits.

Course Outcomes

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 open channel system.

CO4:
Ability to describe and solve problems related to fluid flow in pipeline system.

References

1. Douglas, J.F., J.M. Gasiorek, and Swaffield (2001). "Fluid Mechanics – 4th edition". Prentice-Hall.
2. Young, D.F., Munson, B.R., Okiishi, T.H. & Huebsch, W.W., A Brief Introduction to Fluid Mechanics. Wiley Interscience. (2007).
3. Crowe, C.T., Elger, D.F. and Roberson, J.A.,"Engineering Fluid Mechanics", 8th Edition. John Wiley & Sons, 2005.
4. White, F.M.,"Fluid Mechanics", 5th Edition. McGraw- Hill, 2003.
5. Cimbala, J.M. and Cengel, Y.A.,"Essentials of Fluid Mechanics, Fundamentals and Application". McGraw- Hill, 2006.

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 Civil engineering profession. This includes the structural plan, cross section drawing and structural detailing. Through lectures, students will learn the basic characteristics of professional civil engineering drawing and computer-aided drawing program. Through hands-on sessions using drawing software packages, this course enables the students to have first hand practice on the drawing for some idealized and actual projects. Mini project cover several disciplines of civil engineering profession will be integrated through a series of these hand-on sessions.

Labs

1) Introductions to basics engineering drawing
2) Geometrical construction
3) Projection systems
4) Isometric and oblique sketches
5) Cross-sectioned views
6) Dimensioning and geometrical tolerance
7) Working drawing and detailing
8) Introduction to Computer Aided Drafting
9) Basic Construction techniques

10) Basic Editing
11) Dimensioning 2D drawing
12) Creating 2D drawing (geometric constructions)
13) Creating 2D section views
14) Introduction to 3D solid modelling
15) To produce 2D drawing from 3D solid modelling

Course Outcomes

CO1:
Ability to understand the basic characteristic and features of the computer-aided engineering drawing and their use in design and construction industry.

CO2:
Ability to relate the basic engineering design to the actual construction via graphical presentation.

CO3:
Ability to communicate technical details via computer-aided tools.

References

1. Bertoline, G.R. and Wiebe, E.N. 2005. Fundamental of Graphics Communication, 4/e, New York: McGraw-Hill.
2. Giesecke, F.E., Mitchell, A, Spencer, H.C., Hill, I.L., Dygdon, J.T. and Novak, J.E. 2002. Technical Drawing, 12/e, New Jersey: Prentice Hall.
3. Lamit, L.G., Kitto, K.L, Shull, J.I. and Higgins, J.J. 1997. Engineering Graphics and Design: with Graphic Analysis. St. Paul, Minnepolis: West Publishing Company.
4. Dix, M. And Riley, P. 2005. Discovering AutoCAD 2005., New Jersey: Prentice Hall. Yarwood A. 2004. Introduction to AutoCAD 2004 : 2D and 3D Design. London: 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 trusses, beams, and frames. It introduces analysis of statically determinate structures for trusses. Besides that, it also introduces deformation using virtual work for trusses, beams, and frames and also integration and moment area method for the beams. Cables and arches also will be discussed at the end of this course.

Labs

Lab 1: Deflection truss
Lab 2: Portal frame
Lab 3: Deflection of frame
Lab 4: Two Hinged Arch

Course Outcomes

CO1:
Ability to identify and analyze of statically determinate structures.

CO2:
Ability to analyse and illustrate the internal loading developed in structural members.

CO3:
Ability to analyze the deformation of statically determinate structures using geometrical method.

CO4:
Ability to compute the deformation of determinate structure based on virtual work method.

References

1. R. C. Hibbeler, “Structural Analysis”, Sixth Edition, Pearson, Prentice-Hall, 2006.
2. Reddy C.S., “Basic Structural Analysis”, Tata McGraw Hill Publishing Co., 1996
3. Laible J.P, “Structural Analysis”, Mc Graw Hill Book Co., 1984.
4. Yuan-yu Hsieh & S. T. Mau,”Elementary Theory of Structures, Prentice Hall, 1995
5. Au T and Christiano, P, “Structural analysis”, Prentice Hall, 1982

EAT253/3
STRUCTURAL ANALYSIS I

Synopsis

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.

Course Outcomes

CO1:
Ability to analyze of statically determine structures for beam, trusses and frame using influence line method

C02:
Ability to analyze of statically indeterminate structures for beam, trusses and frame using approximate analysis

C03:
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.

References

1. R. C. Hibbeler, “Structural Analysis”, Seventh Edition, Pearson, Prentice-Hall, 2009.
2. Kenneth, M. Leet., “Fundamentals of Structural Analysis”. Third Edition. McGraw-Hill., 2008.
3. Reddy C.S., “Basic Structural Analysis”, Tata McGraw Hill Publishing Co., 1996
4. Laible J.P, “Structural Analysis”, Mc Graw Hill Book Co., 1984.
5. Yuan-yu Hsieh & S. T. Mau,”Elementary Theory of Structures, Prentice Hall, 1995

EAT257/3
BUILDING SERVICES ENGINEERING

Course Synopsis

This course is designed to provide students with an understanding of specification, design, installation and management of all the engineering services associated with the built environment. It provides students with basic knowledge in building infrastructure which includes assess road or pavement, sewerage design, drainage design, water supply design, fire resistance, acoustic, thermal resistance and conductivity, and electrical supply and installations. At the end of this course, students will be exposed to the mechanical systems that are typically installed in buildings.

Labs

1. Refrigeration trainer
2. Air – Conditional trainer
3. Heating Trainer
4. Elevator Trainer

Course Outcomes

CO1:
Ability to describe and discuss the importance of building services in their buildings’ designs.

CO2:
Ability to evaluate the choice of building services components for better buildings’ design and long term building operational sustainability.

CO3:
Ability to understand the Mechanical & Electrical distribution systems in modern buildings and problems related to design, operation and maintenance.

References

1. Chadderton, David V., Building Services Engineering,Hardback,April 2007, Publisher Taylor & Francis Ltd.
2. David, V. Chadderton ,“Building Services Engineering”, Taylor & Francis , 2000.
3. John J. McGowan, C.E.M., “Direct Digital Control: A Guide To Distributed Building Automation”, The Fairmont Press, Inc.1995
4. Hawkes, Dean : Energy efficient buildings, 2002
5. Miller, Vandome, McBrewster., “Building Services Engineering”, VDM Publishing House Ltd., 2009.

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.

Labs

1. Common specified tests on cement and aggregates
2. Concrete mix design
3. Strength and material tests.

References

1. Edward Ellen and Joseph Lano. “Fundamental of Building Construction: Materials and Methods”, Fourth Edition. Wiley. 2008.
2. Bjorn Berge. “Ecology of Building Materials”. Second Edition. Architectural Press. 2009
3. H. Zhang. “Building Materials in Civil Engineering”. Wood head Publishing Limited. 2010
4. S. K. Duggal. “Building Materials”. Taylor & Francis. 1997.
5. P.C.Varghese. “Building Materials”. PHI Learning Pvt. Ltd. 2005

EAT356/4
Water & Wastewater Engineering

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.

Labs

Lab 1: Jar test
Lab 2: Hardness test
Lab 3: COD
Lab 4: BOD5

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. Metcalf & Eddy, Inc (2003). Wastewater Engineering: Treatment and Reuse. 4th Ed. McGraw-Hill.
2. Thomas Joseph Casey (1997) Unit Treatment Processes in Water and Wastewater Engineering, Wiley
3. Hamidi Abdul Aziz, (1999) Kejuruteraan Air Sisa, Utusan Publication & Distributors Sdn Bhd.
4. George Tchobanoglous, Franklin L. Burton, H. David Stensel, Wastewater Engineering: Treatment and Reuse, McGraw-Hill, 2004
5. Syed R. Qasim, Wastewater treatment plants: planning, design, and operation, CRC Press, 1999

EAT 314/4
GEOTECHNICAL ENGINEERING

Synopsis

The course covers the applied aspects of soils mechanics.

There are three main sections to this course (1)foundations, bearing capacity, settlement, pile foundations, (2) earth-retaining structure, earth pressure, retaining structures and deep excavations and (3) slope stability, planar and non-planar movement, landslide investigations and instrumentations and slope stabilization.

Labs

1. JKR / McKintosh Probe Test
2. One dimensional Consolidation test
3. Triaxial test
4. Direct Shear test

Course Outcomes

CO1:
Ability to analyze bearing capacity and design for shallow foundations and deep foundations.

CO2:
Ability to describe and design various concrete retaining walls based on lateral earth pressure.

CO3:
Ability to conduct slope stability analysis and landslide investigations.

CO4:
Ability to discuss and identify common sampling methods for subsoil exploration.

EAT342/3
Noise Pollution Engineering

Synopsis

Characteristics of sound, Sources, effect and regulation of noise pollution, Measurement and Analyses of noise Noise control, Fundamentals and Basic Concepts of Vibration, Undamped and Damped Free Vibrations

Labs

1. Measurement and Analyses of Noise
2. Effect Noise in Building Materials
3. Pendulum System:
   (a) Simple Pendulum System
   (b) Compound Pendulum System

Course Outcomes

CO1:
Ability to explain and discuss the concept of noise control.

CO2:
Ability to ability to analyse what is noise and vibration.

CO3:
Ability to explain and analyse noise pollution level and know how to overcome it according to the law

CO4:
Ability to describe and compute different system of vibration.

CO5:
Ability to apply knowledge and concept of vibration in solving the problem.

References

1. Baranek, L. L. and Ver, L. L. (Editor), 'Noise and Vibration Control Engineering: Principles and Applications', John Wiley & Sons, 2005.
2. Ambekar, A.G., Mechanical Vibrations and Noise Engineering, Prentice-Hall of India, New Delhi, 2006.
3. Lawrence K. Wang, Norman C. Pereira, Yung-Tse Hung, Advanced air and noise pollution control, Volume 2, Human Press Inc, 2005
4. Agarwal, Noise Pollution Agarwal, S. B. Nangia, 2009
5. A. Lara Sáenz, Raymond William Barrow Stephens, International Council of Scientific Unions. Scientific Committee on Problems of the Environment, John Wiley, 1986

EAT343/3
PUBLIC HEALTH AND OCCUPATIONAL HYGIENE

Course Synopsis

General
Introduction to epidemiology

Water
Safe drinking water; dilemma in compliance; the relation between chemical contaminants in drinking water and public health, control of water-borne diseases.

Air and Noise
Air pollutants and its effect, indoor air pollution, heat and temperature extreme hazard, noise and and vibration hazard.

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

1. Mary-Jane Schneider. *"Introduction to Public Health"* 1st edition, Jones & Bartlett Publishers, 2003.
2. Bernard J. Turnock, Public health: what it is and how it works, 4th Edition, Jones and Bartlett, 2009
3. Bernard J. Turnock, Essentials of public health, Jones and Bartlett, 2007
4. Kerry Gardiner, J. Malcolm Harrington, Occupational hygiene, Blackwell Publising, 2007
5. By Megan Tranter, Occupational Hygiene and Risk Management, Megan Tranter, 2004.

EAT 359/3
Water Resources Engineering

Synopsis

Introduces the fundamental of hydrological process such as hydrologic cycle, atmospheric circulation, precipitation, evaporation, evapotranspiration and infiltration. Analysis in hydrologic will be covered including watershed concepts, rainfall-runoff, unit hydrograph and synthetic unit hydrograph. Focus will also be on the frequency analysis which cover the probability concepts, random variables and probability distribution, return period, common probabilistic models, graphical presentation of data and regional analysis. Apart of that, flood routing chapter will cover hydrologic routing, hydrologic river and reservoir routing, movement of flood wave and kinematic wave routing. Part of hydraulics will also be discussed and reviewed. In addition, water supply and water distribution system will be analyzed.

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

1. V. T Chow, David R, Larry M Mays, Applied Hydrology, McGraw – Hill International, 1988
2. Bedient, Huber, Hydrology and Floodplain Analysis 4th Edition, Pearson 2008
3. Ian Watson, Alister D. Burnett, Hydrology: an environmental approach, CRC Press, 1995
4. Wilfried Brutsaert, Hydrology: an introduction, University Press, Cambridge , 2005
5. Andrew D. Ward, Stanley Wayne Trimble, Environmental hydrology, 2nd Edition, 2003

EAT351/3
CONCRETE BUILDING DESIGN I

Course Synopsis

This course is designed to provide the student with a understanding of the limit state design concept and analysis of sections for bending; to provide a basic understanding of standard methods of analysis and design of reinforced concrete behaviour (including an understanding of capabilities and limitations); and to ability to analyze and design reinforces concrete structural elements. Among the topics discussed are objectives and methods of design, code of practice, analysis and design of sections for moment, design for shear, checking for deflection and cracking, durability and detailing requirements. Design of simply supported, continuous beams and cantilever beam, design of one way and two way restrained and simply supported slab and design a column. The syllabus is cover ultimate and serviceability limit state. Design resistance typical structural element and detailing.

Labs

1. Properties of cement
2. Properties of aggregate
3. Concrete mix design and test on wet concrete
4. Reinforcement properties

Course Outcomes

CO1:
Ability to explain limit state design concept and analysis of sections for bending.

C02:
Ability to design 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. Reinforced Concrete Design. 5th Ed., Palgrave, 1999.
2. IStructE. Manual for the Design of Reinforced Concrete Building Structures. The Institution of Structural Engineer. 1985
3. Kong, F.K. and Evan, R.H. Reinforced and Prestressed Concrete. 3rd Ed., Spoon Press, 1998.
4. Ray, S.S. Reinforced Concrete: Analysis and Design. Blackwell Science,
5. BS 8110: Part 1. Structural use of concrete - Code of practice for design and construction. British Standard Institution. 1997

EAT352/3
CONCRETE BUILDING DESIGN II

Course Synopsis

This course is designed to expose students to a wider scope of reinforced concrete design. As a successor to the Concrete Building Design I, the topics covered are design of staircases, footings, pile caps, retaining walls, multi storey and pre-stressed concrete design which cover topics on principle and methods of pre-stressing, stress limit, losses and selection of section. As an addition, since IBS is one of the national agenda in construction, the introduction to precast concrete building is also introduced.

Course Outcomes

CO1:
Ability to design staircases and footings and ilustrate the detailing.

C02:
Ability to design simple retaining walls and its detailing.

CO3:
Ability to analyse principle and methods of pre-stressing, stress limit, losses and selection of section.

CO4:
Ability to design precast concrete structure.

References

1. Mosley, W.H. Bungey, J.H. and Hulse, R. Reinforced Concrete Design. 5th Ed., Palgrave, 1999.
2. IStructE. Manual for the Design of Reinforced Concrete Building Structures. The Institution of Structural Engineer. 1985
3. Kong, F.K. and Evan, R.H. Reinforced and Prestressed Concrete. 3rd Ed., Spoon Press, 1998.
4. Ray, S.S. Reinforced Concrete: Analysis and Design. Blackwell Science,
5. BS 8110: Part 1. Structural use of concrete - Code of practice for design and construction. British Standard Institution. 1997

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. 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.

C02:
Ability to analyze and solve indeterminate structural problems for prismatic and non- prismatic members.

C03:
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. R. C. Hibbeler, “Structural Analysis”, Seventh Edition, Pearson, Prentice-Hall, 2009.
2. Kenneth, M. Leet., “Fundamentals of Structural Analysis”. Third Edition. McGraw-Hill., 2008.
3. Reddy C.S., “Basic Structural Analysis”, Tata McGraw Hill Publishing Co., 1996
4. Laible J.P, “Structural Analysis”, Mc Graw Hill Book Co., 1984.
5. Yuan-yu Hsieh & S. T. Mau,”Elementary Theory of Structures, Prentice Hall, 1995

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 buckling and failure, particularly those associated with tension, bending, shear compression, combined actions and connections; have a working knowledge of BS, and be competent in designing a simple structure to BS. 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

CO1:
Ability to describe basic concept of steel members, connections and structures behavior.

CO2:
Ability to apply the steel design concept.

CO3:
Ability to design steel structures elements.

References

1. Gray, C. S. Kent L.E Mitchell, W.A., and Godfey, W.B., “Steel Designer’s manual”, English Language Book Society and Granade Publishing, London, 1983.
2. Arya and Ajmani, “Design of steel Structures”, Nemchand Brothers, Roorkee, 1989
3. Dayaratnam, P. “Design of steel structures”, .A.H. Wheeler & Co., Ltd, Allahabad, 1996.
4. Punmia, B.C., Ashok Kumar Jain & Arunkumar Jain, “Design of Steel Structures”,

EAT 357/3
CONSTRUCTION MANAGEMENT

Course Synopsis

This course is designed to provide students with the knowledge of subject area; ability to apply tools in a project environment; demonstrate competence in learning and evidence generating to sustain competency. The syllabus comprises scope management including project authorization, scope definition, control and finalization. Cost management including project costing, resource planning, budgeting and controlling financial completion are also emphasized. In addition, this course will also expose students to the time management including activity sequencing, duration estimating, scheduling, progress control, monitoring and forecasting.

Course Outcomes

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. Gido & Clements., “Successful Project Management”, Second Edition. Thomson, South-Western, 2003.
2. Jack R. Meredith & Samuel J. Mantel, Jr., “Project Management: A Managerial Approach”, Forth Edition. John Wiley. 2000.

3. Hinze, Jimmie W., "Construction Planning and Schedule", Prentice Hall, 1998.
4. Daft, R.K.,"Management" 3rd Ed, The Dryden Press, 1993.
5. Hillebrandt, P. and Cannon, J.,"The Management of Construction Firms-Aspects of Theory", Macmillan Press Ltd, 1994.

EAT 358/3
Highway & Traffic Engineering

SYNOPSIS

This course provides student with understanding of pavement construction. Emphasis of this course is to introduce students to the concept, pavement construction process, survey and site investigation, earthwork operation, sub grade construction, slope stability, land stabilization. Student also will be taught on road drainage, system and surface drainage design, pavement thickness design, base and sub-base construction and flexible pavement, rigid pavement construction method, streets, walks and open storage. Lastly student will be unveiled to appraisal methods, maintenance, and expert system and in road pavement management. Student also required able to understand and analyze construction methods and maintenance through problems that addressed in project.
Course Outcomes:

CO1:
Ability to design highway geometry
CO2:
Ability to design the asphalt mixtures.

CO3:
Ability to design rigid and/or flexible pavement

CO4:
Ability to design intersection and/or analyze highway level of service.

Reference

1. Kendrick P, Copson. M, Beresford. S, McCormick. P, Roadwork Theory and Practice, 5th Edition Elsevier Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford.

2. Brown E.R, Roberts F.L, Kandhal P.S, Lee D.Y & Kennedy T.W. 1996. Hot Mix Asphalt Materials, Mixture Design and Construction (2nd Edition). NAPA Education Foundation, Lanham, Maryland.

3. Mohamed Rehan Karim, Meor Othman Hamzah & Asri Hassan. 1991. Introduction to Bituminous Road Construction (Pengenalan Pembinaan Jalan Raya Berbitumen). Kuala Lumpur: Dewan Bahasa dan Pustaka.

4. Lembaga Lebuhraya Malaysia. 1986. Interurban Toll Expressway System of Malaysia Design Standards. Kuala Lumpur.

5. Huang Yang H. 2004. Pavement Analyses and Design (2nd Edition). New Jersey: Prentice Hall.

6. Wright P.H & Dickson K.K. 2003. Highway Engineering (7th Edition). New York: John Wiley & Sons, Inc. The Asphalt Institute. 1978. Asphalt Paving Manual MS-8. USA.

7. Yoder, E.J & Witczak M.W. 1975. Principle of Pavement Design. New York: John Wiley & Sons, Inc.

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:
Able to acquire an advanced and comprehensive overview of the

behavior of concrete buildings under load.

CO2:
Able to carry out routine conception, analysis and design of typical buildings and structural elements in accordance with standard procedures.

CO3:
Able to draw and specify work for conventional building design, mechanical and electrical work.

CO4:
Able to conduct flexural analysis of continuos beam, slabs, foundation and wall.

References

1. Ambrose, J.E., "Building Structures", John Wiley & Sons, 1993.
2. Brzer, S. Pac, J., "Reinforced Concrete Design: A Practical Approach", Pearson, 2005.
3. Edward G. Nawy., "Reinforced Concrete" 5th Ed, Pearson, 2005.
4. Nunally, S.W., "Construction Methods and Management", Prentice Hall, New Jersey, 1998.
5. Polette, D., Landers, J.M., "Construction Systems", Goodheart-Wilcox Co, 1995.

EAT 414/3
CONSTRUCTION METHODS AND CONTROL

Course Synopsis

This course has been developed to provide the understanding of construction methods, strategies, equipment and machinery in a range of construction activities and an understanding of the principles involved in the design for construction activities.

Course Outcomes

CO1:
Able to understand various construction methods.

CO2:
Ability to design building infrastructures

References

1. Stephens W. Nunally, "Construction Methods and Management" 7th Ed, Prentice Hall,2006.
2. J. Illingworth, "Construction Methods and Planning" 2nd Ed, Spoon Press, 2000.
3. H. Leslie Simmons, "Construction principles, Materials, and Methods "7th Ed, Wiley, 2000.
4. E. Van Amsterdam, "Construction Method for Civil Engineering", Juta Academic, 2000.
5. Ralph W. Liebing, "Introduction to Construction: Management and Methods", Wiley, 2007.

EAT 415/3
ADVANCED STEEL BUILDING DESIGN

Course Synopsis

This course covers the analysis and design of multi-storey braced and unbraced steel frames and types of connections used for simple, semi-continuous, and continuous construction. For un-braced steel frame wind-moment method is introduces. Besides multi-storey steel frame, this course also covers the design of composite beam, plate girder, and portal frame. For composite beam design, linear interaction method and stress block methods are discussed. For plate girder, the design covers the stiffening of the web. For portal frame, elastic and plastic designs are taught.

Course Outcomes

CO1:
Able to understand structural behavior of steel members and connections

CO2:
Able to describe buckling behavior and connection design

CO3:
Able to use software in structural steel design

References

1. Guo-Qiang Li, Jin-Jun Li. “Advanced Analysis and Design of Steel Frames”. John Wiley & Sons, Ltd. 2007.
2. Jack C. MacCormac.“Strucutral Steel Design”. Prentice Hall. Fourth Edition. 2007
3. Dayaratnam, P., “Design of Steel Structures”, A.H. Wheeler & Co. Ltd., Allahabad, 1996.
4. Ragupathy M, “Design of Steel Structures”, Tata McGraw-Hill Publishing Co., Ltd.,New Delhi,1996.
5. T.J. MacGinley & T.C. Ang, ‘Structural Steelwork Design to Limit State Theory’, Butterworth Heinemann, 1993. (TA652 MAC)

EAT 358/3
CONSTRUCTION LAW AND PROCUREMENT

Course Synopsis

This course focuses on introduces principles area of construction law and understanding the relationship between contract documents and the construction process. This includes the contractual relationships, legal roles and responsibilities, and contract types. Legal issues that often result in construction disputes including differing site conditions, time and schedule impacts, change orders and changed conditions also will be explored. Review analysis of the method used in presenting and solving construction control and contract dispute resolution including negotiations, alternative dispute resolutions, and litigation of disputes. Procurement methods, tenders and their assessment, risk and insurance, contractual claims, the law of tort and contract, the law of evidence, statutory duties in respect of construction projects also included in this course.

Course Outcomes

CO1:
Ability to understand principles of construction law and contracts.

CO2:
Ability to review and analyze method use in presenting and solving construction disputes.
CO3:
Ability to interpret procurement methods, tenders and risk assessment related to construction.

CO4:
Ability to review and evaluate the procurement law in respect of construction projects.

References

1. Michael T. Callahan, “Procurement of Construction and Design Contracts (Construction Law Library “,, Aspen Publisher, 2005.
2. Thomas J., Currie and Hancock Smith, “Common Sense Construction Law :A Practical Guide for The Construction Professional”, John Wiley, 2005.
3. R. W. Craig, “Procurement Law for Construction and Engineering Works and Services”, Blackwell Science, 1999.
4. Nancy J. White, “Principles and Practices of Construction Law”, Pearson, 2002.
5. Joseph D. Coleman, “Construction Documents and Contracting”, Prentice Hall, 2004.

EAT 445/2
FINAL YEAR PROJECT I

Course Synopsis

This is an individual research project in connection with a special engineering problem and under the guidance of an academic staff. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. In this subject. In this subject, the students will be taught on how to prepare the research proposal. Besides that, student will be also exposed to earlier part of thesis writing such as introduction, literature review and methodology.

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 problems in a systematic manner.;

CO3:
Ability to work independently in conducting and completing an academic project.

CO4:
Ability to present the final product orally and graphically.

EAT 446/4 FINAL YEAR PROJECT II

This subject is the continuity of Final Year Project I. In this subjects students will conduct experimental tasks which has been planned during the Final Year Project I. Students also will completing their thesis report during this subject. In this subject, students will be also exposed to journal writing.

EAT 455/3 INDUSTRIALIZED BUILDING SYSTEM (IBS)

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 highligted the concept of Score Calculation and submission, Principal of Modular Coordination in IBS and concepts of buildibility. Enhanement through mini project will be done to further strangthen their knowledge on subject matter.

Course Outcomes

CO1:
Ability to discuss the concept of IBS modern construction technology.

C02:
Ability to explain the Principle of Score calculation and its submissions.

CO3:
Ability to discuss Concept of Modular Coordination in IBS.

CO4:
Ability to discusss precast concrete building design.

References

1. Abraham Warzaski. “Industralised and Automated Building Systems: A Managerial Approach”. Second Edition. Tylor & Francis Group. 2005.
2. Albert G. H. Dietz. “Industrialized Building Systems for Housing”. The MIT Press. 1971.
3. Ram S. Gupta. “Principles of Structural Design: Wood, Steel, and Concrete”. Taylor & Francis. 2010.
4. Sarja. “Open and Industrialized Building”. Taylor & Francis. 2010
5. S.G. Bruggeling, G.F. Huyghe. “Prefabrication With Concrete”. Taylor & Francis, 1991

EAT 453/3 ADVANCED STRUCTURAL ANALYSIS

Course Synopsis

Stability: energy methods for single degree-of-freedom elastic systems; critical and nonlinear buckling; classification of types of basic post-buckling responses; imperfection-sensitivity.
Instabilities in struts and columns: idealised and real behaviour; Rayleigh and Timoshenko methods. Instabilities in beams: lateral-torsional buckling. Introduction to plate buckling. Plasticity: moment capacity of composite sections; moment capacity reduction due to shear and axial force, plastic collapse of beams and frames; upper and lower bound theorems. Combination of mechanisms for frame analysis. Dynamics: dynamic

loads, structural modelling: degrees of freedom, lumped mass. Free, damped and undamped vibrations of single degree-of-freedom elastic structures: viscous damping; logarithmic decrement. Forced vibrations: harmonically forced with and without damping: resonance; support motion and earthquake excitation. Concepts of generalised mass, stiffness, damping and force.

Course Outcomes

CO1 :
Ability to discuss stability of structure including single degree-of-freedom elastic systems; critical and nonlinear buckling; classification of types of basic post-buckling responses.

CO2:
Ability to describe plasticity consisting moment capacity of composite sections; moment capacity reduction due to shear and axial force, plastic collapse of beams and frames.

CO3:
Ability to discuss dynamic loads, structural modeling and degrees of freedom.

CO4:
Ability to describe forced vibrations of structures.

References

1. Clough, R.,W., and Penzien, “Dynamics of Structures”, McGraw Hill Book Co Ltd, 1986.
2. Paz Mario,” Structural Dynamics - Theory and Computation”, CBS publishers, 1999
3. Craig,R.R., “Structural Dynamics - An Introduction to computer Methods”, John Wiley & Sons, 1989.
4. Gaylord, Edwin H., Jr., And Charles. N., “Structural Engineering Handbook”, 3rd Ed, McGraw Hill, 1990.
5. K.Chopra. “Dynamics of Structures”, Pearson Prentice Hall. 2007.

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.

C02:
Ability to design timber joint using nail and other mechanical fasteners.

C03:
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. Harbhajan Singh., “Design of Masonry and Timber Structures”, Abhishek Publications, 2007.
2. Chanakya Arya, “Design of Structural Elements: Concrete, Steelwork, Masonry and Timber Design to British Standard and Eurocodes”, Routledge (taylor & Francis)spon, Third Edition,2009.
3. Ram S. Gupta. “Principles of Structural Design: Wood, Steel, and Concrete”. Taylor & Francis. 2010.
4. Mat Lazim Zakaria, “Rekabentuk Struktur Kayu Menurut MS544”, Dewan Bahasa dan Pustaka

5. Desch, H.E.,” Timber, Its Structure, Properties and Utilisation,” Mac Millan Press. (Latest Edition)

EAT 456/3
FOUNDATION ENGINEERING

Course Synopsis

This course exposes students to the application of soil mechanics principles to foundation design. Topics include discussion on various types of foundations and their criteria for selection such as shallow foundation, pile, raft foundation, group piles, and laterally loaded and uplift piles. Settlement and bearing capacity considerations are employed to select and design the appropriate foundation scheme for structures. Construction of foundation, which includes excavation, shoring and bracing, and protection measures for foundation due to chemical attack, corrosion and seepage are also included.

Couse Outcomes

CO1:
Ability to discuss various types of shallow and deep foundation.

CO2:
Ability to design shallow foundation.

CO3:
Ability to design deep foundation.

References

1. Braja M. Das, "Principles of Foundation Engineering", Fourth Edition, Nelson Engineering, 2007.
2. P. C., Varghese, "Foundation Engineering", Prentice-hall Of India Pvt Ltd, 2007.
3. K. Arora., "Soil Mechanics and Foundation Engineering". Standard Publishers Distributors, 2009.
4. Roslan Hashim, "A Brief Guide to Foundation Engineering", Dept. of Civil Engineering, Universiti Malaya, 2003.
5. Tomlinson M. J, "Foundation Design and Construction, 6th Edition", Longman Scientific & Technical, 1995.

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 BASs

CO3:
Ability to evaluate control and optimization of air- conditioning 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., "Intelligent System And Building Automation", Spon Press, 2010
2. Ogata, K., "Modern Control Engineering", 4th Ed. Prentice Hall, 2002.
3. Gopal, M., "Control Systems: Principles and Design", 2nd Ed. Tata McGraw-Hill, 2002.

Career Opportunities

Employment prospects and the career of the graduates are broad because they are trained by multi discipline which involves microbiology study, chemistry and ecology. The graduates with Environmental Engineering Degree and graduates from Building Engineering Bachelor have employment prospects that increasingly widespread in the public sector and private. The sectors that offer the careers are:

- Commodity
- Petrochemical industry
- Chemical industry
- Water treatment industry, waste water, solid waste, hazardous waste
- Processing industry and manufacturing
- Research institutes & development and education
- Consultation institution environment
- Government departments such as Jabatan Alam Sekitar, JPS and JKR
- Municipal Council
- Statutory Bodies such as MARDI, PORIM, SEDC, NIOSH and others
- NGO environment internally and outside the country
- Construction industry
- Research and development (R&D) and academic institution
- Negotiator institution and contractor
- NGOs

Main career to this programme graduate were as follows:

- Engineer / Environmental Officer
- Engineer / Health Officer, Security and Environment
- Health ranger and Security
- Environment Enforcement Official
- Engineer / Executive Risk
- Engineer / Security Officer
- Environment Research Officer
- Remediation Engineer Site
- Process Engineer
- Supply Engineer and Sources of Water
- Public Health Engineer
- Pollution Control Engineer
- Sustainable Development Executive
- Environment Contractor (technical)


PC08

School of Business Innovation and Technopreneurship

PROGRAMS OFFERED

- Bachelor of Business (Honours) (Engineering Entrepreneurship)
- Bachelor of Business (Honours) (International Business)

ADDRESS:

SCHOOL OF BUSINESS INNOVATION AND TECHNOPRENEURSHIP (PPIPT)
Universiti Malaysia Perlis (UniMAP)
Jalan Kangar – Alor Setar
01000 Kangar
Perlis
Tel : +604 – 979 7707
Faks : +604 – 979 7708

Introduction

Pusat Pengajian Inovasi Perniagaan dan Teknousahawan (PPIPT) was approved for inception on June 4, 2010. PPIPT was established to serve as a catalyst in disseminating knowledge in management and business not only to all departments at UniMAP, in particular, the engineering schools but also the society at large.
Currently PPIPT offers two business programmes:

1. Bachelor of Business (Honours) (Engineering Entrepreneurship)
2. Bachelor of Business (Honours) (International Business).

The main aim of the Bachelor of Business (Hons) (Engineering Entrepreneurship) programme is to prepare business students majoring in entrepreneurship as well as basic skills in engineering to become entrepreneurs. This programme is designed for students who are interested in entrepreneurship and wished to develop their knowledge and basic skills of engineering associated with the production and marketing of technology-based products. This program will be able to produce graduates with balanced knowledge and skills in entrepreneurial and technical aspects. Student will be moulded and guided in learning the basic subjects of engineering and entrepreneurship, nurtured to be self-reliant and have high competitiveness to face the challenges in the contemporary globalized environment.

The main aim of the Bachelor of Business (Honours) (International Business) programme is to produce graduates who are knowledgeable and capable of business transactions in the international perspective, as Malaysia is now increasingly active in international trade. Graduates from this program are trained to have the ability to incorporate and apply the knowledge and skills in business. Students shall also be groomed to be self-reliant and able to find solutions to a variety of problems through innovative and creative thinking. Students will also be instilled with noble and ethical values.

Staff Directory

DEAN
ASSOCIATE PROFESSOR DR. HAZRY DESA
E-mail : hazry@unimap.edu.my

DEPUTY DEAN (ACADEMIC AND RESEARCH)
MR. AHMAD ZULHUSNY ROZALI
E-mail : zulhusny@unimap.edu.my

DEPUTY DEAN (STUDENT DEVELOPMENT AND ALUMNI)
DR. MOHAMMAD SHAHAR JUSOH
E-mail : shahar@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (INTERNATIONAL BUSINESS)
MR. RAZIFF JAMALUDDIN
E-mail : raziff@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME (ENGINEERING ENTREPRENEURSHIP)
MRS. TENGKU SURIANI TENGKU YAAKOB
E-mail : tengkusuriani@unimap.edu.my

CHAIRPERSON OF MASTER PROGRAMME (GENERAL MANAGEMENT)
MISS NURSYUHADAH KAMARUDDIN
E-mail : syuhadah@unimap.edu.my

CHAIRPERSON of MASTER PROGRAMME (ENGINEERING MANAGEMENT)
MR. MOHAMMAD SHARIFF ISMAIL
E-mail : shariff@unimap.edu.my

CHAIRPERSON of TECHNOPRENEURSHIP DEVELOPMENT
MISS HAFIZAH ABDUL RAHIM
E-mail :hafizahrahim@unimap.edu.my

COORDINATOR of INDUSTRIAL NETWORKING AND QUALITY MANAGEMENT
MR. ADI ANUAR AZMIN @ CHE WAN
E-mail : adianuar@unimap.edu.my

ASSISTANT REGISTRAR
MRS. RUHAIDA ISMAIL
E-mail : ruhaida@unimap.edu.my

Academic Staff

Professor Dato Wira Dr. Mohd Salleh Hj. Din
Ph.D (SME) University of Durham
MBA (Finance and Marketing) Miami University
Tel : 04-9797726
E-mail : sallehdin@unimap.edu.my

Professor Dr. Rosni Bakar
Ph.D (Economics), University of Exeter, England
MA (Economics), Eastern Illinois University, USA
BA (Economics), Eastern Illinois University, USA
Dip. Ed., UTM, Malaysia
Tel : 04-9797728
E-mail : rosni@unimap.edu.my

Visiting Professor Dato' Dr. Haji Abdul Razak Haji Omar
Ph.D (Business Studies), University of Stirling, Scotland
M.B.A, University of New Heaven, Connecticut.
Professional Certificate in Public Administration, University of New Heaven, Connecticut
B.Soc.Sc. (Hons), USM, Malaysia
E-mail : razakomar@unimap.edu.my

Associate Professor Dr. Hazry Desa
Ph.D (Control Communication-Robotics), Oita University, Japan
Bachelor Degree of Mechanical Engineering, Tokushima University, Japan
Tel : 04-9797707
E-mail : hazry@unimap.edu.my

Associate Professor Ku Halim Ku Ariffin
Master of Public Administration, USM / Syracuse, Malaysia
Bac. of Social Science, USM, Malaysia
E-mail : ku.halim@unimap.edu.my

Associate Professor Dr. Yoshifumi Harada
DBA, Kanagawa University, Japan
MSc. (Economics), Murray State University, USA
MBA, Hampton University, USA
B.Sc (Law), Kobegakuin University, Japan
E-mail : yoshifumi@unimap.edu.my

Associate Professor Dr. Idris Md Noor
Ph.D (Curriculum Studies), University of Manchester, UK
M.Ed, University of Birmingham, UK
BA. Ed (Hons) Geography/ Linguistics, USM, Malaysia
E-mail : idris@unimap.edu.my

Associate Professor Mohamed Murray Hunter
Master of Organisation Behaviour, Swinburne University of Technology, Australia
Dip. of Perfumery, Plymouth University
E-mail : murray@unimap.edu.my

Associate Professor Lt. Kol. Azuddin Hj. Bahari (B)
MBA, Leicester
Dip. Military Studies, Armed Forces Staff College, Malaysia
Dip.Personnel Management, UKM, Malaysia
Tel : 04 - 9797734
E-mail : azuddin@unimap.edu.my

Dr. Muhammad Shahar Jusoh
Ph.D (Quality Management), UUM, Malaysia
Master of Science (Information Management), UiTM, Malaysia
B. BA (Hons), UUM, Malaysia
Tel : 04 - 9797714
E-mail : shahar@unimap.edu.my

Dr. Md Aminul Islam
Ph.D, USM, Malaysia
MBA, USM, Malaysia
BBA, IIUM, Malaysia
Adv. Dip. in Teaching In Higher Education, NTU, UK
Tel : 04 - 9798593
E-mail : amin@unimap.edu.my

Mr. Adi Anuar Azmin @ Che Wan
Master of Education (Human Resource), UTM, Malaysia
BBA (Hons), UiTM, Malaysia
Dip. in Banking, UiTM, Malaysia
E-mail : adianuar@unimap.edu.my

Mr. Ahmad Zulhusny Rozali
M. Sc. (Information Technology Entrepreneurship), UTM, Malaysia
B.Sc (Computer Science), UTM, Malaysia
Tel : 04-9797702
E-mail : zulhusny@unimap.edu.my

Ms. Atikah Nor Johari
MBA, UUM, Malaysia
B.BA (Hons) Finance, UUM, Malaysia
Tel : 04-9797733
E-mail : atikahnor@unimap.edu.my

Miss Azlini Che Hassan @ Hassan
MBA, UUM, Malaysia
B.BA (Hons) Human Resource Management, UUM, Malaysia
Tel : 04 - 9797717
E-mail : azlini@unimap.edu.my

Ms. Bibi Noraini Mohd Yusof
M.Sc (International Business), UUM, Malaysia
Bac. of International Business Management, UUM, Malaysia
E-mail : bibinoraini@unimap.edu.my

Ms. Dayang Hasliza Muhd Yusuf
M.Sc (Finance), IIUM, Malaysia
B.BA (Honours), IIUM, Malaysia
E-mail : dayanghasliza@unimap.edu.my

Miss Hafizah Abdul Rahim
M.Ec, IIUM, Malaysia
Bachelor of Syariah & Economics (Honours), UM, Malaysia
Tel : 04 - 9797713
E-mail : hafizahrahim@unimap.edu.my

Mrs. Husna Afifi Mohd Yusoff @ Mat Jusoh
M. Sc (Information Management), UiTM, Malaysia
Bac. of Public Management (Honours), UUM, Malaysia
Tel : 04 - 9798715
E-mail : husnaafifi@unimap.edu.my

Mr. Hussen Nasir
Executive MBA, UiTM, Malaysia
B.BA (Hons) Finance, UiTM, Malaysia
Dip. BS, UiTM, Malaysia
Certificate in General Mechanical, PUO, Malaysia
E-mail : hussen@unimap.edu.my

Mr. Ku Amir Ku Daud
MBA, UUM, Malaysia
B.BA (Marketing) UiTM, Malaysia
Tel : 04-9771062
E-mail : kuamir@unimap.edu.my

Mr. Mohd Juraij Abd Rani
MBA (Marketing), UPM, Malaysia
B.BA (Hons) Marketing, UiTM, Malaysia
Diploma in Accountancy, KUIS, Malaysia
E-mail : juraij@unimap.edu.my

Mr. Muhammad Faisal Hamidi @ Abd Rani
M. Sc (Management), UUM, Malaysia
Bac.in International Business (Hons), UUM,Malaysia
Dip. in International Trade,KUSZA, Malaysia
E-mail : faisalhamidi@unimap.edu.my

Mr. Mohammad Shariff Ismail
MBA, UUM, Malaysia
BA (Hons) (Accounting & Finance), Southbank University London
Dip. in Education, Kuala Lumpur Technical Teaching College, Malaysia
Dip. in International Baccalaureate, MARA College Banting, Malaysia
Tel : 04-9797715
E-mail : shariff@unimap.edu.my

Mr. Mohd Fitri Mansor
M. Sc (Management), UUM, Malaysia
B.BA (Hons) (Human Resource Management),UK
E-mail : fitrimansor@unimap.edu.my

Mr. Mohd Shahidan Shaari
M. Ec., UUM, Malaysia
B. Ec., UUM, Malaysia
Tel : 04 - 9797716
E-mail : shahidanshaari@unimap.edu.my

Ms. Norshahrizan Nordin
M. Sc (ICT), UUM, Malaysia
Bac. of Technology Management, UUM, Malaysia
Dip. In Manufacturing Technology, KUSZA, Malaysia
E-mail : norshahrizannordin@unimap.edu.my

Miss Nur Syuhadah Kamaruddin
MBA, UUM, Malaysia
B.BA (Minor - Operation Management), UUM, Malaysia
Dip. in Business Studies, ITM, Malaysia
Tel : 04-9797719
E-mail : syuhadah@unimap.edu.my

Tuan Haji Rusli Abd Hamid
MBA, UKM, Malaysia
B. Sc (Hons) (Biology), USM, Malaysia
Dip. in Public Management, INTAN, Malaysia
Certificate in Mechanical Engineering (Production), PUO, Malaysia
Tel : 04 – 9797731
E-mail : rusli@unimap.edu.my

Mr. Raziff Jamaluddin
MBA, UiTM, Malaysia
B. BA (Hons) International Business, UiTM, Malaysia
Tel : 04 – 9797706
E-mail : raziff@unimap.edu.my

Ms. Siti Norwahida Shukeri
M. Sc (Accounting), IIUM, Malaysia
Bac. of Accounting (Hons), IIUM, Malaysia
E-mail : sitinorwahida@unimap.edu.my

Ms. Siti Nor Junita Mohd Radzi
M. Sc (International Accounting), UUM, Malaysia
Bac. of Accounting (Hons), UiTM, Malaysia
Dip. in Accounting, UiTM, Malaysia
Tel : 04-9797737
E-mail : sitijunita@unimap.edu.my

Ms. Suraiya Ibrahim
MBA (Accounting), UUM, Malaysia
Bac. of Accounting (Hons), UiTM, Malaysia
Dip. in Accounting, UiTM, Malaysia
E-mail : suraiya@unimap.edu.my

Ms. Suriani Sukri
MBA, UUM, Malaysia
BBA (Hons), UUM, Malaysia
Tel : 04 - 9797723
E-mail : surianisukri@unimap.edu.my

Ms. Syahira Sa'aban
MBA (Human Resource Management), UUM, Malaysia
B. BA (Hons) Human Resource Management, UiTM, Malaysia
E-mail : syahirasaaban@unimap.edu.my

Ms. Syarifah Fairuz Syed Radzuan
M. Sc (International Accounting), UUM, Malaysia
Bac. of Accounting (Hons), UiTM, Malaysia
Dip. of Accounting, UiTM, Malaysia
E-mail : syarifahfairuz@unimap.edu.my

Miss Syahida Kamil
M. Sc (Finance), UUM, Malaysia
B. BA (Hons) Finance, UiTM, Malaysia
Dip. in Business Studies, UiTM, Malaysia
Tel : 04 - 9798892
E-mail : syahida@unimap.edu.my

Ms. Tengku Suriani Tengku Yaakub
MBA, University of Central Missouri, USA
B. Sc (Busines Administration & Computer Science), Indiana State University, USA
Tel : 04 - 9797705
E-mail : tengkusuriani@unimap.edu.my

Ms. Wan Sallha Yusoff
MBA (Accounting), UUM, Malaysia
Bac.of Accounting (Hons), UUM, Malaysia
E-mail : wansallha@unimap.edu.my

Mr. Wan Mashumi Wan Mustafa
MBA, UUM, Malaysia
B. BA (Hons) (Marketing), UUM, Malaysia
Dip. in Business Studies (Marketing), UiTM, Malaysia
E-mail : wanmashumi@unimap.edu.my

On Study Leave

Miss Evawaynie Valquis Md. Isa
MBA, UiTM, Malaysia
B. BA (Hons) Finance , UiTM, Malaysia
Dip. In Investment Analysis, UiTM, Malaysia
E-mail : evawaynie@unimap.edu.my

Mr. Hirwan Jasbir Bin Jaafar
Master of Human Resource Development, UPM, Malaysia
Bachelor of Law (Hons), UKM, Malaysia
E-mail : hirwan@unimap.edu.my

Ms. Julinawati Suanda
MBA, UUM, Malaysia
Bac. of Public Management, UUM, Malaysia
E-mail : julina@unimap.edu.my

Mr. Kamal Baharin Baharuddin
MBA, UUM, Malaysia
B. BA (Hons), UUM, Malaysia
E-mail : kamal@unimap.edu.my

Mr. Mohd Zukime Mat Junoh
M. Sc (Information Technology), UUM, Malaysia
B. Ec (Hons), UUM, Malaysia
E-mail : zukime@unimap.edu.my

Ms. Tunku Salha Tunku Ahmad
M. Ec , UUM, Malaysia
B. Ec, UUM, Malaysia
Diploma in Education, Maktab Perguruan Persekutuan P. Pinang, Malaysia
E-mail : salha@unimap.edu.my

Administrative Staff

Ms. Ruhaida Ismail
Assistant Registrar
Tel : 04- 9797704
E-mail : ruhaida@unimap.edu.my

Miss Fatin Syazwani Syamimi Abd. Majid
Secretary
Tel : 04-9797707
E-mail : fatinsyazwani@unimap.edu.my

Mr. Mordani Morni
Admin Assistant
Tel : 04-9797710
E-mail : mordani@unimap.edu.my

Mr. Mohd Alif Zakaria
Admin Assistant
Tel : 04-9797709
E-mail : alifzakaria@unimap.edu.my

Miss Siti Azura Abdullah
Admin Assistant
Tel : 04-9797711
E-mail : sitiazura@unimap.edu.my

Mr. Shubri Salleh
Office Assistant
Tel : 04-9797712
E-mail : shubri@unimap.edu.my

Program Educational Objective (Peo) And Program Outcomes (Po) For Bachelor Of Business (Honours) (Engineering Entrepreneurship) And Bachelor Of Business (Honours) (International Business)

Bachelor Of Business (Honours) (Engineering Entrepreneurship)

Program Educational Objective (PEO)

PEO 01
Graduates who are entrepreneurs.

PEO 02
Graduates who are entrepreneurial leaders in the chosen field as demonstrated through career advancement.

PEO 03
Graduates who pursue continuous educational opportunities.

PEO 04
Graduates who contribute to society.

PEO 05
Graduates who contribute through research and development.

Program Outcomes (PO)

PO 01
Ability to apply knowledge of entrepreneurship, business management and basic engineering.

PO 02
Ability to identify problems, create solutions and innovate to improve decision making and problem solving.

PO 03
Ability to apply business operation practices and principles used in the current business environment.

PO 04
Ability to communicate effectively.

PO 05
Ability to demonstrate an in-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO 06
Ability to understand professional and ethical responsibilities.

PO 07
Ability to operate with multi-disciplinary teams.

PO 08
Ability to recognize the need for, and engage in life-long learning.

PO 09
Ability to understand social, cultural and environmental responsibilities of an entrepreneur/manager.

PO 10
Ability to recognize potential utilities of engineering applications as business opportunities.

Bachelor of Business (Honours) (International Business)

Program Educational Objective (PEO)

PEO 01
Graduates who are managers

PEO 02
Graduates who are business leaders experienced in global/international business environment

PEO 03
Graduates who pursue continuous educational opportunities

PEO 04
Graduates who contribute to society

PEO 05
Graduates who contribute through research and development

Program Outcomes (PO)

PO 01
Ability to apply knowledge of business management in the work environment

PO 02
Ability to identify problems, create solutions and innovate to improve decision making and problem solving

PO 03
Ability to apply business operation practices and principles used in the current business environment

PO 04
Ability to communicate effectively

PO 05
Ability to demonstrate an in-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development

PO 06
Ability to understand professional and ethical responsibility

PO 07
Ability to operate with multi-disciplinary teams

PO 08
Ability to recognize the need for, and engage in life-long learning.

PO 09
Ability to understand the social, cultural and environmental responsibilities from a global perspective

PO 10
Ability to adapt to international business environments.

PO 11
Ability to communicate proficiently in foreign languages

Curriculum Structure for Bachelor of Business (Honours) (Engineering Entrepreneurship) Intake 2012/2013

YEAR	FIRST			SECOND		Semester Break (June – August)	THIRD	
SEMESTER	FIRST	SECOND		FIRST	*SECOND		FIRST	SECOND
Business Program Core / Elective Courses	BFT101/3 Business Economics	BFT107/3 Principles of Finance	SEMESTER BREAK	BFT223/3 Human Resource Management	BFT222/3 Managerial Accounting	BIT291/6 INCUBATION PROGRAMME (12 weeks)	BFT318/3 Research Methodology	BFT338/3 Strategic Management
	BFT105/3 Introduction to Business	BFT108/3 Principles of Marketing		BFT211/3 Business Innovation	BFT221/3 Operation Management		BFT326/3 Project Management	BFT362/3 Business Plan for Engineering Project
	BFT106/3 Principles of Accounting	BFT110/3 Organizational Behavior		BFT218/3 Introduction to Manufacturing Technology	BFT103/3 Business Law & Ethics		BFTxxx/3 Elective (Elective 5)	BFTxxx/3 Elective (Elective 8)
	BFT109/3 Principles of Management	BQT173/3 Business Statistics		BFTxxx/3 Elective (Elective 2)	BFT213/3 Business Venture Management		BFTxxx/3 Elective (Elective 6)	BFTxxx/3 Elective (Elective 9)
	BQT133/3 Business Mathematics	BFTxxx/3 Elective (Elective 1)		BFTxxx/3 Elective (Elective 3)	BFT220/3 Technology Entrepreneurship		BFTxxx/3 Elective (Elective 7)	BFTxxx/3 Elective (Elective 10)
					BFTxxx/3 Elective (Elective 4)		BFT219/3 Product Design & Development	
University Required Courses	UUW114/2 Malay Language	BUW123/3 Business Communication		EUWxxx/1 Co-Curriculum			UUW235/2 Ethnic Relations	UUW322/2 Thinking Skills
	UUW122/2 Skills and Technology in Communication	UUW224/2 Engineering Entrepreneurship		UUW223/2 University English				
				UUW233/2 Islamic & Asian Civilizations				
120 units	19	20		20	18	6	20	17

Note:

- * refers to the need of students to register themselves one (1) week earlier than the University's Academic Calendar for the purpose of engaging in incubator program during the following semester break.
- Students who have obtained MUET Band 1, 2 or 3 need to take EUW112-Foundation English course in the First Year, Semester 1.
- Elective Course: Student need to take ELECTIVE course as listed and offered by PPIPT.

Bachelor of Business (Honours) (Engineering Entrepreneurship)
Elective Course

RP52 - Bachelor of Business (Honours) (Engineering Entrepreneurship)			
No	**Course Code**	**Course Name**	**Credit Hour**
1	BFT104/3	E-Business	3
2	BFT312/3	Business Analysis	3
3	BFT316/3	Leadership in Organisation	3
4	BFT319/3	Risk Management	3
5	BFT321/3	Services Marketing	3
6	BFT322/3	Supply Chain Management	3
7	BFT325/3	Logistics Management	3
8	BFT328/3	Managing Engineering and Technology	3
9	BFT212/3	Business Franchising & Licensing	3
10	BFT214/3	Engineering Economics	3
11	BFT215/3	Entrepreneurial Finance	3
12	BFT216/3	Entrepreneurial Marketing	3
13	BFT323/3	Family Business	3
14	BFT329/3	Small and Medium Enterprise Development	3
15	BFT112/3	Introduction to Engineering	3
16	BFT113/3	Engineering Drawing	3
17	BFT225/3	Engineering System Design	3
18	BFT3xx/3	Specialization in Engineering	3

Curriculum Structure for Bachelor of Business (Honours) (International Business) Intake 2012/2013

YEAR	FIRST		Semester Break (July – August)	SECOND		Semester Break (July – August)	THIRD	
SEMESTER	FIRST	SECOND		FIRST	SECOND		FIRST	SECOND
Business Program Core / Elective Courses	BFT105/3 Introduction to Business	BFT108/3 Principles of Marketing	BIT190/3 INDUSTRIAL TRAINING 1 (8 weeks)	BFT107/3 Principles of Finance	BFT314/3 Cross Cultural Management	BIT290/3 INDUSTRIAL TRAINING 2 (8 weeks)	BFT221/3 Operation Management	BFT338/3 Strategic Management
	BFT106/3 Principles of Accounting	BFT103/3 Business Law & Ethics		BFT223/3 Human Resource Management	BFTxxx/3 Elective (Elective 1)		BFT337/3 International Marketing	BFT335/3 International Business Environment
	BFT101/3 Business Economics	BFT110/3 Organizational Behavior		BFT222/3 Managerial Accounting	BFTxxx/3 Elective (Elective 2)		BFT351/6 Final Year Project	BFT351/6 Final Year Project
	BFT109/3 Principles of Management	BQT173/3 Business Statistics		BFT318/3 Research Methodology	BFTxxx/3 Elective (Elective 3)		BFTxxx/3 Elective (Elective 5)	BFTxxx/3 Elective (Elective 8)
	BQT133/3 Business Mathematics			BFT202/3 International Business Management	BFTxxx/3 Elective (Elective 4)		BFTxxx/3 Elective (Elective 6)	BFTxxx/3 Elective (Elective 9)
							BFTxxx/3 Elective (Elective 7)	
University Required Courses	UUW235/2 Ethnic Relations	UUW122/2 Skills and Technology in Communication		EUWxxx/2 Foreign Language (Part 1)	EUWxxx/2 Foreign Language (Part 2)		EUWxxx/2 Foreign Language (Part 3)	EUWxxx/2 Foreign Language (Part 4)
	UUW114/2 Malay Language	UUW223/2 University English		BUW123/3 Business Communication	UUW224/2 Engineering Entrepreneurship			UUW322/2 Thinking Skills
		EUW1xx/1 Co-Curriculum						
		UUW233/2 Islamic & Asian Civilizations						
122 units	19	19	3	20	19	3	20	19

Note:
- Students who have obtained MUET Band 1, 2 or 3 need to take EUW112-Foundation English course in the First Year, Semester1.
- Elective Course: Student need to take ELECTIVE course as listed and offered by PPIPT.

Bachelor of Business (Honours) (International Business)
Elective Course

RE09 - Bachelor of Business (Honours) (International Business)			
No	Course Code	Course Name	Credit Hour
1	BFT104/3	E-Business	3
2	BFT325/3	Logistics Management	3
3	BFT316/3	Leadership in Organization	3
4	BFT321/3	Services Marketing	3
5	BFT322/3	Supply Chain Management	3
7	BFT203/3	International Economics	3
8	BFT204/3	International Finance	3
9	BFT205/3	International Human Resource Management	3
10	BFT331/3	International Business Decision Making	3
11	BFT341/3	International Trade Law	3
12	BFT344/3	Import Export Management	3
13	BFT342/3	Interactive Skills Workshop for Business	3
14	BFT345/3	Business Intelligence and Analytics	3
15	BFT346/3	Change Management	3

Course Synopsis

Core Courses for Engineering Entrepreneurship (RP52) and International Business (Re09)

BFT101/3
BUSINESS ECONOMICS

Course Synopsis

This course applies the tools of economic analysis to issues in business management, developing the student's abilities to problem solve using microeconomic and macroeconomic approach. The module will focus on the operation of markets for goods and services demand and supply analysis, entrepreneurship, emergence and growth of firms, costs of production, different forms of competition and game theory, the macroeconomic environment and government policy.

References

1. Vengedasalam D. & Karunagaran (2010). Principles of Business Economics, (2nd edition.), Oxford University Press.
2. Nellis, J.G. and Parker, D. (2008). Principles of Business Economics, (2nd ed.), Prentice Hall, Pearson
3. Mastrianna, F.V. (2010). Principles of Economics, (15th ed.), South-Western, Cengage Learning.

BFT103/3
BUSINESS LAW & ETHICS

Course Synopsis

Law governs our daily activities. Similarly with other business transactions, these are certain rules that we have to follow. The purpose of having these laws is so that the transactions the parties have breached the law, action can be taken against the aggrieved party. Business ethics deals with what is right and wrong in organizational decisions, behaviour and policies. The ethics provides the principles and guidelines that assist people in making choices that balance economic interests and social responsibilities. The main objective of this course is to nurture students abilities to discuss the various laws which affect business. Ethical issues exposed include business operations and how business effectively operates.

References

1. Vohrah B. & Wu M.A,'The Commercial Law of Malaysia (2nd Edition), Kuala Lumpur Pearson Education Malaysia Sdn Bhd.
2. Ivamy E.R.H (1986), 'Underhill's Principles of the Law of Partnership (12th ed), London:Butterworth.
3. Lee M.P (1997), 'General Principles of Malaysian Law' Kuala Lumpur MLJ.

BFT105/3
INTRODUCTION TO BUSINESS

Course Synopsis

This course presents business theory and practice in comprehensive manner. It focuses on an integrated view of business such as developing a business mindset, business in the global economic environment, business organization and management, business operations and technology and financial management.

References

1. Pride,William M., Hughes R.J, and Kapoor J.R. (2009). Introduction to Business. (10th Edition). South-Western-Cengage Learning Pub
2. Ebert R.J., Griffin, Ricky W. (2011). Business Essentials. (8th edition). New Jersey: Pearson Education Inc.
3. Dlabay,L., Burron, J.L. and Eggland, S.A. (2005),'Intro to Business', (6th Edition), South-Western Educational Pub.

BFT106/3
PRINCIPLES OF ACCOUNTING

Course Synopsis

This introductory course to business accounting, introduces students to the environment of accounting. The course covers nature of accounting and accounting concepts that are relevant to the preparation and presentation of financial statements. This course also exposes students to the skills of analyzing and interpreting the financial statements.

References

1. Frank A, (2008), Business Accounting 1, Pearson Prentice Hall Pub, 2008.
2. A. Wong (2007), Business Accounting, Pearson Prentice Hall Pub.
3. Reeve, J., Warren,C.S and Duchac, J.E. (2007), Principles of Accounting,Thomson South-Western.

BFT107/3
PRINCIPLES OF FINANCE

Course Synopsis

This course provides an introduction to financial decision making rooted in current financial theories and in current state of world economic conditions with emphasis on capital markets and their influences on corporate financial decisions. The aim of this course is to teach students with tools of a discipline or trade and enable students to summarize financial related new and unforeseen problems.

References

1. Titman, Keown and Martin, (2011), Financial Management; Principles and Application (11th Edition), Pearson Prentice Hall Publication.
2. Keown, Martin, Perry (2011). Foundations of Finance: The Logics and Practice of Financial Management,, Pearson International Edition, (6th Edition), Pearson Prentice Hall Publications, USA
3. Brigham and Ehrhardt, (2005), Financial Management; Theory and Practice, International Sudent Edition, (11th Edition), South Western Cengage Learning.

BFT108/3
PRINCIPLES OF MARKETING

Course Synopsis

Marketing is one of the three foundations in any business besides operation management and finance. Every business entity small, medium or multinational organizations need to have these components. This course aims to familiarize student with the important concerns of marketing and the importance of how, when, why and where to promote the business.

References

1. Kutz, D.L., Young, V. (2008), Principles of Contemporary Marketing, Thomson South-Western, USA.
2. Best, R. (2004), Market Based Management, (4th. Edition), London: Prentice-Hall.
3. Hartley, R.H. (2006), Marketing Mistakes and Success, John Wiley and Sons.

BFT109/3
PRINCIPLES OF MANAGEMENT

Course Synopsis

This course is about management and managers. Manager is very importance in all organizations – regardless business size, kind, or location-need. And there’s no doubt that the world that managers face has changed, is changing, and will continue to change. The dynamic nature of today’s organizations means both rewards and challenges for the individuals who will be managing those organizations.

References

1. Robbins, S.P., DeCenzo, D.A., Coulter, M. (2011), Fundamentals of Management, (7th Edition), Pearson.
2. Richard, L.D. (2010), New Era of Management, (9th Edition), South-Western Cengage Learning.
3. Schermerhorn, J. Jr. (2008), Management, (9th Edition), John Wiley & Sons, Inc.

BFT110/3
ORGANIZATIONAL BEHAVIOUR

Course Synopsis

The main reasons for studying organizational behaviour is that most of us work in organizations, so we need to have an ability to understand, predict, and influence the behaviours of others in organizational settings. All of us need organizational behaviour knowledge to address the people issues.

References

1. Quick, J. C. & Nelson, D. L. (2011). Principles of Organizational Behavior: Realities and Challenges (7th Edition). Australia: South-Western Cengage Learning.
2. Greenberg, J. (2010). Managing Behavior in Organizations (5th Edition). New Jersey: Pearson.
3. George. J. M. & Jones, G. R. (2012). Understanding and Managing Organizational Behavior (6th Edition). Boston: Pearson.

BFT221/3
OPERATION MANAGEMENT

Course Synopsis

This course will be of interest to business programmes students because Operation Management is one of the three major foundations in any business organization beside Marketing and Finance/Accounting. Every Business, whether small, medium or Multinational Organization have an operation management component. This course will familiarize students with the important concerns of operation management decisions.

References

1. Render and Heizer,(2010) Operations Management (10th Edition), Prentice Hall
2. William J. Stevenson (2007), Operations Management (9th Edition), McGraw-Hill
3. Krajewski and Ritzman, (2010) Operations Management, Ninth Edition, Prentice Hall

BFT222/3
MANAGERIAL ACCOUNTING

Course Synopsis

This course aims to provide students with a pedagogy that helps them to build their decision-making skills and to develop them with manipulative skills in dealing with accounting information to make decisions. It focuses on contemporary issue which include business to implement organization financial information as a basic function for top management to plan, control and making a decision in the internal organization operations. Students are also learn how to manage business units in the better shape.

References

1. Mowen, Hansen and Heitger (2012), Managerial Accounting: The Cornerstone of Business Decisions (4th Edition), South Western Cengage Learning.
2. Brewer, Garrison and Noreen (2010), Introduction to Managerial Accounting (5th Edition), McGraw-Hill
3. Horngren, Sundem, Stratton, Burgstahler and Schatzberg (2011), Introduction to Management Accounting (15th Edition), Prentice Hall

BFT223/3
HUMAN RESOURCE MANAGEMENT

Course Synopsis

To develop skills in rationale decisions in the discipline of human resource management. A good human resource manager needs to guide their employees, influence their behaviours and motivate them and to become a catalyst to achieve maximum impact of organizational goals.

References

1. Maimunah Aminuddin (2011). Human Resource Management: Principles and Practices (2nd Edition). Shah Alam: Oxford Fajar.
2. Siti Zubaidah Othman et al. (2010). BBPB2103 Human Resource Management (Open University Malaysia Module). Selangor: Pearson Prentice Hall.
3. Mondy, R. W. & Mondy, J. B. (2012). Human Resource Management (12th Edition). Boston: Pearson.

BFT318/3
RESEARCH METHODOLOGY

Course Synopsis

To provide students with the tools and skills required to understand research terminology and types of methods best suited for investigating different types of problems and questions especially in the business.

References

1. Saunders, M., Lewis, P. & Thornhill, A. (2009) Research Methods for Business Students (5th edition), Prentice Hall.
2. Ghauri, P. & Gronhaug, K. (2010) Research methods in Business Studies (4th Edition), Prentice Hall Publications.
3. Sekaran U. (2010) Research Methods for Business: A Skill-Building Approach (5th Ed). John Wiley & Sons.

BFT338/3
STRATEGIC MANAGEMENT

Course Synopsis

This is a capstone program that inter-relates other business courses that students have previously undertaken and is one of the compulsory core courses for all business students.

References

1. Wheelen, T. L. & Hunger, J. D. (2012). Strategic Management and Business Policy: Toward Global Sustainability (13th edition). United States: Pearson Educ. Inc.
2. Haim, H. A. (2010). Pengurusan Strategik: Konsep dan Kes (3rd. edition). Kuala Lumpur: Pearson-Prentice Hall.
3. David, F. R. (2011). Strategic Management: Concepts and Cases (13th edition). New Jersey: Prentice Hall.

BQT133/3
BUSINESS MATHEMATICS

Course Synopsis

The purpose of the course is to provide students with some mathematical techniques which could help them to make better decisions in dealing with business challenges. Topics learn include: Matrix Algebra, Financial Mathematics, Differential Calculus and Integral Calculus.

References

1. Shannon J. (1995). Mathematics for Business, Economics and Finance, John Wiley and Son
2. Brechner R, (2008). Contemporary Mathematics for Business and Consumers, South-Western College Pub.
3. Slavin S., Stouffer T.(2007). Business Math, John Wiley.

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 the variable, discrete and continuous probability distributions, sampling and sampling distributions, estimation, hypothesis tests, regression and correlation, and introduction to multiple regression.

References

1. Mark, L. B., Levine, D. M. & Krehbiel, T.C. (2008). Basic Business Statistics. (11th edition), Prentice Hall.
2. Bowerman, O. & Orris, P. (2008). Essentials of Business Statistics. (2nd edition), McGraw Hill/Irwin.
3. Weiers, R. M. (2007). Introduction to Business Statistics. Duxbury Press, An International Thomson Publishing Company.

Core Courses for Engineering Entrepreneurship (RP52)

BFT211/3
BUSINESS INNOVATION

Course Synopsis

The course explains business opportunities emerging in both business entities and society's contemporary needs. Main focus of this course is to manipulate student's thinking skills especially in creative and innovative aspects. As a result they shall to produce new products, services or processes for customers which would increase market segmentation and saturation and changing customer values and user requirements. Creativity and innovation are vital elements for all level of business to grow and expand.

References

1. Pervaiz Ahmed and Shepherd S. (2010). Innovation Management: Context, strategies, systems and processes (10th ed). Financial Times Press.
2. Mahmood, R., et. all. (2009). Prinsip-prinsip Keusahawanan: Pendekatan Gunaan (2nd ed). Sintok: CENGAGE-Learning.
3. Aman Shah, S.H & Mohd Ali, Abd. R. (2008). Entrepreneurship. Selangor: Oxford Fajar Sdn Bhd.

BFT213/3
BUSINESS VENTURE MANAGEMENT

Course Synopsis

This course is indeed an extension subject of Introduction to Business (BFT 105) and Introduction to Entrepreneurship (BFT217). Students need to apply the knowledge that has been gained earlier for the implementation of the business venture and management process and strategies. The main objective of this course is to equip students with communication skills to make good business venture management decisions, and to formulate cost effectiveness business strategies and programs, if we want to attain business organizational objectives.
It requires students to integrate, in an optimal manner, the appropriate strategies associated with each elements of the management mix (4Ps) to produce a comprehensive business venture management plan.

References

1. Barringer, B.R. and Ireland, R.D (2012), Entrepreneurship Succesfully Launching New Ventures. (3rd Edition), Pearson Education, Singapore.
2. Kathleen, R.A. (2012), New Venture Creation, (5th Edition), South Western Cengage Learning, Singapore.

3. Scarborough N.M (2011). Essentials of Entrepreneurship and Small Business Management, (6th Edition). Pearson, Singapore.

BFT218/3 INTRODUCTION TO MANUFACTURING TECHNOLOGY

Course Synopsis

This course introduces students with some fundamentals of manufacturing technology and its function in product development, production and business. Topics taught include introduction to manufacturing technology and its role in concurrent engineering, metallic and non-metallic material behaviours, casting, forming and shaping processes. Aspects of material removal, joining and surface technology are expose later. Finally, the engineering metrology and quality assurance, manufacturing system and automation, human factors and manufacturing costing.

References

1. Kalpakjian S. and Schmid S. R. (2010), Manufacturing Engineering and Technology, (6th Ed.), Prentice Hall.
2. Grover M. P,(2002) Fundamentals of Modern Manufacturing, (2nd Ed.), John Willey & Sons, Inc.
3. Schey J. A, (2000) Introduction to Manufacturing Processes, (3rd Ed.), Mc Graw Hill.

BFT219/3 PRODUCT DESIGN & DEVELOPMENT

Course Synopsis

This course introduces students to various design aspects in the application of product development. Design plays an importance role in transforming product ideas into physical form which is vital to product development. The design function includes engineering and industrial designs. It is complemented by marketing and manufacturing.

References

1. Ulrich, K.T. and Eppinger, S.D. (2010). Product Design and Development (5th Edition), McGraw-Hill.
2. Baxter, M. (1995). Product Design: Practical Methods for Systematic Development of New Products, CRC Press.
3. Priest, J.W. and Sanchez, J.M. (2001). Product Development and Design for Manufacturing: A Collaborative Approach to Producibility and Reliability (2nd Edition), Marcel dekker, Inc.

BFT220/3 TECHNOLOGY ENTREPRENEURSHIP

Course Synopsis

This course concentrates on the innovative transformation of knowledge into commercial products and services. Students shall access real technologies for commercial potential in terms of licensing and for venture development. The course begins by examining concepts associated with technology commercialization. Concepts are introduced to improve and accelerate the commercialization process, from decisions made by scientist at the research bench, through the development, patenting, and licensing of new technologies, to the formation of entrepreneurial enterprises. Intellectual property studies are to be included in this course too.

References

1. Libecap, G. (2005). University Entrepreneurship and Technology Transfer: Process, Design, and Intellectual Property (Advances in the Study of Entrepreneurship, Innovation and Economic Growth). Jai Press.
2. Merges, Menell & Lemley (2007). Intellectual Property in the New Technological Age, Statutory Supplement.

3. Swanson, J.A. and Baird, M.L. (2003). Engineering Your Start-Up (2nd ed). Belmont, CA: Professional Publications.

BFT326/3
PROJECT MANAGEMENT

Course Synopsis

In this course, students shall learn basic management concepts and models that could enhance successful management of projects in engineering and technology. Topics include, structured approach to project management, project life cycle, project selection and evaluation, organizational concepts in project management, project planning, conflict and negotiation, budgeting and cost estimation, scheduling, resource allocation, monitoring, information systems and project evaluation and control, project reviewing and project termination.

References

1. Pinto, J.K., (2010). Project Management – Achieving Competitive Advantage, (2th Edition). Pearson.
2. Meredith & Mantel, Jr. (2006). Project Management - A Managerial Approach. (6th edition). John Wiley & Sons, Inc.
3. Clements & Gido (2012). Effective Project Management, (2th Edition).South-Western Cengage Learning.

BFT362/3
BUSINESS PLAN FOR ENGINEERING PROJECTS

Course Synopsis

This course provides an exposure to the students to write a business plan proposal which combine for business and basic engineering aspect. Students shall have an opportunity to put their learning into practice in a specific business plan format with specific product project. The product or project to be included in the proposal shall reflect from various sources such as university's including the faculty, industry or student's project.

References

1. Barringer, B.R. (2009). Preparing Effective Business Plans. Ph.D. thesis, Pearson Education Inc.

BIT291/6
INCUBATOR PROGRAM

Course Synopsis

This course exposes students to the actual entrepreneurship and business world. Students will be stationed in business incubators, and have been assigned to one of the newly startup companies or enterprise. Students shall experiencing challenges which include to start up a company / business the company procedures, banking activities, development of new product, business networking, management of the company and others. Communication in business world shall trigger student's mind in fostering an entrepreneurial network.

References

1. UniMAP Business Incubator Guideline (September 2010)
2. UniMAP Business Incubator Log Book

Core Courses for International Business (RE09)

BFT202/3
INTERNATIONAL BUSINESS MANAGEMENT

Course Synopsis

This course covers broad survey of international business field and provides the foundations for further specialisation in the field. It begins with a brief overview of international business and focus on the concept of globalisation. The main objective of this course is to provide students with an understanding and knowledge of international business management concepts. It is also views of thinking aspects of international business linked to management, organizations and contemporary culture. It encourages students to apply theories and idea to practice and to relate them to their own experiences via various examples and study cases from the business world and a range of practical activities.

References

1. Daniels J. D., Radebaugh L. H., & Sullivan D. P. (2011), International Business: Environments and Operations, (13th Edition), Pearson.
2. Inkpen A., & Ramaswamy, K. (2005), Global Strategy: Creating and Sustaining Advantage across Borders, Oxford University Press, USA.
3. Griffin R. W., & Pustay M. W. (2010), International Business, (6th Edition), Pearson.

BFT314/3
CROSS CULTURAL MANAGEMENT

Course Synopsis

The increase of diversity and globalization in business require employees, and managers, to develop cross-cultural competence, to work effectively in international assignments, and on cross-cultural teams. This due to diversification customers and clients needs, and to effectively compete or collaborate with competitors, suppliers, partners, and relatedt stakeholders, such as governments and other public bodies. Effective training and exposure to cultural differences around the world can help employees learn to be more successful in a variety of business settings. This course seeks to provide students with an understanding of effective cross-cultural management and the challenges occurred internationally. It focuses on culture and management, culture and communication and culture and communication.

References

1. Joelle M. and Roger P. (2011), Understanding Cross-cultural Management, (Second Edition), Prentice Hall.
2. Ember C. R and Ember M. (2011), Cultural Anthropology, (13th Edition), Pearson.
3. Schneider, S.C and Barsoux, J.L (2003), Managing Across Culture, (Second Edition), Prentice Hall.

BFT335/3
INTERNATIONAL BUSINESS ENVIRONMENT

This course introduces students to the world of international business environment and global strategies. It focuses strategies devised in response to changes in the internal and external influences of the business environment. Students are also learn various methods of collecting, analysing and organising information and communicating ideas and information, which is core processes of business researches and case studies.

References

1. Inkpen A., & Ramaswamy, K. (2005), Global Strategy: Creating and Sustaining Advantage across Borders, Oxford University Press, USA.
2. Ghemawat P. (2007), Redefining Global Strategy: Crossing Borders in a World Where Differences Still Matter, Harvard Business School Press.
3. Wetherly P. & Otter D. (2011), The Business Environment Themes and Issues (2nd Edition), Oxford.

BFT337/3
INTERNATIONAL MARKETING

Course Synopsis

This course familiarizes student with the important of international marketing and the economic, political, and cultural trend differences among countries as they influence marketing.

References

1. Keegan, W., Green, M. (2011). Global Marketing, (6th edition), Pearson Prentice-Hall.
2. Chernev A.(2007). Strategic Marketing Analysis, (2nd Edition). Brightstar Media, Inc.

3. C. Samuel Craig and Susan P. Douglas (2005). International Marketing Research .Wiley.

BFT351/6
FINAL YEAR PROJECT

Course Synopsis

The course reflects student's abilities to select appropriate research area and then presents a substantial piece of work that prove his/her intellectual abilities to the full. A well-written project is a paper useful document to employer. The skills also provide students who wish to pursue their post graduate study. Student shall learn to 'project management' a substantial piece of work and techniques associated with writing and assembling a large document. These skills shall assist students in dealing with similar ventures in the future.

References

1. Fisher C. (2007), Researching and writing a dissertation: A guidebook for business students. Prentice hall.
2. Johnson R.A and Wichen D.W (2007), Applied Multivariate Statistical Analysis, (6th Ed), Pearson International Edition.
3. Ghauri P. and Gronhaug K. (2010), Research Methods in Business Studies, (4th Ed), Prentice Hall.

BIT190/3
INDUSTRIAL TRAINING 1

BIT290/3
INDUSTRIAL TRAINING 2

Course Synopsis

Industrial training is viewed as an important strategy for students to expose the students to the real work situation. These two series course shall equip them with the necessary skills needed as graduates. It is hoped that students will benefit from the series as well as to provide them with hands on experience of real working world. In addition, students may use this opportunity as preparation to enter real working world.

References

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

Elective Courses For Engineering Entrepreneurship (RP52)

BFT104/3
E-BUSINESS

Course Synopsis

This course is a comprehensive guide to all aspects of deploying e-business and e-commerce within organization. The course is divided into 3 parts: An introduction e-business and e-commerce; reviewing alternatif strategic approaches and applications of e-business; and how do strategies can be implemented.

References

1. Chaffey, D. (2009). E-Business and E-Commerce Management: Strategy, Implementation and Practice (4th Edition). Harlow: Financial Times Prentice Hall.
2. Laudon, K.C. & Traver, C.G. (2009). E-Commerce: Business, Technology, Society (5th Edition). New Jersey: Pearson Prentice Hall.
3. Turban, E. et al. (2009). Introduction to Electronic Commerce (2nd Edition). New Jersey: Pearson Prentice Hall.

BFT 112/3
INTRODUCTION TO ENGINEERING

Course Synopsis

This course introduces students to the basic ofengineering concepts and how they can be applicable in manufacturing systems across industries. It also covers issues from engineering disciplines. These key engineering issues shall be translated into entrepreneurial opportunities. For example, how bioprocess engineering can be used in agriculture, food, perfume and pharmaceuticals. Or cause and effect of climate change to the environment. Or the usage of electrical and electronics engineering in power generation and broadcast transmission systems.

References

1. Jensen J.N. (2005). A user's guide to engineering. Pearson Prentice Hall.
2. Moaveni S. (2010). Engineering Fundamentals: An Introduction to Engineering. Cengage Learning.
3. Wright, Paul H. (2002). Introduction to engineering. (3rd ed). John Wiley & Sons. New York

BFT212/3
BUSINESS FRANCHISING AND LICENSING

Course Synopsis

This course intends to assist students in developing a clear picture of franchisees and franchisors and to provide them with some insights that will help them to make own decisions when entering the field. Students will learn the concept of franchising and licensing comprehensively .
There are 3 focus area in the course: Firstly, a franchisor and franchisee are independent business people who must manage their separate business affairs; secondly, the franchisor and franchisee are dependent upon each other in order to be successful in business; and thirdly, the franchisor-franchisee relationship shall bring with it an interdependent contractual obligation that is legally binding upon both parties.

References

1. Judd, R.J. & Justis, R.T. (2008). Franchising: An Entrepreneur's Guide (4th Edition). Australia: Thomson.
2. Gartner, W.B. & Bellamy, M.G. (2008). Enterprise. Australia: South-Western Cengage Learning.
3. Lambing, P.A. & Kuehl, C.R. (2007). Entrepreneurship (4th Edition). New Jersey: Pearson Prentice Hall.

BFT214/3
ENGINEERING ECONOMICS

Course Synopsis

The main purpose this course is to introduce students to methods and modern techniques of engineering economic analysis for decision making, evaluations of economic alternatives, cost control, capital budgeting, managerial cost accounting, deterministic inventory theory and decision-making under uncertainty situation. It provides a background of economic principles that engineers encounter in working on development projects. Students are also analyse the financial and economic concepts that are required in engineering project financial performance, from the conceptual stage to the engineering and design stages.

References

1. Chan, S. P. (2008). Fundamentals Engineering Economics, (2nd. Ed), Prentice-Hall. (2008)
2. Chan, S.P. (2006). Contemporary Engineering Economics, (4th ed.), Prentice-Hall.
3. Newnan, D., Eschenbach, T. and Lavelle, J. (2004). Engineering Economic Analysis. (9th ed.) Oxford University Press, USA

BFT215/3
ENTREPRENEURIAL FINANCE

Course Synopsis

The subject covers a broad range of core financial aspects that are pertinent for entrepreneurs as starting a business and understanding the financial aspects in running a business may be an overwhelming experience. The course discusses sole proprietorships, partnerships, limited liability companies, and private corporations. Key financial topics, such as financial statements, break-even analysis, working capital management, and time value for money shall be explained and examined. Students shall also study some important topics in finance and describes how mastering these topics can positively give impact to business success. Students are also expected to master the financial tools of Time-Value-of-Money and financial statement analysis - Discusses horizontal, vertical, and ratio analysis of financial statements in detail. Other topics include financial distress and mergers and acquisition, and personal financial planning are related to entrepreneurs.

References

1. Adelman, J.P. and Marks, M.A. (2010). Entrepreneurial Finance (5th Edition), Pearson International Edition
2. Smith, R.L. and Smith Kiholm, J. (2004). Entrepreneurial Finance (2nd Edition), Wiley Publishing.
3. Mohd Noor Mohd Shariff, Rosli Mohd Saad, Siti Hajar Mohd Ali (2006). Financial Analysis for Entrepreneur, Pearson Prentice Hill.

BFT216/3
ENTREPRENEURIAL MARKETING

Course Synopsis

Entrepreneurial Marketing is an art and science in choosing target markets and getting, keeping, and growing customers through creating, delivering, and communicating superior customer value. Entrepreneurial marketing seeks to meet organizational objectives by effectively give satisfaction to customers in a dynamic environment. This course provides an overview of marketing processes, marketing principles, entrepreneurial environment and provides students with the opportunity to apply the key concepts to practical business situations.

References

1. Schindehutte, M., Morris, M. and Pitt, L., (2009),'Rethinking Marketing: The Entrepreneurial Imperative', Prentice Hall,
2. Bjerke, B. and Hultman, C., (2004), 'Entrepreneurial Marketing: The Growth of Small Firms in the New Economic Era', Edward Elgar Pub.
3. Buskirk, B. and Lavik, M., (2003), 'Entrepreneurial Marketing: Real Stories and Survival Strategies', South-Western College Pub; (1st Edition.)

BFT312/3
BUSINESS ANALYSIS

Course Synopsis

This course an analysis of financial information arising primarily from the financial reports of entities. Fundamentals analysis techniques are examined in details with particular emphasis on the application of these techniques in equity (shares) valuations decision. The course comprises three parts where Part One outlines the four basic steps in the fundamental analysis framework: business analysis, accounting analysis, financial analysis and prospective analysis; Part Two are combining the four skills in addressing the question of valuation; Part Three are applying appropriate skills in several different situations such as credit analysis, mergers and acquisition and financial policy decision.

References

1. Palepu K.G. , Healy P.M.and Peek E. (2010) Business Analysis and Valuation IFRS edition (2nd Edition). Cencage Learning.
2. Gibson C.H. (2011). Financial Statement Analysis (12th Edition). Cengage Learning.
3. Carlberg C. (2010). Business Analysis: Microsoft Excell 2010. Que.

BFT316/3
LEADERSHIP IN ORGANIZATION

This course is a comprehensive guide to all aspects of leadership in organizations. The course is divided into 11 topics: (i) nature of leadership, (ii) leadership thoeries, (iii) perspective of effective leadersip behavior, (iv) participative leadership, (v) power and influence, (vi) charismatic and transformational leadership, (vii) leading change, (viii) leadership in teams, (ix) cross-cultural leadership, (x) developing leadership skills and (xi) strategic leadership by executives.

References

1. Yulk, G. D. (2009). Leadership in Organizations, (7th Edition), Pearson Prentice-Hall.
2. Daft, R. L. (2011). Leadership, (5th Edition), South-Western, Cengage Learning.
3. Achua, L. (2010). Effective Leadership, (4th Edition), South-Western, Cengage Learning.

BFT319/3
RISK MANAGEMENT

Course Synopsis

The subject covers a broad range of core aspects that are pertinent for entrepreneurs as starting a business and understanding the risk management of running a business. The course discusses fundamentals of risk management, risk management techniques and strategies. Key topics include, risk and its treatment, legal principles of insurance, financial risk management, enterprise risk management, and also personal insurance which is related to for entrepreneurs.

References

1. Rejda G. E. (2011). Principles of Risk Management and Insurance (11th Edition). Pearson Publications.
2. Chance, D.M. and Brooks R. (2010), An introduction to Derivatives and Risk Management, South Western, Cengage Learning.
3. Hull, J. C. (2009), Options, Futures, and Other Derivatives, (7th Edition), Pearson International Edition.

BFT321/3
SERVICES MARKETING

Course Synopsis

This course focuses on a comprehensive reference of managing services in marketing elements in an organization. It is divided into 4 parts: Understanding Service Products,Consumers,and Markets; Applying the 4 P’s of Marketing to Services; Managing the Customer Interface and Implementing Profitable Service Strategies.

References

1. Lovelock, C.H. and Wirtz, J. (2011). Services Marketing (7th Edition), Pearson Global Edition
2. Zeithaml, V., Bitner, M.J. and Gremler, D.D. (2008), Services Marketing (5th Edition), McGraw-Hill/Irwin
3. Schultz, M. and Doerr, J. (2009). Professional Services Marketing, Wiley

BFT322/3
SUPPLY CHAIN MANAGEMENT

Course Synopsis

This course explores key issues associated with the design and management of industrial supply chains (SC). SC is concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. One of the primary objectives of SC management is to minimize the total SC cost subject to various service requirements.

References

1. Wisner, J. D., Tan,K.C. & Leong,G.K., (2012). Supply Chain Management: A balanced approached (3rd Edition). South-Western Cengage Learning.
2. N. Chandrasekaran, (2010). Supply Chain Management, (1st Edition), Oxford
3. Chopra S. and Meindl P. (2007). Supply Chain Management, (4th Edition), Prentice Hall

BFT323/3
FAMILY BUSINESS

Course Synopsis

The course concerns with a study of family business issues, including ownership and management succession, conflict management, definition of family and business boundaries, and development of family and business values. Case studies of famous and not-so-famous family businesses will be used extensively in the course for the purpose of learning about the family factors and the business factors which influence the success of the family and the family business.

References

1. Ernesto, J. Poza, (2010,) Family Business, (3rd Edition), South-Western Cengage Learning.
2. Hoy, F. & Sharma, P (2010), Entrepreneurial Family Firms, Prentice Hall
3. Phan, P. and Butler, J.E. (2008). Theoretical Developments And Future Research In Family Business (PB) (Research In Entrepreneurship And Management). Information Age Publishing.

BFT325/3
LOGISTICS MANAGEMENT

Course Synopsis

The course focuses on the fundamental principles of contemporary logistics management. It involves the roles and contributions of logistics management in ensuring successful supply chain management process (plan, implementation, control); the efficient, effective forward and reverse flow; storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. It then focuses on the additional competitive pressures and reengineering possibilities generated by the rapid advances in Information Technology (IT) and Intelligent Transportation Systems (ITS) technologies. The final part of the course covers transportation management which highlights the multi-modal transportation.

References

1. Murphy and Wood (2011), Contemporary Logistics, (Tenth Edition), Prentice Hall
2. Ronald H. Ballou (2004), Business Logistics/Supply Chain Management, (Fifth Edition), Prentice Hall

BFT328/3
MANAGING ENGINEERING AND TECHNOLOGY

Course Synopsis

This course introduces students to the management functions of planning, organizing, leading and controlling; analyzes the application of these functions in research, design, production, technical marketing and project management; and studies evolution of the engineering career and the transition to engineering management.

References

1. Babcock , D. L. and Morse, L. C. (2010). Managing Engineering and Technology: International Version (5th Edition), Pearson Higher Education.

2. Friedman, R. S., Roberts, D. M. and Linton, J. D. (2008). Principle Concepts of Technology and Innovation Management: Critical Research Models. Information Science Reference.
3. Parnell, G. S., Driscoll, Patrick J. and Henderson, D. L. (2008). Decision Making in Systems Engineering and Management. Wiley-Interscience.

BFT329/3
SMALL AND MEDIUM ENTERPRISE DEVELOPMENT

Course Synopsis

The aim of this course is to provide the student with a grounding of the issues involved in small and medium enterprise management. It also covers the differences between SME management and entrepreneurship, development of business plan from an idea, developing a business model, crafting strategy, and implemention of the business plan.

References

1. Moore, C.W., Petty, J.W., Palich L.E. and Longenecker J.G. (2010). Managing Small Business: An Entrepreneurial Emphasis. (15th Edition). South Western: Cengage Learning Publication
2. Hatten T.S (2012). Principles of Small Business Management. (5th Edition). South Western: Cengage Learning Publication
3. Frederick, F.H., Kuratko, D.F., & Hodgetts, R.M., (2010) Entrepreneurship: Theory, Process, Practice, Asia-Pacific Edition, (2nd edition), Melbourne, Cengage

Elective Courses International Business (RE09)

BFT104/3
E-BUSINESS

Course Synopsis

This course is a comprehensive guide to all aspects of deploying e-business and e-commerce within organization. The course is divided into 3 parts: An introduction e-business and e-commerce; reviewing alternatif strategic approaches and applications of e-business; and how do strategies can be implemented.

References

1. Chaffey, D. (2009). E-Business and E-Commerce Management: Strategy, Implementation and Practice (4th Edition). Harlow: Financial Times Prentice Hall.
2. Laudon, K.C. & Traver, C.G. (2009). E-Commerce: Business, Technology, Society (5th Edition). New Jersey: Pearson Prentice Hall.
3. Turban, E. et al. (2009). Introduction to Electronic Commerce (2nd Edition). New Jersey: Pearson Prentice Hall.

BFT201/3
INTERNATIONAL ACCOUNTING

Course Synopsis

This course is an extension of Principles of Accounting (BFT 106) course and students need to apply the knowledge that has been gained for the implementation of the accounting regulation and practices. The main objective of this course is to explore on accounting knowledge of the students and to enhance it by putting the accounting issues companies involve in international businesses. The course familiarizes them with international accounting regulations, financial reporting, taxation and other accounting practices that exist across the globe.

References

1. Doupnik and Perera (2011). International Accounting (3rd Edition). McGraw Hill.
2. Choi and Meek. (2010). International Accounting (7th Edition). Pearson-Prentice Hall.

3. Radebaugh, Gray and Black (2006). International Accounting and Multinational Enterprises (6th Edition). Wiley.

BFT203/3
INTERNATIONAL ECONOMICS

Course Synopsis

Student learns the ideas and perspectives of economic theories and thought that build the notion of International Economics. He/she will also learn three major components in International Economic which is International Trade, International Finance, and International Monetary Systems. Later in the next chapter student shall use the knowledge to examine the issues critically in global economy.

References

1. Carbaugh, R. J.(2008). Global Economics, (13th Edition), South-Western Cengage Learning
2. Sawyer,W. C., Sprinkle, R. L.,(2008). International Economics. (3rd Edition), Prentice Hall
3. Balaam, D. N and Veseth, M (2007). Introduction to International Political Economy (4th Edition.). New Jersey: Pearson Prentice Hall.

BFT204/3
INTERNATIONAL FINANCE

Course Synopsis

The subject matter of international finance course consists of issues raised by the special problems of economic interactions between states. This course introduces the main concepts and theories of international finance and illustrates them with applications drawn from the real world. It will address a wide range of issues, including exchange rate risks and management, international capital budgeting, and the asset and liability management in multinational corporations.

References

1. Madura, J. (2010). International Corporate Finance. (10th Edition) South-Western Cengage Learning
2. Eiteman D.K., Stonehill, A.I., and Moffett, M.H. (2010). Multinational Business Finance. (12th Edition) Pearson Prentice Hall
3. Robin, J.A. (2010). International Corporate Finance. (International Edition).McGraw Hill

BFT205/3
INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Course Synopsis

This course provides an introduction to the critical issues in organizations locally and internationally managing their human resources development. It focuses on the interrelatedness of corporate strategies and the effective management of human resources, which require different policies. The course is based on the notion that competitive firms and economies which require an appropriate structure, policies and strategies to managing their employees at every level of the enterprise. This is true particularly in multinational enterprises (MNEs) and transnational corporations (TCs).

References

1. Chaffey, D. (2009). E-Business and E-Commerce Management: Strategy, Implementation and Practice(4th Edition). Harlow: Financial Times Prentice Hall.
2. Laudon, K.C. & Traver, C.G. (2009). E-Commerce: Business, Technology, Society (5th Edition). New Jersey: Pearson Prentice Hall.
3. Turban, E. et al. (2009). Introduction to Electronic Commerce(2nd Edition). New Jersey: Pearson Prentice Hall.

BFT316/3
LEADERSHIP IN ORGANIZATION

Course Synopsis

This course is a comprehensive guide to all aspects of leadership in organizations. The course is divided into 11 topics: (i) nature of leadership, (ii) leadership thoeries, (iii) perspective of effective leadersip behavior, (iv) participative leadership, (v) power and influence, (vi) charismatic and transformational leadership, (vii) leading change, (viii) leadership in teams, (ix) cross-cultural leadership, (x) developing leadership skills and (xi) strategic leadership by executives.

References

1. Yulk, G. D. (2009). Leadership in Organizations, (7th Edition), Pearson Prentice-Hall.
2. Daft, R. L. (2011). Leadership, (5th Edition), South-Western, Cengage Learning.
3. Achua, L. (2010). Effective Leadership, (4th Edition), South-Western, Cengage Learning.

BFT321/3
SERVICES MARKETING

Course Synopsis

This course focuses on a comprehensive reference of managing services in marketing elements in an organization. It is divided into 4 parts: Understanding Service Products,Consumers,and Markets; Applying the 4 P's of Marketing to Services; Managing the Customer Interface and Implementing Profitable Service Strategies.

References

1. Lovelock, C.H. and Wirtz, J. (2011). Services Marketing (7th Edition), Pearson Global Edition
2. Zeithaml, V., Bitner, M.J. and Gremler, D.D. (2008), Services Marketing (5th Edition), McGraw-Hill/Irwin
3. Schultz, M. and Doerr, J. (2009). Professional Services Marketing, Wiley

BFT322/3
SUPPLY CHAIN MANAGEMENT

Course Synopsis

This course explores key issues associated with the design and management of industrial supply chains (SC). SC is concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. One of the primary objectives of SC management is to minimize the total SC cost subject to various service requirements.

1. Wisner, J. D., Tan,K.C. & Leong,G.K., (2012). Supply Chain Management: A balanced approached (3rd Edition). South-Western Cengage Learning.
2. N. Chandrasekaran, (2010). Supply Chain Management, (1st Edition), Oxford
3. Chopra S. and Meindl P. (2007). Supply Chain Management, (4th Edition), Prentice Hall

BFT325/3
LOGISTICS MANAGEMENT

Course Synopsis

The course focuses on the fundamental principles of contemporary logistics management. It involves the roles and contributions of logistics management in ensuring successful supply chain management process (plan, implementation, control); the efficient, effective forward and reverse flow; storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. It then focuses on the additional competitive pressures and reengineering possibilities generated by the rapid advances in Information Technology (IT) and Intelligent Transportation Systems (ITS) technologies. The final part of the course covers transportation management which highlights the multi-modal transportation.

References

1. Murphy and Wood (2011), Contemporary Logistics, (Tenth Edition), Prentice Hall
2. Ronald H. Ballou (2004), Business Logistics/Supply Chain Management, (Fifth Edition), Prentice Hall

BFT331/3
INTERNATIONAL BUSINESS DECISION MAKING

Course Synopsis

This course reveals the decision making challenges traps and offers strategies to overcome them. It is designed to help students think analytically the ways that ethical decisions we made - individuals, organizations and society - and provides theories of ethical decision making and as well as practical skills for the betterment. Applications include negotiations, risk management, institutional design, financial markets, human resource management, the organization of teams, and political movements, among others.

References

1. Boatright J. R. (2009), Ethics and the Conduct of Business, International Edition,(6th Ed.), Pearson Higher Education.
2. Ferrell O.C., Fraedrich J., & Ferrell L. (2010), Business Ethics and Policy: Ethical Decision Making and Cases, Asia Edition, Cengage Learning.
3. Beauchamp T. L., Bowie N., Arnold D. (2009), Ethical Theory and Business, (8th Ed.), Pearson Higher Education.

Career Opportunities:

Bachelor of Business (Honours) (Engineering Entrepreneurship)

Engineering Entrepreneurship graduates have good business potential because they are trained and well-equipped to be entrepreneurs. Off-campus incubator experiences shall strenghtened confidence required by the graduates. For those who are looking for business opportunities in the engineering field, this program provides technical and entrepreneurial skills areas. In term of career opportunities, graduate may involved in finance, hospitality, investment, public service, marketing and production areas.

Bachelor of Business (Honours) (International Business)

International Business graduates have reasonably well-equipped knowledge and skills as they have been dealing with International Business, experiencing industrial training at well-known companies. These knowledge and skills are in-line with socio-economy transformation program. especially at the international level. In term of career opportunities, graduate may involved as Global Management Officer, International Sales Manager, International Sales Representative, International Finance Manager, Human Resource Manager, Operations Manager, Financial Analyst, Audit Staff, Sales Manager, Project Management Specialist, Investment & Banking Executive, Human Resource Specialist and IT Analyst.


BODY GLOVE

UniMAP

Centre for Communication Technology and Human Development

Centre for Communication Technology and Human Development

ADDRESS:

Centre For Communication Technology & Human Development
Universiti Malaysia Perlis (UniMAP)
Kompleks Pusat Pengajian UniMAP (Blok B)
Jalan Kangar – Arau
02600 Jejawi, Arau, Perlis
Tel : +04 – 9798384
Fax : +04 – 9798175

Introduction

Centre for Communication Technology and Human Development or Pusat Teknologi Komunikasi dan Pembangunan Insan (PTKPI), formerly known as Centre for Communication Skills and Entrepreneurship (PKKK) is a centre that serves all other graduates programs in UniMAP. Instead of offering academic programmes, PTKPI provides multiple courses that channel the knowledge of social and humanities that compliments the engineering and business knowledge that is present in all UniMAP acadermic programmes. The philosophy held by PTKPI is to enhance students' generic and soft skills which include communication, languages, ICT and socio-humanities in facing the dynamic of global challenges.

PTKPI hopes to create graduates who are holistically developed in entrepreneurial skills and technical expert, are self-reliant, committed to the field they undertake and possess high competitiveness to face the challenges in this present era of globalization.

VISION
Committed to be the center of the development of science communication and soft competitive international arena

MISSION
Form of intellectual humanity , personality, superior, creative and innovative, competitive and competent through the observation of knowledge and soft skills through quality education, rooted in the aspirations of the university.

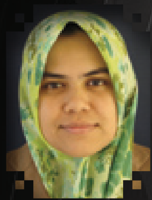
Staff Directory

DEAN
PROF. DR.
SALLEH ABD. RASHID
E-mail : salleh@unimap.edu.my

DEPUTY DEAN
ACADEMIC AND RESEARCH
PN NOR'IZAH AHMAD
E-mail : izah@unimap.edu.my

DEPUTY DEAN STUDENT
AND ALUMNI
DR. SHUHAIRIMI ABDULLAH
e-mail: shuhairimi@unimap.edu.my

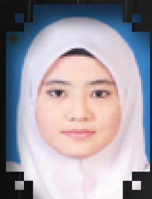
PROGRAMME COORDINATOR
IT, COMMUNICATION AND ENGINEERING
ENTREPRENEURSHIP
PN. AIDA SHARMILA WATI WAHAB
e-mail : aidasharmila@unimap.edu.my



PROGRAMME COORDINATOR
UNIVERSITY COURSES
PN. JUNAINOR HASSAN
E-mail : junainor@unimap.edu.my

HEAD OF DEPARTMENT
DEPARTMENT OF
INTERNATIONAL LANGUAGES
EN. SHAFIQ HIZWARI MD. HASHIM
E-mail : shafiq@unimap.edu.my

ASISTANT REGISTRAR
PN. RASIDAH ABDUL WAHAB
E-mail : rasidah@unimap.edu.my



ASISTANT REGISTRAR
CIK AFIFAH AZMI
E-mail : afifah@unimap.edu.my

ASISTANT REGISTRAR
TUAN HAJI SHUKOR SHAMSUDDIN
Tel : 04 – 9798743
E-mail : abd.shukor@unimap.edu.my

Academic Staff Directory

Prof. Dr. Asiah Sarji
Ph.D (Penyiaran/ Komunikasi) UKM
MSc (Filem/Penyiaran) Syracuse Universiti, New York State, USA.
Sarjana Muda Sastera Kepujian (Bahasa dan Kesusasteraan Melayu), UKM
Tel : 04-9775071
e-mail : asiahsarji@unimap.edu.my

Prof. Dr Rosnah Ismail
Ph.D Psychology, UMS
MA Guidance & Counseling, Dyrham University, UK
BSc. Health Science, San Jose State University California, USA
e-mail : rosnah@unimap.edu.my

Prof. Madya Dr. Syaharom Abdullah
Ph.D (UPSI)
M.Sc.Ed. (NIU)
B.A (English) (NIU) Penilaian Pendidikan
Sijil TESOL (UM) Pengukuran
Sijil Perguruan (MPPPP) Pengujian
Tel : 04 - 9798353
e-mail : syaharom@unimap.edu.my

Prof. Madya Mohariff Shariff
MA in Linguistics, Indiana University Bloomington Indiana, USA
BSc in Education (English) Indiana University Bloomington Indiana, USA (with High Distinction)
Dip. Of Teaching of English as a Second Language, Victoria University, New Zealand
Sijil Perguruan- Maktab Perguruan Persekutuan, P. Pinang.
e-mail : mohariff@unimap.edu.my

Prof. Madya Abdul Aziz Mahmuddin
MSc (Corporate Comm), UPM
B.A (Hons), Malaya
Tel : 04 - 9798643
e-mail : abdulaziz@unimap.edu.my

Prof. Madya Dr. Azizan Bahari
Ph.D (Sociology of Comparative labour Studies) (Warwick)
MA (Industrial Relations) (Warwick)
BA (Social Welfare) (Wisconsin)
Diploma Management Sc. (INTAN)
e-mail : azizanbahari@unimap.edu.my
Web : www.sukarelawanmalaysia.com.

Mejar (Kehormat) Dato' Alim Panglima Prof. Madya Haji Mat Jahya Haji Hussin
Ijazah Sarjana (MA), USM
BA (Hons) Syariah Islamiyyah, Universiti Al-Azhar Kaherah Mesir
Diploma Fatwa, Kementerian Keadilan, Darul Ifta' Mesir
e-mail : matjahya@unimap.edu.my

Prof. Madya Dr. Ahmad Zaidi Haji Johari
Ph.D (Curriculum), UKM
Master Education (Economy), UKM
B.A. (Economy, Psychology) UKM
Dip. Education (UKM)
e-mail : zaidijohari@unimap.edu.my

Dr. Ku Mohd Nabil Ku Ismail
Ph.D Social Linguistics, Kyushu University, Japan
M. Art, Kyushu University, Japan
B. Edu. (Hons), Teaching Japanese As A Second Language, Hirosyima University, Japan.
Sijil Perguruan (MPPPP)
Diploma (Kemanusiaan)
e-mail : kmnabil@unimap.edu.my

Dr. Mohd Mizan Mohammad Aslam
Ph.D, New Zealand.
M.A Civilization Studies (UM)
B.A Hons Islamic, Laws
e-mail : m.mizan@unimap.edu.my

Dr. Amani Ali Elmetwaly Ali Ibrahim
Ph.D Syariah dan Kehakiman USIM
MA syariah Cairo .Uni
Diploma Bahasa Arab Azhar Uni
B.A (Hons)Undang-undang Cairo Uni
e-mail : amaniali@unimap.edu.my

Dr. Noriah Mohamed
Ph.D (Social Work), University of Bradford,UK
M.A (Social Work & Social Care) University of Bradford, UK
B.Soc. Science (USM)
e-mail : noriahmohamed@unimap.edu.my

En. Razli Ahmad
M.Sc. HRD (UPM)
BSWM (Hons) (UUM),
Tel : 04-9798085
e-mail : razli@unimap.edu.my

Tn. Hj. Nor Azmi Johari
M.Sc. (Management) UUM
B.A. (Bahasa Asing) UPM
Tel : 04 – 9798373
e-mail : azmijohari@unimap.edu.my

En. Ahmad Fahmi Mahamood
M.S (Communication Technology) UPM
B. Comm (Corporate Communication) UPM
Tel : 04 - 9798892
e-mail : fahmi@unimap.edu.my

En. Maskor Bajuri
M.A Economy (UKM)
B.A Hons Shariah, Economic (UM)
e-mail : maskor@unimap.edu.my

Cik Hanum Hassan
MA Komunikasi (USM)
B. Komunikasi (Pemujukan) USM
Tel : 04 – 9798450
e-mail : hanum@unimap.edu.my

En. Muhammad Izmer Yusof
Sarjana Pengajian Strategi dan Hubungan Antarabangsa, UUM
Sarjana Muda Sains Pemutusan (Minor Sains Politik), UUM
e-mail : izmer@unimap.edu.my

En. Mohammad Rezal Hamzah
MSc. Corporate Communication (UPM)
Bachelor Of Economics
e-mail : rezal@unimap.edu.my

Pn. Chuthamas Chittithaworn
MBA, UUM
Degree in Humanity and Social Science (Prince of Songkla)
e-mail : chuthamas@unimap.edu.my

En. Shuhairimi Abdullah
Ph.D Islamic Studies (Islamic Entrepreneurs) USM
M. A.Islamic Laws, (Malaya)
B.Syariah (Islamic Laws) (Malaya)
Tel : 04 - 9798673
e-mail : shuhairimi@unimap.edu.my

Lt. Abdul Jalil Ramli
B.A. (Hons) (USM)
M.A. (USM)
Cert. Edu. (UPSI)
e-mail : jalil@unimap.edu.my

En. Shafiq Hizwari Md. Hashim
M.Ed English Language Teaching, UUM
B.Hsc English Language and Literature, IIUM
Tel : 04-9798711
e-mail : shafiq@unimap.edu.my

Pn Nor'izah Ahmad
MSc. (Corporate Communication) UPM
Bachelor in Mass Communication (Public Relation) ITM
Tel : 04 - 9798159
e-mail : izah@unimap.edu.my

Pn Junainor Hassan
MSc. Psychology Counselling, UUM
BSc. Hons Social Science Majoring in Communication Studies, UNIMAS
Diploma in Office Management & Technology
Tel : 04 - 9798910
e-mail : junainor@unimap.edu.my

Cik Rongdara Rochanahasadin
Bachelor of Arts Degree, Major in English
MBA, Marketing
MTEIL, Master of Arts in Teaching English as an International Language
e-mail : rongdara@unimap.edu.my

Pn. Aida Sharmila Wati Wahab
E M.Sc (Computer Engineering. UniMAP
B.Sc. (Information Technology), UUM, Kedah
e-mail : aidasharmila@unimap.edu.my

Cik Siti Nurul Jannah Fital
Master Bahasa Melayu (UPM)
Bac.Sastera Bahasa & Linguistik Melayu (UPM)
e-mail : jannah@unimap.edu.my

Cik Suzana Sulaiman
Ijazah Sarjana Sains Pengajian Strategik (UUM)
Ijazah Sarjana Muda Pengurusan Hal Ehwal Antarabangsa (UUM)
e-mail : suzanasulaiman@unimap.edu.my

Pn. Siti Norayu Mohd Basir
Ijazah Sarjana Sains Pengajian Strategik (UUM)
Ijazah Sarjana Muda Pengurusan Hal Ehwal Antarabangsa
Tel : 012-7818353
e-mail : norayu@unimap.edu.my

Pn. Nor Azizah Binti Hitam
Ijazah Sarjana Muda Teknologi Maklumat (Kepujian),2006 (UIAM)
Ijazah Sarjana Sains (Teknologi Maklumat) 2011 (UiTM)
e-mail : norazizah@unimap.edu.my

Cik Liew Khe Li
M.A (Applied Linguistic) UUM
Bachelor of Education (TESL), UM
Tel : 04-9798380
e-mail : klliew@unimap.edu.my

Cik Loo Shih Min
M.A (Applied Linguistic) UUM
Bachelor of Education (TESL), UM
Tel : 012-4825021
e-mail : smloo@unimap.edu.my

Pn. Zaliza Zubir
M.A Bahasa Melayu Kontemporari (UUM)
Ijazah Bahasa dan Linguistik Melayu (UPM)
Diploma Pengajian Melayu (IBMM)
e-mail : zaliza@unimap.edu.my

En. Hassad Hassan
MBA. in Entrepreneurship (UiTM)
B.A. (Hons) Degree in Marketing (UiTM)
e-mail : hassad@unimap.edu.my

Nor Suhaila Binti Che Pa
M.A Bahasa Melayu Kontemporari (UUM)
B. A (Hons.) Translation and Interpretation (USM)
e-mail : suhailachepa@unimap.edu.my

Zainab Nazar Khalil Wafi
E M.Sc (Computer Engineering. UniMAP (2011)
BSc. Computer Science , Almustasiriya University 2001 (Baghdad-Iraq)
e-mail : zainabwafi@unimap.edu.my

Cik Nazifah Hamidun
M.Ed Curriculum & Instruction (UUM)
B.Ed. (TEYL) Hons (UUM)
e-mail : nazifahhamidun@unimap.edu.my

Eunice M. Aclan
MA in Educational (major in Educational Administration)
BA in English Education
MA in English Language and Literature
e-mail : eunice@unimap.edu.my

Pn. Norehan Hussein
Ph.D Linguistics (Eberhard Karls University, Tubingen)
M Sc. State University New York, Albany
M Ed. University of Southern Mississippi Hattiesburg
e-mail : norehanhussin@unimap.edu.my

Pn. Sri Kandy Putri Naru Abdul Hamid Naru
Master in Applied Linguistics, (2011), Universiti Utara Malaysia
Bachelor of Human Sciences in English Language and Literature, 2008, International Islamic University Malaysia
e-mail : srikandy@unimap.edu.my

En. Hanif Suhairi Abu Bakar
M.Sc. Info Mgt. (UiTM)
B.Mass Communication, (Advertising) (ITM)
e-mail : hanifsuhairi@unimap.edu.my

Tuan Hj. Huzili Hj. Hussin
M.Ed. (Guidance & Counseling) UM.
B.A (Hons), UM
e-mail : huzili@unimap.edu.my

Guru Bahasa

En. Hassan Hj. Arshad
B.A Bahasa & Terjemahan (Al-Azhar),
Dip. Edu (Al-Azhar)
Tel : 04 - 9798236
e-mail : hassan@unimap.edu.my

Pn. Suhaidah Said
MA Bahasa Melayu (USM)
Bac.Sastera.(UPM)
Tel : 04 - 9798372
e-mail : suhaidah@unimap.edu.my

Pn. Siti Aisyah Mohd Nor
MSc. (Counselling) UUM
Bachelor in Islamic Laws (Fiqh Wa Usul) Yarmouk University, Jordan
Tel : 04 – 9798370
e-mail : sitiaisyah@unimap.edu.my

En. Ahmad Hifzurrahman Ridzuan
B.Ed. TESL (Hons), UiTM
M. Applied Linguistics, UUM
Tel : 04-9798400
e-mail : hifzurrahman@unimap.edu.my

Cik Aiza Khris C Pagulong
Bac. Of Secondary Education Major in English (Notre Dame of Dadiangas University)
e-mail : aizakhris@unimap.edu.my

En. Faharol Zubir
B.Ed. TESL (Hons), UiTM
M. Applied Linguistics, UUM
e-mail : faharol@unimap.edu.my

En. Wan Norhaizar Harun
B.ed TESL UiTM
Tel : 04-9792861
e-mail : haizar@unimap.edu.my

En. Mohd Azrizal Mohd Salleh
B.Ed TESL (UiTM)
e-mail : azrizalsalleh@unimap.edu.my

Cik Nurul Syazwani Zulkifli
Bac.Sastera Bahasa & Linguistik Melayu (UPM)
e-mail : nsyazwani@unimap.edu.my

Pn. Sharifah Anis Zarith Syed Dziauddin
Bac. in English Literature (UKM)
e-mail : aniszarith@unimap.edu.my

Pn. Azizah Abdullah
B.A Pengajian Islam Dan Bahasa Arab (Al-Azhar Mesir)
e-mail : azizahabdullah@unimap.edu.my

Cik Habiba
Bac. Degree of Law (University of Xinjiang)
e-mail : habiba@unimap.edu.my

Cik Katrina Mae D Avena
Bac. in Creative Writing (University of Philippines)
e-mail : katrina@unimap.edu.my

Pn. Sareepa Je-Arwae
BA Major in Arabic language and Literature (IIUM)
e-mail : sareepa@unimap.edu.my

Cik Juliana Ahmad
Bac.Bahasa Melayu & Sosio-Budaya Melayu (UM)
e-mail : julianaahmad@unimap.edu.my

Cik Masturah Sabri
B. Ed (Hons) TESL (UNISEL)
e-mail : masturah@unimap.edu.my

Pn. Zaleha Mat Aman
B.A (Hons) Languages and Linguistics (UM)
e-mail : zaleha@unimap.edu.my

Cik Nur Farhinaa Othman
B.Hsc English Language International and Literature (IIUM)
e-mail : nurfarhinaa@unimap.edu.my

Cik Yuziana Binti Yasin
B.Ed (Hons.) TESOL (USM)
e-mail : yuziana@unimap.edu.my

Rom Kenneth Buglosa Sales
Bac. Of Secondary Education Major in English (Notre Dame of Dadiangas University)
e-mail : romkenneth@unimap.edu.my

Nole Redentor O. Aclan
BA in English Education
MA in Education (major in Educational Administration)
e-mail : nole@unimap.edu.my

Staf Cuti Belajar

Pn. Zuhairah Idrus
Bac.Pengajian Melayu.(Malaya)
Tel : 04 - 9798164
e-mail : zuhairah@unimap.edu.my

Pn. Noor Maizatul Akmar Ishak
MSc Information Mgt, (UiTM)
B.Eng Electronic (Hons), The University of Leeds, UK
Diploma Sains (ITM)
Tel : 04 – 9798159
e-mail : maizatul@unimap.edu.my

Pn. Ina Suryani Ab Rahim
M. Sc Computing
B.Ed TESL (Hons) Minor Language Literature
Tel : 04- 9798160
e-mail : inasuryani@unimap.edu.my

Tn. Syed Zulkarnain Syed Idrus
M.Sc (Computer Engineering). UniMAP
B.Sc. (Information Systems Engineering), UMIST, UK
BTEC National Diploma (IT Applications), North Trafford College, UK
e-mail : syzul@unimap.edu.my

Pn Norhudi'in Danu
B. (Hons) (Dakwah & Kepimpinan Dalam Pengurusan Islam) UKM
e-mail : norhudin@unimap.edu.my

Pn. Sharmini Abdullah
M.A In Lingustics and English Language Studies, USM
B.Ed in ELT (Surrey)
Tel : 04 - 9798176
e-mail : sharmini@unimap.edu.my

Pn. Rozilawati Mahadi
MA (Applied Linguisties)
BA.ELS. (Pengajian B. Inggeris) UKM
Tel : 04 – 9798162/8458
e-mail : rozilawati@unimap.edu.my

Cik Noor Asliza Abdul Rahim
MA Bahasa Melayu USM
Bac. Sastera.(UPM)
Tel : 04 - 9798397
e-mail : asliza@unimap.edu.my

Pn. Noor Salwani Hussin
Bac.Syariah & Sains Politik (UM)
Tel : 04 - 9798374
e-mail : noorsalwani@unimap.edu.my

Staf Pentadbiran

Pn. Rasidah Abdul Wahab
Penolong Pendaftar
Tel : 04 – 9798169
e-mail : rasidah@unimap.edu.my

Tn. Haji Abdul Shukor Shamsuddin
Penolong Pendaftar
Tel : 04-9798743
e-mail : abd.shukor@unimap.edu.my

Cik Afifah Azmi
Penolong Pendaftar
Tel : 04-9797391
e-mail : afifah@unimap.edu.my

Pn. Ropidah Ahmad
Juruteknik
Tel : 04-9798156
e-mail : ropidah@unimap.edu.my

En. Zaimeen Zahari
Juruteknik
e-mail : zimeen@unimap.edu.my

Pn. Nor Hazliza Ibrahim
Pembantu Tadbir (Kesetiausahaan)
Tel : 04-979 8384/8389
e-mail : hazliza@unimap.edu.my

Pn. Noor Rastina Johari
Pembantu Tadbir (P/O)
Tel : 04-9798171
e-mail : nrastina@unimap.edu.my

En. Rosman Ramli
Pembantu Tadbir (P/O)
Tel : 04-9798176
e-mail : rosman@unimap.edu.my

Pn. Norain Abdullah
Pembantu Tadbir (P/O)
Tel : 04-9798177
e-mail : rosman@unimap.edu.my

En. Reynold @ Reynold Wong
Pembantu Tadbir (P/O)
e-mail : reynold@unimap.edu.my

En. Roseffandi Darus
Pembantu Am Pejabat
Tel : 04-9798176
e-mail : roseffandi@unimap.edu.my

Compulsory Courses

UUW223
UNIVERSITY ENGLISH

Course Synopsis

This course is designed to help students achieve confidence in extracting, evaluating and synthesizing information with a view to writing good technical documents. The emphasis will be upon writing clear, concise, accurate, conventional, appropriate materials on a worthwhile subject of interest or technical field as specified in the assignment. Students will learn the techniques of analysis of the writing situation, methods of investigation of the problem, the functional organization of the report itself and the writing of the report to the preparation of the final copy. Students are also required to formally present their research report orally at the end of the semester.

References

1. Ingre, D.,'Survivor's guide to technical writing. Mason, OH,' South Western, 2003.
2. Blicq, R. & Moretto, 'Technically write, 6th Ed. Upper Saddle River, New Jersey', Pearson, 2004.
3. Hutchinson, T. and Waters, A., 'English for Specific Purposes: A Learning-Centered Approach', Cambridge: Cambridge University Press, 1987.
4. Krishnaswamy, N. and Sriraman,T., 'Current English for Colleges: A Course for Undergraduate Learners', Madras : Macmillan, 1990.
5. Young, Dona J., 'Foundations of Business Communication', Boston: McGraw-Hill Irwin, 2006.

EUW224
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.
3. Peggy A, Lambing and Charles R. Kuehl, 'Entrepreneurship', 4th Edition, Pearson, 2007.
4. Rosli Mahmood, et. all , 'Prinsip-prinsip Keusahawanan: Pendekatan Gunaan', 2nd Edition, Cengage Learning, 2010.
5. William G. Sullivan, Elin M. Wicks and James T. Luxhoj, 'Engineering Economics', 13th Edition, Pearson, 2006.

Lecturers

1. En. Itassad Hassan
2. Maskor Bajuri
3. Cik Rongdara Rochanahasadin

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
ISLAMIC & ASIAN CIVILISATIONS

References

1. 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
3. Azizan Baharuddin, (2005). Peradaban menurut Perspektif Islam. Kuala Lumpur : Pusat Dialog Peradaban, Universiti Malaya.
4. Bertrond Fort. (2005). One Year of Culture and Civilizations Dialogue 2003/2004. Singapore Asia-Europe Foundation.
5. Zaid Ahmad. (2005) ”Ibnu Khaldun’s Approach in Civilizational Studies in Massino Companini, Studies on Ibn Khaldun, Corso Milano Italy: Polimetrica International Scientific Publisher.

Lecturers

1. Dr. Shuhairimi Abdullah
2. Dr. Mohd Mizan Mohammad Aslam
3. Dr. Amani Ali Elmetwaly Ali Ibrahim
4. Pn. Siti Aisyah Mohd Nor

UUW 235/2
ETHNIC RELATIONS

Lecturers

1. Assoc. Prof. Dr. Azizan Bahari
2. Left. Abdul Jalil Ramli
3. Tn. Hj Nor Azmi Johari
4. Muhammad Izmer Yusof
5. Siti Norayu Mohd Basir

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.

References

1. A. Aziz Deraman (2005), *Masyarakat dan Kebudayaan Malaysia* , Kuala Lumpur: Dewan Bahasa dan Pustaka
2. Abdul Aziz Bari. (2000). Perlembagaan Malaysia: Asas-asas dan Masalah. Kuala Lumpur: Dewan Bahasa dan Pustaka
3. Azmi Aziz & Shamsul AB. (2004). The relegious, the plural, the secular and the modern: a brief critical survey on Islam in Malaysia. Inter-Asia cultural studies. Volume 5. Number 3. December.
4. Wan Mohd Nor Wan Daud. (2001). Pembangunan di Malaysia. Kuala Lumpur ISTAC
5. Zaid Ahmad, Ho Hui Ling, Sarjit Singh Gill, Ahmad Tarmizi Talib, Ku Halim Ku Ariffin, Lee Yok Fee, Nazri Muslim & Ruslan Zainuddin,(2006). Hubungan Etnik Di Malaysia. Oxford Fajar

UUW 322/2
THINKING SKILLS

Course Synopsis

The aim of this course is to develop and enhance students’ thinking skills in helping them make decision and resolve issues. Generally, there are two main ideas of thinking skills which are mostly acquired. They are creative thinking and critical thinking. The introduction the soft skills of the main idea in thinking skill concepts such as logical thinking, creative thinking, critical thinking; it is hoped that students can acquire creative and innovative ways with better judgement in resolving issues, especially pertaining to career and self development.

References

1. Butterworth & Thwaite.,’Thinking Skills. 4th ed. UK’, Cambridge University Press, 2005.
2. Chong Hoe, Lok.,’Pemikiran

Kritis dan Logik. Pulau Pinang', Universiti Sains Malaysia Printing, 2003.
3. De Bono, Edward,'Pemikiran Lateral untuk Pengurusan. Kuala Lumpur', Golden Book Sdn. Bhd, 2001.
4. Mohd, Ainon & Hassan, Abdullah.,'Belajar Berfikir'. Pahang: PTS Publication, 2003.
5. Wright, Larry.,'Critical Thinking: An Introduction to Analytical Reading and Reasoning'. USA:Oxford University Press, 2001.

Lecturers

1. Prof. Dr. Salleh Bin Abd Rashid
2. En. Razli Bin Ahmad
3. Pn. Junainor Binti Hassan
4. Prof. Rosnah Binti Ismail
5. Tuan Haji Huzili

UUW 114/2
UNIVERSITY MALAY LANGUAGE

Course Synopsis

The aim of this course is to develop an 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 civilisation of countries where the language is spoken, thus encouraging positive attitudes towards language learning.

References

1. Daniel Zakaria,'Panduan Belajar Bahasa Inggeris-Bahasa Melaysia', Ar-RisalahProduct Sdn. Bhd: Kuala Lumpur, 2008.
2. Lee Guat Eam & Wan Rosmawati,'Bacalah Sayang', Percetakan Surya Sdn. Bhd: Melaka, 2005.
3. Noor Asliza Abdul Rahim, Abdul Jalil Ramli, Zuhairah Idrus, Suhaidah Said,'Modul Bahasa Melayu Asas', Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis, 2009.
4. Othman Sulaiman,'Malay for Everyon', Pelanduk Publication (M) Sdn Bhd Selangor, 2005.
5. Sulaiman Masri, 'Penulisan Berita Dalam Bahasa Melayu', Dewan Bahasa dan Pustaka, Kementerian Pendidikan Malaysia; Edisi Pertama, 1990.

UUW 111
BASIC MALAY LANGUAGE
(FOR INTERNATIONAL STUDENTS ONLY)

Course Synopsis

The objective of the course is to expose students to the four skills of language: listening, speaking, reading and writing. The listening and speaking skills are merged, and focuses are given not only on forms and functions, but also on pronunciation. The reading and writing skills emphasizes on accuracy and grammar, structure and semantics (meaning).
Topics for essay writing provide opportunity for students to learn analysis processes, syntax and elaboration.

References

1. Daniel Zakaria,'Panduan Belajar Bahasa Inggeris-Bahasa Melaysia', Ar-RisalahProduct Sdn. Bhd: Kuala Lumpur, 2008.
2. J. Nulawadin Mustafagani, 'Asas Kemahiran Berbahasa Malaysia', Kuala Lumpur, Fajar Bakti, 199.
3. Lee Guat Eam & Wan Rosmawati,'Bacalah Sayang', Percetakan Surya Sdn. Bhd: Melaka, 2005.
4. Noor Asliza Abdul Rahim, Abdul Jalil Ramli, Zuhairah Idrus, Suhaidah Said,'Modul Bahasa Melayu Asas', Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis, 2009.
5. Othman Sulaiman,'Malay for Everyone', Pelanduk Publication (M) Sdn Bhd Selangor, 2005.

Lecturer

1. Pn. Suhaidah Bt. Said

Optional Courses

UUW 222
FOUNDATION ENGLISH

Course Synopsis

This one semester course is programmed and designed to remedy students' weaknesses in the use of English and to raise their proficiency level. It covers major aspects of grammar, writing, reading and speaking; and prepares them for the mainstream English Language Course – EUW 2I2 University English in UniMAP. Graded passages will be used to develop a reading habit and also to expose students to a wide range of English. The course will adopt a learner-centered approach in which students will be actively involved in various situations requiring communication in English. Grammar is an essential component of the course and will be incorporated into the 4 skills and taught in context. Students will also be actively involved in various situations requiring communication in English.

References

1. Atkinson, R.H. & Longman, D. G., 'College Learning and Study Skills 6th ed. USA: Wadsworth', Thomson Learning, 2006.
2. Becker, S. G. & Skidell, M. B., 'The Main Idea Reading To Learn. 3rd ed. USA', Pearson Education, Inc., 2004.
3. Bledsoe, P.S. & Selby, N. ' Essential College English: A Grammar, Punctuation and Writing Workbook. 6th Ed. U.S.',Addison Wesley Longman, Inc., 2003
4. Cummings, M.G., 'Listen, Speak, Present. Boston', Heinle & Heinle, 1994.
5. Cutting Edge: Elementary SB, Cunningham, Sarah, Moor, Peter, Longman ELT, UK, paperback, pp, CUT, Elementary student book, 2001.

UUW 151
THAI LANGUAGE 1

Course Synopsis

This course aim to introduce student to the basic structure of the Thai language.Student will be exposed to new vocabulary,simple sentence structures ,speeches and texts ;Listening to and producing simple dialogues based on everyday activities.Student also will be introduced to the Thai writing system,tone system and tonediscrimination , reading vary simple passages and writing simple sentences.

References

1. Kiettipongse,M. (2008) Thai language for The Beginner. Bangkok. Duangkamol Publishing
2. Ponmanee, S. (2000). *Learn to Read Thai*. Chiangmai: Thaigreat.
3. Becker, B.P. (2003). *Improving Your Thai Pronounciation.* Bangkok: Paiboon Publishing.
4. Becker, B. P. (2003). *Thai for Beginners.* Bangkok: Paiboon Publishing.
5. Tontraseney, W. (1981). *Bahasa Thai*, Kuala Lumpur: Universiti Malaya.

Lecturer

1. Sareepa Jearwae

UUW 152
THAI LANGUAGE 2

Course Synopsis

As in the first course, this course also emphasizes on listening, speaking, reading and writing. Students will be exposed to vocabulary expansion, speaking using dialogues for different purposes and different contexts. Students will be introduced to simple essential grammar and sentence structures. Students will also be exposed to reading short passages and writing longer sentences to compose shot passages.

References

1. Kiettipongse, M. (2008) Thai language for The Beginner. Bangkok. Duangkamol Publishing
2. Ponmanee, S. (2000). *Learn to Read Thai*. Chiangmai: Thaigreat.
3. Becker, B.P. (2003). *Improving Your Thai Pronounciation.* Bangkok: Paiboon Publishing.
4. Becker, B. P. (2003). *Thai for Beginners.* Bangkok: Paiboon Publishing.
5. Tontraseney, W. (1981). *Bahasa Thai*, Kuala Lumpur: Universiti Malaya.

Lecturer

1. Sareepa Jearwae

References

1. Kiettipongse,M. (2008) Thai language for The Beginner. Bangkok. Duangkamol Publishing
2. Ponmanee, S. (2000). *Learn to Read Thai*. Chiangmai: Thaigreat.
3. Becker, B.P. (2003). *Improving Your Thai Pronounciation.* Bangkok: Paiboon Publishing.
4. Becker, B. P. (1998). *Thai for Intermidieate Learners.* Bangkok: Paiboon Publishing.
5. Tontraseney, W. (1981). *Bahasa Thai*, Kuala Lumpur: Universiti Malaya.

Lecturer

1. Sareepa Jearwae

References

1. Kiettipongse,M. (2008) Thai language for The Beginner. Bangkok. Duangkamol Publishing
2. Ponmanee, S. (2000). *Learn to Read Thai*. Chiangmai: Thaigreat.
3. Becker, B.P. (2003). *Improving Your Thai Pronounciation.* Bangkok: Paiboon Publishing.
4. Becker, B. P. (1998). *Thai for Intermidieate Learners.* Bangkok: Paiboon Publishing.
5. Tontraseney, W. (1981). *Bahasa Thai*, Kuala Lumpur: Universiti Malaya..

Lecturer

1. Sareepa Jearwae

UUW 253
THAI LANGUAGE 3

Course Synopsis

This course will expand and use more complex vocabulary, exposure to sophisticated sentences to read and write longer essays. Students also will be exposed to use various material such as tapes ,short articles from magazine or internet for independent study to enhance their skill.

UUW 254
THAI LANGUAGE 3

Course Synopsis

This course will expand and use more complex vocabulary relevant to society,religion,culture and economy ;speak and react to radio or TV broadcast ,newspaper articles , passage or texts read and learn about language styles used in the media.Learn more essential grammar point to make longer essay ,make note and express idea of texts read . Student also will have the idea and understand Thai culture,manner ,value and beliefs through the text.

UUW131/2
COMMUNICATIVE ARABIC

Course Synopsis

The course provides the students with active training in their ability to understand and use Arabic in various contexts and to read and write texts of a varying nature, in which grammar is practiced. Written and oral proficiency, writing skills and reading comprehension are considered as important as translation from and to Arabic. The course focuses on further developing the students' ability to communicate in moderately difficult and everyday situations.

References

1. Abdullah Sulaiman Al-Jarbuk, Tammam Hassan Umar , Mahmud Kamil al-Naqah, Abdullah Kamil Al-Abadi, Ali Muhammad Al-Fiqqi dan Rusydi Ahmad Taimah, ' Taklimu al-Lughah al-Arabiyyah Lighairi al-Natiqin Biha, Al-Mamlakah al-Arabiyyah al-Saudiyyah', Jamiah Ummu al-Quran, 1984.
2. Muhammad Roihan Hasbullah M.A (Hj.) 'Perbualan Bahasa Arab Untuk Peringkat Rendah dan Menengah' , Kuala Lumpur, Pustaka Syuhada, 2002.
3. Sekumpulan guru-guru Bahasa Arab, 'Al-Jadid al-Lughati al-Araabiyyah Li al-Sanah al-Ula al-Ikdadiyah, Gombak Utara Selangor' , Pustaka Markiland, 1987.
4. Universiti Sains Malaysia (Pusat Bahasa & Terjemahan),Bahasa Arab 1,USM,Bahagian Bahasa Arab, 2002.
5. Zaid Al-Hamid "Pelajaran Bahasa Arab Untuk Semua, Kuala lumpur, Speedy Self Study System, 2001.
6. Fuad Ifram al-Bustaniy, "Al-Munjid Al-Tullab" Darul Syarq, Beirut, Lubnan, 1986
7. Lingua Phone (2000) , Lingua Phone Institut Limited , Carlton Plaza, 111 Upper Richmond Road, London.

Lecturer

1. Dato' Alim Panglima Hj. Mat Jahya Bin Hj. Hussin

UUW 132
COMMUNICATIVE ARABIC

Course Synopsis

The course provides the students with active training in their ability to understand and use Arabic in various contexts and to read and write texts of a varying nature, in which grammar is practiced. Written and oral proficiency, writing skills and reading comprehension are considered as important as translation from and to Arabic. The course focuses on further developing the students' ability to communicate in moderately difficult and everyday situations.

References

1. H. Ridlo. Masduki (Prof.Dr.), H.Chatibul Umam (Prof. Dr.) H. Moh. Matsna (Dr.), (2000) العربية لطلاب الجامعة , Darul Ulum Press, Edaran oleh Wisma Yakin, Kuala Lumpur.
2. Nuhammad Akram Saaduddin (at all), (1990), العربية الفصيحةالقلم : للناطقين بغير ها وبها , Fajar Ulung Sdn. Bhd. L.B.C. Publishers International Book Centre, Kuala Lumpur
3. Ishak Mohd. Rejab (Prof. Madya Dr.), (1987), Kursus Bahasa Arab (Bahagian 11), Yayasan Dakwah Islamiah Malaysia (YADIM), Kuala Lumpur
4. Ali al-Jarim, Mustafa Amin (1966), النحو الواضح فى قواعد اللغة العربية , Mesir.
5. Elias A. Elias & Ed. E. Elias (t.t.) القاموس العصري , عربى - انكليزي, Mesir.
6. Institut Agama Islam Negeri (IAIN) , Sharif Hidayatullah , Jakarta, (1977) , بالنماذج العربية, Bulan Bintang , (Penerbit dan Penyebar buku-buku Teks) Jakarta Indonesia.
7. Lingua Phone (2000) , Lingua Phone Institut Limited , Carlton Plaza, 111 Upper Richmond Road, London.
8. Sono Cairo Audio , VIDEO CD, (t.t.) , تعليم اللغة العربية للمتحدثين بالانجليزية , Cairo Egypet.
9. Syed Umar al-Sagaf , Muhamad Khalil Hj. Ahmad dan Mohd. Abdul Rahim , Mohd. Abdul Rahman (2000) , اللغة العربية الاتصالية , Dewan Bahasa dan Pustaka, Kuala Lumpur
10. Universiti Putra Malaysia (t.t.), مذكرة اللغة العربية للمستوى الثالث , Fakulti Bahasa Moden dan Komunikasi.
11. Mustaffa Abdullah (terjemahan oleh Siti Rohaya Sarnap & SitiSujinah Sarnap (2000) , Cara Mudah belajar Bahasa Arab, JAHABERSA & CD, Singapore.
12. Al-said Muhmmad Badawi (Dr.), (1983), تعليم اللغة العربية لغير الناطقين بها, Tunisia.
13. Hassan Bin Hj. Arshad (2000), BAHASA ARAB (al-Qawaid dan al-Maqalah) Universiti Sains Malaysia (Pusat Bahasa & Terjemahan).

Lecturer

1. En Hassan Bin Hj Arshad

UUW 133/2
COMMUNICATIVE ARABIC

Course Synopsis

The course provides the students with active training in their ability to understand and use Arabic in various contexts and to read and write texts of a varying nature, in which grammar is practiced. Written and oral proficiency, writing skills and reading comprehension are considered as important as translation from and to Arabic. The course focuses on further developing the students' ability to communicate in moderately difficult and everyday situations. This course covers the eight (8) topics of Arabic grammar, eight (8) topics of essays and eight (8) topics of *Balaghah* The course covers through four fundamentals namely listening, speaking, reading and writing

References

1. Mahmud Ismail As-sini(Dr.), (1993) العربية للناشئين : منهج متكامل لغير الناطقين بالعربية, Darul Ma'arif Mamlakah 'Arabiah Saudiah, Arab Saudi.
2. Nuhammad Akram Saaduddin (at all), (1990),**العربية الفصيحةالقلم : للناطقين بغير ها وبها** , Fajar Ulung Sdn. Bhd. L.B.C. Publishers International Book Centre, Kuala Lumpur
3. Ishak Mohd. Rejab (Prof. Madya Dr.), (1987), Kursus Bahasa Arab (Bahagian 11), Yayasan Dakwah Islamiah Malaysia (YADIM), Kuala Lumpur
4. Ali al-Jarim, Mustafa Amin (1966), **النحو الواضح فى قواعد اللغة العربية** , Mesir.
5. ______1990. Linguaphone: Rakaman Kaset dan Buku Panduan. London:Linguaphone Institute Limited, St Giles House.
6. Sohair Abdul Moneim Sery. 1997. Kursus Bahasa Arab (Arabtone).Selangor: Anglophone (Malaysia). Sdn. Bhd.
7. Penterjemah: Siti Rohani. 2000. Cara Mudah Belajar Bahasa Arab. (Malaysia) Jahabersa Sdn. Bhd.

Lecturer

1. En Hassan Bin Hj Arshad

UUW 234/2
COMMUNICATIVE ARABIC

Course Synopsis

The course provides the students with active training in their ability to understand and use Arabic in various contexts and to read and write texts of a varying nature, in which grammar is practiced. Written and oral proficiency, writing skills and reading comprehension are considered as important as translation from and to Arabic. The course focuses on further developing the students' ability to communicate in moderately difficult and everyday situations. This course covers the four fundamentals namely listening, speaking, reading and writing. Other emphasis of the course are to improve vocabulary development and reading techniques, as well as basic techniques of writing focusing on narrative and descriptive essays.

References

1. Ahmad Hassan Ziyat (…….) العربي الأدب تاريخ, Darul Kutub Misriyyah, Mesir.
2. Batras Al-Bustaniy, (1989), أدباء العرب. بيروت :النذير دار,Darul Nazir, Beirut.
3. Abdul Rahman Al-Barquni (1979), Darul Kitab, Beirut شرح ديوان المتنبي. بيروت : الكتاب دار
4. Syauqi Dhaif (……..), **البارودى رائد الشعر الحديث** , Darul Ma'arif, Kaherah, Mesir.
5. Subhi Soleh (1960), **دراسات فى فقه اللغة** Darul 'Ilmi Malayin, Beirut.
6. Ali Abdul Wahid Wafi (1945) **فقه اللغة**Darul Nahdhah, Mesir
7. Imil Badi' Ya'kub (1982).**العربية فقه اللغة وخصائصها** Darul 'Ilmi Malayin, Beirut.

Lecturer

1. Dr. Amani Ali Elmetwaly Ali Ibrahim

UUW 141
MANDARIN LANGUAGE I

Course Synopsis

Mandarin Language Class EUW114 is the first course in a series of Chinese language courses and is designed for students who have NO previous knowledge in spoken or written Chinese. This course introduces elementary Mandarin Chinese pronunciation, grammar, characters, as well as commutation skills.

This course aims to enable students to communicate effectively in Chinese and to understand contemporary social/cultural differences between the Greater China region and western countries through the study of Chinese language. This course will cover nine lessons of lecture notes, including the introduction on *pinyin*. Students will learn greetings, numbers, directions, how to introduce oneself and one's family, how to tell dates and time, how to talk about one's hobbies, how to talk about festivals in Malaysia and shopping. Students will also learn how to write and type Chinese characters.

References

1. Boping Yuan, Sally Kathryn Church, 'Oxford Beginner's Chinese Dictionary, Oxford University Press, USA; Bilingual Edition, 2006.
2. Claudia Ross, Jing-Heng Sheng Ma, Baozhang He, ' Modern Mandarin Chinese Grammar Workbook', Routledge; Bilingual Edition, 2006.
3. William McNaughton, 'Reading & Writing Chinese: Simplified Character Edition', Tuttle Publishing; Bilingual Edition, 2005.
4. Laurence Matthews Alison Matthews, 'The First 100 Chinese Characters: Simplified Character Edition: The Quick and Easy Method to Learn the 100 Most Basic Chinese Characters', Tuttle Publishing, 2007.
5. Xinhua Dictionary With English Translation, 2007.

Lecturer

1. Pn. Chutamas Chittithaworn

UUW 142
MANDARIN LANGUAGE 2

Course Synopsis

Mandarin Language Class EUW114—Level II is designed for students who have previous knowledge in spoken or written Chinese. Students will gain listening, speaking, reading and writing skills in standard (Mandarin) Chinese, attaining approximately the second level.

Be able to understand some deliberate speech and discussion pertaining to such topics. Be able to handle successfully most communicative tasks and social situations.

This course will cover the six lessons of the textbook. Students will learn Making a Telephone Call, Asking the Way, Daily Life—Eating & drinking, In the Restaurant, Discussing one's Studies, Shopping- Buying things at the free market. Students will also learn about use Chinese dictionary.

References

1. Boping Yuan, Sally Kathryn Church, 'Oxford Beginner's Chinese Dictionary, Oxford University Press, USA; Bilingual Edition, 2006.
2. Claudia Ross, Jing-Heng Sheng Ma, Baozhang He, ' Modern Mandarin Chinese Grammar Workbook', Routledge; Bilingual Edition, 2006.
3. William McNaughton, 'Reading & Writing Chinese: Simplified Character Edition', Tuttle Publishing; Bilingual Edition, 2005.
4. Laurence Matthews Alison Matthews, 'The First 100 Chinese Characters: Simplified Character Edition: The Quick

and Easy Method to Learn the 100 Most Basic Chinese Characters', Tuttle Publishing, 2007.
5. Xinhua Dictionary With English Translation, 2007.

Lecturer:

1. Pn. Chutamas Chittithaworn

UUW 171
JAPANESE LANGUAGE I

Course Synopsis

This course aims to introduce students to the basic structure of the Japanese Language. Students will be exposed to new vocabulary, simple sentence patterns, speeches and texts. In this course, the basic function of Japanese Language such as writing, listening, and reading are emphasized.

References

1. Bunka Institute Of Language,'Shin Bunka Syokyu Nihongo1', Rensyu Mondai Bonjinsya, 2000.
2. The Association For Overseas Technical Scholarship (Aots),'Shin Nihongo-No Kiso 1', 3a Corpration,1990.
3. The Association For Overseas Technical Scholarship(Aots),'Shin Nihongo-No Kiso 1', (Asian Edition) 3a Corpration,1997.
4. The Association For Overseas Technical Scholarship(Aots),'Mina No Nihongo Syokyu I', 3a Corpration,1998.
5. The Association For Overseas Technical Scholarship(Aots),'Shin Nihongo-No Kiso 1',Standard Question, 3a Corpration, 1993.

Lecturer

1. Dr. Ku Mohd Nabil Bin Ku Hamid @ Ku ISmail
2. Pn. Zaleha Binti Mat Aman

UUW 172
JAPANESE LANGUAGE 2

As in the first course, this course also emphasizes on listening, speaking, reading and writing. Students will be exposed to vocabulary expansion, speaking using dialogues for different purposes and different contexts. Students will be introduced to simple essential grammar and sentence structures. Students will also be exposed to reading short passages and writing longer sentences to compose shot passages.

The syllabus ranges from the basic Japanese structures to basic Japanese cultural elements.

Buku Teks / *Text Book :*

Modul Bahasa Jepun II. Ku Mohd Nabil .Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis. (monograph) 2010

Buku Rujukan / *Reference Books:*

- The Association For Overseas Technical Scholarships, (1998),Minnnano nihonngo 1, Tokyo : 3A CORPORATION
- The Association For Overseas Technical Schorlarships,(1997),Shin nihonggo no kiso1 (Asian Edition)
- Etsuko Hirai Sachiko Miwa, (2000), Minna no nihonggo 1 Bunkei Renshuu Tyou, Tokyou : 3A CORPORATION
- Sachie MIYAGI, Akiko MITSUI, Everyday listening in 50 days(1997) : Tokyo: Bonjinsha Corporation

Lecturers

1. Dr Ku Mohd Nabil b Ku Ismail
2. Pn. Zaleha Binti Mat Aman

UUW 273
JAPANESE LANGUAGE 3

As in the second course, this course also emphasizes on listening, speaking, reading and writing. Students will be exposed to vocabulary expansion, speaking using dialogues for different purposes and different contexts.

Students will be introduced to simple essential grammar and sentence structures. Students will also be exposed to reading short passages and writing longer sentences and to compose a dialogue. Beginning Chinese characters (kanji) will be introduced. The syllabus ranges from the basic Japanese structures to basic Japanese cultural elements.

Buku Teks / *Text Book :*

Modul Bahasa Jepun III. Ku Mohd Nabil .Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis. (monograph) 2010

Buku Rujukan / *Reference Books:*

- The Association For Overseas Technical Scholarships, (1998), Minnnano Nihonngo 1, Tokyo: 3A CORPORATION
- The Association For Overseas Technical Schorlarships,(1997),Shin nihonggo no kiso1 (Asian Edition)
- Etsuko Hirai Sachiko Miwa, (2000), Minna no nihonggo 1 Bunkei Renshuu Tyou, Tokyou: 3A CORPORATION
- Sachie MIYAGI, Akiko MITSUI, Everyday listening in 50 days (1997): Tokyo: Bonjinsha Corporation

Lecturers

1. Dr. Ku Mohd Nabil b. Ku Ismail
2. Pn. Zaleha Binti Mat Aman

UUW 274
JAPANESE LANGUAGE 4

This is the fourth of a four part program for Japanese Language Course. As in the third course, this course also emphasizes on listening, speaking, reading and writing. Students will be exposed to vocabulary expansion, speaking using dialogues for different purposes and different contexts. Students will be introduced to the advanced communicative competence. Students will also be exposed to reading, writing longer sentences and passages and to compose a dialogue. Beginning Chinese characters (kanji) will be introduced. The syllabus ranges from the basic Japanese structures to basic Japanese cultural elements.

Buku Teks / *Text Book :*

Modul Bahasa Jepun IV. Ku Mohd Nabil .Pusat Kemahiran Komunikasi dan Keusahawanan, Universiti Malaysia Perlis. (monograph) 2010

Buku Rujukan / *Reference Books:*

- The Association For Overseas Technical Scholarships, (1998),Minnnano nihonngo 1, Tokyo: 3A CORPORATION
- The Association For Overseas Technical Schorlarships,(1997),Shin nihonggo no kiso1 (Asian Edition)
- Etsuko Hirai Sachiko Miwa, (2000), Minna no nihonggo 1 Bunkei Renshuu Tyou, Tokyou : 3A CORPORATION
- Sachie MIYAGI, Akiko MITSUI,Everyday listening in 50 days(1997) : Tokyo: Bonjinsha Corporation

Lecturers

1. Dr Ku Mohd Nabil b Ku Ismail
2. Pn. Zaleha Binti Mat Aman

UUW 181
GERMAN LANGUAGE I

Course Synopsis

The course aims to equip the students with simple spoken and writing skills in German language. This will help student to carry out simple communication, reading and writing in German language. They will use simple structures to carry out simple conversations on daily topics.

References

1. Funk, Koenig,'Genial kursbuch', A. Langenscheidt, 2000.
2. Leitner, A., 'German Made Simple: Learn to Speak and Understand German Quickly and Easily',. Made Simple; Revised Edition, 2006,
3. Rosenberg, J., 'German: How to Speak and Write It (Beginners' Guides)', BN Publishing, 2008.

4. Swick, Ed., ‘German Demystified: A Self Teaching Guide’, McGraw-Hill; 1st Edition, 2007.
5. Coggle, P., ‘Teach Yourself German - in Malay - in Indonesian’, Renaisans, Jakarta, Inonesia, 1997.

Lecturer

1. Pn. Norehan Binti Hussein

EUW182/2
GERMAN LANGUAGE 2

Course Synopsis

Kursus ini memberi pendedahan kepada pelajar mengenai asas pertuturan dan penulisan dalam bahasa Jerman. Kursus ini akan membantu pelajar untuk berkomunikasi, membaca dan menulis dalam bahasa Jerman.

References

1. Funk, Keller. (2006). So Wie So. Muenchen:Langenscheidt Verlag
2. Funk, Koenig,’Genial kursbuch’, A. Langenscheidt, 2000.
3. Leitner, A., ‘German Made Simple: Learn to Speak and Understand German Quickly and Easily’, . Made Simple; Revised Edition, 2006,
4. Rosenberg, J., ‘German: How to Speak and Write It (Beginners’ Guides)’, BN Publishing, 2008.
5. Swick, Ed., ‘German Demystified: A Self Teaching Guide’, McGraw-Hill; 1st Edition, 2007.

Lecturer

1. Pn. Norehan Binti Hussein

Core Courses

UUT 122/BUW 122/2
SKILLS AND TECHNOLOGY IN COMMUNICATION
(FOR ENGINEERING AND BUSINESS STUDENTS)

Course Synopsis
The purpose of this course is to expose students to communication and information technology. This course introduces students to the basic aspects of human. Students are introduced to motivation, knowledge and skills as tools for competent communication. The first part of the course discusses the basic process in effective communication such as perception, verbal and non-verbal communication, listening skills, basic communication models and information acquisition. The second part deals with competency in communication in the contexts of interpersonal communication, communication in organisation, small group communication, internet communication, basic skills for presentation and intercultural communication.

References

1. Devito, J.A.,’Human communication: The Basic Course’. 9th Ed’, Pearson Education Inc, 2003.
2. Devito, J.A.,’The Interpersonal Communication Book’. 12th Edition, Pearson Education Inc, 2009.
3. Pearson, J. Nelson, p. Titsworth, S. Harter, L.,’ Human Communication 2nd Edition’,New York: McGraw Hill, 2006.
4. Wood, J.T., ‘Communication Mosaics: An introduction to the field of communication. 3rd Ed. Wadsworth’, Thomson Learning, 2004.
5. LaBerta, C., ‘Computers Are Your Future Complete’. 11th Edition, Pearson Education Inc, 2011.
6. Pearson, Compiled by Nor’izah Ahmad, Mohammad Rezal Hamzah & Aida Sharmila Wati Wahab, 2011.

Lecturers

1. Prof. Dr. Asiah Sarji.
2. Assoc. Prof. Abdul Aziz Mahmuddin.
3. Nor’izah Ahmad.
4. Mohamad Rezal Hamzah.
5. Aida Sharmila Wati Wahab.
6. Nor Azizah Hitam
7. Ahmad Fahmi Mahamood

Offering Schedule

	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 global communication management, communication technology and its trends in business settings, organizational and managerial communication as well as preparation in the formal writing and oral presentation.

References

1. Bovee, C. and V. Thill, J., 'Business Communication Essentials', 4th Edition,) Prentice Hall; 4th Edition, 2009.
2. Krizan, Merrier, Logan, Williams, 'Business Communication'. Thomson - South Western, 2009.
3. Locker, K. and Kaczmarek, S., 'Business Communication: Building Critical Skills', McGraw-Hill/Irwin; 4th Edition, 2008.
4. Marry Ellen Guffey, Bertha Du-Babcock, 'Essentials of Business Communication', Thomson Publishing. 2007
5. Marry Ellen Guffey, 'Business Communication: Process and Product', South-Western College Pub; 6th Edition, 2007.

Lecturers

1. Mohamad Rezal Hamzah
2. Nor'izah Ahmad

Offering Schedule

Semester	Year 1	Year 2
Semester 2	PPIPT (Engineering Entrepreneurship)	
Semester 1		PPIPT (International Business)

EUT 442/2
ENGINEERS IN SOCIETY
(FOR ENGINEERING STUDENTS ONLY)

*Penggunaan Kod Mulai Kohot 2013/2014

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 introductory 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.

References

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', Mc Graw Hill, 2005.

4. Registration Of Engineering Act 1976 and Registration Of Engineer Regulation, 1990.
5. R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, 'Engineers In Society', Mc Graw Hill 2nd Edition.

Lecturer

1. Assoc. Prof. Ir. Shuib Sahudin
2. En. Muhammad Arkam Che Munaim
3. En. Phak Len *A/L* Eh Kan
4. Prof. Ir. Dr. Ibni Hajar Haji Rukunudin

EUT444/3
ENGINEERING MANAGEMENT
(FOR ENGINEERING STUDENTS ONLY)
*Penggunaan Kod Mulai Kohot 2013/2014

Course Synopsis

This course aims to teach students on how to apply project management skills, 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, student will be able to identify and discuss issues and challenges faced by engineers relating to project management in the current economic scenarios.

References

1. C M Chang, 'Engineering Management: Challenges in the New Millennium', Prentice Hall, 2004.
2. O'Sullivan / Sheffin, 'Economics: Principles And Tools', Prentice Hall, 2001.
3. R. Logeswaran, Hairul Azhar, Pau Kiu Nai and Sim Hock Kheng, 'Engineers In Society', Mc Graw Hill 2nd edition.
4. S. Park Chan, 'Fundamentals Engineering Economics, 2nd.', Prentice Hall, 2008.
5. Stanley E.P Samuel J.M., Jack R.M, Scot M.S, Margaret M. Sutton, 'Project Management: Planning, Scheduling, And Controlling Project', John Wiley & Sons Inc. USA, 2008.

Lecturer

1. Assoc. Prof. EurIng. Ir. Dr. Kenneth Sundaraj

Engineering Centre

ADDRESS

ENGINEERING CENTRE
University Malaysia Perlis
1st Floor, Administration Building
Pauh Putra Main Campus
02600 Arau, Perlis
MALAYSIA
Phone : 604-9885455
Fax : 604-9885466
www.unimap.edu.my

Introduction

The Engineering Centre is located within the Kuala Perlis Industrial Complex. It was established to manage laboratories and workshops which are vitally needed for various engineering programs offered by UniMAP. The teaching learning approach practiced in UniMAP is essentially based on practical-oriented; hence the use of labs cannot be overemphasized.

Objectives

Besides managing laboratories and workshop, the Engineering Centre also supports research and development activities in UniMAP. It also aspires to be a centre for designing and creating innovative engineering products. The Engineering Centre offers facilities for courses which require training and technical skills, parallel to industry standard. It also offers 'teaching factory' that is based on industries advanced technology, facilities and conducive environment for research and development activities and training for students and members of staff.

Courses Offered by Engineering Centre

There are two core courses offered by Engineering Centre for undergraduate's level:

- Engineering Skills (ECT111/ECT112)

And also a core course:

- Basic Engineering Skill (DCT100)

ENGINEERING SKILLS (ECT111/ECT112)

- AutoCAD Software Module consist of drawing and editing, layer control and properties modification, hatching, and dimensioning, text and template drawing
- Technical Drawing consists of geometric construction, lettering, tolerance, sectional view and symbols
- MATLAB Software Module consists of M- Files, Projection format, Matrix, vector, scalar and plotting
- Mechanical workshop consists of basic measurement, machining, welding, fitting, sheet metal
- PCB Fabrication process
- PCB design by using OrCAD Software.
- Electrical domestic wiring.
- Mechanical workshop - machining
- PLC - Programmable Logic Control.

BASIC ENGINEERING SKILL (DCT 100)

- Basic knowledge of computer
- Construction and measurement of electronic circuit
- Basic knowledge of electrical wiring
- An exposure to measurement techniques, fitting and sheet metal process
- Experience to the welding techniques and handling of mechanical machine

Lab Facilities

PCB FABRICATION LAB

- Introduction to advance Printed Circuit Board process development including single sided and double sided PCB production. We also can produce multi layer PCB process up to 6 layers.

PLC LAB

- **PLC** application in automation CAD/CAM LAB and COMPUTER LAB
- Introducing software of AUTOCAD, MATLAB and ORCAD.

ELECTRICAL WIRING WORKSHOP

- Domestic wiring, installation of surface wiring, PVC conduit and steel conduit wiring systems

MECHANICAL WORKSHOP

- Basic mechanical measurements, sheet metal process, fitting, welding, and machining

BASIC COMPUTER LAB

- Hardware assembly and software installation

TEACHING FACTORY

- Injection moulding, CNC turning, CNC milling, wave solder machine, Rapid Prototyping machine, Rotional machine, Vacum casting, powder metalogy, EDM wire cut

TECHNICAL DRAWING STUDIO

- Basic technical drawing equipment.

Staff Directory

DEAN
ASSOC. PROF. CHE MOHD RUZAIDI BIN GHAZALI
e-mail : ruzaidi@unimap.edu.my

DEPUTY DEAN
MR. SHARULNIZAM BIN MOHD MUKHTAR
e-mail: sharul@unimap.edu.my

CHAIRMAN OF PROGRAMME
ASSISTANT REGISTRAR
MR. MAHAMAD AKMAL B. HJ. SAAD
e-mail: mahakmal@unimap.edu.my

CHAIRMAN OF PROGRAMME
ASSISTANT REGISTRAR
MRS. ALMA AZIZAH ABDUL RAHIM
e-mail: alma@unimap.edu.my

Lecturers

Assoc. Prof. Che Mohd Ruzaidi B. Ghazali
M.Sc. Tech. Polymer (USM)
B. Tech. Polymer (USM)
e-mail : abd.rahman@unimap.edu.my

Mr. Sharulnizam B. Mohd Mukhtar
M.Sc. (Electrical Sys. Eng.) (UniMAP)
B.Eng. (Hons) Electrical & Electronic (Power) (UPM)
e-mail : sharul@unimap.edu.my

Senior Vocational Training Officer

Mr. Mahamad Akmal B. Hj. Saad
B.Sc. Mech. Eng (Hanyang University, Seoul Korea)
e-mail : mahakmal@unimap.edu.my

Vocational Training Officer

Mr. Khairulnizam B. Sultan Ali
B. in Electrical Engineering (Mechatronic), Kuitho
e-mail : khairulnizam@unimap.edu.my

Mr. Mohd. Nazri B. Abu Bakar
B. Eng Mekatronik (Univ. Fachhochschule Aolen, German)
e-mail : nazribakar@unimap.edu.my

Mr. Mohd Wafiyuddin B. Yahya
B. Eng (Hons) Electrical System Engineering (UniMAP)
e-mail : wafiyuddin@unimap.edu.my

Mrs. Noor Shazliza Bt. Zakaria
B. Eng (Hons) Computer Engineering (UniMAP)
e-mail : shazliza@unimap.edu.my

Mr. Nurulazmi B. Abdul Rahman
M.Sc. (Electrical Eng.)(UiTM)
B. Eng (Electrical), UTM
e-mail : nurulazmi@unimap.edu.my

Mrs. Rokiah Bt. Abdullah
B. in Electric Engineering (Computer Technology), KUITTHO
e-mail : rokiah@unimap.edu.my

Mr. Shafie B. Omar
B.Eng.Mech (UiTM)
e-mail : shafieomar@unimap.edu.my

Mr. Shahrul Fazly B. Sulaiman
B. Eng (Hons) Electrical Electronic, Metropolitan University UK
e-mail : shahrulfazly@unimap.edu.my

Mr. Wan Mohd Faizal B. Wan Nik
B. Eng Electrical (Instrumentation), UiTM
e-mail : mohdfaizal@unimap.edu.my

Mr. Zulkapli B. Abdullah
B.Eng(Hons) Computer and Comunication Engineering (USM)
e-mail : zulkapli@unimap.edu.my

Mr. Mahzan B. Musa
B.Eng.(Hons) Computer Engineering (UniMAP)
e-mail : mahzan@unimap.edu.my

Miss Farah Nazlia Bt. Che Kassim
B.Eng.(Hons) Computer Engineering (UniMAP)
e-mail : nazlia@unimap.edu.my

Mr. Sabri B. Zakaria
B.Eng. Electric& Electronic (Akita University)
e-mail : sabri@unimap.edu.my

Assistant Engineer

Mr. Zainul Abidin B. Ramli
Dip. In Machine Tools & Dip. In Teaching (Ferris State College)
e-mail : zainul@unimap.edu.my

Senior Technicians

Mr. Halim B. Harun
Cert. of Electronic Communication (Politeknik Ungku Omar)
e-mail : halim@unimap.edu.my

Mr. Rosiswardi B. Rusli
Cert. Of Mech. Eng (POLIMAS)
e-mail : rosis@unimap.edu.my

Technicians

Mr. Mohd Irwan B. Ibrahim
Cert. Of Electric (Power), (POLIMAS)
e-mail : irwan@unimap.edu.my

Mr. Mohd Yusri B. Yahya
Cert. Of Mech. Eng (POLIMAS)
e-mail : mohdyusri@unimap.edu.my

Mr. Shahreeza B. Zainal Abidin
Cert. Of Electric (Power), (POLIMAS)
e-mail : shahreeza@unimap.edu.my

Mr. Mohd Zulmajdi B. Che Din
Cert. Of Electronic Comm. (POLIMAS)
e-mail : zulmajdi@unimap.edu.my

Mr. Roshidi B. Ali
Cert. Of Mech. Eng (POLIMAS)
e-mail : shidi@unimap.edu.my

Mr. Muhammad Fathehi B. Ahmad Fuad
Cert. Of Mech. Eng (PSA)
e-mail : fathehi@unimap.edu.my

Mrs. Roslina binti Ahmad @ Hamid
Cert. in Mechanical Engineering (Manufacturing)POLIMAS
e-mail : sitikhalijah@unimap.edu.my

Mr. Mohammad Farid B. Yusoff
Cert. Of Mech. Eng (PKU)
e-mail : mohdfarid@unimap.edu.my

Mr. Sufyian B. Abu Suhor
Cert. Of Mech. Eng
(Politeknik Tuanku Syed Sirajuddin)
e-mail : sufyian@unimap.edu.my

Mr. Eirwan B. Rusli
Cert. Of Electrical & Electronic Eng.
(Politeknik Tuanku Syed Sirajuddin)
e-mail : eirwanrusli@unimap.edu.my

Handyman

Mr. Shaharizam B. Shafeei
Malaysian Skill Certificate- Level 2 in Milling and Lathe Operation
(IKM Lumut)
e-mail : shaharizam@unimap.edu.my

Administrative Staffs

Mrs. Alma Azizah Bt. Abdul Rahim
Assistant Registrar
e-mail : alma@unimap.edu.my

Mrs. Haidasafinas Bt. Abas
Secretary's Office
e-mail : haida@unimap.edu.my

Mrs. Sharifah Hanita Bt. Syed Ahmad
Senior Administrative Assistant
e-mail : sh.hanita@unimap.edu.my

Mrs. Diliana Bt. Mohd Fauzi
Administrative Assistant
(Clerical & Operations)
e-mail : diliana@unimap.edu.my

Mr. Hafizi B. Hassan Al- Kamal
General Office Assistant
e-mail : hafizi@unimap.edu.my

ECT111
ENGINEERING SKILLS

Course Synopsis

This subject is 100% practical coursework and carried out 3 units credit hours. This course contains six modules which are Basic Workshop, Machining, Wiring, PCB Design, PLC, AutoCAD and Technical Drawing that specifically planned for electronic based programs.

Course Outcomes

- Ability to apply and construct a basic skills and standard practiced of mechanical machines and equipments
- Ability to apply and construct the basic skills and standard practiced of domestic wiring.
- Ability to apply and construct a logic system using common controller tool (PLC).
- Ability to apply construct a standard practiced of manual technical drawing and able to design a product using common software (AutoCAD)
- Ability to apply and construct the basic skills and standard practiced of PCB layout design and fabrication process.

Syllabus

Technical Drawing
- DRAW, DISCUSS and APPLY the engineering practice to deliver an accurate technical drawing
  Software: AutoCAD
- DEFINE, DISCUSS and USE the engineering software (AutoCAD) as a tool to create 2D and 3D product

Basic Workshop
- DEFINE and DEMOSTRATE the functions of metrology equipments. DESCRIBE and APPLY the techniques of fitting, sheet metal forming and metal joining (welding).

Machining
- DISCUSS and USE a standard mechanical engineering machines such as Milling, Lathe and Grinding Machine to produce general component.

Domestic Wiring
- DISCUSS, DEMOSTRATE and APPLY the techniques of domestic wiring such as surface and conduit (PVC and GI) techniques.

Programmable Logic Control
- DEFINE, DISCUSS and USE of common logic controller which involves with programming, PLC structure and application.

PCB Design & Fabrication
- DEFINE, DISCUSS and USE the engineering software (OrCAD) as a tool to design PCB layout. DISCUSS a process of PCB fabrication and USE common machines to produce PCB.

References

1. Timothy Sean Sykes. (2002). *AutoCAD 2002 One Step at A Time*. Prentice Hall.
2. Ralph Grabowski. (2002). *Using AutoCAD 2002*. Thompson Learning.
3. Mohd Ramzan Mainal, Badri Abdul Ghani, Yahya Samian. (2000). *Lukisan Kejuruteraan Asas*. UTM,

ECT112
ENGINEERING SKILLS

Course Synopsis

This subject is 100% practical coursework and carried out 3 units credit hours. This course contains six modules which are Basic Workshop Machining, Wiring, Basic Electronics, Matlab, AutoCAD and Technical Drawing that specifically planned for non-electronic based programs.

Course Outcomes

- Ability to apply and construct a basic skills and standard practiced of mechanical machines and equipments
- Ability to apply and construct a basic skills and standard practiced of domestic wiring.
- Ability to apply and construct a mathematical analysis using Matlab software.
- Ability to apply and construct a basic skills and standard practiced of manual technical drawing and able to design a product using common software (AutoCAD)
- Ability to apply and construct a basic skill of electronics and its applications.

Syllabus

Technical Drawing
- DRAW, DISCUSS and APPLY the engineering practice to deliver an accurate technical drawing
  Software: AutoCAD
- DEFINE, DISCUSS and USE the engineering software (AutoCAD) as a tool to create 1D and 3D product.

Basic Workshop
- DEFINE and DEMONSTRATE the function metrology equipments. DESCRIBE and APPLY the techniques of fitting, sheet metal forming and metal joining (welding).

Machining
- DISCUSS and USE a standard mechanical engineering machines such as Milling, Lathe and Grinding Machine to produce general component.

Domestic Wiring
- DISCUSS, DEMOSTRATE and APPLY the techniques of domestic wiring such as surface and conduit (PVC and GI) techniques.

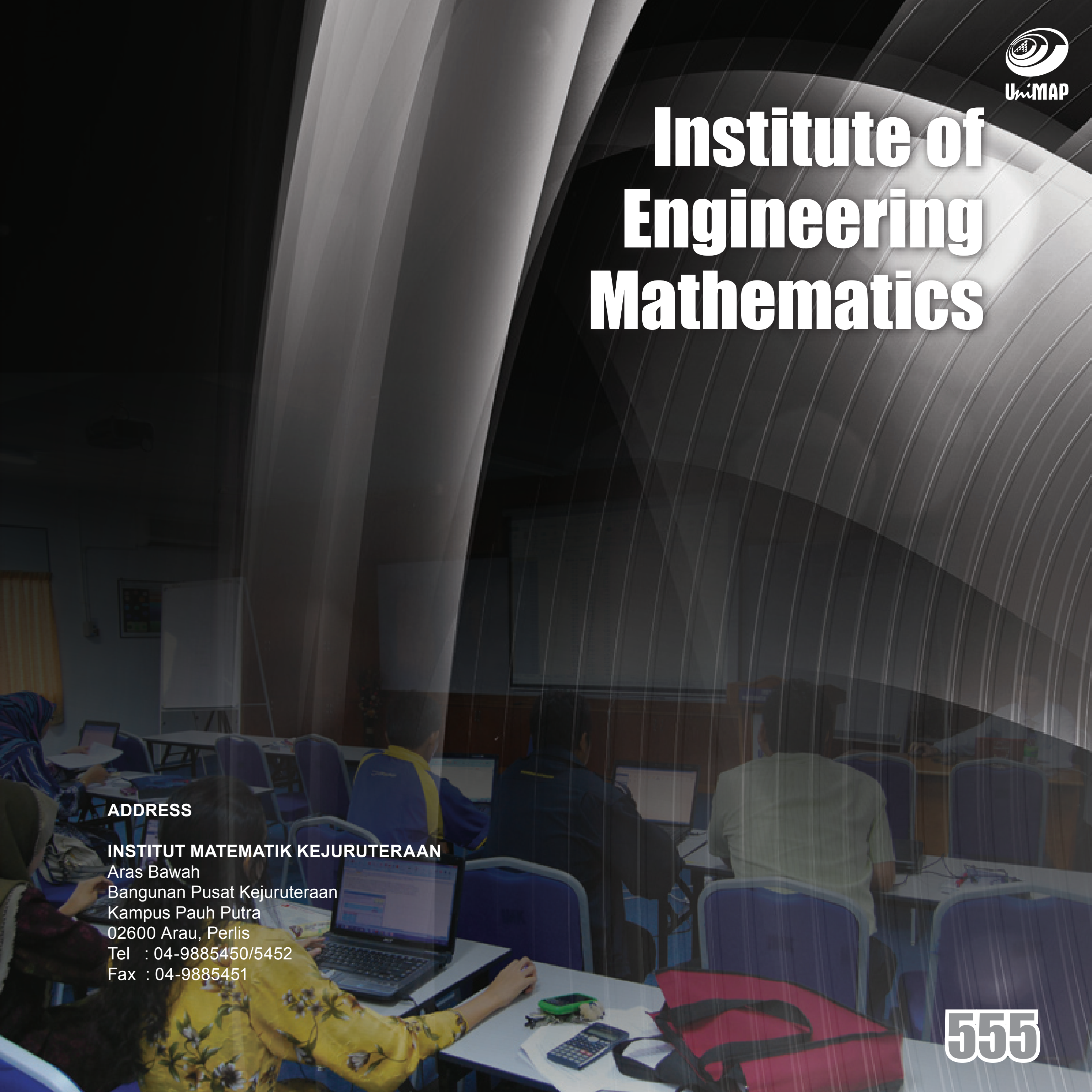
Matlab
- DEFINE, DISCUSS and USE of common mathematical analysis software (MATLAB) to calculate matrix, differential, integration, graph, and other mathematical formulas.

Basic Electronics
- DEFINE, DISCUSS and USE of basic electronic devices, electronic components, soldering techniques, testing techniques, measurement techniques and its application.

References

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.
4. Mohd Ramzan Mainal, Badri Abdul Ghani, Yahya Samian. (2000). *Lukisan Kejuruteraan Asas*. UTM


22



Institute of Engineering Mathematics

ADDRESS

INSTITUT MATEMATIK KEJURUTERAAN
Aras Bawah
Bangunan Pusat Kejuruteraan
Kampus Pauh Putra
02600 Arau, Perlis
Tel : 04-9885450/5452
Fax : 04-9885451

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.

Staff Directory

DEAN
ASSOCIATE PROFESSOR DR
ABD. WAHAB JUSOH
E-mail: abdwahab@unimap.edu.my

DEPUTY DEAN
MR. MOHD SYAFARUDY BIN ABU
E-mail : syafarudy@unimap.edu.my

CHAIRPERSON of DEGREE PROGRAMME
MR. WAN MOHD KHAIRY ADLY BIN WAN ZAIMI
E-mail: khairy@unimap.edu.my

CHAIRPERSON of DIPLOMA PROGRAMME
MR. LIM ENG AIK
E-mail: ealim@unimap.edu.my

ASSISTANT REGISTRAR
MRS. AZILAH BINTI ABIDIN
E-mail : azilah@unimap.edu.my

Lecturer

Prof. Qamar Nasir Usmani
Ph.D.(Theoretical Physic), Aligerh Muslim University India
M.Sc. (Physic), Aligerh Muslim University India
B.Sc. (Physic), Aligerh Muslim University India
e-mail : qamar@unimap.edu.my

Prof. Madya Dr. Abd Wahab Jusoh
Ph.D.(Numerical Analysis), Loughborough University of Technology, UK
M.Sc (Optimization & Computing), Loughborough University of Technology, UK
Master (Statistics), Institut Teknologi Bandung, Indonesia
B.Sc. Institut Teknologi Bandung, Indonesia
Tel : 04-9885450
e-mail : abdwahab@unimap.edu.my

Prof. Madya Abdull Halim Abdul
M.Sc (Statistics), Brunel University
B.Sc. (Hons) Mathematics, Universiti Malaya
e-mail : abdhalim@unimap.edu.my

Prof. Madya Drs. Mohd Said Bono
M.Sc Mathematics, Universiti Sains Malaysia
M. Ed,Drs, IKIP Bandung, Indonesia
B. Ed Mathematics, Universiti Sumatera Utara, Indonesia
e-mail : saidbono@unimap.edu.my

En. Mohd Syafarudy Abu
M.Sc. (Mathematics), Universiti Kebangsaan Malaysia
B.Sc (Hons) Mathematics, Universiti Putra Malaysia
e-mail : syafarudy@unimap.edu.my

En. Ahmad Kadri Junoh
M.Sc. (Mathematics), Universiti Kebangsaan Malaysia
B.Eng.(Hons) Mechanical, Akita University, Japan
e-mail : kadri@unimap.edu.my

En. Khairul Anwar Mohamad Khazali
M.Sc (Mathematics), Universiti Teknologi Malaysia
B.Sc Hons (Industrial Mathematics), Universiti Teknologi Malaysia
e-mail : khairulanwar@unimap.edu.my

En. Lim Eng Aik
M.Sc , Mathematics, Universiti Sains Malaysia
B.Sc. (Hons) Matematik Tulen , Universiti Sains Malaysia
e-mail : ealim@unimap.edu.my

En. Wan Mohd Khairy Adly Wan Zaimi
M.Sc (Mathematics), Universiti Teknologi Malaysia
B.Sc Hons (Industrial Mathematics), Universiti Teknologi Malaysia
e-mail : khairy@unimap.edu.my

En. Wan Zuki Azman Wan Muhamad
M.Sc. Engineering Mathematics, Universiti Teknologi Malaysia
B.Sc Hons (Industrial Mathematics), Universiti Teknologi Malaysia
e-mail : wanzuki@unimap.edu.my

En. Muhammad Zaini Ahmad
M. Sc (Mathematics), Universiti Kebangsaan Malaysia
B.Sc (Hons) (Mathematics), Universiti Putra Malaysia
e-mail : mzaini@unimap.edu.my

Pn. Nursalasawati Rusli
M.Sc (Mathematics), Universiti Kebangsaan Malaysia
B.Sc (Hons) (Mathematics), Universiti Sains Malaysia
e-mail : nursalasawati@unimap.edu.my

Pn. Nooraihan binti Abdullah
M.Sc Mathematics, Universiti Sains Malaysia
B.Sc Mathematics, Universiti Putra Malaysia
e-mail : raihan@unimap.edu.my

Pn. Wan Suhana Wan Daud
M.Sc. Mathematics, Universiti Kebangsaan Malaysia
B.Sc Hons (Mathematics), Universiti Teknologi Mara
e-mail : wsuhana@unimap.edu.my

Pn. Najah Ghazali
M.Sc. Mathematics, Universiti Kebangsaan Malaysia
B.Sc Hons (Mathematics), Universiti Kebangsaan Malaysia
e-mail : najah@unimap.edu.my

Pn. Nor Fashihah Mohd Noor
Master of Science (Hons) Statistics, Universiti Kebangsaan Malaysia
B.Sc Hons (Statistics), Universiti Kebangsaan Malaysia
e-mail : norfashihah@unimap.edu.my

Pn. Elyana Sakib
M.Sc. Mathematics, Universiti Kebangsaan Malaysia
B.Sc w Edu(Hons)-Statistics, Universiti Putra Malaysia
e-mail : elyana@unimap.edu.my

Cik Wan Nurhadani Wan Jaafar
M.Sc. Mathematics, Universiti Sains Malaysia
B.Sc. (Hons) Mathematics, Universiti Sains Malaysia
e-mail : hadani@unimap.edu.my

Cik Siti Jasmida Jamil
M.Sc. Mathematics, Universiti Sains Malaysia
B. Applied Sc. (Hons) Mathematical Modelling, Universiti Sains Malaysia
e-mail : jasmida@unimap.edu.my

Cik Shakila Saad
M.Sc. Mathematics, Universiti Teknologi Malaysia
B.Sc. (Hons) Mathematics, Universiti Teknologi Mara
Dip. In Sc. Computer, Universiti Teknologi Mara
e-mail : shakila@unimap.edu.my

Cik Wan Nor Munirah Ariffin
M.Sc. Mathematics, Universiti Teknologi Malaysia
B.Sc Hons (Industrial Mathematics), Universiti Teknologi Malaysia
e-mail : munirah@unimap.edu.my

Cik Nurhidayah Omar
M.Sc. Mathematics, Universiti Kebangsaan Malaysia
Bachelor of Science and Computer with Education (Mathematics), UTM
e-mail : hidayahomar@unimap.edu.my

Cik Alezar Mat Ya'acob
Master Education (Mathematics),Universiti Teknologi Malaysia
Bachelor of Science (Computer), Universiti Teknologi Malaysia
e-mail : alezar@unimap.edu.my

Cik Siti Haida Ismail
Master of Mechanical (Industrial Engineering), Universiti Teknologi Malaysia
B.Sc Hons (Industrial Mathematics), Universiti Teknologi Malaysia
e-mail : sitihaida@unimap.edu.my

Cik Rohana Abdul Hamid
Master of Fluid Dynamics, Universiti Putra Malaysia
B.Sc w Edu(Hons)-Mathematics, Universiti Putra Malaysia
e-mail : rohanahamid@unimap.edu.my

Cik Nor Ashikin Abu Bakar
M.Sc. Mathematics, Universiti Kebangsaan Malaysia
B.Sc Hons (Mathematics), Universiti Kebangsaan Malaysia
e-mail : ashikinbakar@unimap.edu.my

Tutor

Pn. Haslina Zakaria
B.Sc(Hons) (Decision Science), Universiti Utara Malaysia
e-mail : haslinazakaria@unimap.edu.my

Pn Siti Rohana Goh Abdullah
B.Sc(Hons) Decision Science, Universiti Utara Malaysia
e-mail : sitirohana@unimap.edu.my

Study Leave

Pn. Aishah binti Mohd Noor
M.Sc Statistics, Universiti Sains Malaysia
B.Sc Statistics, Universiti Kebangsaan Malaysia
e-mail : aishah.mn@unimap.edu.my

Pn. Maz Jamilah binti Masnan
M.Sc Decision Science ,Universiti Utara Malaysia
BA Statistics , Michigan State University
Diploma in Statistics ,Universiti Teknologi Mara
e-mail : mazjamilah@unimap.edu.my

Cik Sam Teek Ling
M.Sc. Mathematics, Universiti Sains Malaysia
B.Sc. (Hons) Mathematics, Universiti Sains Malaysia
e-mail : tlsam@unimap.edu.my

Pn Nor Azrita Mohd Amin
M.Sc. Mathematics, Universiti Teknologi Malaysia
B.Sc Hons (Industrial Mathematics), Universiti Teknologi Malaysia
e-mail : norazrita@unimap.edu.my

Pn. Biliana Bidin
M.Sc. Mathematics, Universiti Kebangsaan Malaysia
B.Sc with Edu Hons(Statistics),Universiti Putra Malaysia
e-mail : biliana@unimap.edu.my

Cik Shazalina Mat Zin
M.Phil. Applied Mathematics, Universiti Malaya
B.Sc Hons (Industrial & Computational Mathematics), Universiti Malaya
e-mail : shazalina@unimap.edu.my

Administration Staff

Pn. Azilah Abidin
Penolong Pendaftar
Tel : 04-9885452
e-mail : azilah@unimap.edu.my

Pn. Jasliza Johari
Setiausaha Pejabat
Tel : 04-9885450
e-mail : jasliza@unimap.edu.my

Pn. Nainatul Farzuha Nor
Pembantu Tadbir (Kewangan)
e-mail : nainatul@unimap.edu.my

En. Muhamad Fahmi Abdullah
Pembantu Tadbir (Perkeranian & Operasi)
e-mail : mfahmi@unimap.edu.my

En.Muhammad Nasrudin Norsilan
e-mail : mnasrudin@unimap.edu.my

Programme Offered

MASTER OF SCIENCE (ENGINEERING MATHEMATICS) BY RESEARCH 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

EQT373/4
Statistics for Engineers

PQT111/3
Mathematics for Engineering Technology I

PQT112/3
Mathematics for Engineering Technology II

PQT213/3
Mathematics for Engineering Technology III

Programme Outcomes [PO] UniMAP

PO 01
Ability to acquire and apply knowledge of mathematics, science, engineering and an in-depth technical competence in a engineering discipline.

PO 02
Ability to identify, formulate and solve engineering problems.

PO 03
Ability to design a system, component or process to meet desired needs.

PO 04
Ability to design and conduct experiments, as well as to analyze and interpret data.

PO 05
Ability to use techniques, skills and modern engineering tools necessary for 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
In-depth understanding of entrepreneurship, the process of innovation and the need for sustainable development.

PO 08
Understanding of professional and ethical responsibilities and commitment to the community.

PO 09
Ability to function on multi-disciplinary teams.

PO 10
Ability to communicate effectively.

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

UniMAP

Course Syllabus

EQT101/3
ENGINEERING MATHEMATICS I

Course Synopsis

This course will introduce the fundamental principles and concepts in linear algebra and calculus. The topics that will be discussed in this course are complex numbers, matrices, vectors, and differentiation & integration and partial differential equations also topic of Partial Derivatives.

Course Outcomes

1. Ability to relate relevant concepts and methods in algebra.
2. Ability to relate concepts and methods in calculus.
3. Ability to evaluate solutions of engineering problems using relevant concepts and methods.

References

1. Fundamental Mathematics McGraw Hill
2. James, G et.al.(2007): Modern Engineering Mathematics. Pearson Education, 4th edition.
3. Stroud,K.A. (2007): Engineering Mathematics. Industrial Press Inc, 6th edition.
4. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
5. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.

EQT102/3
ENGINEERING MATHEMATICS II

Course Synopsis

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 equatio
2. Ability to apply the Laplace transforms method to solve and analyze certain differential equations problems theoretically and physically.
3. 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 result must be **D+** and above

References

1. Introduction To Ordinary Differential Equation (2010), Penerbit UniMAP
2. W. E. Boyce (2009): Elementary Differential Equations and Boundary Value Problems: International Student Version. John Wiley & Sons Inc,9th edition.
3. B.R. Hunt, L.J. Lardy ,R.L. Lipsman, J.E. Osborn, J.Rosenberg (2008):Differential Equations with Maple Wiley, 3rd edition.
4. R. K. Nagle, E. 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.

6. 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 to solve the business models.
2. Ability to identify and 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. John Shannon (1995). *Mathematics for Business, Economics and Finance*, John Wiley and Son
2. Brechner, Robert (2008). *Contemporary Mathematics for Business and Consumers*, South-Western College Pub.
3. Steve Slavin, Tere Stouffer (2007). *Business Math, John Wiley.*
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 demonstrate knowledge and understanding of elements in business statistics.
2. Ability to apply knowledge and concept of business statistics in decision making.
3. Ability to perform and analyze statistical analysis, estimation and inference regarding one sample.
4. Ability to perform statistical analysis , estimation and inference regarding two and more samples.

References

1. Mark, L. B., Levine, D. M. & Krehbiel, T.C. (2008). Basic Business Statistics. 11th edition, Prentice Hall.
2. Bowerman, O. & Orris, P. (2008). Essentials of Business Statistics. 2nd edition, McGraw Hill/Irwin.
3. Weiers, R. M. (2007). Introduction to Business Statistics. Duxbury Press, An International Thomson Publishing Company.
4. Ronald E. W. , Raymond H. M, Sharon. L. M, Keying Ye (2002), Probability & Statistic for Engineers & Scientist, Prentice Hall.
5. Frederick L.C(2006), Statistics: A Gentle Introduction, Thousand Oaks, California, SAGE Publication.

EQT203/3
ENGINEERING MATHEMATICS III

Course Synopsis

This course introduces the definition and concepts in vector calculus, numerical methods and introduction on basic of finite element. The topics discuss includes differentiation and integration of vectors, surface and volume integral, green's, gauss and stokes theorems, curve fitting, interpolation, numerical integration, numerical solution of differential equations, introduction to finite element for 1-D heat transfer problem. Important concepts related to vector fields, numerical method and basic 1-D finite element method are introduce in this course and then follow by the use of these concepts in solving mathematical problem.

Cources Outcomes

1. Ability to apply vector calculus concepts to solve single, double or triple integrals.
2. Ability to solve numerical problems by selecting suitable numerical methods.
3. Ability to relate the weighted residual approach and finite element method to solve engineering problem

Prerequisite

EQT 101
Engineering Mathematics I result must be **D+** and above

References

1. Undergraduate Mathematics for Engineering Student. McGraw Hill
2. Erwin Kreyszig (2006): *Advanced Engineering Mathematics*, 9th edition, John Wiley & Sons, Inc.
3. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
4. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
5. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
6. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.
7. Harman, T.L., Dabney, J. and Richert, N. (1997): *Advance Engineering Mathematics using MATLAB V.4*, Boston: PWS Publishing Company.

EQT221/3
DISCRETE MATHEMATICS & LINEAR ALGEBRA

Course Synopsis

This course introduces the definition and concepts in discrete mathematics and linear algebra which is an essential tools in almost all subareas of computer science and communication systems. The topics discuss includes sets and functions, logic, theory number and cryptography, matrices and linear transformation, vector spaces and inner product spaces.

Cources Outcomes

1. Ability to identify and choose the suitable concepts of discrete mathematics in solving engineering problems.
2. Ability to apply the concept of linear algebra in solving engineering problems.
3. Ability to relate and solve engineering problems using discrete mathematics and linear algebra

References

1. Rosen, H. Kenneth. 2007. Discrete Mathematics and Its Application (6th Edition). McGraw-Hill, New York.
2. Ross, A. Kenneth & Wright, R. 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
4. Buchmann, J.A. 2004. Introduction to Cryptography (2nd Edition). Springer-Verlag, New York
5. Kolblizt, N. 1994. A course in Number Theory and Crytpgraphy (2nd Edition). Springer-Verlag, New York.
6. Ma Siu Lun, Victor Tan. 2006. Linear Algebra I. Pearson Prentice Hall, Inc, New Jersey.
7. Larson, R & Falvo, D. 2010. Elementary Linear Algebra, Brooks/Cole Cengage Learning.

EQT241/3:
INTERMEDIATE MATHEMATICS

Course Synopsis

This course introduces the definition and concepts in vector calculus and numerical methods. Three important concepts related to scalar and vector fields. The topics discuss also includes numerical differentiation and numerical integration, numerical solution of differential equations and finite difference method.

Cources Outcomes

1. Ability to define the vector integrals and evaluate the line, volume and surface integral using Green, Guass and Stoke theorem.
2. Ability to find the numerical solution of the equation and use the suitable numerical methods to solve the problems.
3. Ability to relate the relevant concept of vector calculus and numerical methods to solve engineering problems.

References

1. Erwin Kreyszig (2006): *Advanced Engineering Mathematics*, 9th edition, John Wiley & Sons, Inc.
2. Undergraduate Mathematics for Engineering Student. McGraw Hill
3. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
4. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
5. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
6. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.
7. Harman, T.L., Dabney, J. and Richert, N. (1997): *Advance Engineering Mathematics using MATLAB V.4*, Boston: PWS Publishing Company.

EQT271/3
ENGINEERING STATISTICS

Course Synopsis

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 two-way ANOVA) and nonparametric statistics (The c^2 test, Sign test, Mann-Whitney test, Kruskal Wallis test, Wilcoxon-signed 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.
4. Ability to apply the basic methodology of nonparametric statistics to solve engineering problems.

References

1. Walpole, R., Myers, R., Myers, S. and Keying Ye (2006): *Probability & Statistics for Engineers & Scientist, 8th edition,* Pearson.
2. Ledolter, J. and Hogg, R. (2009): *Applied Statistics for engineers and Physical Scientists*, Pearson.

3. Mendenhall, W. and Sincich, T. (2006): *Statistics for engineering and the sciences, 5th edition,* Pearson.
4. McClave, J., Sincich, T. and Mendenhall, W. (2008): *Statistics, 11rd edition,* Pearson.
5. David, S.M., George, P.M. and Bruce, C. (2008): *Introduction to the Practise of Statistics, 6th edition, Palgrave.*
6. David, S.M. (2008): *The Basic Practise of Statistics, 5th edition,* Palgrave.

EQT272/3
PROBABILITY & STATISTICS

Course Synopsis

This course provides an elementary introduction to probability and statistics with applications. Topics include probability theorem, random variables, probability distribution, statistical inference which is including estimation and hypothesis testing and finally the regression concept.

Cources Outcomes

1. Ability to apply the theory of probability and solve discrete and continuous random variables.
2. Ability to understand and apply the concepts of probability distribution.
3. Ability to apply hypothesis testing and simple linear regression model to solve engineering problems.

References

1. Richard J. Larsen and Morris L. Marx, (2001): *An Introduction to Mathematical Statistics and Its Applications*, 3rd edition, Prentice Hall.
2. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
3. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
4. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
5. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.
6. Harman, T.L., Dabney, J. and Richert, N. (1997): *Advance Engineering Mathematics using MATLAB V.4*, Boston: PWS Publishing Company.

EQT373/4
STATISTICS FOR ENGINEERS

Course Synopsis

Topics to be covered will include collection and summarization of data, measures of central tendency and dispersion, random variables, discrete and continuous probability distributions, sampling distribution, estimation, hypothesis testing, introductory linear regression, analysis of variance, introductory design of experiments and statistical process control (introduction to control charts).

Cources Outcomes

1. Ability to apply fundamental concepts of probability distributions and statistics.
2. Ability to apply knowledge of statistics in analyze and interpret data.
3. Ability to apply knowledge of statistics for decision making and to solve engineering problems.
4. Ability to apply knowledge of statistics for designing the engineering experiment.
5. Ability to relate relevant concepts and practices of statistic process control in the manufacturing processes.

References

1. Jay L.Devore. (2007).*Probability and Statistics for Engineering and the Sciences*. 7th Edition. Duxbury Press, Belmont.
2. Willian Navidi. (2006). *Statistics for Engineers and Scientists.* MaGraw Hill, New York.
3. Douglas C.Montgomery, George C.Runger.Norma F.Hubele.John Wiley (2001). *Engineering Statistics.* 2nd Edition. New York.

4. Robert V. Hogg, Johannes Ledolter (1992). *Applied Statistics for Engineers and Physical Scientist.* 2nd Edition. Macmillan.New York.
5. Ronald E. W. , Raymond H. M, Sharon. L. M, Keying Ye (2002), Probability & Statistic for Engineers & Scientist, Prentice Hall.

PQT111/3 MATHEMATICS FOR ENGINEERING TECHNOLOGY I

Course Synopsis

This course will introduce the fundamental principles and concepts in algebra, calculus and statistics. The topics that will be discussed in this course are complex numbers, matrices, vectors, differentiation & integration and statistics.

Cources Outcomes

1. Ability to solve mathematical problems using basic concepts of algebra (complex numbers, matrices and vectors).
2. Ability to solve mathematical problems using basic concepts of calculus (differentiation and integration).
3. Ability to solve statistical problems using data analysis.

References

1. Fundamental Mathematics, McGraw Hill
2. James, G et.al.(2007): Modern Engineering Mathematics. Pearson Education, 4th edition.
3. Stroud,K.A. (2007): Engineering Mathematics. Industrial Press Inc, 6th edition.
4. Mario F. Triola.(2009). Elementary Statistics Using Excel. Addison-Wesley. 4th Edition.
5. Beverly Dretzke.(2008). Statistics With Microsoft Excell. Prentice Hall. 4th Edition.
6. Devore, J.L. (2007): Probability and Statistics for Engineering and the Sciences. Duxbury Press,7th edition.
7. Montgomery, D.C. (2006): *Applied Statistics and Probability for Engineers*. Wiley, 4th edition.

PQT112/3 MATHEMATICS FOR ENGINEERING TECHNOLOGY II

Course Synopsis

This course will introduce the concepts of ordinary differential equations. The topics that will be discussed in this course are the methods in solving the differential equations including first and second order differential equations and its applications. Next, the course will introduce to the Laplace transform method to solve differential equations and at the end of topic, Fourier Series expansion of a function will be discussed to the students.

Cources Outcomes

1. Able to solve differential equations involving the first and second order differential equation by selecting appropriate techniques and able to relate and analyze the certain physical problems to differential equations.
2. Ability to apply the Laplace transforms method to solve and analyze certain differential equations problems.
3. Ability to apply the fundamental understanding of Fourier series and able to express Fourier series and Fourier series expansions to any given function.

Prerequisite

PQT 111
Mathematics for Engineering Technology I result must be **D+** and above

References

1. Introduction To Ordinary Differential Equation (2010), Penerbit UniMAP
2. W. E. Boyce (2009): Elementary Differential Equations and Boundary Value Problems:

International Student Version. John Wiley & Sons Inc,9th edition.
3. B.R. Hunt, L.J. Lardy ,R.L. Lipsman, J.E. Osborn, J.Rosenberg (2008):Differential Equations with Maple Wiley, 3rd edition.
4. R. K. Nagle, E. 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.
6. D.G. Zill (2008). A First Course in Differential Equations. Brooks Cole,9th edition.

PQT213/3
MATHEMATICS FOR ENGINEERING TECHNOLOGY III

Course Synopsis

This course will introduce the definition and concepts of partial derivatives and vector calculus. An introduction to some theorems in vector calculus topic will be exposed for students. At the end of study, this course also discusses the topic of numerical methods that introduce several methods in solving mathematical problems.

Cources Outcomes

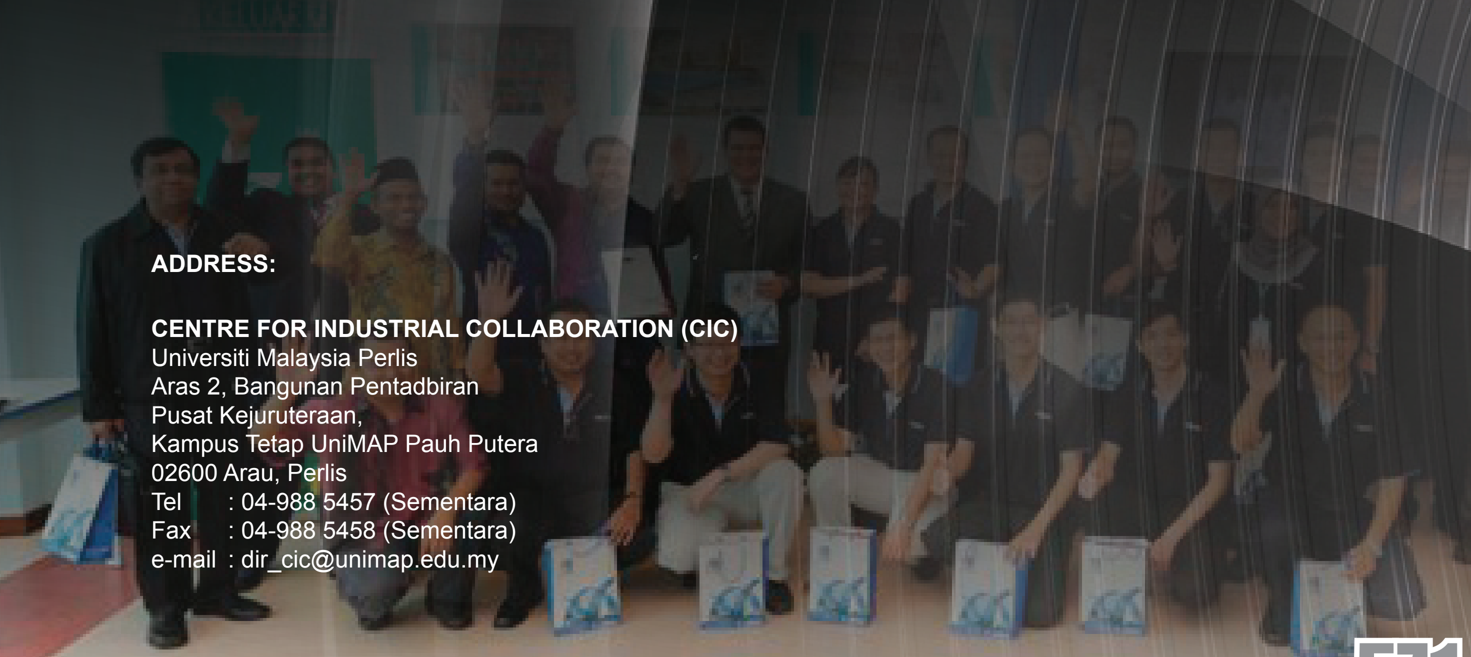
1. Ability to apply the concepts of partial derivatives and able to evaluate solutions of mathematical problems using suitable methods
2. Ability to apply vector calculus concepts and able to differentiate and solve single, double or triple integrals
3. Ability to solve numerical problems by selecting suitable numerical methods

References

1. Undergraduate Mathematics for Engineering Student. McGraw Hill
2. Erwin Kreyszig (2006): *Advanced Engineering Mathematics*, 9th edition, John Wiley & Sons, Inc.
3. Peter V. O'Niel (2006): *Advanced Engineering Mathematics*, 6th edition, CL Engineering.
4. Lawrence H.T. Chang and Radzuan Razali (2002): *Asas Metematik Kejuruteraan*, Prentice Hall.
5. K.A. Stroud (2001): *Engineering Mathematics*, 6th edition, Palgrave.
6. K.A. Stroud (2003): *Further Engineering Mathematics*, 3rd edition, Palgrave.


KELUAR
m
alve
icle
alve
Arteries
eins
e
cle
e

Centre for Industrial Collaboration



ADDRESS:

CENTRE FOR INDUSTRIAL COLLABORATION (CIC)
Universiti Malaysia Perlis
Aras 2, Bangunan Pentadbiran
Pusat Kejuruteraan,
Kampus Tetap UniMAP Pauh Putera
02600 Arau, Perlis
Tel : 04-988 5457 (Sementara)
Fax : 04-988 5458 (Sementara)
e-mail : dir_cic@unimap.edu.my

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 Career and Graduate Employability, Academic and Industry, and Consultation. Among the training courses offered 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 with Industries and Industry Centre of Excellence (CoE).

Staff Directory

DIRECTOR
ENGR. DR. YUFRIDIN BIN WAHAB
E-mail: yufridin@unimap.edu.my

DEPUTY DIRECTOR
PROGRAM CHAIRMAN
(Employability & Career)
MR. MUHAMMAD IZMER BIN YUSOF
E-mail: izmer@unimap.edu.my

DEPUTY DIRECTOR
PROGRAM CHAIRMAN
(Academic & Employability)
MR. ANAS BIN ABDUL RAHMAN
E-mail: anasrahman@unimap.edu.my

ASSISTANT REGISTRAR
MRS. SITI NUR IDAYU BINTI ALIAS
E-mail : nuridayualias@unimap.edu.my

ASSISTANT REGISTRAR
MR. MOHD. NIZAM BIN ISMAIL
E-mail : m.nizam@unimap.edu.my

IMR. CHE KU KAIRULAZAM
BIN CHE KU ABDULLAH
E-mail: chekuazam@unimap.edu.my

ASSISTANT REGISTRAR
MS. NURUL AKHMAR
BT ABDUL HAMID
E-mail: akhmarhamid@unimap.edu.my

ASSISTANT REGISTRAR
MR. KAMARUDIN BIN MAT ARSAD
E-mail: kamarudinarsad@unimap.edu.my

ASSISTANT REGISTRAR
MR. MOHAMAD FIRDAUS
BIN ABU BAKAR
E-mail: firdausbakar@unimap.edu.my

Lecturers

Engr. Dr. Yufridin Bin Wahab
B.Eng (Electrical & Electronic), USM
M.Sc (Rekabentuk VLSI), USM
Ph.D. Micro Electro Mechanical System, University of Victoria, Australia
e-mail : yufridin@unimap.edu.my

Mr. Muhammad Izmer Bin Yusof
Bac (Decision Science, Major international Politics), UUM
MSc (Straregic Studies & International Politics), UUM
e-mail : izmer@unimap.edu.my

Mr. Anas Abdul Rahman
B. Sc. Mech (Iowa State, USA)
M.Eng. Mech (UKM)
e-mail : anasrahman@unimap.edu.my

Administrative Officer

Mr. Mohd. Nizam Bin Ismail
e-mail : m.nizam@unimap.edu.my

Mr. Kamaruddin Bin Mat Arsad
e-mail : kamarudinarsad@unimap.edu.my

Mr. Che Ku Kairulazam Bin Che Ku Abdullah
e-mail : chekuazam@unimap.edu.my

Ms. Nurul Akhmar Binti Abdul Hamid
e-mail : akhmarhamid@unimap.edu.my

Mrs. Siti Nur Idayu Binti Alias
e-mail : nuridayualias@unimap.edu.my

Mr. Mohamad Firdaus Bin Abu Bakar
e-mail : firdausbakar@unimap.edu.my

Assistant Administrative Officer

Mr. Mohd. Faizoo Bin Othman
e-mail : faizoo@unimap.edu.my

Mr. Mohd. Shahfi Bin Ismail
e-mail : shahfi@unimap.edu.my

Mrs. Janatul Naim Zulkefli
e-mail : janatulnaim@unimap.edu.my

Secretary

Mrs. Nor Azlindamazlini Binti Mahamad
e-mail : dir_cic@unimap.edu.my

Administrative Assistant

Mrs. Istiharah Binti Ishak
e-mail : isti@unimap.edu.my

Mrs. Nor Faezah binti Mirdukhim @ Mustapa
e-mail : faezahmustapa@unimap.edu.my

Mr. Azhar Bin Ali
e-mail : azhar_ali@unimap.edu.my

General Worker

Mr. Abang Syamri Bin Ahmad
e-mail : syamri@unimap.edu.my

Course Offered

EIT 302/4
INDUSTRIAL TRAINING
[DEGREE IN ENGINEERING PROGRAMME]

Course 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]

Course 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.

Reference

1. UniMAP Industrial Training Log Book

BIT291/6
INCUBATOR PROGRAMME
[DEGREE IN BUSINESS (ENGINEERING ENTREPRENEURSHIP) PROGRAMME]

Course Syllabus

This course gives students direct exposure to the real entrepreneurship and business world. Students will be stationed in business incubators, generally assigned to one of the startup companies. Students will go through the experience of starting up a company / business including being exposed to the company procedures, banking activities, development of new product, business networking, management of the company and so on. Students will also get exposure communicating in actual business world and this will develop their skills in fostering an entrepreneurial network.

Course Outcomes

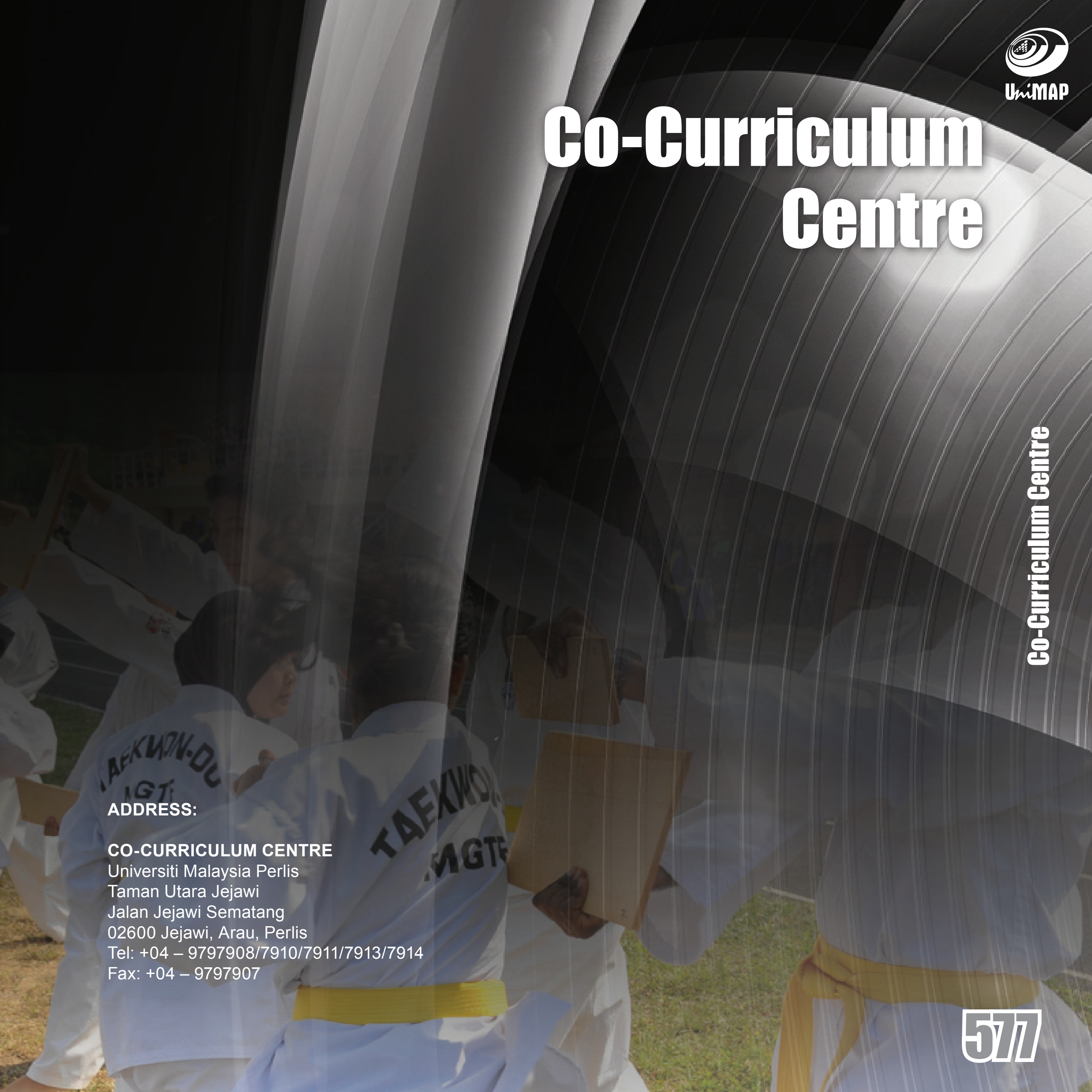
CO1:
Ability to display good work performance and adapt to the working environment during training period.

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



Co-Curriculum Centre

Co-Curriculum Centre

ADDRESS:

CO-CURRICULUM CENTRE
Universiti Malaysia Perlis
Taman Utara Jejawi
Jalan Jejawi Sematang
02600 Jejawi, Arau, Perlis
Tel: +04 – 9797908/7910/7911/7913/7914
Fax: +04 – 9797907

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 (opposite of the Perlis JPJ building). 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.

Staff Directory

DIRECTOR
MR. AHMAD FAHMI MAHAMOOD
E-mail:fahmi@unimap.edu.my

DEPUTY DIRECTOR

HONORARY OFFICER
STUDENTS VOLUNTARY POLICE CORP
(ACADEMIC)
MR. MOHAMAD NUZAIHAN MD. NOR
E-mail : m.nuzaihan@unimap.edu.my

CHAIRPERSON of PALAPES
PROGRAMME
MR. VITHYACHARAN A/L
RETNASAMY
E-mail : rcharan@unimap.edu.my

ASSISTANT REGISTRAR
MRS. ISMA IRINI SHAFIE
E-mail : isma@unimap.edu.my

Lecturers

(Director)

Mr. Ahmad Fahmi Mahamood
M.S (Communication Technology) UPM
B. Comm (Corporate Communication) UPM
Tel : 04 – 9797913/7914
e-mail : fahmi@unimap.edu.my

Administrative Staffs

Mrs. Isma Irini Shafie
Assistant registrar
Tel : 04-9797911
e-mail : isma@unimap.edu.my

Mrs. Nur Nadiah Jalil
Assistant Administrative Officer
Tel : 04-9797910
e-mail : nurnadiah@unimap.edu.my

Miss. Syarifah Syaimaa Binti Syed Hamzah
Office secretary
Tel : 04-9797913
e-mail : syaimaa@unimap.edu.my

Mr. Zulkefly Wahab
Administrative Assistant (P/O)
Tel : 04-9797908
e-mail : zulkefly@unimap.edu.my

Mrs. Nur Syafarina Che Ani
Administrative Assistant (P/O)
Tel : 04-9797909
e-mail : syafarina@unimap.edu.my

Mr. Mohd Faiz Musa
Administrative Assistant (P/O)
Tel : 04-9797908
e-mail : faizmusa@unimap.edu.my

Miss. Roziana Binti Ahmad Tajuddin
Administrative Assistant (P/O)
Tel : 04-9797908
e-mail : rozianatajuddin@unimap.edu.my

Miss. Nurul Ashikin Binti Mohd Josrie
Administrative Assistant (P/O)
Tel : 04-9797908
e-mail : nurulashikin@unimap.edu.my

Mr. Hasnul Hadi Bin Shawal Bakhtiar
Office Assistant
Tel : 04-9797908
e-mail : hasnul@unimap.edu.my

Mrs. Che Ku Nur Aida Binti Che Ku Rahim
Office Assistant
Tel : 04-9797908
e-mail : nuraida@unimap.edu.my

Co-Curriculum Courses Offered yy 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:

NO	COURSES	COURSE CODE	NOTE
1	Golf [Golf]	UZW101	SUKAN
2	Besbal [baseball]	UZW102	
3	Woodball [Woodball]	UZW103	
4	Bola Sepak [Football]	UZW104	
5	Bola Jaring [Netball]	UZW105	
6	Tenis [Tennis]	UZW106	
7	Ekuestrian [Equestrian]	UZW107	
8	Angkat Berat [Weightlifting]	UZW108	
9	Daya Usaha & Inovasi [Initiative & Innovation]	UZW130	DAYA USAHA & INOVASI DAN KEUSAHAWANAN
10	Student In-Free Enterprise (SIFE) [Student In-Free Enterprise (SIFE)]	UZW131	
11	Renang I [Swimming I]	UZW180	SUKAN
	Renang II [Swimming II]	UZW280	
	Renang III [Swimming III]	UZW380	
12	Boling Padang [Lawn Bow	UZW181	
13	Petanque [Petanque]	UZW182	
14	Kayak [Canoe]	UZW183	
15	Badminton [Badminton]	UZW184	
16	Hoki [Hockey]	UZW185	
17	Sepak Takraw [Sepak Takraw]	UZW186	
18	Ragbi [Rugby]	UZW187	
19	Memanah [Archery]	UZW188	
20	Ping Pong [Table Tennis]	UZW189	
21	Seni Silat Cekak I [Seni Silat Cekak I]	UZW171	
	Seni Silat Cekak II [Seni Silat Cekak II]	UZW271	
	Seni Silat Cekak III [Seni Silat Cekak III]	UZW371	
22	Taekwon-Do GTF I [Taekwon-Do GTF I]	UZW172	
	Taekwon-Do GTF II [Taekwon-Do GTF II]	UZW272	
	Taekwon-Do GTF III [Taekwon-Do GTF III]	UZW372	

23	Karate-Do [Karate-Do]	UZW173	SUKAN
24	Lawan Pedang [Fencing]	UZW174	
25	Asas Gamelan [Foundations of Gamelan]	UZW151	KEBUDAYAAN
	Gamelan II [Gamelan II]	UZW251	
	Gamelan III [Gamelan III]	UZW351	
26	Kumpulan Jazz I [Jazz Band I]	UZW152	
	Kumpulan Jazz II [Jazz Band II]	UZW252	
	Kumpulan Jazz III [Jazz Band III]	UZW352	
27	Brasben I [Brass Band I]	UZW153	
	Brasben II [Brass Band II]	UZW253	
	Brasben III [Brass Band III]	UZW353	
28	Angklung I [Angklung I]	UZW154	
	Angklung II [Angklung II]	UZW254	
	Angklung III [Angklung III]	UZW354	
29	Seni Pergerakan Kreatif [Arts of Creative Movement]	UZW155	
30	Drama, Pementasan & Seni Lakon [Drama, Playwright & Acting]	UZW156	
31	Khidmat Masyarakat [Community Services]	UZW191	KHIDMAT KOMUNITI, KEPEMIMPINAN & PENGUCAPAN AWAM
32	Tajwid [Tajwid]	UZW193	
33	Pidato [Elocution]	UZW194	
34	Radio Kampus [Campus Radio]	UZW195	
35	Palapes Darat I [ROTU Army I]	UZW160	KESUKARELAWANAN
	Palapes Darat II [ROTU Army II]	UZW161	
	Palapes Darat III [ROTU Army III]	UZW260	
	Palapes Darat IV [ROTU Army IV]	UZW261	
	Palapes Darat V [ROTU Army V]	UZW360	
	Palapes Darat VI [ROTU Army VI]	UZW361	

36	Kor Siswa Siswi Pertahanan Awam I (Kor SISPA I) [Malaysia Civil Defense Department I]	UZW162	KESUKARELAWANAN
	Kor Siswa Siswi Pertahanan Awam II (Kor SISPA II) [Malaysia Civil Defense Department II]	UZW163	
	Kor Siswa Siswi Pertahanan Awam III (Kor SISPA III) [Malaysia Civil Defense Department III]	UZW262	
	Kor Siswa Siswi Pertahanan Awam IV (Kor SISPA IV) [Malaysia Civil Defense Department IV]	UZW263	
	Kor Siswa Siswi Pertahanan Awam V (Kor SISPA V) [Malaysia Civil Defense Department V]	UZW362	
37	Kursus Persijilan Persatuan Bulan Sabit Merah Malaysia I [The Malaysian Red Crescent Societies Certification Course I]	UZW164	
	Kursus Persijilan Persatuan Bulan Sabit Merah Malaysia II[The Malaysian Red Crescent Societies Certification Course II]	UZW165	
	Kursus Persijilan Persatuan Bulan Sabit Merah Malaysia III [The Malaysian Red Crescent Societies Certification Course III]	UZW264	
38	SUKSIS-I @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- I @ Students Voluntary Police Corp]	UZW166	
	SUKSIS-2 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 2 @ Students Voluntary Police Corp]	UZW167	
	SUKSIS-3 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 3 @ Students Voluntary Police Corp]	UZW266	
	SUKSIS-4 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 4 @ Students Voluntary Police Corp]	UZW267	
	SUKSIS-5 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 5 @ Students Voluntary Police Corp]	UZW366	
	SUKSIS-6 @ Kor Sukarelawan Polis Siswa/Siswa [SVPC- 6 @ Students Voluntary Police Corp]	UZW367	
39	Briged RELA Siswa Siswi (RELASIS) I [Malaysian People's Volunteer corps I]	UZW168	
	Briged RELA Siswa Siswi (RELASIS) II [Malaysian People's Volunteer corps II]	UZW169	
	Briged RELA Siswa Siswi (RELASIS) III [Malaysian People's Volunteer corps III]	UZW268	
	Briged RELA Siswa Siswi (RELASIS) IV [Malaysian People's Volunteer corps IV]	UZW269	
	Briged RELA Siswa Siswi (RELASIS) V [Malaysian People's Volunteer corps V]	UZW368	
	Briged RELA Siswa Siswi (RELASIS) IV [Malaysian People's Volunteer corps IV]	UZW369	

40	Briged Bomba I [Fire And Rescue Briged I]	UZW120	KESUKARELAWANAN
	Briged Bomba II [Fire And Rescue Briged II]	UZW121	
41	Pandu Puteri Siswi I (PPS I) [Girl Guide I (PPS I)]	UZW122	
	Pandu Puteri Siswi II (PPS II) [Girl Guide II (PPS II)]	UZW123	
42	St. John Ambulans Malaysia I [Malaysian St. John Ambulance I]	UZW124	
	St. John Ambulans Malaysia II [Malaysian St. John Ambulance II]	UZW125	
43	Kumpulan Latihan Kelanasiswa Malaysia I [Malaysian University Rover Training Group I]	UZW126	
	Kumpulan Latihan Kelanasiswa Malaysia I [Malaysian University Rover Training Group I]	UZW127	
44	Kumpulan Latihan Kelanasiswa Malaysia I (Laut) [*Malaysian University Rover Training Group I (Sea)]*	UZW128	
	Kumpulan Latihan Kelanasiswa Malaysia II (Laut) [*Malaysian University Rover Training Group II (Sea)]*	UZW129	

Co-Curriculum Courses

UZW101
GOLF

Course Synopsis

The Golf Co-Curriculum course aims to expose the students to the science of the game of golf in both theoretical and technical skills. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of golf, while the technical portion focuses on the practical training i.e. skills in playing golf.

References

1. James, L. and Moore, T., ‘Golf’s Three Noble Truths: The Fine Art of Playing Awake’, New World Library, 2010.
2. Lumb, N., ‘A Beginner’s Guide to Golf’ Smithmark Publishers, 1989.
3. McCord, Gary., ‘Golf For Dummies by’, Wiley Publishing, 2006.
4. Parks, P., ‘How to improve at Golf’, Tunbridge Wells Ticktock, 2007.
5. Smith, A., ‘Andrew’s Essential Guide to Beginners Golf’, Andrew’s Book Company, 2009

UZW102
BASEBALL

Course Synopsis

The Baseball Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the baseball game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of baseball, while the technical portion focuses on the practical training i.e. skills in playing baseball.

References

1. Eckart, E., ‘I Can Play Baseball (Welcome Books)’, Children’s Press (CT), 2002.
2. Freeman, S. H., ‘Basic Baseball Strategy: An Introduction for Coaches and Players’, McGraw-Hill, 2006.
3. Morgan, J., ‘Baseball for Dummies’, For Dummies, 2005.
4. Wallace, J., ‘Baseball: 365 Days’, New York Abrams, 2008.
5. Wark, L., ‘Baseball (Basics for Beginners)’, Kids Can Press, 1994.

UZW103
WOODBALL

Course Synopsis

The Woodball Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the woodball game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of woodball, while the technical portion focuses on the practical training i.e. skills in playing woodball.

References

1. Rules of Beach Woodball (International Woodball Federation), Revolution Publication, 1996.
2. http://www.iwbf-woodball.org/ Woodball Rules
3. http://www.woodball.org/

UZW104
FOOTBALL

Course Synopsis

The Soccer/Football Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the soccer/football game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of soccer/football, while the technical portion focuses on the practical training i.e. skills in playing soccer.

References

1. Carr, D., and Metzler, M.W., ‘Soccer: Mastering the Basics with the Personalized

Sports Instruction System (A Workbook Approach)', Benjamin Cummings, 2000.
2. Drewett, J., 'How to improve at football', Tunbridge Well Ticktock Media, 2005.
3. Lewis, M. and Lalas, A., 'Soccer for Dummies', Inc. LASTUnited States Soccer Federation, 2000.
4. Negoesco, S., 'Soccer', McGraw-Hill, 1992.
5. Wark, L. and Ritchie, S., 'Soccer (Basics for Beginners)', Kids Can Press, 1994.

UZW105
NETBALL

Course Synopsis

The Netball Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the netball game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of netball, while the technical portion focuses on the practical training i.e. skills in playing netball.

References

1. Galsworthy, B., 'Netball: The Skills of the Game', Crowood Press, 1996.
2. Mullan, N., Netball (Successful Sports)', Heinemann Library, 1997.
3. Navin, A., 'Netball: Skills Techniques Tactics (Crowood Sports Guides)', Crowood Press, 2008.
4. Shakespear, W., 'Netball: Steps to Success - 2nd Edition (Steps to Success Activity Series)', Human Kinetics, 2009.
5. Woodlands, J., 'The Netball Handbook', Human Kinetics, 2006.

UZW106
TENNIS

Course Synopsis

The Tennis Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the tennis game. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of tennis, while the technical portion focuses on the practical training i.e. skills in playing tennis.

References

1. Claxton, D., 'Tennis', McGraw-Hill, 1998.
2. Kumar, N., 'Complete Book of Lawn Tennis', New Delhi India Anmol Publication, 2006.
3. Metzler, M., 'Tennis: Mastering the Basics with the Personalized Sports Instruction System (A Workbook Approach)', Benjamin Cummings, 2000.
4. O'Meara, D.J., and Murray, T.J., 'Tennis Unlimited (The Basic Elements of Sports Series)', ICS Books, 1997.
5. Patrick McEnroe, P., 'Tennis for Dummies', For Dummies, 1998.

UZW107
EQUESTRIAN

Course Synopsis

This course aims to train the students in mastering the basic skills of horses handling and management. In addition, it exposes students to the knowledge on horses grooming, installation of equipment and riding techniques. Equestrian sports provide the opportunities for students to interact, foster the spirit of sportsmanship, cooperation, responsibility, and are able to develop positive personality among students.

References

1. Black, D., 'Horses and Owner's Guide', Greenwich Editions, 2001.
2. Draper, J., 'The Ultimate Book of the Horse and Rider' LB, 2000.
3. Foster, C., 'Basic Jumping (Crowood Equestrian Guides)', Crowood Press, 1991.
4. Foster, C., 'Basic Riding (Crowood Equestrian Guides)', Crowood Press, 1991.

5. Ripman, 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.
3. Everett, G., 'Olympic Weightlifting: A Complete Guide for Athletes & Coaches', Catalyst Athletics, 2009.
4. Drechsler, A.J., 'The Weightlifting Encyclopedia: A Guide to World Class Performance', A is A Communications, 1998.
5. Kinetics, H. and Sandler, D., 'Weight Training Fundamentals (Sports Fundamentals Series)', Human Kinetics, 2003.

UZW 130
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.*

UZW131
STUDENT IN-FREE ENTERPRISE (SIFE)

Course Synopsis

Kursus Ko-kurikulum SIFE ini adalah bagi menerapkan pembudayaan keusahawanan dan memupuk semangat kemasyarakatan di kalangan pelajar. Di samping itu, kursus ini juga mempunyai 3 elemen terpenting yang diambil untuk memberi sumbangan kepada masyarakat iaitu keusahawanan, pembelajaran dan persekitaran. Ia dilaksanakan agar para pelajar dapat membantu masyarakat untuk meningkatkan taraf hidup bagi mereka yang memerlukan.

References

1. Kuratko, Donald F (2009). ***Introduction to Entrepreneurship,*** 8th edn, Canada: South Western.
2. Scarborough, Norman M. & Zimmerer, Thomas W (2004). ***Esssentials of Entrepreneurship and Small Business Management***, 4th edn, New Jersey: Pearson Education.
3. AB Aziz Yusof (2003). ***Prinsip Keusahawanan***, Prentice Hall-Pearson Malaysia Education.
4. AB Aziz Yusof (2000). ***Usahawan dan Pengukuhan Jaringan Rakan Niaga, Kedah, Malaysia***: Penerbit UUM.

5. Barringer, Bruce R & Ireland, R. Duane (2008). ***Entrepreneurship: Succesfully Launching New Ventures***, 2nd edn, New Jersey: Prentice Hall.

UZW180
SWIMMING I

Course Synopsis

The swimming co-curriculum course aims to expose the students to the science of swim in the theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology and other related aspects of swimming activities. While technical, this course is more focused on the practical training in terms of swimming skills.

References

1. Brems, M., 'The Fit Swimmer: 120 Workouts & Training Tips', Mc-Graw Hill; 1st Edition, 1984.
2. Keegan, N., 'Swimming (Vintage Contemporaries)', Vintage, 2010.
3. Kumar, N., 'Complete Book of Swimming', New Delhi: India Anmall Publication, 2006.
4. Mason, P., 'How to Improve at Swimming', Tumbrigde Wells Ticktock Media, 2005.
5. Thomas, D., 'Swimming: Steps to Success – 3rd Edition (Steps to Success Sports Series)', Human Kinetics; 3rd Edition, 2005.

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

1. Brems, M., 'The Fit Swimmer: 120 Workouts & Training Tips', Mc-Graw Hill; 1st Edition, 1984.
2. Keegan, N., 'Swimming (Vintage Contemporaries)', Vintage, 2010.
3. Kumar, N., 'Complete Book of Swimming', New Delhi: India Anmall Publication, 2006.
4. Mason, P., 'How to Improve at Swimming', Tumbrigde Wells Ticktock Media, 2005.
5. Thomas, D., 'Swimming: Steps to Success – 3rd Edition (Steps to Success Sports Series)', Human Kinetics; 3rd Edition, 2005.

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.

References

1. Brems, M., 'The Fit Swimmer: 120 Workouts & Training Tips', Mc-Graw Hill; 1st Edition, 1984.
2. Keegan, N., 'Swimming (Vintage Contemporaries)', Vintage, 2010.
3. Kumar, N., 'Complete Book of Swimming', New Delhi: India Anmall Publication, 2006.
4. Mason, P., 'How to Improve at Swimming', Tumbrigde Wells Ticktock Media, 2005.
5. Thomas, D., 'Swimming: Steps to Success – 3rd Edition (Steps to Success Sports Series)', Human Kinetics; 3rd Edition, 2005.

UZW181
LAWN BOWL

Course Synopsis

The lawn bowl co-curriculum courses aims to expose the students to the knowledge of lawn sports in the theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects of lawn sports. While technically, this course is more focused on the practical training (practical) skills in lawn bowls.

References

1. Bell, J., ‘Bowls: Skills, Techniques, Tactics (Crowood Sports Guides)’, Crowood Press; illustrated Edition, 2007.
2. Dobbie, J., ‘Successful Lawn Bowls’, John Wiley & Sons Australia Ltd; Revised Edition, 1987.
3. Marshall, B. L. G., ‘ Lawn Bowls Champions Secrets’, Lulu.com, 2008.
4. Newton, A., ‘Fundamental of Lawn Bowls’, Angus & Robertson; 2nd Edition, 1993.
5. Taylor, T. & Esch, H. L., ‘Lawn Bowling Handbook’, Harold L. Esach, 1948.

UZW182
PETANQUE

Course Synopsis

The petanque co-curriculum courses aims to expose the students to the knowledge of petanque sports in theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other aspects associated with petanque sports. While technically, this course is more focused on practical training (practical) skills in petanque.

References

1. Durbin, M. ‘From Gutterballs to Strikes’, McGraw-Hill; 1st Edition, 1998.
2. Fieux, P., ‘La Petanque de Competition’, Les Presses du Midi, 2002.
3. Fieux, P., ‘Dictionary de la Petanque’, Presses du Midi, 2003.
4. Freeman, G., ‘Petanque: The French Game of Boules’, Hyperion Books, 1987.
5. Philpott, P., ‘The Art of Wrist-Spin Bowling’, Crowood Press, 1997.

UZW183
CANOE

Course Synopsis

The canoeing co-curriculum course aims to expose the students to the sports science of canoeing theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with canoeing. While technically, this course is more focused on the practical training (practical) skills in canoeing.

References

1. Evans, J and Mattos, B., ‘The Ilustrated Handbook of Kayaking, Canoeing and Sailing’, 2007.
2. Harrison, D., ‘Whitewater Kayaking (Canoe & Kayak Techniques)’, Stackpole Books; 1st Edition, 1998.
3. Harrison, D. & Morser, 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.
4. Grice, T., ‘Badminton: Steps to Success – 2nd Edition (Steps to Success Activity Series)’, Human Kinetics; 2nd Edition, 2007.
5. Metzlar, M., ‘Badminton: Mastering the Basic with the Personalized Sports Instructions System’, Boston Allyn & Bacon, 2001.

UZW185
HOCKEY

Course Synopsis

The hockey ho-curriculum course aims to expose the students to the sport science of hockey in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with hockey. While technically, this course is more focused on the practical training (practical) in terms of skills in playing hockey.

References

1. Andershttp://www.amazon.com/Field-Hockey-Steps-Success-Sports/dp/0736068376/ref=pd_cp_b_2, E., ‘Field Hockey: Steps to Success’, Human Kinetics; 2nd edition, 2008.
2. Barth, K. and Nordmann, L., ‘Learning Field Hockey’, Meyer & Meyer, 2007.
3. Complete Book of Hockey (Anupam Sharma) New Delhi India: Anmol Publication 2006.
4. French, L., http://www.amazon.com/How-Play-Hockey-Step--Step/dp/0711704902/ref=sr_1_5?s=books&ie=UTF8&qid=1279557235&sr=1-5‘How to Play Hockey: A Step-By-Step Guide’, Jarrold Sports, Jarrold Publishing, 1993.
5. Mitchell-Taverner, C., http://www.amazon.com/Hockey-Techniques-Tactics-Claire-Mitchell-Taverner/dp/0736054375/ref=sr_1_2?s=books&ie=UTF8&qid=1279557235&sr=1-2‘Field Hockey Techniques & Tactics’, Human Kinetics; 2nd edition, 2004) 6. 7. 8. 9. 10. .

UZW186
SEPAK TAKRAW

Course Synopsis

The sepak takraw co-curriculum course aims to expose the students to the science of sepak takraw sports, theoretically and technically. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects associated with sepak takraw. While technically, this course is more focused on the practical training (practical) in terms of skills in playing sepak takraw.

References

1. Books LLC, ‘Sport in Southeast Asia: Sepak Takraw’, Books LLC, 2010.
2. Dunsmore, S., ‘Sepak Raga (Takraw) The South East Asian Ball Game’, Sarawak Museum, 1983.

3. Lorna Fe P. Lopez, ‘Physical education, health and music (sepak takraw)’, Rex Book Store.Inc, Philippine Copyright, 2000.

UZW187
RUGBY

Course Synopsis

The rugby co-curriculum course aims to expose the students to the knowledge of rugby in terms of theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other aspects associated with rugby. While technically, this course is more focused on the practical training (practical) skills in playing rugby.

References

1. Biscombe, T. and Drewett, P., ‘Rugby: Steps to Success’, Human Kinetics; 2nd edition, 2009.
2. Brown, M., Guthrie, P. and Growden, G., ‘Rugby For Dummies’, For Dummies; 2nd edition, 2007.
3. Richardshttp://www.amazon.com/Game-Hooligans-History-Rugby-Union/dp/1845962559/ref=sr_1_2?s=books&ie=UTF8&qid=1279559168&sr=1-2, H., ‘A Game for Hooligans: The History of Rugby Union’, Mainstream Publishing, 2007.
4. Williams, T. and Bunce, F., ‘Rugby Skills, Tactics and Rules’, Firefly Books; Revised edition, 2008.
5. http://www.irlfunds.org/new zealand/ news.html

UZW188
ARCHERY

Course Synopsis

The archery co-curriculum course aims to expose the students to archery, shooting sports science in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other related aspects concerning shooting. While technically, this course is more focused on the practical training (practical) skills in archery.

References

1. Axford, R., ‘Archery Anatomy: An Introduction to Techniques for Improved Performance’, Souvenir Press, 1996.
2. Engh, D., ‘Archery Fundamentals (Sports Fundamentals Series)’, Human Kinetics; 1st edition, 2004.
3. Haywood, M. and Lewis, C., ‘Archery : Step to Success’, Champaign IL Kinetics, 2006.
4. Ruis, S. and Stevenson, C., ‘Precision Archery’, Human Kinetics; 1st edition, 2003.
5. Sorrells, 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.
3. McAfee, R., ‘Table Tennis: Steps to Success (Steps to Success Activity Series)’, Human Kinetics; 1st edition, 2009.

4. Roetert, P. and Ellenbecker, T., 'Complete Conditioning for Tennis (Complete Conditioning for Sports Series)', Human Kinetics; 2007.
5. Seemiller, D. and Holowchak, M., "Winning Table Tennis: Skills, Drills, and Strategies', Human Kinetics,1996.

UZW171
SENI SILAT CEKAK

Course Synopsis

Martial Arts Fight Co-Curriculum course aims to expose students to the knowledge of martial arts self defence fight in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background back, terminology, self-management and other related to Martial arts. While technically, this course focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

References

1. Malay, 'Silat Cekak Hanafi - Peneraju Warisan Mutlak', 2005.
2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
3. Talib, A., 'Silat: A perspective on the Malay Martial Arts', Amiruddin Dato Seri Paduka Haji Talib Talib, 2009.
4. www.silatcekak.org.my, 2010.
5. www.silatcekakhanafi.org, 2010.

UZW271
SENI SILAT CEKAK II

Course Synopsis

Martial Arts Fight II Co-Curriculum course aims to expose the students the knowledge of martial arts self defence fight in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background back, terminology, self-management and other related to Martial arts. While technically, this course focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

References

1. Malay, 'Silat Cekak Hanafi - Peneraju Warisan Mutlak', 2005.
2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
3. Talib, A., 'Silat: A perspective on the Malay Martial Arts', Amiruddin Dato Seri Paduka Haji Talib Talib, 2009.
4. www.silatcekak.org.my, 2010.
5. www.silatcekakhanafi.org, 2010.

UZW371
SENI SILAT CEKAK III

Course Synopsis

Martial Arts Fight III Co-Curriculum course aims to expose the students the knowledge of martial arts self defense fight in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background back, terminology, self-management and other related to Martial arts. While technically, this course focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

References

1. Malay, 'Silat Cekak Hanafi - Peneraju Warisan Mutlak', 2005.
2. Pengenalan kepada Persatuan Seni Silat Cekak Malaysia, Persatuan Seni Silat Cekak Perlis, Perlis.
3. Talib, A., 'Silat: A perspective on the Malay Martial Arts', Amiruddin Dato Seri Paduka Haji Talib Talib, 2009.
4. www.silatcekak.org.my, 2010.
5. www.silatcekakhanafi.org, 2010.

UZW172
TAEKWON – DO GTF I

Course Synopsis

Taekwon-Do I (GTF) Co-Curriculum course aims to expose the students to the knowledge of martial arts that is Taekwon-Do (GTF) in terms of theoretical and technical skills.
In terms of theory, this course is focused on historical background, terminology, self-management and other related with Taekwon-Do. While technical, this course is more focused on practical training (practical) skills in terms of hands and feet that are being practice from time to time.

References

1. Hi, C., 'Encyclopedia of Taekwon-Do', 1972.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (GTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, 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.
2. Huraisen Masri, A.R., 'Modul Ko-Kurikulum Taekwon-Do (GTF)', UniMAP, 2003.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, 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.
3. Legacy, 'Taekwon-Do VCD, The Complete Pattern Black Belt Series', 2000.
4. Wai Meng, L., 'Taekwon-Do, The Complete Syllabus & Grading Manual', 1992.
5. Whang S.C., Whang, J.C., Lee, D.S., and Saltz, 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 karate-do in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, management of oneself and other associated with the art of karate-do. While technically, this course is focused on practical training (practical) skills in the art of karate-do.

References

1. Frost, B., 'Koei-Kan Karate-Do: Practice and Precept', Frog Books, 1998.
2. Funakoshi, G., 'Karate-Do Kyohan: The Master Text', Kodansha International, 1973.
3. Funakoshi, G., 'Karate-Do Nyumon: The Master Introductory Text', Kodansha International, 1994.
4. Funakoshi, G., 'The Twenty Guiding Principles of Karate: The Spiritual Legacy of the Master', Kodansha International, 2003.
5. Healy, K., 'Karate A Step By Step Guide to Shotokan Karate', New Delhi Health Harmony, 2002

UZW174
FENCING

Course Synopsis

The fencing co-curriculum course aims to expose the students to the science of fencing sports theory and technical skills. In terms of theory, this course is more focused on the history, background, terminology, the skills of defence of oneself and other related aspects of fencing sports. While technically, this course is more focused on skills in practical training (practical).

References

1. Cheris, E., 'Fencing: Step to Success', Champaign IL Human Kinetics, 2002.
2. Evangelista, N., 'The Art and Science of Fencing', McGraw-Hill; 1st Edition, 1999.
3. Evangelista, N., 'The Inner Game of Fencing: Excellence in Form, Technique, Strategy and Spirit', McGraw-Hill; 1st Edition, 2000.
4. Pitman, B., 'Fencing: Techniques of Foil, Epee and Sabre', Crowood Press, 1988.
5. Price, R. G., 'The Ultimate Guide to Weight Training for Fencing (Ultimate Guide to Weight Training…)', Sportsworkout.com; 2nd Edition, 2009

UZW 151
BASIC GAMELAN

Course Synopsis

The Basic Gamelan Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the traditional art of gamelan. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of traditional art of gamelan, while the technical portion focuses on the practical training i.e. the skills in playing gamelan.

References

1. Ahmad, A., 'Lagu- lagu Gamelan : Buku 1', UM, 1997.
2. Nasarudin, M.G., 'Buku Muzik Tradisional Malaysia Edisi Baharu', DBP, 2003.
3. Pickvance, R., 'A Gamelan Manual: A player's guide to the central Javanese gamelan', Jaman Mas Books, 2006.
4. Sutton,R.A., 'Traditions of Gamelan Music in Java: Musical Pluralism and Regional Identity (Cambridge Studies in Ethnomusicology)', Cambridge University Press, 2008.
5. Tenzer, M., 'Balinese Music', Periplus Editions, 1998.

UZW 251
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.
3. Pickvance, R., ‘A Gamelan Manual: A player’s guide to the central Javanese gamelan’, Jaman Mas Books, 2006.
4. Sutton,R.A., ‘Traditions of Gamelan Music in Java: Musical Pluralism and Regional Identity (Cambridge Studies in Ethnomusicology)’, Cambridge University Press, 2008.
5. Tenzer, M., ‘Balinese Music’, Periplus Editions, 1998.

UZW 351
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.
3. Pickvance, R., ‘A Gamelan Manual: A player’s guide to the central Javanese gamelan’, Jaman Mas Books, 2006.
4. Sutton,R.A., ‘Traditions of Gamelan Music in Java: Musical Pluralism and Regional Identity (Cambridge Studies in Ethnomusicology)’, Cambridge University Press, 2008.
5. Tenzer, M., ‘Balinese Music’, Periplus Editions, 1998.

UZW 152
JAZZ GROUP

Course Synopsis

The Jazz Group Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of the jazz music. The theoretical aspect of the course covers the history, background, terminology, self-management and other related aspects of jazz music, while the technical portion focuses on the practical training i.e. skills in playing the jazz music.

References

1. Mause, A.D., ‘How to Play Jazz Guitar: For Group or Individual Instruction (Acorn Basic Lessons, 120360)’, Acorn Music Press, 1978.
2. Meeder, C., ‘Jazz: the Basics’, Routledge, 2007.
3. Mike, C., ‘The Sound of Improvisation: A Basic Method for Individuals, Small Groups, Jazz Band - Book One’, Alfred Publishing Co., 1976.
4. Sutro, D., ‘Jazz for Dummies’, NJ Wiley Pub, 2006.
5. Szwed, J.F., ‘Jazz 101: A Complete Guide to Learning and Loving Jazz’, Hyperion, 2000.

UZW 252
JAZZ GROUP 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.

References

1. Mause, A.D., ‘How to Play Jazz Guitar: For Group or Individual Instruction (Acorn Basic Lessons, 120360)’, Acorn Music Press, 1978.
2. Meeder, C., ‘Jazz: the Basics’, Routledge, 2007.
3. Mike, C., ‘The Sound of Improvisation: A Basic Method for Individuals, Small Groups, Jazz Band - Book One’, Alfred Publishing Co., 1976.
4. Sutro, D., ‘Jazz for Dummies’, NJ Wiley Pub, 2006.
5. Szwed, J.F., ‘Jazz 101: A Complete Guide to Learning and Loving Jazz’, Hyperion, 2000

UZW 352
JAZZ GROUP 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 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.
3. Mike, C., ‘The Sound of Improvisation: A Basic Method for Individuals, Small Groups, Jazz Band - Book One’, Alfred Publishing Co., 1976.
4. Sutro, D., ‘Jazz for Dummies’, NJ Wiley Pub, 2006.
5. Szwed, J.F., ‘Jazz 101: A Complete Guide to Learning and Loving Jazz’, Hyperion, 2000.

UZW 153
BRASS BAND I

Course Synopsis

The Brass Band Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of brass musical instruments. The theoretical aspect of the course covers the history, background, terminology, self-management and other related features of brass band, while the technical portion focuses on practical training of playing the brass musical instruments in group.

References

1. Bailey, W. and Caneva, T., ‘The Complete Marching Band Resource Manual: Techniques and Materials for Teaching, Drill Design, and Music Arranging (Plastic Comb)’, University of Pennsylvania Press, 2003.
2. Brand, V. and Brand, G., ‘Brass Bands in the Twentieth Century’, Egon Publishers Ltd, 1979.
3. Burns, M., ‘Keeping the Beat on the Street: The New Orleans Brass Band Renaissance’, Louisiana State University Press, 2008.
4. Cameron, A., ‘A Whole Brass Band’, Harbour, 1992.
5. Newsome, R., ‘The Modern Brass Band: From The 1930s To The New Millennium’, Ashgate Publishing, 2006.

UZW 253
BRASS BAND II

Course Synopsis

Brass Band II Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of brass musical instruments. The theoretical aspect of the course covers the history, background, terminology, self-management and other related features of brass band, while the technical portion focuses on practical training of playing the brass musical instruments in group.

References

1. Bailey, W. and Caneva, T., 'The Complete Marching Band Resource Manual: Techniques and Materials for Teaching, Drill Design, and Music Arranging (Plastic Comb)', University of Pennsylvania Press, 2003.
2. Brand, V. and Brand, G., 'Brass Bands in the Twentieth Century', Egon Publishers Ltd, 1979.
3. Burns, M., 'Keeping the Beat on the Street: The New Orleans Brass Band Renaissance', Louisiana State University Press, 2008.
4. Cameron, A., 'A Whole Brass Band', Harbour, 1992.
5. Newsome, R., 'The Modern Brass Band: From The 1930s To The New Millennium', Ashgate Publishing, 2006.

UZW 353
BRASS BAND III

Course Synopsis

Brass Band III Co-Curriculum course aims to expose the students to both the theoretical and technical aspects of brass musical instruments. The theoretical aspect of the course covers the history, background, terminology, self-management and other related features of brass band, while the technical portion focuses on practical training of playing the brass musical instruments in group.

References

1. Bailey, W. and Caneva, T., 'The Complete Marching Band Resource Manual: Techniques and Materials for Teaching, Drill Design, and Music Arranging (Plastic Comb)', University of Pennsylvania Press, 2003.
2. Brand, V. and Brand, G., 'Brass Bands in the Twentieth Century', Egon Publishers Ltd, 1979.
3. Burns, M., 'Keeping the Beat on the Street: The New Orleans Brass Band Renaissance', Louisiana State University Press, 2008.
4. Cameron, A., 'A Whole Brass Band', Harbour, 1992.
5. Newsome, R., 'The Modern Brass Band: From The 1930s To The New Millennium', Ashgate Publishing, 2006.

UZW 154
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.
2. 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.

UZW 254
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.
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.

UZW 354
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.
2. 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.

UZW 155
CREATIVE MOVEMENT

Course Synopsis

Creative movement Co-Curriculum course aims to expose the students to the knowledge of arts creative movement in terms of theoretical skills and technical. In terms of theory, this course is more focused on the history, background, terminology, self-management and other related arts creative movement, while technically, this course is more focused practical training (practical) of skills in the art of creative movement.

References

1. Bossler, C., '15 minutes Dance Workout', London Dorling Kindersley, 2009.
2. Kaufmann, K.A., 'Inclusive Creative Movement and Dance', Human Kinetics, 2005.
3. Dora, M.B., 'See what I can do!: A book of creative movement', Prentice-Hall, 1973.
4. H' Doubler, M.N. and Mary Alice Brennan, M.A., 'Dance: A Creative Art Experience', University of Wisconsin Press, 1959.
5. Whitehouse, M.S., 'Authentic Movement (v. 1)', Jessica Kingsley Publishers, 1999.

UZW 156
DRAMA, PLAYWRIGHT AND ACTING

Course Synopsis

The drama, playwright and acting co-curriculum course aims to expose the students to the knowledge of drama, theatre in terms of theoretical and technical skills. In terms of theory, this course is more focused on the history, background, terminology, self-management and other related aspects of drama, theatre and arts. The technical terms, this course is more focused on the practical training (practical) skills in drama, theatre and playwright. .

References

1. Adler, S., 'The Art of Acting', Applause Books, 2000.
2. Bernard, I., 'Film and Television Acting, Second Edition: From stage to screen', Focal Press; 2nd edition, 1997.
3. Comey, J., 'The Art of Film Acting: A Guide For Actors and Directors', http://www.amazon.com/Art-Film-Acting-Actors-Directors/dp/0240805070/ref=pd_sim_b_4Focal Press; 1st edition, 2002.
4. Marsh, M., 'Screen Acting', Nabu Press, 2010.
5. Tucker, P., 'Secret of Screen Acting', New York Routledge, 2003.

UZW191
COMMUNITY SERVICE

Course Synopsis

The community service co-curriculum course fosters community spirit of volunteerism among the students. In addition, the course will also help the process of forming communication network and self-stimulate the intellectual of the community.

References

1. Carole 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.
2. Faizulaswad, 'Modul perlaksana kursus & seminar Motovasi', 2003.
3. Faizulaswad, 'Modul teknik-teknik belajar yang berkesan', 2003.
4. Kamaruddin Hussin, 'Modul konsep kumpulan Dinamika & Peranan Fasilitator dalam mengendalikan latihan kumpulan secara berkesan', 1999.
5. Marlene, G. and Lesser, G., 'Clinical Social Work Practice: An Integrated Approach', Allyn & Bacon; 3rd edition, 2007.

UZW193
TAJWID

Course Synopsis

Kursus ini mencakupi pengenalan kepada asas-asas ilmu tajwid, pengetahuan asas hukum-hukum bacaan Al-Quran yang tepat, dan seterusnya talaqqi dan latihan bacaan Al-Quran secara mujawwad. Pelajar mengetahui asas hukum-hakam tajwid, mengadakan perbincangan dalam sesi muzakarah, menjalani latihan bacaan Al-Quran, mengaplikasi ilmu tajwid dan seterusnya menjalani talaqqi musyafahah dan ujian untuk penilaian.

References

1. Theory and Practice of Tajwid," Encyclopedia of Arabic Language and Linguistics, IV, Leiden, Brill, 2007
2. Surul Shahbudin bin Hassan (2007). Ilmu Tajwid Hafs 'An 'Asim. Kuala Lumpur: Prospecta Printers Sdn. Bhd.
3. Ustaz Mahadi bin Dahlan & Ustaz Azharuddin Sahil (2005). Al-Quran Rasm Uthmani – Bertajwid dan Disertai Makna. Kuala Lumpur: Pustaka Haji Abdul Majid.
4. Haji Abdul Ghani Arifin (2005). Panduan Tajwid & Taranum. Kuala Lumpur: Sarjana Media.

5. Theory and Practice of Tajwid," Encyclopedia of Arabic Language and Linguistics, IV, Leiden, Brill, 2009

UZW194
PIDATO

Course Synopsis

Kursus kokurikulum Pidato mendedahkan kepada para pelajar berkenaan tujuan, teknik dan jenis-jenis pidato. Pidato menekankan kemahiran komunikasi interpersonal, keyakinan diri, motivasi, semangat dan maklumat yang tepat.

References

1. Abdullah Hassan & Ainon Muhammad (1994). Bahasa Melayu untuk maktab Perguruan. Kuala Lumpur: Fajar Bakti.
2. Abdullah Hassan (1994) Tatabahasa Dinamika. Kualala Lumpur: Utusan Publication & Distributors.
3. Abdul Halim A. Karim (1992) Pengucapan Awam. Sungai Petani: Intan.
4. Amat Johari Moain (1989) Sistem Panggilan Dalam Bahasa Melayu: Kuala Lumpur: Dewan Bahasa dan Pustaka. 3
5. Ahmad Kamal Mohamad (1992) Kejayaan Berkomunikasi. Kuala Lumpur: Nurin Enterprise.
6. Awang Sariyan (1980) Kesalahan Umum Penggunaan Bahasa Malaysia. Kuala Lumpur: Dewan Bahasa dan Pustaka.

UZW195
CAMPUS RADIO

Course Synopsis

Radio is one of the most effective medium or disseminator of information, and also more extensive compared to TV. Campus Radio curriculum will expose students to the ethics of broadcasting, editing management, recording, and live events. Campus Radio will help students to communicate better and have better ethical in delivering information to the public.

References:

1. Multimedia dan Teknologi Komunikasi Edisi Kedua (2005)

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 Senjata-senjata 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 Senjata-senjata 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 Senjata-senjata 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 Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
iii) 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 Senjata-senjata 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 Senjata-senjata 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 theoretical and practical rescue, and also first aid during accidents to enhance the understanding, mentally and physically ready to face any emergency issues.

References

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.

2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication, Selangor.
3. Ali Nafiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd.

UZW163
MALAYSIA CIVIL DEFENSE DEPARTMENT II (Kor SISPA II)

Course Synopsis

This course offers basic knowledge and skills of marching, extrication techniques, rope knots, chainsaw safety operation manual, fire science and firefighting equipment, map and compass reading techniques, first aid management and also security during natural disasters. The students will learn the theoretical and practical rescue and first aid during an accident to enhance the understanding and the mental and physical readiness to face any emergency issues.

References

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication Selangor.
3. Ali NAfiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd.

UZW262
MALAYSIA CIVIL DEFENSE DEPARTMENT III (Kor SISPA III)

Course Synopsis

This course offers basic knowledge and skills of marching, National Integrity Plan (NIP), the use of power cutter and hydraulic equipment, 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.
3. Ali Nafiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd.

UZW263
MALAYSIA CIVIL DEFENSE DEPARTMENT IV (Kor SISPA IV)

Course Synopsis

This course offers basic knowledge and skills of marching, 999 Emergency services, disaster and crisis management, training management, team management, leadership courses in the organization (PTB), and etiquette and protocol courses. Students will learn the theory and practice of rescue operations and administration of the Civil Defense Department (JPA) to enhance students' understanding of the organizational structure of JPA.

References

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication, Selangor.
3. Ali NAfiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd

UZW362
MALAYSIA CIVIL DEFENSE DEPARTMENT V (Kor SISPA V)

Course Synopsis

This course offers basic knowledge and skills of marching, management of meetings, characteristics, ethics, leadership, etiquette and protocol, endurance training coaching-skills courses and courses to be officers. The students will learn in theory and practice regarding the management and administration of the Malaysian Civil Defence Department (JPA) team to further enhance the preparedness of the students with the possibility in the future.

References

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar. (1999) Federal Publication, Selangor.
3. Ali Nafiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn. Bhd.

UZW164
THE MALAYSIAN RED CRESCENT SOCIETIES CERTIFICATION COURSE I

Course Synopsis

Certified Red Crescent Co-Curriculum course aims to expose the students to both the theoretical and traditional aspects of Certified Red Crescent. The theoretical aspect of the course covers on historical background, terminology, self-management and other related features of Certification by the Red Crescent, while the technical aspects focuses on practical training in terms of skills for the Certification of the Red Crescent.

References

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN), 1965. 2. DK Publishing, 'ACEP First Aid Manual, 3rd Edition', by, DK Adult, 2010.
2. Handal, K.A., 'The American Red Cross First Aid and Safety Handbook', Little, Brown and Company, 1992.
4. Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
5. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.

UZW165
THE MALAYSIAN RED CRESCENT SOCIETIES CERTIFICATION COURSE II

Course Synopsis

Certification of Red Crescent II Co-Curriculum course aims to expose students in terms of sport science in Certification by the Red Crescent theoretical and technical skills.
In terms of theory, this course is focused on historical background, terminology, self-management and other related Certification by the Red Crescent. While technically, this course is focus on practical training (practical) in terms of skills Certification of the Red Crescent.

References

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN),1965.
2. DK Publishing, 'ACEP First Aid Manual, 3rd Edition', by, DK Adult, 2010.
3. Handal, K.A., 'The American Red Cross First Aid and Safety Handbook', Little, Brown and Company, 1992.
4. Mu'in, H.U., 'Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia', Gramedia Pustaka Utama, 1999.
5. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.

UZW264
THE MALAYSIAN RED CRESCENT SOCIETIES CERTIFICATION COURSE III

Course Synopsis

Certification of Red Crescent III Co-Curriculum course aims to expose students in terms of sport science in Certification by the Red Crescent theoretical and technical skills.
In terms of theory, this course is focused on historical background, terminology, self-management and other related Certification by the Red Crescent. While technically, this course is focus on practical training (practical) in terms of skills Certification of the Red Crescent.

References

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN),1965.
2. DK Publishing, ‘ACEP First Aid Manual, 3rd Edition’, by, DK Adult, 2010.
3. Handal, K.A., ‘The American Red Cross First Aid and Safety Handbook’, Little, Brown and Company, 1992.
4. Mu’in, H.U., ‘Gerakan Palang Merah dan Bulan Sabit Merah Internasional & Perhimpunan Palang Merah Indonesia’, Gramedia Pustaka Utama, 1999.
5. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.

UZW166
SVPC-1 @STUDENTS VOLUNTARY POLICE CORP

Course Synopsis

The Co-Curriculum course is to form personality and student development that is knowledgeable, disciplined and patriotic, and also possesses good level of police knowledge. The training programme and SVPC Corp activities are by following the training programme and activity that was provided and approved by PDRM. A total of 672 hours needed to comply with the training needs and SVPC Corp activity for commission purposes. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/ Management, outdoor activity and academic. The reason the SVPC Corp was established are:

1. 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.
2. To create civic consciousness and good police relationship with society.
3. Nurture physical resilience, mental and strong personality to face challenge.

References

Akta Polis 1967 (Akta 344)
Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
Modul Latihan dari PDRM
Akta Dadah Merbahaya 1952 (Akta 234)
Modul Undang-undang PDRM
Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
Buku Panduan Senjata
Akta Pencegahan Jenayah 1959
Manual Pertolongan Cemas PBSMM
Manual Senjata Kecil PDRM

UZW 167
SVPC-2 @STUDENTS VOLUNTARY POLICE CORP

Course Synopsis

This is the addition from the programme that has been implemented in semester one that intends to shape student personality and development that is knowledgeable, discipline and patriotic, and also possess good police knowledge level. The training programme and SVPC Corp activity is followed by the training programme and activity that has been provided and approved by PDRM. Thus, a total of 112 hours of training are needed to fulfil the training requirement in the aspect of Administration/Management, outdoor activity and academic.

References

Akta Polis 1967 (Akta 344)
Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
Modul Latihan dari PDRM
Akta Dadah Merbahaya 1952 (Akta 234)
Modul Undang-undang PDRM
Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
Buku Panduan Senjata
Akta Pencegahan Jenayah 1959
Manual Pertolongan Cemas PBSMM
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

Akta Polis 1967 (Akta 344)
Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
Modul Latihan dari PDRM
Akta Dadah Merbahaya 1952 (Akta 234)
Modul Undang-undang PDRM
Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
Buku Panduan Senjata
Akta Pencegahan Jenayah 1959
Manual Pertolongan Cemas PBSMM
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

Akta Polis 1967 (Akta 344)
Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
Modul Latihan dari PDRM
Akta Dadah Merbahaya 1952 (Akta 234)
Modul Undang-undang PDRM
Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
Buku Panduan Senjata
Akta Pencegahan Jenayah 1959
Manual Pertolongan Cemas PBSMM
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

Akta Polis 1967 (Akta 344)
Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
Modul Latihan dari PDRM
Akta Dadah Merbahaya 1952 (Akta 234)
Modul Undang-undang PDRM
Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
Buku Panduan Senjata
Akta Pencegahan Jenayah 1959
Manual Pertolongan Cemas
PBSMM
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

Akta Polis 1967 (Akta 344)
Kanun Keseksaan (Akta 574) atau Penal Code (Act 574)
Modul Latihan dari PDRM
Akta Dadah Merbahaya 1952 (Akta 234)
Modul Undang-undang PDRM
Akta Penagih Dadah (Rawatan dan Pemulihan) (Akta 283)
Buku Panduan Senjata
Akta Pencegahan Jenayah 1959
Manual Pertolongan Cemas
PBSMM
Manual Senjata Kecil PDRM


BOMBA