



Universiti
Malaysia
PAHANG
Engineering • Technology • Creativity

UNDERGRADUATE **PROSPECTUS** 2018 - 2019



www.ump.edu.my

   UMPMalaysia





UNDERGRADUATE PROSPECTUS 2018-2019



MyMoheS

EXCELLENT
Ministry of Higher Education
Sar Puting (MyMoheS) 2017



EXCELLENT
Ministry of Higher Education
Institutions Rating System (SETARA) 2017

MyRA®

EXCELLENT
Malaysia Research Assessment
(MYRA) 2016



EXCELLENT
Indeks Akreditasi/Pengiraan Kewangan
Jabatan Audit Negara 2016



CONTENTS

5	Malaysia On Your Doorstep
6	Welcome To Kuantan
7	Foreword From Vice-Chancellor
8	Vision, Mission, Objectives, Philosophy and Core Values
9	Research and Development
10	Welcome To UMP
12	Academic Facilities and Resources
14	Faculties and Programmes
16	Academic Calendar
18	Undergraduates Programme
21	Faculty Of Electrical & Electronics Engineering
37	Faculty Of Computer Systems & Software Engineering
65	Faculty Of Chemical & Natural Resources Engineering
104	Faculty Of Civil Engineering and Earth Resources
126	Faculty Of Mechanical Engineering
166	Faculty Of Industrial Sciences & Technology
213	Faculty Of Manufacturing Engineering
253	Faculty Of Engineering Technology
363	Faculty Of Industrial Management
412	Centre For Modern Languages and Human Sciences (CMLHS)
442	Students Affairs and Alumni Department
445	Co-Curriculum Centre
451	Entry Requirements

MALAYSIA ON YOUR DOORSTEP

Geographically, Malaysia is as diverse as its culture. Malaysia is divided into 13 states and three Federal Territories, separated by the South China Sea with 11 states and two federal territories (Kuala Lumpur and Putrajaya) in Peninsular Malaysia and two states and one federal territory (Labuan) in East Malaysia.

One of Malaysia's key attractions is its extreme contrasts. Towering skyscrapers look down upon wooden houses built on stilts, and five-star hotels sit several meters away from ancient reefs. Cool hideaways are found in the highlands that roll down to warm, sandy beaches, and rich humid mangroves.

Pahang, which covers an area of 35,960 sq. km, is the largest state in Peninsular Malaysia. Pahang has so much to offer the visitor that tourists, both locals and foreign, come back again and again.

Pahang has cool green mountains, rain forests, hill resorts, tranquil fishing villages, long stretches of sandy beaches, mysterious caves, and unspoiled lakes.

With a population of one million, the state, which lies on the East Coast of Peninsular Malaysia, offers the finest beaches such as the famous Cherating Beach, Teluk Chempedak and Beserah Beach. There are also renowned hill resorts of Cameron Highlands, Genting Highlands, and Frasers Hill. If you are looking for an adventure, why not visit parks such as Kenong Rimba, Endau-Rompin and Taman Negara (National Park).





FOREWORD

Locally rooted, internationally acknowledged. As one of Malaysia's Public Universities, UMP offers a wide range of high quality academic programmes in engineering, science, technology and management at the undergraduate and postgraduate levels.

This Undergraduate Prospectus provides you with useful information about the University's background, admission requirement, academic structure, the faculties as well as other services and facilities available at our Pekan and Gambang Campuses.

As a focused university, UMP is committed to developing its niche in chemical engineering, industrial biotechnology and automotive engineering alongside other disciplines namely civil and environmental engineering, electrical and electronics engineering, mechanical engineering, manufacturing engineering, engineering technology, software systems, science and management.

We look forward to welcoming you as part of our diverse and vibrant academic community. Experience the best engineering, science and technology education here in UMP!

Regards,

PROF. DATO' SRI Ts. DR. DAING NASIR IBRAHIM
VICE-CHANCELLOR



WELCOME TO KUANTAN

Kuantan, the capital of the state of Pahang is the gateway to an adventurous, thrilling, and exhilarating tropical holiday.

The town, located on the east of the state of Pahang facing the South China Sea, is fast developing into a modern commercial centre while still retaining its unique age-old charm and heritage. Modern high-rise structures cohabit harmoniously with pre-war shop houses and colonial buildings. The State Mosque, with its distinctive dome and minarets in a pastel shade of sky blue and mint green stands regal in the middle of the town as a prominent landmark to newcomers.

Place of interests are aplenty in and on the outskirts of Kuantan. A visit to Kuantan is not complete without visiting some of these places, which never fail to arouse the curiosity of the visitors.

The Kuantan river cruise takes visitors through the picturesque landscape of a 500-year mangrove forest reserve that spreads along the Kuantan River. The swamp which covers an area of 340 hectares is home to fascinating varieties of estuarine plants, birds, and fish species.



VISION AND MISSION



VISION

A Distinguished Technological University

MISSION

We provide world class education, research and services in an ecosystem of creative and innovative engineering and technology to maximize human potential for societal good.

OBJECTIVES

1. To produce outstanding graduates by providing competitive engineering and technological programmes.
2. To spearhead cutting edge industry-relevant research initiatives.
3. To be a leading service provider to industries and community based on our niche and areas of expertise.
4. To be recognized as an institution for excellent management and work culture.

PHILOSOPHY

Knowledge, a trust bestowed by Allah to man as vicegerent on earth, is to be fully utilized. Emphasis is an applied knowledge guided by Islamic values to develop human capital towards universal harmony and prosperity.

CORE VALUES

1. Strong bond with the Creator.
2. Steadfast in upholding shared principles.
3. Creative in making wise decisions.
4. Resolute in facing challenges.
5. Proactive in taking actions.



RESEARCH AND DEVELOPMENT

UMP research and development are centered around specific niche areas which are:

- Chemical Engineering and Industrial Biotechnology
- Automotive Engineering and Manufacturing

The University focused on applied research and industrial projects to boost the teaching and learning process with four focus groups and six expert groups:



Focus Groups:

- Chemical Engineering
- Biotechnology
- Automotive
- Manufacturing



Experts Groups

- Process Instrumentation and Control
- Innovative Construction
- Information Technology
- Human Sciences
- Environmental
- Advance Material

INTERNATIONAL RECOGNITION AND ACHIEVEMENTS

The University has established links with reputable institutions of higher learning in Germany, United States, Indonesia, and other countries focusing on academic collaboration, student as well as staff exchange and research collaboration. Exhibition of research products by renowned researchers of the University is among the university's main agenda. UMP has received various awards from the International Invention, Innovation, Industrial Design and Technology Exhibition (ITEX), the International Exhibition Ideas-Inventions New Products (IENA 07) in Germany, the Malaysian Invention and Design Society (MINDS) and many more.



WELCOME TO UMP

Universiti Malaysia Pahang (UMP) offers a wide range of practical-based higher education programmes in engineering and technology to produce competent engineers.

The application-oriented curriculum which integrates theory and practice in the concept of a teaching factory emphasizes experiential and action learning that is task-oriented and concentrated on problem-solving.

UMP focuses on applied research and industrial projects to enrich the teaching and learning processes while promoting the commercialization of the research products, thus exposing our students to the latest research and development activities in the industries.

Our campus is fully-equipped with the latest ICT systems, including wireless broadband internet connection to facilitate the university's electronic-based e-Learning and e-Management activities. UMP is committed to the development of human capital and technology to fulfil the needs of industries and contribute to national development.



UMP Campus in Gambang, Kuantan, Pahang

UMP now operates at two separate campuses, one in Gambang of about 30 km away from the state capital Kuantan and another in the designated royal residential town of Pekan. Collectively, the University encompasses a land area of 65,000 square meters, accommodating 5,000 students.

The University is only 2.5 hours away from Kuala Lumpur, via the East Coast Expressway. Being strategically located in the East Coast Industrial Belt of Peninsular Malaysia; which hosts a number of multinational corporations (MNCs) in the chemical, petro-chemical, manufacturing, automotive, and biotechnology industries; UMP students get extensive exposure to the latest development in the fields of engineering and technology.



UMP Campus in Pekan, Pahang

UMP's main campus of 642 acres in Pekan began its operation in July 2009. At present, the campus harbours three engineering faculties, namely the Mechanical, Electrical & Electronics, and Manufacturing Engineering. When construction is fully completed, the Pekan campus can accommodate up to a total of 10,000 students and 2,000 staffs.

ACADEMIC FACILITIES AND RESOURCES

LIBRARY

UMP has two libraries, one at each campus. The library of UMP plays an important role in its service for resources in teaching and learning, research, and consultancy. It is also a catalyst in promoting culture of knowledge sharing at UMP and the community enriching various knowledge repositories.

The library in Pekan campus started its services since March 2010. UMP libraries have a vast collection of books and multimedia for circulation and reference. UMP also subscribes to various repository databases. Physical facilities include discussion rooms, seminar rooms, multimedia rooms, computer laboratories, and audio visual rooms.

The e-Resources of UMP library provide comprehensive access to full-text e-journals available at the library. The portal allows you to search for online databases, e-journals, e-books by title, or browse title by subject.



STUDENT SUPPORT AND SERVICES

UMP in Gambang has been specially refurbished to provide an excellent study and learning environment. The university provides a wide variety of campus facilities for its academic staffs and students. UMP has set up facilities to ensure that students enjoy the convenience of travel and accommodation when undertaking a programme at the university.

UMP is equipped with wireless internet accesses, which allow students and staffs to access the internet from their laptops. Wireless internet access points have been installed at strategic locations on campus to facilitate internet access. UMP students, with notebooks, thus have the advantage of being able to access the internet anywhere, anytime on campus that is within range of the wireless internet access points. This flexibility allows them to access and download material from the web directly to their notebooks at their conveniences.



Accommodation

UMP provides ample accommodation for undergraduate and graduate students in five residential colleges. Room types available are single, twin sharing, and quad sharing. Bus services are provided for students who are living at nearby housing estates for commuting to the campuses.

Inter Campus Transportation

An inter-campus bus services is also provided every 15 minutes in the morning and evening.



Sport Facilities

Sport facilities available in UMP campus are gymnasium, badminton court, squash court, table tennis, tennis court, basketball court, soccer field, volleyball court, and takraw court. The sports complex building has the biggest capacity in Pahang with 12 badminton courts. UMP also has a jogging track with exercise equipment.



Health Services

UMP has a medical centre that gives outpatient services to the students and staffs of UMP. It is situated strategically in the centre of the campus with easy access for all.



FACULTIES AND PROGRAMMES

FACULTY	PROGRAMMES	DURATIONS	SPM	STPM	MATRIC	DIPLOMA / EQUIVALENT	A-LEVEL	NON MALAYSIAN
Faculty of Civil Engineering & Earth Resources	B.Eng. (Hons.) Civil Engineering	4 Years		√	√	√	√	√
	Diploma in Civil Engineering	2 Years 9 Months	√					
Faculty of Chemical & Natural Resources Engineering	B.Eng. (Hons.) Chemical Engineering	4 Years		√	√	√	√	√
	Bachelor of Chemical Engineering Technology with Hons.	4 Years						
	Diploma in Chemical Engineering (Process Plant)	2 Years 9 Months	√					
Faculty of Electrical & Electronics Engineering	B.Eng. (Hons.) Electrical Engineering (Electronics)	4 Years		√	√	√	√	√
	B.Eng. (Hons.) Electrical Engineering (Power System)	4 Years		√	√	√	√	√
	Diploma in Electrical Engineering (Industrial Electronics)	2 Years 9 Months	√					
Faculty of Mechanical Engineering	B.Eng. (Hons.) Mechanical Engineering	4 Years		√	√	√	√	√
	B.Eng. (Hons.) Mechanical Engineering (Automotive)	4 Years		√	√	√	√	√
	B.Eng. (Hons.) Automotive Engineering - (Collaboration Programme with HsKA, Germany)	4 1/2 Years		√	√	√	√	√
	Diploma in Mechanical Engineering	2 Years 9 Months	√					
Faculty of Computer Systems & Software Engineering	Bachelor of Computer Science (Software Engineering) With Honours	4 Years		√	√	√	√	√
	Bachelor of Computer Science (Computer Systems & Networking) with Honours	4 Years		√	√	√	√	√
	Bachelor of Computer Science (Graphics & Multimedia Technology) with Honours	4 Years		√	√	√	√	√
	Diploma in Computer Science	2 Years 9 Months	√					



FACULTIES AND PROGRAMMES

FACULTY	PROGRAMMES	DURATIONS	SPM	STPM	MATRIC	DIPLOMA / EQUIVALENT	A-LEVEL	NON MALAYSIAN
Faculty of Industrial Sciences & Technology	Bachelor of Applied Science (Hons.) Industrial Chemistry	4 Years		√	√	√	√	√
	Bachelor of Applied Science (Hons.) Industrial Biotechnology	4 Years		√	√	√	√	√
	Bachelor of Applied Science (Hons.) Material Technology	4 Years		√	√	√	√	√
Faculty of Manufacturing Engineering	B.Eng. (Hons.) Manufacturing Engineering	4 Years		√	√	√	√	√
	B.Eng. (Hons.) Mechatronics Engineering	4 Years		√	√	√	√	√
	B.Eng. (Hons.) Mechatronics Engineering - (Collaboration Programme with HskA, Germany)	4 1/2 Years		√	√	√	√	√
Faculty of Industrial Management	Bachelor of Project Management with Hons.	4 Years		√	√	√	√	√
	Bachelor of Industrial Technology Management with Honours	4 Years		√	√	√	√	√
	Bachelor of Business Engineering with Hons.	4 Years		√	√	√	√	√
Faculty of Engineering Technology	Bachelor of Occupational Safety and Health with Hons.	4 Years		√	√	√	√	√
	Bachelor of Engineering Technology (Infrastructure Management) with Hons.	4 Years		√	√	√	√	√
	Bachelor of Engineering Technology (Electrical) with Hons.	4 Years		√	√	√	√	√
	Bachelor of Engineering Technology (Manufacturing) with Hons.	4 Years		√	√	√	√	√
	Bachelor of Engineering Technology (Pharmaceutical) with Hons.	4 Years		√	√	√	√	√
	Bachelor of Engineering Technology (Energy & Environmental) with Hons.	4 Years		√	√	√	√	√
	Bachelor of Electrical Engineering Technology (Power & Machine) with Honours	4 Years		√	√	√	√	√
	Bachelor of Electronics Engineering Technology (Computer System) with Honours	4 Years		√	√	√	√	√
	Bachelor of Mechanical Engineering Technology (Petroleum) with Honours	4 Years		√	√	√	√	√

UNIVERSITI MALAYSIA PAHANG ACADEMIC CALENDAR – 2018/2019 ACADEMIC SESSION

PRELIMINARY SHORT SEMESTER (NEW DIPLOMA STUDENTS)

ACTIVITIES/PROGRAM	DURATION	DATE
Registration of New Students (Diploma)	1 day	03 June 2018 (Sunday)
Lecture (AA)	8 weeks	04 June (Monday) to 27 July 2018 (Friday)
Examination	1 week	30 July (Monday) to 03 August 2018 (Friday)

- Students Orientation Week for Diploma Programme will be held on 03 to 04 June 2018 (Sunday & Monday)
- 15 & 16 June 2018 (Friday & Saturday) – Eid al Fitr 1439 H

SEMESTER I

ACTIVITIES/PROGRAM	DURATION	DATE
Registration of New Students (International)	1 day	30 August 2018 (Thursday)
Registration of New Students (Local)	1 day	2 September 2018 (Sunday)
Lecture	8 weeks	12 September 2018 (Wednesday) to 02 November 2018 (Friday)
Semester I Mid Term Break (B)	1 week	03 November 2018 (Saturday) to 11 November 2018 (Sunday)
Lecture	6 weeks	12 November 2018 (Monday) to 21 December 2018 (Friday)
Study Week (C)	1 week	22 December 2018 (Saturday) to 30 December 2018 (Sunday)
Semester I Final Examination	2 weeks	31 December 2018 (Monday) to 13 January 2019 (Sunday)

- Students Induction Week (MINDS) will be held on 02 to 06 September 2018 (Sunday to Thursday)
- 31 August 2018 (Friday) – National Day
- 9 September 2018 (Sunday) - The Yang Di-Pertuan Agong's Birthday
- 11 September 2018 (Tuesday) - Awal Muharram 1440 H / Maal Hijrah
- 6 November 2018 (Tuesday) – Deepavali
- 25 December 2018 (Tuesday) – Christmas

SEMESTER II

ACTIVITIES/PROGRAM	DURATION	DATE
Registration of New Students (February Intake - Semester II 2018/2019)	1 day	25 January 2019 (Friday)
Lecture (D)	7 weeks	28 January 2019 (Monday) to 15 March 2019 (Friday)
Semester II Mid Term Break	1 week	16 March 2019 (Saturday) to 24 March 2019 (Sunday)
Lecture	7 weeks	25 March 2019 (Monday) to 10 May 2019 (Friday)
Study Week	1 week	11 May 2019 (Saturday) to 19 May 2019 (Sunday)
Semester II Final Examination (E)	2 weeks	21 May 2019 (Tuesday) to 2 June 2019 (Sunday)

- Students Induction Week (MINDS) will be held on 25 & 26 January 2019 (Friday & Saturday)
- 5 & 6 February 2019 (Tuesday & Wednesday) – Chinese New Year
- 19 May 2019 (Sunday) – Wesak Day
- 5 & 6 June 2019 (Wednesday & Thursday) - Eid al Fitr 1440 H

SHORT SEMESTER

ACTIVITIES/PROGRAM	DURATION	DATE
Short Semester for Course Registration	2 days	30 May 2019 (Thursday) to 31 May 2019 (Friday)
Lecture	8 weeks	17 June 2019 (Monday) to 9 August 2019 (Friday)
Short Semester Examination	1 week	13 August 2019 (Tuesday) to 16 August 2019 (Friday)

- 11 August 2019 (Sunday) - Eid al Adha 1440 H

2018/2019 PUBLIC HOLIDAY FOR FEDERAL AND STATE OF PAHANG

-	Nuzul Al-Quran 1439 H	2 June 2018 (Saturday)
AA	Eid al-Fitri 1439 H	15 & 16 June 2018 (Friday & Saturday)
A	Eid al- Adha 1439 H	22 August 2018 (Wednesday)
-	National Day	31 August 2018 (Friday)
-	The Yang Di-Pertuan Agong's Birthday	9 September 2018 (Sunday)
-	Awal Muharram 1440 H / Maal Hijrah	11 September 2018 (Tuesday)
-	Malaysia Day	16 September 2018 (Sunday)
-	Birthday of KDYMM Sultan Pahang	24 October 2018 (Wednesday)
B	Deepavali	6 November 2018 (Tuesday)
-	Prophet Muhammad Birthday S.A.W	20 November 2018 (Tuesday)
C	Christmas	25 December 2018 (Tuesday)
-	New Year 2019	1 January 2019 (Tuesday)
D	Chinese New Year	5 & 6 February 2019 (Tuesday & Wednesday)
-	Labour Day	1 May 2019 (Wednesday)
-	Hari Hol Pahang	7 May 2019 (Tuesday)
-	Wesak Day	19 May 2019 (Sunday)
-	Nuzul Al-Quran 1440 H	22 May 2019 (Wednesday)
E	Eid al-Fitri 1440 H	5 & 6 June 2019 (Wednesday & Thursday)

This academic calendar is subject to change (if any) which will be notified by the University.

**NEW AMENDMENTS DATE DIPLOMA STUDENT REGISTRATION ACADEMIC SESSION 2018/2019
UNIVERSITI MALAYSIA PAHANG
ACADEMIC CALENDAR - 2018/2019 ACADEMIC SESSION**

ACTIVITIES / PROGRAM	DURATION	DATE (SEMESTER 0 – ORIGINAL)	NEW DATE (SEMESTER 0 - NEW)
Registration of New Students (Diploma)	1 Day	3 rd June 2018 (Sunday)	23 rd June 2018 (Saturday)
Lecture (AA)	8 Weeks	4 th June (Monday) until 27 th July 2018 (Friday)	25 th June 2018 (Monday) until 17 th August 2018 (Friday)
Examination	1 Week	30 th July (Monday) until 3 rd August 2018 (Friday)	20 th August 2018 (Monday) until 24 th August 2018 (Friday)

Note :

- 22nd August 2018 is a public holiday for Eidul Adha 1439 H
- Students Orientation Week for Diploma Programme will be held on 23rd to 24th June 2018 (Saturday & Sunday)
- The amendment of the date for registration has been approved in *Mesyuarat Senat Kali Ke-142* Bil. 4/ 2018 dated 16th May 2018.



UNDERGRADUATE PROGRAMMES

PEKAN CAMPUS

FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

- B.Eng. (Hons.) Electrical Engineering (Electronics)
- B.Eng. (Hons.) Electrical Engineering (Power Systems)
- Diploma in Electrical Engineering (Industrial Electronics)

FACULTY OF MECHANICAL ENGINEERING

- B.Eng. (Hons.) Mechanical Engineering
- B.Eng. (Hons.) Mechanical Engineering (Automotive)
- B.Eng. (Hons.) Automotive Engineering (Collaboration with HsKA, Germany)
- Diploma in Mechanical Engineering

FACULTY OF MANUFACTURING ENGINEERING

- B.Eng. (Hons.) Manufacturing Engineering
- B.Eng. (Hons.) Mechatronic Engineering
- B.Eng. (Hons.) Mechatronic Engineering (Collaboration with HsKA, Germany)

GAMBANG CAMPUS

FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES

- B.Eng. (Hons.) Civil Engineering
- Diploma in Civil Engineering

FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

- B.Eng. (Hons.) Chemical Engineering
- Bachelor of Chemical Engineering Technology with Hons.
- Diploma in Chemical Engineering (Process Plant)

FACULTY OF COMPUTER SYSTEMS & SOFTWARE ENGINEERING

- Bachelor of Computer Science (Software Engineering) with Honours
- Bachelor of Computer Science (Computer Systems & Networking) with Honours
- Bachelor of Computer Science (Graphics & Multimedia Technology) with Honours
- Diploma in Computer Science

FACULTY OF ENGINEERING TECHNOLOGY

- Bachelor of Occupational Safety and Health with Hons
- Bachelor of Engineering Technology (Electrical) with Honours
- Bachelor of Engineering Technology (Energy & Environmental) with Honours
- Bachelor of Engineering Technology (Infrastructure Management) with Honours
- Bachelor of Engineering Technology (Manufacturing) with Honours
- Bachelor of Engineering Technology (Pharmaceutical) with Honours
- Bachelor of Engineering Technology (Power & Machine) with Honours
- Bachelor of Engineering Technology (Computer System) with Honours
- Bachelor of Engineering Technology (Petroleum) with Honours

FACULTY OF INDUSTRIAL MANAGEMENT

- Bachelor of Project Management with Hons.
- Bachelor of Industrial Technology Management with Hons.
- Bachelor of Business Engineering with Honours (Collaboration programme with HsR, Germany)

FACULTY OF INDUSTRIAL SCIENCES AND TECHNOLOGY

- Bachelor of Applied Science (Hons.) Industrial Chemistry
- Bachelor of Applied Science (Hons.) Industrial Biotechnology
- Bachelor of Applied Science (Hons.) Material Technology

COLLABORATION PROGRAMMES BETWEEN UMP AND LOCAL EDUCATION INSTITUTIONS

ACADEMIC COLLABORATION PROGRAMMES WITH GERMAN-MALAYSIAN INSTITUTE (GMI)

- Bachelor of Engineering Technology (Manufacturing) with Honours
- Bachelor of Engineering Technology (Electrical) with Honours

ACADEMIC COLLABORATION PROGRAMME WITH INTERNATIONAL COLLEGE OF AUTOMOTIVE MALAYSIA (DHU)

- Bachelor of Industrial Technology Management with Hons.

FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING





FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

INTRODUCTION

The Faculty of Electrical & Electronic Engineering was first established on 16th February, 2002 with the aim of producing high-skilled engineers and technical assistants in the field of electrical and electronic engineering. The faculty delivers high quality teaching in diploma and degree level, which combine technology and engineering aspects, targeting both theory and practical skills. The programs offered by the faculty focus on two areas which are electronics and power systems. Besides producing professional and semi-professional engineers in electrical and electronic engineering, the faculty aims to be a leading service provider in its field related to the petrochemical and manufacturing industries.

The faculty's research activities are organized broadly into groups of expertise, in the fields of computer vision, intelligent system, signal processing, applied electronics, robotics, control & instrumentation, optimization, power system and renewable energy. Each group collaborates widely with partner in industrial and research institutions, funded by a wide range of sources. The objective of the research activities is to become the centre of reference for industries in electrical and electronic solutions especially in the east coast region of Peninsular Malaysia.

PROGRAMMES OFFERED

- a) B.Eng (Hons.) Electrical Engineering (Electronics) - BEE
- b) B.Eng (Hons.) Electrical Engineering (Power System) - BEP
- c) B.Eng (Hons.) Electrical Engineering (Electronics) Part-Time - BET/SBEE
- d) Diploma in Electrical Engineering (Industrial Electronics) - DEE

CAREER OPPORTUNITIES

The demand for professionals in the fields of electrical and electronics are increasing by the year.

Graduates will have the opportunity to work in the fields of industrial power systems, consumer and industrial electronics, manufacturing, and education.



FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING
CURRICULUM STRUCTURE
B.ENG (HONS.) ELECTRICAL ENGINEERING (ELECTRONICS)

YEAR SEMESTER	FIRST			SECOND			THIRD			FOURTH			
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	
	BEE1133 CIRCUIT ANALYSIS 1	BEE1143 DIGITAL ANALYSIS 2	BEE1010 INSTRUMENTATION & MEASUREMENTS	BEE112 PROJECT MANAGEMENT	BEE223 MICROPROCESSOR	BEE305 INDUSTRIAL TRAINING (HW)	BEE432 EMBEDDED CONTROLLER TECHNOLOGY	BEE4*3 (ELECTIVE 3)					
	BEE1213 DIGITAL ELECTRONICS	BEE1213 DIGITAL ELECTRONICS	BEE2123 ELECTRICAL MACHINES	BEE2143 SIGNALS & NETWORKS	BEE3113 ELECTROMAGNETIC FIELDS THEORY	BEE3233 ELECTRONICS SYSTEM DESIGN	BEE4413 DIGITAL SIGNAL PROCESSING	BEE4*3 (ELECTIVE 4)					
	BEE1223 LOW VOLTAGE ELECTRICAL INSTALLATION	BEE1223 COMPUTER PROGRAMMING & APPLICATION	BEE2213 ANALOG ELECTRONICS 1	BEE2233 ANALOG ELECTRONIC S 2	BEE3313 PRINCIPLES OF CONTROL SYSTEMS	BEE3333 INTEGRATED ENGINEERING DESIGN	BEE4*3 (ELECTIVE 1)	BEE4*3 (ELECTIVE 5)					
	BUF1113 BASIC PHYSICS	BEE1322 FUNDAMENTAL OF ENGINEERING	BEE1051 TECHNICAL DRAWING	BEE2331 ENGINEERING COMPUTER LITERACY	BEE33413 PRINCIPLES OF COMMUNICATION SYSTEMS	BEE3942 MICROCONTROLLER PROGRAMMING & INTERFACING	BEE4*3 (ELECTIVE 2)	BEE474 ENGINEERING PROJECT 2					
	BUM2133 DIFFERENTIAL EQUATION	BUM2123 APPLIED CALCULUS	BEE1061 MOTOR CONTROL	BEE2332 ENGINEERING ECONOMICS	BEE2423 MULTIMEDIA TECHNOLOGY & APPLICATIONS	BEE4632 MAINTENANCE TECHNOLOGY	BEE4712 ENGINEERING PROJECT 1						
	UHL2412 ENGLISH FOR ACADEMIC COMMUNICATION	UHL2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHS021 SOFTWARE SKILLS 1	BEE2931 BASIC PLC	BEE1611 OSH	BEE4642 ENGINEERS & SOCIETY	UGE2002 TECHNOPRENEURSHIP						
	UHR012 ISLAMIC AND FOREIGN LANGUAGES CIVILIZATION	UHF111 FOREIGN LANGUAGE LEVEL 1	UHL2432 ENGLISH FOR PROFESSIONAL	BEE2971 PRINCIPLE	UHS2021 SOFTWARE SKILLS 2	UHM2022 ETHNIC RELATIONS							
	UBI1*1 CO-CURRICULUM 1	UC2*1 CO-CURRICULUM 2	BUM2313 NUMERICAL METHODS	UHF2*1 FOREIGN LANGUAGE LEVEL 2	BUM2413 APPLIED STATISTICS								
	17	17	17	17	17	17	16	13					
TOTAL CREDIT													
TOTAL CREDIT FOR GRADUATION													



**ELECTIVE COURSES FOR
B.ENG (HONS.) ELECTRICAL ENGINEERING (ELECTRONICS)**

NO.	CODE	COURSE	CREDIT HOUR
1	BEE4163	Alternative Energy	3
2	BEE4223	Power Electronics & Drives Systems	3
3	BEE4233	Data Communications	3
4	BEE4253	Computer Vision Systems	3
5	BEE4333	Intelligent Control	3
6	BEE4343	Process Control	3
7	BEE4363	Distributed Control System	3
8	BEE4373	Robotics	3
9	BEE4423	RF Circuit Design	3
10	BEE4433	Antenna & Propagation	3
11	BEE4523	Industrial Instrumentation	3
12	BEE4553	VLSI Design & Process	3
13	BEE4563	Rapid Digital System Prototyping	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			15



FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING
CURRICULUM STRUCTURE
BENG (HONS.) ELECTRICAL ENGINEERING (POWER SYSTEM)

YEAR SEMESTER	FIRST			SECOND			THIRD			FOURTH	
	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND
	BEE1133 ELECTRONICS INSTRUMENTATION & ANALYSIS 1	BEE1143 CIRCUIT ANALYSIS 2	BEE1313 INSTRUMENTATION & MEASUREMENTS	BEE2112 PROJECT MANAGEMENT	BEE3343 POWER SYSTEMS ANALYSIS	BEE4223 POWER ELECTRONICS & DRIVES SYSTEMS	BEE3305 INDUSTRIAL TRAINING (HW)	BEE4143 POWER SYSTEM PROTECTION & HIGH VOLTAGE	BEE4*3 (ELECTIVE 3)		
	BEE1931 BASIC ELECTRONICS INSTRUMENTATION	BEE1213 DIGITAL ELECTRONICS	BEE2123 ELECTRICAL MACHINES	BEE2133 ELECTRICAL POWER SYSTEMS	BEE3113 ELECTROMAGNETIC FIELDS THEORY	BEE3333 INTEGRATED ENGINEERING DESIGN	BEE4173 POWER SYSTEM OPERATION & CONTROL	BEE4*3 (ELECTIVE 4)			
	BEE1971 LOW VOLTAGE ELECTRICAL INSTALLATION	BEE1233 COMPUTER PROGRAMMING & APPLICATION	BEE2133 ANALOG ELECTRONICS 1	BEE2233 ANALOG ELECTRONICS 2	BEE3313 PRINCIPLES OF CONTROL SYSTEMS	BEE3342 MICROCONTROLLER PROGRAMMING & INTERFACING	BEE4393 ELECTRONIC DRIVES	BEE4*3 (ELECTIVE 5)			
	BUE1113 BASIC PHYSICS	BEE1332 FUNDAMENTAL ENGINEERING	BEE1951 TECHNICAL DRAWING	BEE2331 ENGINEERING COMPUTER LITERACY	BEE3413 PRINCIPLES OF COMMUNICATION SYSTEMS	BEE4632 MAINTENANCE TECHNOLOGY	BEE4*3 (ELECTIVE 2)	BEE474 ENGINEERING PROJECT 2			
	BUM2133 ORDINARY DIFFERENTIAL EQUATION	BUM2123 APPLIED CALCULUS	BEE1961 MOTOR CONTROL	BEE2332 ENGINEERING ECONOMICS	BEE2143 SIGNALS & NETWORKS	BEE4642 ENGINEERS & SOCIETY	BEE4712 ENGINEERING PROJECT 1				
	UHL2412 ENGLISH FOR COMMUNICATIVE FUNCTION	UHL2422 ENGLISH FOR COMMUNICATIVE FUNCTION	UHS1021 SOFT SKILLS 1	BEE2931 BASIC PLC	BEE1611 OSH	BEE4*3 (ELECTIVE 1)	UCSE202 TECHNOLOGICAL REINFORCEMENT				
	UHR1012 ISLAMIC AND ASIAN CIVILIZATIONS	UHF111 FOREIGN LANGUAGE LEVEL 1	UHL2432 ENGLISH FOR PROFESSIONAL COMMUNICATION	BEE2971 FIELD PRINCIPLE	UHS2021 SOFT SKILLS 2	UHM2022 ETHNIC RELATIONS					
	UQB1*1 CO-CURRICULUM 1	UQ2*11 CO-CURRICULUM 2	BUM2313 NUMERICAL METHODS	UHF2*1 FOREIGN LANGUAGE LEVEL 2	BUM2413 APPLIED STATISTICS						
TOTAL CREDIT	17	17	17	17	17	17	17	16	5	16	13
TOTAL CREDIT FOR GRADUATION	136										



**ELECTIVE COURSES FOR
B.ENG (HONS.) ELECTRICAL ENGINEERING (POWER SYSTEM)**

NO.	CODE	COURSE	CREDIT HOUR
1	BEE4113	Electrical Installation Design	3
2	BEE4153	Power Quality	3
3	BEE4163	Alternative Energy	3
4	BEE4273	HVDC & Facts	3
5	BEE4323	Embedded Controller Technology	3
6	BEE4343	Process Control	3
7	BEE4373	Robotics	3
8	BEE4413	Digital Signal Processing	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			15



FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING
CURRICULUM STRUCTURE
DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL ELECTRONICS)

YEAR SEMESTER	PRIMARY (0)	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	UHL141 FOUNDATION ENGLISH	DEE1124 CIRCUITS ANALYSIS 1	DEE2124 CIRCUITS ANALYSIS 2	DEE1133 ANALOGS ELECTRONICS 1	DEE2133 ANALOGS ELECTRONICS 2	DEE113 INDUSTRIAL TRAINING (HW)	
	UOE1011 BRIGED SISWA	DEE2114 INSTRUMENTATION & MEASUREMENTS	DEE1224 DIGITAL ELECTRONICS	DEE3224 MICROPROCESSOR & MICROCONTROLLER FUND.	DEE3113 PRINCIPLES OF CONTROL SYSTEMS		
	DUM1113 BASIC MATHEMATICS	DEE1941 TECHNICAL DRAWING	DEE1213 COMPUTER PROGRAMMING	BASIC ELECTRICAL MACHINES & POWER SYSTEMS	DEE3113 PRINCIPLES OF COMMUNICATION SYSTEMS		
		DEE1971 ELECTRICAL INSTALLATION	DEE2331 BASIC PROGRAMMABLE LOGIC CONTROLLER APPLICATION	DEE3233 INDUSTRIAL AUTOMATIONS	DEE2612 BASIC MAINTENANCE TECHNOLOGY		
		DUF1113 PHYSICS	DEE1941 MICROCONTROLLER APPLICATION	DEE3331 ELECTROPNEUMATIC	DEE3713 MINI PROJECT		
		UHL1422 ENGLISH FOR ACADEMIC COMMUNICATION	DUM1123 CALCULUS	DUM2113 CALCULUS & MATHEMATICS	UHS2021 SOFT SKILLS 2 (HW)		
		UHS1021 SOFT SKILLS 1 (HW)	UHL1422 ENGLISH FOR OCCUPATIONAL COMMUNICATION	UHM2022 ETHNIC RELATIONS	UGE1002 ASAS KEBUDAYAAN KEUSAHAWAAN		
		UHR1012 ISLAMIC AND ASIAN CIVILIZATIONS					
TOTAL CREDIT	6	18	18	19	17	12	
TOTAL CREDIT FOR GRADUATION							90



SYNOPSIS OF FACULTY & PROGRAMME COURSES

BACHELOR PROGRAMME COURSE SYNOPSIS

BEE1133 Circuit Analysis I

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces the basic concepts and engineering methods of DC and AC circuit analysis. The contents include Ohm's Law, Kirchhoff's Law, series and parallel circuits, Mesh and Nodal analysis, Source Transformation Theorems, and responses of basic First Order circuits.

Course Outcomes

- CO1: Describe basic principle of laws, rules and circuit analysis (Direct Current and Alternating Current).
- CO2: Analyze linear circuits.
- CO3: Apply the circuit analysis techniques to solve any given linear electric circuit.
- CO4: Work in a team and communicate effectively

BEE1143 Circuit Analysis II

Credit: 3

Pre-Requisite: BEE1133

Synopsis

This course provides the basic concepts and engineering methods of DC and AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem, Resonant circuit, second order circuit and Balanced 3-phase circuits are also covered.

Course Outcomes

- CO1: Describe the basic principles of circuit theorems (DC and AC)
- CO2: Perform AC steady-state power calculations, power triangle and power factor correction.
- CO3: Analyze variation RLC circuits using frequency domain and resonant parameter.
- CO4: Analyze second order circuits.
- CO5: Apply the theorems and concepts in order to analyze any given linear electric circuit.
- CO6: Work in a team and communicate effectively.

BEE1213 Digital Electronics

Credit: 3

Pre-Requisite: None

Synopsis

This course emphasizes on the fundamental of digital electronics. The students will learn about the number system and logic gates before introducing them to digital IC technology first. Then they are exposed to both combinational logic network and combinational MSI logic. In concurrence with this, the fundamental of sequential logic, flip-flop, counter and shift register will be taught. Finally, the memory devices are introduced.

Course Outcomes

- CO1: Apply various techniques for digital logic simplification
- CO2: Apply basic gates, flip flops and MSI in digital circuit
- CO3: Analyze simple logic system
- CO4: Work in a team and communicate effectively

BEE1223 Computer Programming

Credit: 2

Pre-Requisite: None

Synopsis

This course presents the C programming language for electrical & electronics engineer. The contents emphasis not only on the theoretical knowledge of programming but also the practical implementation in real-life situation. Students will learn basic structure of computer programming .

Course Outcomes

- CO1: Identify the basic principles and concept of computer programming to solve the basic problem with utilization the knowledge of mathematics & sciences (C2)
- CO2: Apply structure programming technique and develop a computer program using high level programming language to solve a problem (C3)
- CO3: Demonstrate a solution using computer programming techniques and tools for solving engineering problems (P)

BEE1313 Instrumentation & Measurement

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces students to the principles of instrumentations and measurements, determination of error that caused by the meters. The students will be exposed to the architecture and the operation of DC and AC meters, oscilloscope, signal generator, sensors and transducers, analysis of DC and AC meters and introduction to signal conditioning.

Course Outcomes

- CO1: Describe the elements of Instrumentation & Measurement System.
- CO2: Solve numerical problems for AC and DC meters.
- CO3: Demonstrate the operation of oscilloscope, signal generator, measuring devices and their applications.
- CO4: Communicate and express idea effectively.

BEE1332 Fundamental of Engineering

Credit: 2

Pre-Requisite: None

Synopsis

This course introduces the fundamental of engineering mathematics including Differentiation, Integration, Complex numbers, Functions, Vectors, Matrix algebra and Statistics.

Course Outcomes

- CO1: Critically analyse and solve some mathematical problems
- CO2: Demonstrate knowledge and understanding of basic differential and integral calculus, complex numbers, vectors and matrices, statistics and differential equations, and be familiar with partial differentiation and some more advanced techniques of calculus

CO3: Show logical thinking in problem solving

BEE1611 Occupational Safety & Health

Credit: 1

Pre-Requisite: None

Synopsis

The course aims to ensure worker safety and health by working with employers to create better working environments. Outreach, education and compliance assistance enable OSHA to play a vital role in preventing on-the-job injuries and illnesses. At the end of this course, students will be able to establish safety and health programs and identifying and correcting workplace hazards.

Course Outcomes

- CO1: Interpret the legislative requirement and its liabilities under OSHA 1994. (C2, PLO6)
- CO2: Conduct the vulnerability analysis of Emergency Response Plan and Interpret the emergency management plan. (C3, PLO6)
- CO3: Explain the principles of good housekeeping. (C3, PLO8)
- CO4: Response to medical emergencies in safer manner. (C3, PLO8)
- CO5: Work effectively as individual, and as a member/leader in a team. (C3, PLO8)

BEE1931 Basic Electronics Instrumentation

Credit: 1

Pre-Requisite: None

Synopsis

This course will introduce students to basic electronics circuit development, implementing basic measurements, use electronics design/simulation software and familiarizing the student with electronic instrumentation such as power supply, function generator, digital multimeter and oscilloscope.

Course Outcomes

- CO1: Recognize and construct basic electronics components
- CO2: Measure basic electronics parameters.
- CO3: Utilize electronics instrumentation and measurement tools.
- CO4: Expose to electronics design/simulation software.

BEE1951 Technical Drawing

Credit: 1

Pre-Requisite: None

Synopsis

This course covers theoretical knowledge and practical-based on doing technical drawing by using mainly AutoCAD software. The course is focusing on the fundamental level of AutoCAD from scratch until the plotting technique. The students will be guided and exposed to technical drawing knowledge as well as electrical, electronic, geometrical and isometric drawing.

Course Outcomes

- CO1: Apply the principles of technical drawing with utilization of knowledge of drawing and modifying techniques in AUTOCAD
- CO2: Construct electrical engineering schematic drawing using AUTOCAD

CO3: Sketch electronic circuit using AutoCAD software.



CO4: Follow basic commands in AutoCAD to draw technical drawing.

CO5: Practice usage of AutoCAD software in other engineering discipline.

BEE1961 Motor Control

Credit: 1

Pre-Requisite: None

Synopsis

This course exposes student to various types of three phase induction motor starting circuit. The students also will learn about the principle of electrical motor and its protection system.

Course Outcomes

- CO1: Explain the function, types and components of electrical motor.
- CO2: Implement motor starter circuit.
- CO3: Construct motor control circuit using suitable tools and accessories.
- CO4: Practice right attitude and safety implementation.

BEE2112 Project Management

Credit: 2

Pre-Requisite: None

Synopsis

This course introduces students to the principles of managing a project systematically. Several approaches and techniques of proper project management are covered in wide range of functions.

Course Outcomes

- CO1: Explain fundamental principles of project management
- CO2: Produce a proper project planning using project management techniques and tools.
- CO3: Develop personal action plan to apply the skill acquired at workplace.

BEE2123 Electrical Machines

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces the fundamental concepts and principles of transformer and various types of electrical machines. It is intended for students to understand fundamental aspects of rotating electrical machines. The first part of the course is a quick review of some electromagnetism fundamental while the following will deal with the transformers and different types of electrical machines.

Course Outcomes

- CO1: Describe the basic principles of selected electrical machines.
- CO2: Analyze the transformer and machines equivalent circuits.
- CO3: Analyze the operating conditions for electrical machines under steady state conditions.
- CO4: Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines.
- CO5: Communicate effectively

BEE2143 Signals & Networks

Credit: 3

Pre-Requisite: BUM2133

Synopsis

This course introduces the students to various signals transformation techniques and its application to electrical circuits. This includes Fourier Series, Fourier Transforms and Laplace Transform. The concept of transfer function is introduced in filter analysis and design with additional two port network techniques.

Course Outcomes

- CO1: Identify various types of signals and systems.
- CO2: Apply Fourier and Laplace transform in solving electrical circuit problems.
- CO3: Analyze filters characteristic and obtain its transfer function.
- CO4: Apply two-port parameters in solving electrical circuit problems

BEE2213 Analog Electronics I

Credit: 3

Pre-Requisite: BEE1133

Synopsis

This course introduces the fundamental of semiconductor devices which are diodes and transistors. It also describes BJT transistors operational characteristic that covers the DC and AC analysis. In addition, the various type

of BJT configuration will be examined and analyzed. Furthermore, the analysis of the amplifier circuit will be extended to its frequency response.

Course Outcomes

- CO1: Describe the characteristic and operation of semiconductor diodes and BJT transistor properties in AC and DC condition
- CO2: Analyze the operating condition of various BJT configuration in AC and DC condition
- CO3: Determine the frequency response of various BJT configuration

BEE2223 Microprocessor

Credit: 3

Pre-Requisite: BEE1213

Synopsis

This course in an introduction to a microprocessor. Students are exposed to the internal architecture of the microprocessor, various instruction sets, and basic hardware design of microprocessor-based

Course Outcomes

- CO1: Explain the architecture of the microprocessor system.
- CO2: Use assembly language to program a microprocessor system.
- CO3: Develop a simple hardware based on 80800 microprocessor
- CO4: Work in a team and communicate effectively

BEE2233 Analog Electronics II

Credit: 3

Pre-Requisite: BEE2213

Synopsis

This course introduces the fundamental of semiconductor devices which are transistors. It also describes Field-Effect Transistor (FET) operational characteristic that covers the DC and AC analysis. Some important devices such as op-amp and active filters are also introduced. Towards the end of this course, students are exposed to the applications of these semiconductor devices. During the laboratory sessions, students are expected to demonstrate and troubleshoot basic semiconductor device circuits.

Course Outcomes

- CO1: Describe the characteristic and operation of FET properties and op-amp in AC and DC condition
- CO2: Identify various FET and op-amp configuration in AC and DC condition
- CO3: Design for various type of FET amplifier configuration and active filters
- CO4: Demonstrate and troubleshoot FET and op-amp circuits

BEE2331 Engineering Computer Literacy

Credit: 1

Pre-Requisite: None

Synopsis

The primary objective of this course is to give students an ability to use computer-based technology in accessing, managing, integrating, evaluating, creating and communicating information. Student will be prepared for the academic development and professional careers.

Course Outcomes

- CO1: Demonstrate fundamental knowledge of Ms Word using DOTX template.
- CO2: Adaptive references using reference manager software
- CO3: Analysing numerical data in a grid format using mathematical operations.
- CO4: Construct presentation using an appropriate multiple application for future development.
- CO5: Produce and publish information using collaborative software.

BEE2332 Engineering Economics

Credit: 2

Pre-Requisite: None

Synopsis

In this course the students will be exposed to the analysis of financial data the concept of interest rates and time value of money. Students will be able to make choices between alternative projects using a set of basic tools and techniques of engineering analysis, including the time value of money, internal rate of return and benefit cost ratio. Furthermore, the student will be able to gather a comprehensive knowledge about advanced engineering economics topics like depreciation of assets, after tax cash flows and inflation. In addition, the student will gain knowledge about important decision making tools like sensitivity analysis, risk analysis and simulation.

Course Outcomes

- CO1: Analyze the cost concept, cost structure and estimation



- CO2: Analyze the money-time relationship with/without taxes consideration
- CO3: Justify the best economical alternative in private and public engineering projects

BEE2931 Basic Programmable Logic Controller

Credit: 1

Pre-Requisite: None

Synopsis

This course covers the fundamental of Programmable Logic Controller (PLC) included input and output component, memory address, wiring diagram, troubleshooting and design of a ladder diagram.

Course Outcomes

- CO1: Describe the basic principle of PLC and PLC functions.
- CO2: Implement PLC Hardware configuration.
- CO3: Execute and practice PLC Programming for specific tasks.
- CO4: Practice right attitude and safety procedure.

BEE2971 IED Engineering Design Principle

Credit: 1

Pre-Requisite: None

Synopsis

This course introduces, educates and develops students to integrate their technical knowledge and generic skills gained in their first two years of study. It consist of knowledge and flow of a design project from sketching, design in necessary software. The translation of the idea into a professional drawing is also covered in this course. In the end of sessions, students are expected to be able to identify the complex problem to be solved, plan the solution for the problem and eventually execute the project. The course includes complex electrical and electronics engineering problems and proposal of design systems, components or processes that integrate core areas. Students will be divided into small groups of three or four members to conduct project that integrates multi-disciplinary areas. Students are required to produce product which considers environmental safety and sustainability.

Course Outcomes

- CO1: Analyze and propose solutions for electrical engineering project complex engineering problem that integrates multi-disciplinary areas
- CO2: Design systems that includes various components or processes from different core areas using modern engineering tools and considering environmental issues for sustainability
- CO3: Work in a team effectively as an individual and in a group
- CO4: Capacity for independent critical thought, rational inquiry and self-directed learning
- CO5: Apply the theory of management principles and engineering to manage project

BEE3113 Electromagnetic Fields Theory

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces students on the importance and the applications of the Electromagnetic Fields Theory in the Electrical Engineering courses. The syllabus covered includes the concepts of electrostatic field, magnetostatic field and electromagnetic field (time varying field).

Course Outcomes

- CO1: Apply the basic concept of vector algebra in coordinate system to solve electric and magnetic fields problems.
- CO2: Solve electric and magnetic fields including stored energies due to specified charge and current distributions.
- CO3: Solve problem involving one dimensional Poisson's and Laplace's equations
- CO4: Differentiate the physical basis of Maxwell's equations in integral and differential forms.
- CO5: Apply the properties of electromagnetic (EM) wave in relation to its propagation.

BEE3123 Power Generation & Operation

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces students to the concept of power system operation and control. Students will be exposed to the concept of power system management to meet load demand at optimal operating cost and various ways in controlling electrical power

Course Outcomes

- CO1: Perform calculation and analyze related to planning of electrical power.
- CO2: Differentiate and analyze control method in power.

- CO3: Model and analyze power system network under steady state conditions using power system software.
- CO4: Work in team and communicate effectively.

BEE3133 Electrical Power Systems

Credit: 3

Pre-Requisite: BEE1133

Synopsis

This course introduces the fundamental of electrical power system which are the overview of power system, generation, transmission lines, distribution, representation of components, basic power system analysis.

Course Outcomes

- CO1: Discuss the roles of each component in Malaysian power system operation and explain the basic concept of electricity tariff and energy efficiency.
- CO2: Analyse the basic design concepts and perform component representation using per-unit system.
- CO3: Derive and apply suitable equations related to parameters, models and performances of power transmission lines.
- CO4: Work in team effectively

BEE3143 Power System Analysis

Credit: 3

Pre-Requisite: BEE3133

Synopsis

This course introduces students to the fundamental concepts of power system analysis which covered the power flow problem analysis, balanced and unbalanced fault analysis and stability evaluation. Students will be exposed to the problems commonly encountered in power system engineering practice, analysis and techniques applied to solve some practical problems in power systems.

Course Outcomes

- CO1: Analyze the power flow equations for an n-bus power system.
- CO2: Analyze balance and unbalance fault analysis.
- CO3: Evaluate the performance of power system stability.
- CO4: Analyze model of power system network under steady state and faults conditions using power system software.
- CO5: Work in team effectively.

BEE3233 Electronic System Design

Credit: 3

Pre-Requisite: BEE1213

Synopsis

In this course, the principles of advanced digital design will be introduced. It builds on logic design principles learned in BEE 1213 and demonstrates how digital design and rapid prototyping can be facilitated by FPGAs and hardware description languages (HDL). Digital design is taught at a higher level of abstraction than BEE1213. It has a lab component involving VHDL and FPGAs.

Course Outcomes

- CO1: Describe the principles of designing finite state machines (FSM).
- CO2: Implement logic circuit using HDL.
- CO3: Design a digital system using combinational & sequential (medium scale Integrated logic) MSI component.
- CO4: Design finite state machines based on electrical & electronics engineering problem.
- CO5: Work in team and communicate effectively.

BEE3313 Principles of Control Systems

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces students to the control system technology, mathematical models of feedback systems. The students will be exposed to transient and steady-state analysis, root locus, frequency response and analysis design of compensator.

Course Outcomes

- CO1: Acquire fundamental concept of control systems.
- CO2: Derive and manipulate mathematical model and transfer function of physical systems.
- CO3: Analyze control system performance in terms of transient, steady-state, and frequency response of a linear time-invariant systems.
- CO4: Design a compensator to meet specifications in frequency domain.

BEE3413 Principles of Communication Systems

Credit: 3

Pre-Requisite: BEE3413



Synopsis

This course introduces theories in the area of communication systems. Topics covered include the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and noise impact on the modulation system. Finally, some emergence of digital communication technologies are presented and compared.

Course Outcomes

- CO1: Describe the basic principle of communication system
- CO2: Analyze and differentiate various types of modulation and demodulation techniques
- CO3: Apply the concepts to practical applications in Telecommunication
- CO4: Work in a team and communicate effectively

BEE3941 Microcontroller Applications

Credit: 1

Pre-Requisite: None

Synopsis

This course exposes students to the Peripheral Interface Circuit programming and hardware configurations. Beginning with understanding on PIC architecture, applying programming software is used to operate hardware function. Several applications such as ADC, PWM, UART for USB and LCD functions are used to get more functioning development for PIC control system.

Course Outcomes

- CO1: Explain the function, types and components of PIC control system.
- CO2: Implement PIC hardware and software.
- CO3: Demonstrate right attitude and safety implementation.
- CO4: Construct PIC circuit using suitable tools and components.

BEE3942 Microcontroller Programming & Interfacing

Credit: 2

Pre-Requisite: None

Synopsis

This course exposes students to the microcontroller in term of programming and hardware configurations. Beginning with understanding of microcontroller architecture, the programming software is applied to configure for several applications such as DI, DO, AI, ADC, and PWM. In addition, students are exposed to the integration between microcontroller and external devices.

Course Outcomes

- CO1: Explain the principles, operation and function of microcontroller system.
- CO2: Create applications program for specific task.
- CO3: Demonstrate interface electronics circuit to control the external devices.
- CO4: Pursue knowledge and look for relevant information.

BEE4113 Electrical Installation Design

Credit: 3

Pre-Requisite: None

Synopsis

This course provides knowledge in electrical installation design especially for commercial buildings. It explores the basic estimation and design procedure based on various codes of practice and standards. Student will be introduced to design a few basic systems in electrical installation such as lighting, protection system, grounding and lightning protection. Students also involve in problem solving and troubleshooting technique when they study on system inspection and testing.

Course Outcomes

- CO1: Design lighting layout and power layout using CADD software.
- CO2: Estimate electrical load for an installation and design single-line diagram for the installation.
- CO3: Explain the protection system used in electrical installation.
- CO4: Design grounding system and lightning protection system.
- CO5: Explain basic inspection and testing for building electrical installations.

BEE4143 Power System Protection & High Voltage

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces students to the concept of power system protection and high voltage engineering. It covers in detail the components of power system protections and relay coordination. The theory of high voltage engineering will also be covered in this course.

Course Outcomes

- CO1: Describe the components of power system protection.
- CO2: Recognize the various type of circuit breaker
- CO3: Design the relay setting of IDMT and distance protection
- CO4: Explain the concepts of high voltage engineering
- CO5: Work in team and communicate effectively.

BEE4153 Power Quality

Credit: 3

Pre-Requisite: None

Synopsis

This course is an introduction to power quality disturbances. It first introduces the concept of power quality and then quantifies the particular power quality disturbances that fall within the wider umbrella of electromagnetic phenomena. It provides a strong foundation for better understanding of the underlying principles of each power quality problem. Students are exposed to power quality solutions, standards, monitoring tools, grounding practices and distributed generation.

Course Outcomes

- CO1: Identify types of power quality disturbances.
- CO2: Classify problems and effects of power quality.
- CO3: Evaluate methods to eliminate power quality interference
- CO4: Assess severity of power quality disturbances.
- CO5: Work in group environment

BEE4163 Alternative Energy

Credit: 3

Pre-Requisite: None

Synopsis

This course introduces students to the alternative energy theories and concepts of some components and energy utilization in electric power system industries. It covers energy conversion, utilization and storage system for renewable technologies such as solar, wind, biomass, fuel cell, wave and etc. This course emphasis on fundamental of photovoltaic (PV) systems such as solar energy potential and solar energy resources, solar cells and its electrical characteristics, PV modules and array, PV modules interconnection, conversion into electrical energy, energy storage, power conditioning and maximum power point tracking (MPPT), inverter control topologies, design and sizing for stand-alone and grid-connected system. It also touches upon the environmental consequences of energy conversion and how alternative energy can reduce pollution and global climate change

Course Outcomes

- CO1 : Present alternative energy scenario
- CO2 : Understanding solar resources and PV system components.
- CO3 : Explain effects of power system to environment.
- CO4 : Design PV System for power generation

BEE4213 Multimedia Technology & Applications

Credit: 3

Pre-Requisite: None

Synopsis

This subject emphasizes on integration of multiple media (text, images, audio, video and animation) using various practices of software application and to develop multimedia system. It introduces how multimedia can be used in various application areas. Issues in multimedia will also be discussed.

Course Outcomes

- CO1: Demonstrate the knowledge of principles in multimedia (text, images, audio, video and animation), compression techniques and multimedia technologies
- CO2: Practice various type of software application in multimedia system.
- CO3: Develop a multimedia system
- CO4: Work effectively as an individual, and as a member/leader in a team.

BEE4213 Power Electronics and Drive Systems

Credit: 3

Pre-Requisite: None

Synopsis

The primary objective of the course is to give students a foundation of knowledge, understanding, analysis and design of power electronics circuits for conversion and control of electrical energy. The course presents concepts, fundamentals analysis tools, practical consideration for design, and a range of power electronics applications. Practical experiments in the laboratory will also be conducted. Students will be exposed to the power converter, PWM switching techniques, DC and induction motor drives.



Course Outcomes

- CO 01: Demonstrate switching characteristics of basic solid state power devices, operating principles, advantages and disadvantages of basic power electronic converter topologies
- CO 02: Analyze power electronic converters using commercially available simulation tools.
- CO 03: Design power electronic converters to meet functional objectives
- CO 04: Work effectively in team

BEE4233 Data Communications

Credit: 3
Pre-Requisite: None

Synopsis

This course emphasizes the importance and the applications of the Data Communications in the Electrical & Electronics Engineering courses. The syllabus covers data communications, communication networks and TCP/IP protocol suite.

Course Outcomes

- CO1: Define data communications generally and describe various types of computer network protocols.
- CO2: Identify data transmission using ISO standard and explain the protocol of data transmission.
- CO3: Determine standard interface for certain data network protocols.

BEE4253 Computer Vision System

Credit: 3
Pre-Requisite: None

Synopsis

This course introduces students to the principles of Computer Vision which includes image formation and low level image processing, theory and techniques for extracting features from images, measuring shape and location, and recognizing and classifying objects. Student will be exposed to design project using image processing software.

Course Outcomes

- CO1: Apply the concept of computer vision and their applications
- CO2: Evaluate various image processing techniques.
- CO3: Develop a simple vision system application using image processing software.

BEE4313 Industrial Control Technology

Credit: 3
Pre-Requisite: None

Synopsis

This course mainly consists of three major modules which are related to industrial control application. Students will gain knowledge in theoretical part of modern control technology as well as application of control system in manufacturing and process control

Course Outcomes

- CO1: Describe types of controller to be used in industrial applications.
- CO2: Derive mathematical modeling of fluid system.
- CO3: Analyze suitable controller for manufacturing and process application.
- CO4: Evaluate the application of analogue and digital Controllers

BEE4323 Embedded Controller Technology

Credit: 3
Pre-Requisite: BEE1213

Synopsis

This course is an introduction to a microcontroller and is designed to give the students a fundamental understanding of the microcontroller-based system. It provides an introduction to the architecture and the design of hardware and software for the Motorola M68HC11. Various instruction sets and internal features are explained. Its applications as a single chip controller are discussed and its interfacing with various I/O devices is demonstrated.

Course Outcomes

- CO1: Explain the architecture of the microcontroller.
- CO2: Develop a firmware using assembly language.
- CO3: Design a simple hardware based on 68HC11 microcontroller.
- CO4: Work in a team and communicate effectively.

BEE4333 Intelligent Control

Credit: 3
Pre-Requisite: None

Synopsis

This course introduces students to the principles of Artificial Intelligence which includes Expert System, Fuzzy Logic, Artificial Neural Networks and Genetic

Algorithms. Project based exercise will also included in order to have a better understanding on the course.

Course Outcomes

- CO1: Explain the concept of intelligent control and their applications.
- CO2: Analyze the Fuzzy Logic and Artificial Neural Networks through case study or project based exercise.
- CO3: Analyze Genetic Algorithms system through case study.

BEE4343 Process Control

Credit: 3
Pre-Requisite: None

Synopsis

The course introduces students to establishing the process performance through methods of specifying and measuring process performance. With basic overview of the control loop and its components, this leads students for designing process control loops, process control improvement and techniques to assist in the process of identifying the potential for improved process control performance in team.

Course Outcomes

- CO1: Describe the basic principles and objectives of control in process industries
- CO2: Apply knowledge of mathematics and sciences to process dynamics and control
- CO3: Analyze and utilize process input output data to form empirical models of a process plant
- CO4: Use and apply modern computational techniques and tools for solving process control problems.
- CO5: Evaluate PID controller performance with different tuning strategies
- CO6: Work effectively in team

BEE4373 Robotics

Credit: 3
Pre-Requisite: None

Synopsis

This course provides an understanding of the principles of operation of automated equipment with particular reference to the industrial robot. This course covers classification and various types of robots and its application, robot kinematics, differential kinematics, robot dynamics, robot path planning and robot sensing.

Course Outcomes

- CO1: Understand robotics and sensing system, its basic components and applications.
- CO2: Determine the velocity of a robot manipulator using Jacobian matrix.
- CO3: Demonstrate the trajectory command that satisfies a set of constrained via points.
- CO4: Apply techniques and skills of robot manipulation through laboratory work.
- CO5: Analyze robot kinematics and dynamic.

BEE4383 Computer Controlled Systems

Credit: 3
Pre-Requisite: None

Synopsis

This course introduces students to the basic design and analysis tools used in practical discrete-time and sampled data control systems as well as to give an exposure of the student to the general area of linear systems theory which appears so very often in all branches of engineering.

Course Outcomes

- CO1: Identify the principles of signal conversion in digital control systems
- CO2: Apply the sampling process, associated theorem and various form of sampling operations
- CO3: Apply the mathematical modeling of the discrete-time system in z-domain
- CO4: Apply various method of discretization of analog transfer function into discrete-time
- CO5: Apply realization of Digital Filters and Controllers
- CO6: Analyze the quantization effect due to truncation and rounding propagating through system's transfer function

BEE4413 Digital Signal Processing

Credit: 3
Pre-Requisite: None

Synopsis

This course introduces students to the fundamental principles of digital signal processing including sampling theorems, z-transform, Linear Time-invariant systems analysis, Discrete-Time Systems structures, Filter design and Discrete Fourier Transform. This course also exposes students to



computational tools (MATLAB) in solving engineering problems related to DSP.

Course Outcomes

- CO1: Describe the DSP fundamental theory and components
- CO2: Apply z-transform for analysis of discrete time system
- CO3: Define various structure of discrete-time system
- CO4: Design various types of FIR and IIR filter based on a set of specification.
- CO5: Apply DFT technique to analyze signal

BEE4523 Industrial Instrumentation

Credit: 3

Pre-Requisite: None

Synopsis

This course presents the process parameters that are applied in most processing industries of pressure, level, temperature and flow for both measurement and control applications. The principles applications of primary sensing elements, final control elements, transducers and transmitters which are used in process industries are discussed. Industrial application for instrumentation and process control is also covered.

Course Outcomes

- CO1: Describe the concept and suitable instrument for process measurement.
- CO2: Implement the equations involving pressure, temperature, level, flow, and final control element for numerical problems.
- CO3: Analyze the information of measurement device and industrial application.
- CO4: Evaluate the operation and installation procedure for selected measurement instruments in a particular industrial situation.
- CO5: Communicate effectively through written communication.

BEE4632 Maintenance Technology

Credit: 2

Pre-Requisite: None

Synopsis

This course exposed the students to various maintenance strategies and technologies available for maintenance practices adoption. The course will introduce the students to the many skills required for the implementation of an effective maintenance program, including workplace environment simulation, i.e. interpersonal skills, desired work-culture, costs appreciation, workplace safety, workplace productivity, etc.

Course Outcomes

- CO1: Describe the importance of maintenance organization in an industry.
- CO2: Classify the types of maintenance strategies available.
- CO3: Distinguish differences of predictive maintenance tools
- CO4: Implement an effective maintenance program for a specific set-up.
- CO5: Execute an effective failure analysis Techniques
- CO6: Assess maintenance performance using Computerized Maintenance Management System (CMMS) software.
- CO7: Demonstrate appropriate and effective action for plant shutdown programme

BEE4642 Engineers & Society

Credit: 2

Pre-Requisite: None

Synopsis

This course is to enable student to gain a deeper understanding of the ethical and laws issues and dilemmas that arise in one or more areas in professional conduct and their responsibility to society. It also intended to develop students to understand the academic responsibility and accountability of a profession in engineering and the organizational activities of professional engineering institutions.

Course Outcomes

- CO1: Understand regulatory and statutory requirements and demonstrate engineer's role towards social, culture, global and environment responsibilities.
- CO2: Explain ethical issues and problems that arise in professional environments and impact to society environmental context
- CO3: Develop the entrepreneurship skill in engineering practice.



DIPLOMA COURSE SYNOPSIS

DEE1124 Circuit Analysis I

Credit Hours: 4
Pre-Requisite : None

Synopsis

This course introduces the basic concepts and engineering methods of DC circuit analysis. The contents include Ohm's Law, Kirchhoff's Law, series and parallel circuits, Mesh and Nodal analysis, Superposition, Source Transformation, Thevenin's and Norton's theorem, and responses of First Order circuits.

Course Outcomes

- CO1: Attribute the basic concepts of electrical quantities by using basic circuit laws (Ohm's law and Kirchhoff's law) and simplification of resistive circuits (C3)
- CO2: Analyze DC circuit problems using circuit theorem, nodal analysis and mesh analysis (C4)
- CO3: Attribute the basic concepts of capacitance and inductance and analyze the characteristic of natural and step response in first order circuits (C4)
- CO4: Construct DC electric circuits to apply the concept of electrical quantities and verify circuit theorems (P3)
- CO5: Demonstrate the role of individual in the team to achieve task completion (A2)

DEE1213 Computer Programming

Credit Hours : 3
Pre-Requisite : None

Synopsis

This course presents the C programming language for electrical and electronic engineer. The contents emphasis not only on the theoretical knowledge of programming but also the practical implementation in real-life situation. Students will learn structured program development, input and output, selection statement, repetitive statement, function, array, pointer and file input and output.

Course Outcomes

- CO1: Identify the basic principles and concept of computer programming to solve the basic problem with utilization the knowledge of mathematics & sciences. (C1)
- CO2: Use and apply structure programming technique using high level programming language. Proposed a solution using computer programming techniques for solving engineering problems. (C3)
- CO3: Proposed a solution using computer programming techniques for solving engineering problems. (C3)
- CO4: Demonstrate a solution using computer programming tools for solving engineering problems. (P3)
- CO5: Work in a team effectively as a leader or team member. (A2)

DEE1224 Digital Electronics

Credit Hours: 4
Pre-Requisite: None

Synopsis

This subject is emphasis on the fundamental of digital electronics. The student is first thought about the number system and logic gates before introducing them to digital IC technology. Then they are exposed to both combinational logic network and combinational MSI logic. In concurrence with this, the fundamental of sequential logic, flip-flop, counter and shift register will be thought. Finally, the memory devices are introduced.

Course Outcomes

- CO1: Apply various techniques for digital logic fundamental and simplification (C3)
- CO2: Analyze sequential logic system in designing counter, shift register and MSI logic circuit. (C4)
- CO3: Explain the digital IC logic families and memory devices. (C2)
- CO4: Construct logic circuit and counter. (P)
- CO5: Work in a team and communicate effectively (A)

DEE1233 Analog Electronics I

Credit Hours : 3
Pre-Requisite : DEE1124

Synopsis

Nowadays, industrial demands especially in semiconductor devices are increasing rapidly. This requires a strong basic knowledge in semiconductors. In this course, an introduction of basic knowledge in analog electronics, that includes knowledge of semiconductors and modern electronic components such as diodes, rectifiers, capacitor as filters, and also BJT are covered. Their basic applications and circuit troubleshooting technique are also discussed in this course to meet the industrial demands.

Course Outcomes

- CO1: Describe the characteristic and operation of semiconductor diodes and BJT transistor properties in AC and DC condition. [C2]
- CO2: Analyze the operating condition of various semiconductor diodes in DC and AC condition. [C4]
- CO3: Analyze the operating condition of various BJT configurations in DC and AC condition. [C4]
- CO4: Construct the semiconductor diode and BJT transistor circuit. [P]
- CO5: Work effectively as an individual and in a group. [A]

DEE1941 Technical Drawing

Credit Hour: 1
Pre-Requisite: None

Synopsis

This course covers theoretical knowledge and practical-based on doing technical drawing by using mainly AutoCAD software. The course is focusing on the fundamental level of AutoCAD from scratch until the plotting technique. The students will be guided and exposed to technical drawing knowledge as well as electrical, electronic, geometrical and isometric drawing.

Course Outcomes

- CO1: Apply the principles of technical drawing with utilization of knowledge of drawing and modifying techniques in AUTOCAD.[C]
- CO2: Construct electrical engineering schematic drawing using AUTOCAD.[C]
- CO3: Sketch electronic circuit using AutoCAD software.[P]
- CO4: Follow basic commands in AutoCAD to draw technical drawing.[P]
- CO5: Practice usage of AutoCAD software in other engineering discipline.[A]

DEE1971 Electrical Installation

Credit Hours: 1
Pre-Requisite: None

Synopsis

This course introduces students to the single phase and three phase wiring and installation. The students will learn about supply system, rules and regulation, wiring system and electrical protection system. They are also will practice in applying trunking and conduits for electrical wiring as well as doing fitting and installation of electrical system devices. Then, they will conduct inspection and testing on their wiring and installation as safety conformation and fulfill the regulations.

Course Outcomes

- CO1: Interpret rules and regulation for electrical wiring comprising of cable selection and load calculation
- CO2: Perform inspection and testing in electrical installation
- CO3: Construct electrical wiring using suitable wiring tools and accessories
- CO4: Apply ethical principles and commit to professional ethics

DEE2124 Circuit Analysis II

Credit Hours : 4
Pre-Requisite: DEE1124

Synopsis

This course provides the basic concepts and engineering methods of AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, second order circuit and Balanced 3-phase circuits are also covered.

Course Outcomes

- CO1: Analyze AC circuit problems using nodal, mesh, Superposition, Source Transformation, Thevenin and Norton (C3)
- CO2: Perform AC steady-state power calculations, power triangle and power factor correction (C4)
- CO3: Analyze variation of RLC circuits (C4)
- CO4: Apply the theorems and concepts in order to analyze any given linear electric circuit (P3)
- CO5: Work in a team and communicate effectively (A2)

DEE2314 Instrumentation & Measurements

Credit Hours: 4
Pre-Requisite: None

Synopsis

This Course introduces students to the principles of instrumentation and measurements, determination of error that caused by the meters. The students will be exposed to the architecture and the operation of DC and AC meters, oscilloscope, signal generator, sensors and transducers, analysis of DC and AC meters and introduction to signal conditioning.

Course Outcomes

- CO1: Explain the elements of Instrumentation & Measurement System



- CO2: Solve numerical problems for AC and DC meters
- CO3: Describe the operation of oscilloscope, sensors and transducers and their applications
- CO4: Demonstrate basic calibration techniques and signal conditioning
- CO5: Differentiate the functional role of individual towards task accomplishment

DEE2612 Basic Maintenance Technology

Credit Hours: 2

Pre-Requisite: None

Synopsis

This course aims to develop maintenance skills and knowledge in two distinct areas:

1. Exposes students to the required technical / engineering discipline knowledge and skills to diagnosis and correct faults across a wide range of equipment.
2. Provides knowledge of different strategic approaches to maintenance and the manufacturing environment and context they are best suited to.

Course Outcomes

- CO1: Identify the difference between the key maintenance strategies and their affects upon manufacturing performance. [C1]
- CO2: Explain the key technologies in modern maintenance practices such as PDM, TPM, RCM, and CBM.[C2]
- CO3: Demonstrate the use of maintenance management software i.e. CMMS and subsequently analyze the data forthcoming from this application.[C3]
- CO4: Demonstrate communication and presentation skills. [C3]
- CO5: Explain the impact of good maintenance job execution negligence to the society. [C2]

DEE2931 Basic Programmable Logic Controller

Credit Hour: 1

Pre-Requisite: None

Synopsis

This course covered the fundamental of Programmable Logic Controller (PLC) including input and output component, memory address, wiring diagram, troubleshooting and design of ladder diagram.

Course Outcomes

- CO1: Explain the principle, operation and function of PLC hardware and software.
- CO2: Construct ladder diagram of a control operating system
- CO3: Simulate ladder diagram of a control operating system using PLC program

DEE3143 Basic Electrical Machines & Power Systems

Credit Hours: 3

Pre-Requisite: None

Synopsis

This course introduces the fundamental of electrical and power system which are the concepts and principles of transformer and various types of electrical machines. It is intended the students to understand fundamental aspects of rotating electrical machines. This course introduces an overview of power system, generation, transmission lines, distribution, representation of components, basic power system analysis.

Course Outcomes

- CO1: Explain the constructions, equivalent circuits and principle operations of transformers and electrical machines– C3
- CO2: Determine the roles of power system components, calculate load factor and demand based on the load profiles and explain the concept of electricity tariff and energy efficiency– C3
- CO3: Analyze the power system component representations using per-unit system– C4
- CO4: Analyze the performance of low voltage switch board for low voltage distribution system operation – P
- CO5: Recognize the importance of electrical machines technology and developments in life-long learning - A

DEE3224 Microprocessor & Microcontroller Fundamentals

Credit Hours: 4

Pre-Requisite: None

Synopsis

This course an introduction to a microprocessor and microcontroller. Students are exposed to the internal architecture of the microprocessor and microcontroller, various instruction sets, and basic hardware design of microprocessor-based.

Course Outcomes

- CO1: Illustrate the architecture of the microprocessor and microcontroller system and its interface [C]
- CO2: Interpret the assembly language instruction sets [C]
- CO3: Develop a program in a microprocessor and microcontroller system by using an assembly language [C]
- CO4: Design and build a simple hardware based on the microprocessor and microcontroller[P]
- CO5: Work in a team and communicate effectively [A]

DEE3233 Analog Electronics II

Credit Hours: 3

Pre-Requisite: DEE1233

Synopsis

This course introduces the fundamental of semiconductor devices which are transistors. It also describes Field-Effect Transistor (FET) operational characteristic that covers the DC and AC analysis. Some important device such as Op-Amp is also introduced. Towards the end of this course, students are exposed to the applications of Op-Amp devices. During the laboratory sessions, students are expected to demonstrate and troubleshoot basic semiconductor device circuits.

Course Outcomes

- CO1: Describe the characteristics of FET and analyze its various configuration in DC and AC condition (C2)
- CO2: Identify and analyze frequency response of FET (C3)
- CO3: Perform analysis on various Op-Amps configuration (C3)
- CO4: Assemble and analyze FET and Op-Amps configuration circuit (P)
- CO5: Work effectively as individual, and as a member/leader in a team (A)

DEE3313 Principles of Control Systems

Credit Hours: 3

Pre-Requisite: None

Synopsis

This course introduces students to the control system technology, mathematical models of feedback systems. The students will be exposed to transient and steady-state analysis, root locus, and frequency response analysis.

Course Outcomes

- CO1: Explain basic components of control systems (C1)
- CO2: Solve mathematical models of simple electrical and mechanical System (C3)
- CO3: Illustrate block diagrams and signal flow graphs of system interconnection (C3)
- CO4: Carry out stability analysis of linear time invariant feedback system. (P2)
- CO5: Work in a team effectively. (A3)

DEE3323 Industrial Automations

Credit Hours: 3

Pre-Requisite: None

Synopsis

This course introduces students to gain a working knowledge of an industrial automation, including its purpose and structure from theory & practical viewpoint. Also introducing in this course are the common industrial control system, automation tools, industrial actuators & controller.

Course Outcomes

- CO1: Explain the automated system, cell, control devices, various types of controller, sensors and robotic automation used in Industrial Automation and industrial safety. (C)
- CO2: Discuss various types of industrial sensors and actuators; and use applied modern tools for solving industrial automation. (C)
- CO3: Discuss and design various types of industrial controllers, communication and network (C)
- CO4: Analyze the robotics systems and functions. (P)
- CO5: Work effectively in a team with consideration of industrial automation installation process and cost justification. (A)

DEE3413 Principles of Communication System

Credit Hours: 3

Pre-Requisite: None

Synopsis

This course introduces the fundamentals of communication systems emphasizing theory, concepts and industrial applications. It discusses the analog and digital modulation techniques that are used nowadays. This includes the amplitude modulation (AM) and frequency modulation (FM). Digital modulation techniques such as pulse code modulation, delta modulation and including shift keying are also discussed. Various sampling, quantization process and line coding are also introduced in this course. The system performance due to the presence of noise is also presented.



Course Outcomes

- CO1: Describe the basic principle of communication system (C1)
- CO2: Demonstrate and solve communication system parameters for various types of modulation and demodulation techniques (C3).
- CO3: Apply the concepts to practical applications in telecommunication (C3)
- CO4: Demonstrate ability to communicate effectively and working as individual or as a team member (C3)

DEE3931 Electro Pneumatic

Credit Hour: 1

Pre-Requisite: None

Synopsis

This subject covers a general introduction to function and operation of pneumatic and electrical equipment used in electropneumatics control including pneumatic supply, input elements, processing elements, control elements and working elements. The course deals with controlling of pneumatic actuators using electrical sensing and switching devices.

Course Outcomes

- CO1: Explain the fundamental and terminology of electropneumatic system
- CO2: Interpret electropneumatics components, symbols, circuit diagrams and motion diagrams
- CO3: Construct pneumatic and electropneumatic system for specific tasks
- CO4: Design electropneumatic circuits for the problem given

DEE3941 Microcontroller Applications

Credit Hours: 1

Pre-Requisite: None

Synopsis

This course exposes students to the microcontroller in term of programming and hardware configurations. Beginning with understanding of microcontroller architecture, the programming software is applied to configure for several applications such as DI, DO, AI, ADC, and PWM. In addition, students are exposed to the integration between microcontroller and external devices.

Course Outcomes

- CO1: Explain the principles, operation and function of microcontroller system
- CO2: Create applications program for specific task
- CO3: Construct interface electronics circuit to control the external devices
- CO4: Develop electronic circuit using microcontroller system

DEE3713 Final Project for Diploma (PSAD)

Credit Hours: 3

Pre-Requisite: None

Synopsis

This course aims to introduce students at entry level to problem solving and innovation in electrical engineering applications.

Course Outcomes

- CO1: Identify and propose solution to engineering problem in particular project with ethically and professionally. (P1)
- CO2: Solve problems related to electrical & electronics engineering projects using appropriate engineering tools. (C3)
- CO3: Demonstrate project in term of oral presentation and technical report. (A3)

DEE3812 Industrial Training (HW)

Credit Hours: 12

Pre-Requisite: All subjects must be completed

Synopsis

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo an industrial training for a certain period that has been agreed by the faculty during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations.

Course Outcomes

- CO1: Show and classify in-depth the industrial structure and organization and to understand roles of typical personnel in that particular industry. (C3)

- CO2: Articulate the knowledge learned in the university and to practice them in problem solving direct or indirect application to any design, planning, production or management. (P)
- CO3: Practice the professionalism and work etiquette that comply to good and responsible engineer. (A)
- CO4: Demonstrate communication and management/leadership skills to lead or manage effectively in a industry environment. (A)
- CO5: Demonstrate the knowledge and ability to search and retrieve information and materials related to the industrial needs. (A)

**FACULTY OF COMPUTER
SYSTEMS & SOFTWARE
ENGINEERING**





FACULTY OF COMPUTER SYSTEMS & SOFTWARE ENGINEERING

INTRODUCTION

Faculty of Computer Systems & Software Engineering was established on 16 February 2002 to produce knowledgeable, high skilled and competitive graduates within the sphere of software engineering, system and computer network. At the beginning, the faculty had two fields which are Software Engineering and Networking.

The faculty has also embarked on research and development activities in the area such as information systems, software engineering, computer systems, communication systems, graphic and multimedia technology to produce technologies that are relevant to the needs of industries. Currently, the faculty has four research groups which are Network & Security, Modeling & Simulation, Data Mining & Knowledge Management and Graphic & Image Processing to support university's focus groups (Manufacturing & Automotive and Chemical & Biotechnology).

The faculty emphasizes on the development and growth of its students' enrolment and graduates. Through high quality teaching (by completing specific quality outcome and generic skills), great laboratories facilities, proper and careful advising and numerous professional activities, our students have opportunity to excel in the classroom and laboratory session. In a personable atmosphere, the students become well prepared in the term of software engineering knowledge and technical skills. Thus, they are ready and confident to begin their professional career or further their studies.

The faculty's current planning is to be an ICT reference centre in Pahang to support the development of East Coast Economic Region (ECER), Malaysia. To realize this, many activities which involve industries and government sectors have been carried out.

PROGRAMMES OFFERED

Bachelor of Computer Science (Software Engineering) with Honours
Bachelor of Computer Science (Computer Systems & Networking) with Honours
Bachelor of Computer Science (Graphics & Multimedia Technology) with Honours
Diploma in Computer Science



CAREER OPPORTUNITIES

Diploma in Computer Science

- Assistant Software Engineer
- Computer Programmer
- Web Application Developer
- Assistant Information Developer
- Computer System Analyst
- Assistant IT Manager
- Technical Consultant
- Computer Application Developer
- Sales & Marketing
- Technopreneur

Bachelor of Computer Science (Software Engineering) with Honours

- Software Quality Engineer
- System Analyst
- System Administrator
- Information System Officer
- Solutions Architect
- System Specialist
- Database Administrator
- Research Engineer
- Consultant
- Marketing Executive
- Technopreneur

Bachelor of Computer Science (Computer Systems & Networking) with Honours

- Computer Systems & Network Engineer
- System Analyst
- Network Administrator
- Information System Officer
- Server Administrator
- Information System Officer
- System & Network Analyst
- Research Engineer
- Consultant
- Marketing Executive
- Technopreneur



Bachelor of Computer Science (Graphics & Multimedia Technology) with Honours

- Computer Graphic & Multimedia Programmer
- System Analyst
- Web Designer
- Information System Officer
- 3D Programmer
- Game Developer
- Multimedia Developer
- Research Engineer
- Consultant
- Marketing Executive
- Technoprenuer

FACULTY OF COMPUTER SYSTEM AND SOFTWARE ENGINEERING
CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEMS & NETWORKING) WITH HONOURS

YEAR	FIRST			SECOND			THIRD			FOURTH	
	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND
SEM	BCN143 STRUCTURED NETWORK PROBLEM SOLVING	BCN1043 COMPUTER ARCHITECTURE AND ORGANIZATION	BCN2193 NETWORK TECHNOLOGIES	BCN2143 ALGORITHMS & COMPLEXITY	BCN2093 NETWORK ANALYSIS AND DESIGN	BCN2013 ARTIFICIAL INTELLIGENCE	BCN2063 DISTRIBUTED & PARALLEL COMPUTING	BCN2043 DATA & NETWORK SECURITY	BCN2023 WEB ENGINEERING	BCN123 ELECTIVE BCN II	BCN083 INDUSTRIAL TRAINING
	BCN1063 OPERATING NETWORK CABLING	BCN1063 DATA COMMUNICATION AND NETWORKING	BCN1093 DATA STRUCTURE & ALGORITHMS	BCN2093 COMPUTER NETWORKS	BCS2143 OBJECT ORIENTED PROGRAMMING	BCN2023 DATA & NETWORK SECURITY	BCS2024 UNDERGRADUATE PROJECT II				
	BCN2053 OPERATING SYSTEMS	BCS1063 SOFTWARE ENGINEERING	BUM1433 DISCRETE STRUCTURE & APPLICATION	BCS1133 SYSTEMS ANALYSIS AND DESIGN	BCN3203 WAN TECHNOLOGY	BCS2243 WEB ENGINEERING					
	BUM1233 DISCRETE MATHEMATICS & APPLICATION	BCN1023 PROGRAMMING TECHNIQUES	UHF1*1 FOREIGN LANGUAGE LEVEL 1	UH**2 ETHNIC UNIVERSITY I	BCN3043 NETWORK SERVICE ADMINISTRATION	BCS3012 UNDERGRADUATE PROJECT I					
	UOB1*1 CO-CURRICULUM 1	UHM2022 ETHNIC RELATIONS	BCI2023 DATABASE SYSTEMS	BUM2413 APPLIED STATISTICS	BCN3033 NETWORK PROGRAMMING	BCN3023 NETWORK MANAGEMENT					
	UHS1021 SOFT SKILLS 1	UHL2412 ENGLISH FOR ACADEMIC COMMUNICATION	UHL2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHL2432 ENGLISH FOR PROFESSIONAL COMMUNICATION	UGS2002 TECHNOPRENEURSHIP	BCN113 ELECTIVE BCN I					
	UHR1012 ISLAMIC AND ASIAN CIVILISATIONS 1	UQ2**1 CO-CURRICULUM II	UHS2021 SOFT SKILLS 2								
	UGS1110 FIRST YEAR SEMINAR	UHL2400 FUNDAMENTALS OF ENGLISH LANGUAGE									
TOTAL CREDIT	16	17	16	16	17	17	16	17	17	16	12
TOTAL CREDIT FOR GRADUATION	127										



FACULTY OF COMPUTER SYSTEM AND SOFTWARE ENGINEERING
CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING) WITH HONOURS

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEM	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	BCI1143 PROBLEM SOLVING	BCI2023 DATABASE SYSTEMS	BCI1093 DATA STRUCTURE & ALGORITHMS	BCN2053 OPERATING SYSTEMS	BCI2313 ALGORITHM & COMPLEXITY	UHF1*1 FOREIGN LANGUAGE LEVEL I	BCS3143 SOFTWARE PROJECT MANAGEMENT	BCC4012 INDUSTRIAL TRAINING
	BCS1033 SOFTWARE ENGINEERING	BCN1053 DATA COMMUNICATION AND NETWORKING	BCS2143 OBJECT ORIENTED PROGRAMMING	BCS2313 ARTIFICIAL INTELLIGENCE	BCS2213 FORMAL METHOD	BCC3012 UNDERGRADUATE PROJECT I	BCS1*23 ELECTIVE BCS III	
	BCN1043 COMPUTER ARCHITECTURE ORGANIZATION	BCI1023 PROGRAMMING TECHNIQUES	BCS2173 HUMAN COMPUTER INTERACTION	BCS2243 WEB ENGINEERING	BCS3233 SOFTWARE TESTING	BCS3233 SOFTWARE ENGINEERING PRACTICES	BCS3024 UNDERGRADUATE PROJECT II	
	BUM1233 DISCRETE MATHS & APPLICATION	BCS1133 SYSTEMS ANALYSIS AND DESIGN	BCS2233 SOFTWARE REQUIREMENT WORKSHOP	BCS2343 SOFTWARE DEVELOPMENT WORKSHOP	BCN2023 DATA & NETWORK SECURITY	BCS3153 SOFTWARE EVOLUTION & MAINTENANCE	BCS3263 SOFTWARE QUALITY ASSURANCE	
	UOB1*1 CO-CURRICULUM 1	BUM1433 DISCRETE STRUCTURE & APPLICATION	UO2*1 CO-CURRICULUM II	BUM2413 APPLIED STATISTICS	UGE2002 TECHNOPRENEURSHIP	BCS1*23 ELECTIVE BCS II	UHF2*1 FOREIGN LANGUAGE LEVEL II	
	UHS1021 SOFT SKILLS 1	UHL2412 ENGLISH FOR ACADEMIC COMMUNICATION	UHL2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHL2432 ENGLISH FOR PROFESSIONAL COMMUNICATION	BCS1*13 ELECTIVE BCS I	UHS2021 SOFT SKILLS 2	UHF*12 ELECTIVE UNIVERSITY II	
	UHR1012 ISLAMIC AND ASIAN CIVILISATIONS 1	UHL2400 FUNDAMENTAL OF ENGLISH LANGUAGE	UHM2022 ENGLISH RELATIONS			UH*12 ELECTIVE UNIVERSITY I		
	UCS1110 FIRST YEAR SEMINAR							
TOTAL CREDIT	16	17	17	17	17	15	16	12
TOTAL CREDIT FOR GRADUATION	127							

FACULTY OF COMPUTER SYSTEM AND SOFTWARE ENGINEERING
 CURRICULUM STRUCTURE
 BACHELOR OF COMPUTER SCIENCE (GRAPHICS & MULTIMEDIA TECHNOLOGY) WITH HONOURS

YEAR	FIRST		SECOND		THIRD		FOURTH			
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND		
COURSES	BC1143 PROBLEM SOLVING	BC1203 DATABASE SYSTEMS	BC1093 DATA STRUCTURE & ALGORITHMS	BUM123 APPLIED CALCULUS	BCS243 WEB ENGINEERING	BCG1*23 ELECTIVE BCG II	BCG3024 UNDERGRADUATE PROJECT II	BCG4012 INDUSTRIAL TRAINING		
	BCS1033 SOFTWARE ENGINEERING	BCN063 OPERATING SYSTEMS	BCM2053 COMPUTER GRAPHIC	BCM3163 COMPUTER GAMES PROGRAMMING 1	BC1213 ALGORITHM & COMPLEXITY	BCM3203 COMPUTER GAMES PROGRAMMING II	BCN2023 DATA & NETWORK SECURITY			
	BCN1043 COMPUTER ARCHITECTURE ANALYSIS & ORGANIZATION	BC11023 PROGRAMMING TECHNIQUES	BCS1133 SYSTEM ANALYSIS & DESIGN	BCM3233 3D MODELING & ANIMATION	BCM3103 VIRTUAL REALITY	UH1***2 ELECTIVE UNIVERSITY I	BC13283 MOBILE APPLICATION DEVELOPMENT			
	BUM1233 DISCRETE MATHEMATICS & APPLICATION	BCM2023 FUNDAMENTAL OF DIGITAL MEDIA DESIGN	BCS2173 HUMAN COMPUTER INTERACTION	BCS2143 OBJECT ORIENTED PROGRAMMING	UH1*1 FOREIGN LANGUAGE LEVEL I	BCG3012 UNDERGRADUATE PROJECT I	BCM3243 PROJECT DEVELOPMENT WORKSHOP			
	UGB1**1 CO-CURRICULUM 1	BUM1433 WEB STRUCTURE & APPLICATION	UHL2422 ENGLISH FOR TECHNICAL COMMUNICATION	BCN1053 COMMUNICATION & NETWORKING	BCG113 ELECTIVE BCG I	UGE2002 TECHNOPRENEURSHIP	BCG1*33 ELECTIVE BCG III			
	UHS1021 SOFT SKILLS 1	UHL2412 ENGLISH FOR ACADEMIC COMMUNICATION	BCS2313 ARTIFICIAL INTELLIGENCE TECHNIQUES	UHL2432 ENGLISH FOR PROFESSIONAL COMMUNICATION	UHS2021 SOFT SKILLS 2	UHM2022 ETHNIC RELATIONS	UHE***2 ELECTIVE UNIVERSITY II			
	UHR1012 ISLAMIC AND ASIAN CIVILISATIONS 1	UHL2400 FUNDAMENTAL OF ENGLISH LANGUAGE	UCO2**1 CO-CURRICULUM II				UHF2**1 FOREIGN LANGUAGE LEVEL II			
	TOTAL CREDIT	16	17	18	17	14	14	19	12	
	TOTAL CREDIT FOR GRADUATION								127	



**ELECTIVE COURSE TO BE OFFER IN
BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEMS &
NETWORKING) WITH HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BCM2023	FUNDAMENTAL OF DIGITAL MEDIA DESIGN	3
2	BCM2063	COMPUTER GRAFICS	3
3	BCS2173	HUMAN COMPUTER INTERACTION	3
Total Credit			9

**ELECTIVE COURSE TO BE OFFER IN
BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING) WITH
HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BCM3163	COMPUTER PROGRAMMING I	3
2	BCM2023	FUNDAMENTAL OF DIGITAL MEDIA DESIGN	3
3	BCN2083	COMPUTER NETWORKS	3
Total Credit			9

**ELECTIVE COURSE TO BE OFFER IN
BACHELOR OF COMPUTER SCIENCE (GRAPHICS) WITH HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BCN2093	NETWORK ANALYSIS AND DESIGN	3
2	BCS2203	FORMAL METHOD	3
3	BCN3133	COMPUTER ETHICS AND POLICIES	3
Total Credit			9



FACULTY OF COMPUTER SYSTEM AND SOFTWARE ENGINEERING
DIPLOMA IN COMPUTER SCIENCE

YEAR	SEMESTER	SHORT SEM		FIRST		SECOND		THIRD	
				FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
			UQB1011 BRIGED SISWA (KOKURIKULUM)	DUM1113 BASIC MATHEMATICS	DCM1013 GRAPHICAL USER INTERFACE	DCI1033 DATA STRUCTURE & ALGORITHM	DUM2413 STATISTIC & PROBABILITY	DCC3112 INDUSTRIAL TRAINING	
			UHL1412 FOUNDATION ENGLISH	DCI063 COMPUTER SYSTEMS & APPLICATION	DUM1213 FUNDAMENTAL DISCRETE STRUCTURE	DC***3 ELECTIVE I	DCI2063 OBJECT ORIENTED PROGRAMMIN G		
			UHS1021 SOFT SKILLS 1	DCI1013 PROBLEM SOLVING	DCI1043 DATABASE SYSTEMS	DCI2073 WEB PROGRAMMING	DC***3 ELECTIVE II		
				DCN1023 DATA COMMUNICATION & NETWORKING	DCI1023 PROGRAMMING TECHNIQUES	DUM1123 CALCULUS	DC***3 ELECTIVE III		
				DCN1013 COMPUTER ARCHITECTURE & ORGANIZATION	DCS1013 SYSTEMS ANALYSIS DESIGN	DCN1033 OPERATING SYSTEMS	DCC3024 FINAL YEAR PROJECT II		
				UHR1012 ISLAMIC AND ASIAN CIVILISATIONS 1	UGE1002 ASAS PEMBUDAYAAN KELSAHAWANAN	DCS3012 FINAL YEAR PROJECT I	UHS2021 SOFT SKILLS 2		
				UHL1422 ENGLISH FOR ACADEMIC SKILLS	UHM2022 HUBUNGAN ETNIK	UHL1432 ENGLISH FOR OCCUPATIONAL COMMUNICATION			
			4	19	19	19	17	12	
			TOTAL CREDIT						
			TOTAL CREDIT FOR GRADUATION						

90



**ELECTIVE COURSE TO BE OFFER IN
DIPLOMA IN COMPUTER SCIENCE**

NO.	CODE	COURSE	CREDIT HOUR
1	DCN2033	DATA & NETWORK SECURITY	3
2	DCI3063	CURRENT ISSUES IN ICT	3
3	DCI2093	WEB APPLICATION DEVELOPMENT	3
4	DCM2063	FUNDAMENTAL OF MULTIMEDIA	3
5	DCM2053	MULTIMEDIA INTERACTIVE DEVELOPMENT	3
Total Credit			15

COURSE SYNOPSIS - DEGREE

BCI1023 PROGRAMMING TECHNIQUES

Credit Hour: 3

Prerequisite: None

Synopsis:

This course discusses on understanding problems and translating them into computer solution techniques using programming language. This course enables students to select appropriate programming techniques, write programming codes from given problems and execute programming codes successfully.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Select appropriate techniques in solving a problem.
- CO2 : Construct and run programs.
- CO3 : Differentiate various techniques in solving a problem.

BCI1093 DATA STRUCTURE & ALGORITHMS

Credit Hour: 3

Prerequisite: BCS1023 Programming Techniques

Synopsis:

This course is designed to expose the students to the data structures and algorithm. It provide theoretical basis in data structures and the application of data structures is based on standard algorithms. Students must also be able to transform the data structure and algorithms problems into the computer programs.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Analyse various types of data structures and algorithms techniques in solving a related problem.
- CO2 : Construct a programme by applying the data structure and algorithms techniques for a related problem.
- CO3 : Use online application to find solution for a related problem.

BCI1143 PROBLEM SOLVING

Credit Hour: 3

Prerequisite: None

Synopsis:

This course expose to the students with the appropriate computing methods in solving problem through programming approach, which consists of programming design, algorithm, pseudo code, flow chart and logic structure.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Produce the solutions for a given problems using appropriate problem solving approach.
- CO2 : Demonstrate logical thinking skills in problem solving.
- CO3 : Demonstrate team working skills through group assignment

BCI2023 DATABASE SYSTEMS

Credit Hour: 3

Prerequisite: None

Synopsis:

The course emphasizes on the importance of data to an organization and how the data should be managed. Database management system (DBMS) will be viewed as a solution to the problems of file processing system. Aspects of relational database design will be covered in details. This includes database development life cycle, database architecture, data models, and normalization process. Several query languages such as relational algebra, Structured Query Language (SQL) and Query by Example (QBE) will be discussed but the emphasis is on SQL. Students will be given a real life problem to design and develop a database application system. In the later part of the course students will be exposed to the latest developments in database architecture.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Distinguish appropriate concepts, principles and applications of database systems.
- CO2 : Manipulate queries using the syntax of Structure Query Language (SQL), Relational Algebra and Query By Example.
- CO3 : Construct innovative solution through the representation of data model using ER and EER Diagrams and normalize database to be implemented in database application system using appropriate DBMS.
- CO4 : Work in group in order to complete the given assessments in specific time frame.

BCI2313 ALGORITHMS AND COMPLEXITY

Credit Hour: 3

Prerequisite: BCS1093 Data Structure & Algorithms

Synopsis:

Algorithm design and analysis is a fundamental and important part of computer science. This course introduces students to advanced techniques for the design and analysis of algorithms and explores a variety of applications.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze various advanced types of algorithms techniques in solving a related problem.

CO2 : Construct a programme by applying the most optimize algorithms techniques for a related problem.

CO3 : Use online application to find solution for a related problem.

BCN1043 COMPUTER ARCHITECTURE & ORGANIZATION

Credit Hour: 3

Prerequisite: None

Synopsis:

This course discusses the component, structure and function of a computer. It expose student with the architecture and organization of a computer. This subject covers on the numbering system and the representation of data, the internal and external computer communication through system buses and Input and Output, computer storage, internal architecture of Central Processing Unit, Logic Gates and Boolean Algebra. Assembly languages are expose to student for better understanding of the computer structure and component as a whole.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Classify and illustrate the internal and external components of a computer structure and its functionality which include CPU, buses, memory and I/O. Explain how the components of a computer architecture and organization contribute to the computer performance.

CO2 : Display and calculate the different machine data level representation, arithmetic and write a assembly language code to show computer inner working behavior.

CO3 : Demonstrate team working element by solving problems of computer architecture and organization in a groups.

BCN1053 DATA COMMUNICATION & NETWORKING

Credit Hour: 3

Prerequisite: None

Synopsis:

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. It uses the OSI and TCP layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate knowledge and understanding of basics computer networking.

CO2 : Construct a simple LAN topologies by applying basic principles of cabling using network simulation.

CO3 : Follow basic configuration of network design using real network devices such as switches and routers.

CO4 : Relate their surrounding environment (i.e. economy, environmental, cultural) with the professional practice in the context of data communication and networking.

BCN2023 DATA & NETWORK SECURITY

Credit Hour: 3

Prerequisite: None

Synopsis:

The course introduces fundamental of data and network security. Course's chapters explain information security concepts, fundamentals, purposes, implementation and discussion in their respective areas related to data and network security. Topics include: foundational concepts in security, principles of secure design, threats and attacks, malware, cryptographic tools, network securing, and intrusion detection and prevention systems.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze theory and principles of information security, types of security threats, potential attacks, data cryptography, firewalls, and intrusion detection systems.

CO2 : Construct attack and defense methods into computer and network environments.

CO3 : Relate their surrounding environment (i.e. economy, environmental, cultural) with the professional practice in the context of data network and security.

BCN2053 OPERATING SYSTEMS

Credit Hour: 3

Prerequisite: None

Synopsis:

This subject introduces the various data and control structures necessary for the design and implementation of modern computer operating systems. Memory, Processor, Concurrent, File, Device and Network Management are explored as the basic of all Operating Systems.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Distinguish the relationship between OS and hardware (User command interface, Memory Management, Processor Management, Concurrent Manager, File Management, Device Management & Network Management).

CO2 : Construct & manipulate OS instructions via Command line and Shell Scripting.

CO3 : Search and manage relevant information from different sources related to the operating systems.

BCS1033 SOFTWARE ENGINEERING

Credit Hour: 3

Prerequisite: None

Synopsis:

This course presents an introduction to software engineering concepts including: software engineering paradigms, requirements specification, design, software verification and validation; software evolution and reliability.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Distinguish the important terminology and activities involves (theoretically and practically) related to foundation concepts of software engineering and software development process.

CO2 : Show technical solutions to a range of audience.

CO3 : Work effectively in group and promote leadership's skills through effective communication ether in written, oral form, presentation and group discussion.

BCS1133 SYSTEM ANALYSIS & DESIGN

Credit Hour: 3

Prerequisite: None

Synopsis:

This course describes the concepts and methods of information system analysis and design, with an emphasis on system analysis methods and tools. The course focuses on the issues and management technique involved in analysis, design and implementation of information system.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Classify and choose the knowledge of systems analysis and design by selecting appropriate software development process and tools to be used.

CO2 : Reproduce a system design from a case study that comply with the stages of systems development life cycle.

CO3 : Work effectively in group and promote leadership's skills through effective communication ether in written, oral form, presentation and group discussion.

BCS2143 OBJECT ORIENTED PROGRAMMING

Credit Hour: 3

Prerequisite: BCS1023 Programming Techniques

Synopsis:

This course provides an introduction to the concepts of object orientation and object-oriented programming (OOP) techniques using any object-oriented programming language such as JAVA. It will emphasize on the use of OOP characteristic that expose students to Unified Modelling Language (UML) design, class and object, inheritance, polymorphism, exception handling and Graphical User Interface (GUI) and event driven programming.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate the ability of proposing solution based on object-oriented approach to the given problem.

CO2 : Able to translate or implement from OOAD to working application/system.

CO3 : Explain, explore and manipulate the proposes solution to build the application.

BCS2313 ARTIFICIAL INTELLIGENCE

Credit Hour: 3

Prerequisite: None

Synopsis:

This course introduces student to the theory and practice of the Artificial Intelligence (AI). Student are expose to the main artificial intelligence topics including the fundamental issues, search strategies, knowledge representation and reasoning, advanced search, agents, machine learning and robotics. Practical examples of how artificial intelligence is applied to commercial, scientific and consumer applications will be covered.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Distinguish the artificial intelligence concepts and methodologies in computer science.

CO2 : Construct an intelligence system prototype/module.

CO3 : Demonstrate critical thinking ideas in artificial intelligence knowledge and problem-solving.

CO4 : Initiate AI knowledge to the final year/capstone projects and future problems.

BCI3283 MOBILE APPLICATION DEVELOPMENT

Credit Hour: 3

Prerequisite: BCI1023, BCS2143

Synopsis:

This course is concerned with the development of applications on mobile and wireless computing platforms. It explores mobile application development aspects with emphasis on the relationship between theoretical and its practical application using cases and real examples of mobile applications. Emphasis is placed on the process, tools and frameworks required to develop applications for current and emerging mobile computing devices.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze the limitations and challenges in mobile applications.

CO2 : Construct a mobile application using selected software development environment.

CO3 : Demonstrate ability to recognize and respect group member's attitude, act and belief.

BCI3913 STRUCTURED QUERY LANGUAGE

Credit Hour: 3

Prerequisite: BCI2023 DATABASE SYSTEMS

Synopsis:

Understanding the basic concepts of relational databases ensure refined code by developers. This course helps the participants to write sub queries, combine multiple queries into a single query using SET operators and report aggregated data using group functions. Controlling privileges at the object and system level are also dealt with in detail.

This course covers creating indexes and constraints, and altering existing schema objects. Additionally, participants learn how to create and query external tables. In order to query and manipulate data within the database, to use the dictionary views to retrieve metadata and create reports about their schema objects, participants get to understand the advanced features of SQL. Some of the date-time functions available in the Oracle Database are also covered. This course also discusses how to use the regular expression support in SQL.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Distinguish the concepts and principles of Structured Query Language (SQL).

CO2 : Construct Structured Query Language (SQL) for data definition, manipulation and control.

SO3 : Apply SQL formatting style in solving data management using SQL.

BCN3083 z/OS FOUNDATION

Credit Hour: 3

Prerequisite: None

Synopsis:

This course provides students of information systems technology with the background knowledge and skills necessary to begin using the basic facilities of a mainframe computer. Explore the reasons why public and private enterprises throughout the world rely on the mainframe as the foundation of large-scale computing and discuss the types of workloads that are commonly associated with the mainframe, such as batch jobs and online or interactive transactions, and the unique manner in which this work is processed by a widely used mainframe operating system—z/OS. Students will also be thought the Job Control Language (JCL) and mainframe system programming using COBOL.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Distinguish ways in which the mainframe of today challenges the traditional thinking about centralized computing versus distributed computing.

CO2 : Construct jobs in mainframe using Job Control Language to perform various tasks.

CO3 : Organize new idea and able for autonomous learning in performing system programming and accessing flat-files using COBOL programming language.

BCN3113 ETHICAL HACKING

Credit Hour: 3

Prerequisite: BCN2023 DATA & NETWORK SECURITY

Synopsis:

This course will immerse the student into an interactive environment where they will be shown how to scan, test, hack and secure their own systems. The lab intensive environment gives each student in-depth knowledge and practical experience with the current essential security systems. Students will begin by understanding how perimeter defenses work and then be lead into scanning and attacking their own networks, no real network is harmed. Students then learn how intruders escalate privileges and what steps can be taken to secure a system.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Inquire and analyze theory and principles of information security, element of security, hacking cycle, hacktivism and ethical hacking.

CO2 : Construct attack and defense methods into computer and network environments.

CO3 : Relate their surrounding environment (i.e. economy, environmental, cultural) with the professional practice by demonstrating usage of data and ethical hacking methods and tools.

BCN3193 COMPUTER FORENSIC & INVESTIGATION

Credit Hour: 3

Prerequisite: None

Synopsis:

The primary focus of this course is to give students instruction in the principle knowledge of Computer Forensics, and the need to be observed by the computer forensic investigator in order to successfully identify, secure, analyze and present digital evidence. This course will enable students to relate the principle and practice of computer forensic, which builds on that foundation simultaneously enhance the skills of the IT security professional.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Illustrate the nature of computer crime, digital evidence, computer forensic principle, network forensics and the role of computer forensics expert to analyze risk to your system and implement a workable security policies to protect information assets.

CO2 : Analyze and conduct a computer forensics examination and report the findings that are suitable for use by counsel bot in civil and criminal matters.

CO3 : Organize new idea and able for autonomous learning.

BCS3413 INTRODUCTION TO INTEGRATED BUSINESS PROCESS WITH SAP

Credit Hour: 3

Prerequisite: None

Synopsis:

This course exposes the student to integrated business processes with ERP Systems and the key processes supported by modern ERP systems. This course is use as both reference guide and a conceptual resource for students that are taking ERP-focused courses using SAP. It examines in depth the core concepts applicable to all ERP environments, and it explains how those concepts can be utilized to implement business processes in SAP systems.

Integrated Business Processes with ERP Systems approaches topics using an integrated process perspective of the firm. Each process is discussed within the context of its execution across functional areas in the company, with special emphasis on the role of data in managing the coordination between activities and groups. Students will gain a deep appreciation for the role of enterprise

systems in efficiently managing processes from multiple functional perspectives.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Classify and distinguish between each business processes in their fields and how they compliments each other in the term of information sharing and exchange.

CO2 : Navigate and organize all given business processes information into the current ERP system.

CO3 : Propose and present advice and implementation for an enterprise by using Enterprise Resource Planning concepts.

BCS2173 HUMAN COMPUTER INTERACTION

Credit Hour: 3

Prerequisite: None

Synopsis:

This course provides an introduction to Human-Computer Interaction (HCI). HCI is concerned with understanding, designing, implementing and evaluating user-interfaces so that the students have better support users in carrying out their tasks. On completing this course, the students will have knowledge of the theoretical foundations of designing for interaction between humans and computers. They will also have practical experience in implementing and evaluating graphical user interfaces.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze Human Computer Interface (HCI) principles and related approaches.

CO2 : Construct an application based on HCI principles and approaches.

CO3 : Work effectively in a team for a project on developing and evaluating the prototype based on HCI rules.

BCS2213 FORMAL METHODS

Credit Hour: 3

Prerequisite: None

Synopsis:

This course is introducing Formal Methods, which can be used in developing software specification. Formal Methods is the software specification technique that is used to ensure the software or system to be developed is being validated before it is actually developed. Therefore any bugs can be detected at early stage in order to reduce the cost of the development. Formal Methods to be introduced in formal notations using appropriate techniques, skills and tools.



Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate the understanding of theory and principles of Formal Methods in software development.

CO2 : Construct the software specification in formal notation using appropriate techniques, skills and tools.

CO3 : Work and communicate effectively in group to develop software specification in formal notation.

BCS2233 SOFTWARE REQUIREMENT WORKSHOP

Credit Hour: 3

Prerequisite: BCS1133 SYSTEMS ANALYSIS AND DESIGN

Synopsis:

This course exposes the student to software requirement stages. It will concentrate on discovering and eliciting requirements techniques, languages and models for representing requirements, requirement documentation standard, handling requirement changes and writing Software Requirement Specifications (SRS) customize from DOD and IEEE standard.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Classify and capturing requirement by using appropriate software development process and tools to be used.

CO2 : Construct a comprehensive Software Requirement Specification (SRS) document by using UML tools.

CO3 : Fix problems and construct innovative solutions that comply with principles of software engineering (problem solving skills).

CO4 : Work effectively in group and promote leadership's skills through effective communication ether in written, oral form, presentation and group discussion.

BCS2243 WEB ENGINEERING

Credit Hour: 3

Prerequisite: BCS1023, BCS1133, BCN1053

Synopsis:

This course introduces the essential topics of managing the diversity and complexity of web applications development. Students are required to develop a web/Internet application based on web engineering concepts.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Design appropriate solution using fundamental web engineering concepts.

CO2 : Construct a web-based application using web-engineering technologies.

CO3 : Demonstrate communication effectively in written and oral form through group discussion, meeting and presentation session.

BCS2343 SOFTWARE DESIGN WORKSHOP

Credit Hour: 3

Prerequisite: BCS2143, BCS2333

Synopsis:

This course introduces the students how to develop software development documents –Software Design Description (SDD) and their system development process. Continue from previous project/problems, students must produce Software Design Description document follow certain standards.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze the software design and architecture then develop the software design documentation.

CO2 : Construct a system prototype that comply with the pre-developed software design documentation.

CO3 : Work effectively in group and promote leadership's skills through effective communication either in written, oral form, presentation and group discussion.

BCS3133 SOFTWARE ENGINEERING PRACTICES

Credit Hour: 3

Prerequisite: BCS2343, BCS3233

Synopsis:

The course aims to prepare software engineering students to work in a small team on a small project, and to gain hands on knowledge on software engineering practices through a capstone project.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Internalize the best practices for software engineering (from inception, design, implementation, testing, maintenance).

CO2 : Formulate and justify software engineering solution for a particular problem.

CO3 : Demonstrate critical thinking ideas to software design.

BCS3143 SOFTWARE PROJECT MANAGEMENT

Credit Hour: 3

Prerequisite: BCS2343, BCS3233

Synopsis:

This course exposes the student with step by step project management process inclusive of project planning, evaluation, estimation, resource allocation, monitoring and control and managing people and teams to bring about the successful completion of specific project goals and objectives.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Distinguish appropriately the concepts and principles of Software Project Management.

CO2 : Construct and produce a practical software project management plan based on PMBOK.

CO3 : Utilize teamwork skill in executing the project plan.

BCS3153 SOFTWARE EVOLUTION & MAINTENANCE

Credit Hour: 3

Prerequisite: BCS1133

Synopsis:

This course will introduce types of maintenance as well as other issues such as economic implications, maintenance organizational structure, quality measurement, processes related to change requests and configuration management. Student will also exposes on different maintenance process models such as Boehm, Osborne, Iterative enhancement and reuse-oriented models. Upon completing this class student are expected to be able to understanding the fundamental aspects of software maintenance and evolution, including concepts, techniques and process models for system evolution.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Differentiate and classify the software evolution and maintenance techniques and issues.

CO2 : Examine technical and managerial problem in software maintenance.

CO3 : Explain and organize the related information to justify the given idea.

BCS3233 SOFTWARE TESTING

Credit Hour: 3

Prerequisite: BCS1032, BCS1133

Synopsis:

This course is designed to provide students with in-depth knowledge on software testing and its test process. The course covers the basic principles of software testing and test activities that include the test plan, test design, monitoring, implementation and test closure. The

student will also learn various categories of test design techniques and methods used in both black-box and white-box testing. At the end of this course, students should be able to recognize various types and levels of testing as well as categorizing and applying software testing process & techniques.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Compare and classify between various levels of testing, test types and test approaches.

CO2 : Organize and display the test activities throughout the software testing life cycle.

CO3 : Work on the test design techniques, risk analysis and reporting within test process.

BCS3263 SOFTWARE QUALITY ASSURANCE

Credit Hour: 3

Prerequisite: BCS3233

Synopsis:

This course introduces students to the concept of Software Quality Assurance (SQA) including principles, component, process, models, standards and certification of SQA. Students are required to understand the relationship between software quality assurance and software engineering.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Inquire a knowledge of main software quality assurance activities, their tasks, work products and their models.

CO2 : Organize software product quality related activities by applying ISO and IEEE standards.

CO3 : Work in a team and present the team decision/solution for a given tasks.

BCC3012 UNDERGRADUATE PROJECT I

Credit Hour: 3

Prerequisite: None

Synopsis:

This course aim to give chances for the student to practice and apply their knowledge and skills that they gain during their study in the university. Student will learn to identify problem, analyze the problem, give general solution, collect the required data regarding specific solution and do research on the solution. Finally student will be able to produce report proposal and solve the problem identified. During the course, student will be supervised by their supervisor in order to guide and monitor the students' project progress and to ensure that they can achieve the course objective.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze a specific problem and design the proposed solutions that comply with principles of computer science.

CO2 : Organize the solution based on specific problem and usage of appropriate tools to be used in the development of the solution.

CO3 : Explore and find solution through independent work.

CO4 : Present the solution through oral and written form in order to defend their proposal.

CO5 : Demonstrate professional values and attitude through meeting and punctuality in any form of deliverables.

BCC3024 UNDERGRADUATE PROJECT II

Credit Hour: 3

Prerequisite: BCC3012 UNDERGRADUATE PROJECT I

Synopsis:

This course aim to give chances for the student to practice and apply their knowledge and skills that they gain during their study in the university. Student will learn to identify problem, analyze the problem, give general solution, collect the required data regarding specific solution and do research on the solution. Finally student will be able to produce report proposal and solve the problem identified. During the course, student will be supervised by their supervisor in order to guide and monitor the students' project progress and to ensure that they can achieve the course objective.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Develop the solution based on the approved proposal (PSM1) which comply with the principles of computer science.

CO2 : Organize an appropriate validation and verification tasks for the propose solution.

CO3 : Identify and critically discuss the solution for future values.

CO4 : Organize and justify the solution through oral and written form.

CO5 : Demonstrate professional values and attitude through meeting and punctuality in any form of deliverables.

BCC4012 INDUSTRIAL TRAINING

Credit Hour: 3

Prerequisite: None

Synopsis:

This course aim to give chances for the student to practice and apply their knowledge and skills that they gain during their study. During the placement, we expect students to keep a log book, in which they make regular entries describing the work they are undertaking. Student also supervised by industrial and university supervisor to guide and ensure that they can do their work as good as possible and achieved the objective for this course.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Organize the industrial training knowledge, experience and skills in appropriate written report.

CO2 : Construct solution by applying the theory learned to solve real problem in organization.

CO3 : Build communication skills on oral presentation.

CO4 : Work effectively with good critical thinking and problem solving in organization to perform task given.

CO5 : Practise interpersonal skills and professional ethics in organization.

BCM3113 3D MODELLING & ANIMATION

Credit Hour: 3

Prerequisite: BCM2053 COMPUTER GRAPHICS

Synopsis:

The focus of the course is on 3D modelling and animation. Students are introduced to 3D modelling and animation methods such as modelling with NURBS, polygons, and subdivision surfaces. Texture mapping, lighting, key framing, rigging and rendering are also discussed. Production pipeline issues such as geometry deformation and level of detail are emphasized.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate understanding of 3D modelling basic concepts and its methods.

CO2 : Construct 3D models by implementing concepts of 3D modelling.

CO3 : Demonstrate roles as a leader that been able to plan, coordinate and managing task and resources.

BCM3153 VISUAL EFFECTS & POST PRODUCTION WORKSHOP

Credit Hour: 3

Prerequisite: None

Synopsis:

This course will discuss on general knowledge and a few techniques of designing User Interface (UI), Three Point Lighting & VFX Lighting, Rendering & VFX Rendering, Compositing, Rotoscoping, Motion Tracking. Students will learn basic skills and techniques on modelling, rendering and compositing.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Point out the concept and application of visual effects compositing during post production.

CO2 : Develop visual effects by applying the theory and techniques of lighting, dynamic and particle Illusion, editing, rendering and compositing.

CO3 : Work effectively and creatively to achieve the project goals by building a good relationship and interaction among team members.

BCM2043 FUNDAMENTAL OF MULTIMEDIA

Credit Hour: 3

Prerequisite: None

Synopsis:

This course will expose students to the theoretical and fundamental concepts of multimedia, its applications and the techniques involved. Topics to be covered include five elements of multimedia such as text and audio, animation, image and video, the art of multimedia, and multimedia over the network.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrates conceptual understanding and knowledge in multimedia, functions of each multimedia element, its usage and processing technique.

CO2 : Manipulate multimedia elements (text, graphic, audio, video & animation) using software tools.

CO3 : Recognize the issues in context of multimedia technology and able to adapt to other related fields.

BCM2053 COMPUTER GRAPHICS

Credit Hour: 3

Prerequisite: None

Synopsis:

This course is designed to expose the student to the concept of computer graphics. This includes understanding and designing aspects by using a computer graphics concepts and technology. Through this course, students will be exposed to the skill of interactive computer graphics and some drawing algorithms using a computer graphics.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate the concept of computer graphics and ability to use the computer graphics technology.

CO2 : Construct 2D graphics by implementing concepts of computer graphics and computer graphics programming.

CO3 : Work together effectively to achieve the same goal by building a good relationship and interaction among team members.

BCM2063 IMAGE PROCESSING

Credit Hour: 3

Prerequisite: BCS1023 Programming Techniques

Synopsis:

This course discusses about the processing of digital images. The techniques covers are reading image enhance the image quality and manipulate the image. Several image processing methods will be touch in this course. Programming skill and creativity is a required whereby students' are compulsory to do one related project in order to complete this course.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze and investigate different types of image formats and techniques in Image Processing.

CO2 : Construct a computerized solution using image processing techniques.

CO3 : Identify and organize relevance information by searching from various sources.

BCM2073 MODELLING & SIMULATION

Credit Hour: 3

Prerequisite: BUM2313 Numerical Methods

Synopsis:

This course will discuss the general principles and a few techniques of the simulation. Topics to be covered are introduction to simulation, a few examples of simulation system, general principles in modelling, techniques to develop models, how to verify and validate the models. Students are expected to equip themselves with adequate skill of modelling and simulation.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Apply certain techniques in analyzing the simulation input, output, approve the simulation model and also to differentiate between model and proposed model.

CO2 : Construct simulation model to assist in decision making based on given problem.

CO3 : Develop independence in learning and exploring the process and techniques of modelling and simulation.

BCM3103 VIRTUAL REALITY

Credit Hour: 3

Prerequisite: BCM3113 3D Modelling & Animations

Synopsis:

This module introduces the concepts of virtual reality and enables the students to gain hands-on experience by developing their own virtual reality applications. The student will learn about the virtual reality architecture, hardware and software, modelling, augmented reality and applications of virtual reality in various fields.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate conceptual understanding of virtual reality, regardless of the programming language used.

CO2 : Construct virtual reality application by implementing concepts of virtual reality.

CO3 : Work in team and undertake the role of a leader and a group member interchangeably.

BCM3123 DATA VISUALIZATION

Credit Hour: 3

Prerequisite: None

Synopsis:

Topics include the introduction to data visualization. It focuses on the visualization techniques and method that have a broad applicability in visualization applications. This course also covers the dataset concept by describing the most frequently used types of datasets in visualization. Students will be exposed to the various data processing stages that form the visualization process: data acquisition, data filtering, data mapping and rendering.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze the concept of data visualization in various visualization applications.

CO2 : Construct visualization application by implementing data processing stages which are data acquisition, data filtering, data mapping and rendering.

CO3 : Shows the ability for independence learning and propose the suitable solutions to solve the data visualization problems.

BCM3143 GAMES PROGRAMMING

Credit Hour: 3

Prerequisite: BCS1023 Programming Techniques

Synopsis:

This course will expose students to the theoretical and fundamental concepts of games programming, development and underlying architecture. Topics to be covered are game design and documentation, game space, 3D in game, platforms, user interaction/input, development using specific API, data management, game engine, runtime engine architecture, animation in game, game AI with AI engine and other related sub topics that contributed to the development of game application.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze various components in game application and development across diverse game genre and platform.

CO2 : Construct a cohesive and interactive game application by manipulating game object using game programming technique.

CO3 : Demonstrate critical thinking by producing output based on game development scientific approach.

BCM3173 GEOGRAPHICAL INFORMATION SYSTEM

Credit Hour: 3

Prerequisite: None

Synopsis:

This course aims to expose the students with the fundamental concept and principles of Geographical Information system whilst giving them the experience of developing their own GIS system. Throughout the completion of the course, the students will also be able to apply their theoretical knowledge gained in the hands-on exercises using GIS software.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate analytical and conceptual understanding of GIS.

CO2 : Develop a GIS system following the principle of GIS project development; design, use and reason the spatial analyses involved; and apply hands-on skills of GIS tools.

CO3 : Work together effectively to achieve a specific goal by building a good relationship and interaction among related associations.

BCM3193 COMPUTER GRAPHICS PROGRAMMING

Credit Hour: 3

Prerequisite: BCM2053 Computer Graphics

Synopsis:

This course exposes to the students with the advance of basic computer graphics. The emphasis will be on the design of 3D object and its elements. Student will be exposed with the use of major elements of computer graphics applications. Through this course, student will be able to develop a simple complete computer graphics environment.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate the concept 3D object and elements.

CO2 : Construct 3D graphics and its elements by implementing concepts of computer graphics and computer graphics programming.

CO3 : Integrate the concepts and technology of computer graphics in producing the computer graphics application.

BCM3203 PROJECT DEVELOPMENT WORKSHOP

Credit Hour: 3

Prerequisite: BCM2043 Fundamental of Multimedia

Synopsis:

This course is designed to the managing process of project development life cycle including managing people, cost estimation, risk management, ethical issues related to project management and other activities in project development using various tools and technology.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Understand the managing process of project development including planning, cost estimation, requirement analysis, project design, implementation, evaluation, risk and ethical issues related to project development in delivering successful projects.

CO2 : Conduct necessary activities in project management process using various tools and techniques.

CO3 : Implement the mechanisms of tracking, managing cost estimation for the project development and managing people through communications, negotiation and leadership skills.

CO4 : Apply professional practice in project development such as ethical issues, copyright, accessibility and other related professional services.

BCN2043 ASSEMBLY LANGUAGE

Credit Hour: 3

Prerequisite: BCN1043 Computer Architecture & Organization

Synopsis:

This course provides an introduction to machine language and assembly language programming. Concepts discussed include

techniques for encoding data as numbers, instruction set design, and the IEEE floating point standard. Assignments, which reinforce ideas covered in Computer Architecture and Organization, teach assembly language programming techniques and allow students to practice assembler programming. This is a programming intensive course.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate knowledge of basic components of a computer including registers, ALU, Instruction Set Architecture and instruction execution cycle.

CO2 : Reproduce high-level programming into machine-language level by writing new program or reverse engineered.

CO3 : Organize new idea and able for autonomous learning

BCN3053 DISTRIBUTED AND PARALLEL COMPUTING

Credit Hour: 3

Prerequisite: BCN1053 Data Communication & Networking, BCN2053 Operating Systems

Synopsis:

This course is intended to introduce and motivate the study of high performance computer systems and algorithms. The student will be presented with the foundational concepts pertaining to the different types and classes of high performance computers. The students shall learn advanced computer architectures, organization, and design, and also the basics of parallel programming i.e., algorithm design and analysis. Software is no longer sequential. Many programs are now concurrent, parallel, distributed or mobile. This module explores technologies that enable, the design issues that concern, and the hierarchy of architectures that deliver, distributed and parallel systems.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate the principles and fundamentals of distributed and parallel computing the technical challenges and current issues the systems design.

CO2 : practice in analyzing, design and implementation of distributed and parallel programs to solve specified problems.

CO3 : Organize new idea and able for autonomous learning.

BCN1063 STRUCTURE NETWORK CABLING

Credit Hour: 3

Prerequisite: None

Synopsis:

This course introduces structured cabling for Local Area Network (LAN). Students are exposed to the fundamental of computer

network, network topology, network devices and cabling tools, Copper cabling, Fiber Optic cabling, Simple LAN Device Installation, Wide Area Network Connection and network troubleshooting and documentation.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Investigate the Local Area Network elements such as basic of networking, safety environment, network hardware and related LAN.

CO2 : Design, install, implement, configure, test and troubleshoot structured cabling and LAN device based on LAN rules and standard.

CO3 : Identify problem, discuss and make suggestion on the structured cabling network.

BCN2083 COMPUTER NETWORKS

Credit Hour: 3

Prerequisite: BCN1053 Data Communication & Networking

Synopsis:

The primary focus of this course is on LAN redundancy, wireless LANs and dynamic routing. This course focuses on switching and routing protocols and concepts used to improve redundancy, propagate information, and secure the portion of the network where most users access network services. Switching technologies are relatively straightforward to implement; however, as with routing, the underlying protocols and algorithms are often quite complicated. This course will go to great lengths to explain the underlying processes of the common Layer 2 and layer 3 technologies.

Each concept will be introduced within the context of a single topology for each chapter.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze of how a switch communicates with other switches and routers in a small or medium-sized business network to implement wireless LANs and routing protocol.

CO2 : Organize the configuration, verification, and troubleshooting Wireless LANs, Single-area and Multi-area OSPF, and EIGRP.

CO3 : Organize new idea and able for autonomous learning in the context of network problems at layers 1, 2, 3 and 7 using a layered model approach.

BCN2093 NETWORK ANALYSIS & DESIGN

Credit Hour: 3

Prerequisite: BCN1053 Data Communication & Networking

Synopsis:

This course focuses on analysis and design of enterprise networks that are reliable, secure and manageable. It includes top-down network design methodology to design networks that meet

customer's business and technical goals, analysis of business and technical requirements, examine traffic flow and Quality of Service (QoS) requirements, and production of RFP documentation with relevant procedure steps for case study/project to fulfil this subject requirement.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze various computer networks, formulate problems and provide technical solutions to improve quality of service (QoS).

CO2 : Build a logical and/or physical network following all the steps and documentation phases for a specific requirement.

CO3 : Demonstrate ability to lead a project in order to produce RFP.

BCN2183 NETWORK SERVICES ADMINISTRATION

Credit Hour: 3

Prerequisite: BCN1053 Data Communication & Networking

Synopsis:

This course is designated to expose the student about Active Directory Technology Specialist s how to implement and configure secure network access and implement fault tolerant storage technologies, understand the network technologies most commonly used and IP-enabled network, and how to secure servers and maintain update compliance.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Classify the services supported by the Server Technology.

CO2 : Fix the problems to install and configure servers and clients applications individually or in a group by implementing safety measures.

CO3 : Relate their surrounding environment (i.e. economy, environmental, cultural) with the professional practice in the Server Technology.

BCN2193 NETWORK TECHNOLOGIES

Credit Hour: 3

Prerequisite: BCN1053 Data Communication & Networking

Synopsis:

This course describes the architecture, components, and operations of routers and switches in a small network. Students learn how to configure a router and a switch for basic functionality. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPv2, single-area and multi-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Discover the critical role routers play in enabling communications across multiple networks.

CO2 : Construct and organize basic operations for a newly-installed router with primary routing protocols.

CO3 : Organize new idea and able for autonomous learning in the context of dynamic routing protocols and modern network design.

CO4 : Relate their surrounding environment (i.e. economy, environmental, cultural) with the professional practice by identifying router, show and debug commands to troubleshoot common errors that occur in small routed networks.

BCN3023 NETWORK MANAGEMENT

Credit Hour: 3

Prerequisite: BCN1053 Data Communication & Networking

Synopsis:

This course introduces the overview of network management to familiarize student with network management systems and the five areas of network management. Student will learn a practical means of designing or evaluating a network management system for particular networking environment. Student also equipped with the example of simple, complex and advanced tools for each category of network management so that they could determine that a particular functionality would be useful and might want to pursue its development.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze all of the possible pieces of information available on a network device including Management Information Bases (MIBs) and also about Remote Network Monitoring Devices (RMON) MIB.

CO2 : Organize Network Management Protocols such as Simple Network Management Protocol (SNMP) that is the most widely deployed network management protocols on networking devices.

CO3 : Relate their surrounding environment (i.e. economy, environmental, cultural) with the professional practice by Identifying and explain the five areas of network management.

BCN3203 WAN TECHNOLOGY

Credit Hour: 3

Prerequisite: BCN1053 Data Communication & Networking

Synopsis:

This course discusses the WAN technologies and network services required by converged applications in a complex network. The course enables students to understand the selection criteria of network devices and WAN technologies to meet network requirements. Students learn how to configure and troubleshoot network devices and resolve common issues with data link

protocols. Students also develop the knowledge and skills needed to implement IPSec and virtual private network (VPN) operations in a complex network.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze and classify the components required for switched network, switching concept involving configuration, VLAN, LAN redundancy, link aggregation, and inter VLAN routing. DHCP concept and configuration for IPv4 & IPv6, wireless LAN concept, configuration and security.

CO2 : Assemble, build, construct and organize switched network involving basic switch configuration and security management, VLAN implementation, LAN redundancy via PSVT and link aggregation, inter - VLAN routing and troubleshooting, DHCP and wireless LAN setup.

CO3 : Organize new idea and able for autonomous learning.



COURSE SYNOPSIS - DIPLOMA

DCI1013 PROBLEM SOLVING

Credit Hour: 3

Prerequisite: None

Synopsis:

This course expose to the students with the appropriate computing methods in solving problem through programming approach, which consists of programming design, algorithm, pseudo code, flow chart and logic structure.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Produce the solutions for a given problems using appropriate problem solving approach.

CO2 : Demonstrate logical thinking skills in problem solving.

CO3 : Demonstrate team working skills through group assignment.

DCI1033 DATA STRUCTURE & ALGORITHMS

Credit Hour: 3

Prerequisite: DCI1023 Programming Techniques

Synopsis:

This course is designed to expose the students to the data structures and algorithm. It provide theoretical basis in data structures and the application of data structures is based on standard algorithms. Students must also be able to transform the data structure and algorithms problems into the computer programs.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Analyze various types of data structures and algorithms techniques in solving a related problem.

CO2 : Construct a programme by applying the data structure and algorithms techniques for a related problem.

CO3 : Use online application to find solution for a related problem.

DCI2063 OBJECT ORIENTED PROGRAMMING

Credit Hour: 3

Prerequisite: DCI1023 Programming Techniques

Synopsis:

This course provides an introduction to the concepts of object orientation and object-oriented programming (OOP) techniques using Java programming language. It will provide students with a through look at the basic constructs of the Java programming language such as its basic data types and operations. It will also emphasize on the use of OOP characteristic that expose students to Unified Modelling

Language (UML) design, class and object, inheritance, polymorphism, exception handling and Graphical User Interface (GUI) and event driven programming.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate the concept of object-oriented in programming.

CO2 : Manipulate object-oriented programming in given problems.

CO3 : Formulate the solution of given problems using object-oriented programming technique.

DCI2073 WEB PROGRAMMING

Credit Hour: 3

Prerequisite: DCI1023 Programming Techniques

Synopsis:

This course introduces the essential topics of Internet programming & development of web-based applications. Students are required to develop a web/Internet application which connected to the database.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate understanding in fundamental of dynamic web-based applications.

CO2 : Design and construct a web-based application prototype using HTML, web server, database and scripting language.

CO3 : Demonstrate communication effectively in written and oral form through group discussion, meeting and presentation session.

DCM1013 GRAPHICAL USER INTERFACE

Credit Hour: 3

Prerequisite: None

Synopsis:

This course introduces the standard Graphical User Interface (GUI) using usability-engineering life cycle for any software system and application. Student will expose to the concept of graphical user interface for computer application and how to design good user interface based on the usability heuristic concept.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Classify the Graphical User Interface (GUI) in various types of software.

CO2 : Construct a GUI prototype according to the user interface guidelines.

CO3 : Work and communicate effectively in group to complete the given assessment in specific time given.

DCI1023 PROGRAMMING TECHNIQUES

Credit Hour: 3

Prerequisite: None

Synopsis:

This course discusses on understanding problems and translating them into computer solution techniques using programming language. This course enables students to apply programming techniques, write programming codes from given problems and execute programming codes successfully.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Select appropriate techniques in solving a problem.
- CO2 : Construct and run programs.
- CO3 : Differentiate various techniques in solving a problem.

DCI1043 DATABASE SYSTEMS

Credit Hour: 3

Prerequisite: None

Synopsis:

The course emphasizes on the importance of data to an organization and how the data should be managed. Database management system (DBMS) will be viewed as a solution to the problems of file processing system. Aspects of relational database design will be covered in details. This includes database development life cycle, database architecture, data models, and normalization process. Several query languages such as Structured Query Language (SQL) and Query by Example (QBE) will be discussed but the emphasis is on SQL. Students will be given a real life problem to design and develop a database application system. In the later part of the course students will be exposed to the latest developments in database architecture.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Demonstrate the concepts and principles of database systems.
- CO2 : Manipulate queries using the syntax of Structure Query Language (SQL) and Query By Example.
- CO3 : Construct innovative solution through the representation of data model, relationship ER and EER Diagrams and database normalization in database application system using appropriate DBMS.
- CO4 : Organize the group work to complete the given assessments in specified time frame.

DCI1053 COMPUTER SYSTEMS & APPLICATION

Credit Hour: 3

Prerequisite: None

Synopsis:

This course enables students to learn how to develop an executable application starting with the design of interface, writing of the codes using programming tool and lastly integrating the application with database. Students is also exposed to troubleshooting and managing all computer hardware and software.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Discover the activities for simple application development, computer installation, maintenance and troubleshooting.
- CO2 : Follow the standard operating procedures for application development and computer systems.
- CO3 : Work effectively in team in order to complete the given assessment in specific time.

DCN1013 COMPUTER ARCHITECTURE & ORGANIZATION

Credit Hour: 3

Prerequisite: None

Synopsis:

This course discusses the structure and function of a computer. It expose student with the architecture and organization of a computer. This subject covers on the numbering system and the representation of data, the internal and external computer communication through system buses and Input and Output, computer storage, internal architecture of Central Processing Unit and Boolean Algebra.

Course Outcome:

By the end of semester, students should be able to:

- CO1 : Identify and classify computer structure and its functions.
- CO2 : Explain the internal components and their functionality of a computer (control unit, ALU, register, memory and CPU addressing modes); and their design to produce high performance.
- CO3 : Demonstrate team working by solving problems in groups.

DCN1023 Data Communication & Networking

Credit Hour: 3

Prerequisite: None

Synopsis:

This course introduces the communication of voice and video, networks and its functions, data conversions, controlling of errors, switching information and its devices, internetworking device and different layers of TCP/IP.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate knowledge and understanding of basics computer networking.

CO2 : Construct the physical arrangement of networks, types and modes of networks, data conversions and transmission medium.

CO3 : Build the detection and correction of errors, link control and link protocols of data link layer.

CO4 : Perform logic of link mechanisms used in networks and different layers of TCP/IP.

DCN1033 OPERATING SYSTEMS

Credit Hour: 3

Prerequisite: None

Synopsis:

This subject introduces the various data and control structures necessary for the design and implementation of modern computer operating systems. Process creation and control, communication synchronization and concurrency, memory management and file systems concept are explored in the context of the WINDOWS/LINUX operating system.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Describe the theory of operating systems, distinguish the relationship between OS and hardware (system calls, I/O, files and symbolic links, directories and file systems, process management, forks, threads, inter-process communication, shells, signal handling, pipes, sockets, CPU scheduling and memory management).

CO2 : Follow instructions on Operating Systems installation.

CO3 : Identify the current issues in operating system from the viewpoint of a system designer.

DCS1013 SYSTEMS ANALYSIS AND DESIGN

Credit Hour: 3

Prerequisite: None

Synopsis:

This course describes the concepts and methods of information system analysis and design, with an emphasis on system analysis methods and tools. The course focuses on the issues and management technique involved in analysis, design and implementation of information system.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate the understanding of the stages in System Development Life Cycle.

CO2 : Reproduce the design of a given case study that comply with the stages of systems development lifecycle.

CO3 : Discuss effectively in a team by proposing solution for a given case study and capable to demonstrate leadership's skills through group assignment.

DCC3013 FINAL YEAR PROJECT I

Credit Hour: 3

Prerequisite: None

Synopsis:

This course aims to give chances for the student to practice and apply their knowledge and skills that they gain during their study in the university. Student will learn to identify problem, analyze the problem, give general solution, collect the required data regarding specific solution and do research on the solution. Finally student will be able to produce proposal report and solve the problem identified. During the course, student will be supervised by their supervisor in order to guide and monitor the students' project progress and to ensure that they can achieve the course objective.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Design a solution based on specific problem by following the principle of software development process.

CO2 : Organise the solution and use appropriate tools in the development of the solution.

CO3 : Demonstrate good communication and presentation skills.

CO4 : Demonstrate student professional values and responsibility throughout the project completion.

DCC3026 FINAL YEAR PROJECT II

Credit Hour: 3

Prerequisite: DCC3013 Final Year Project I

Synopsis:

This course aim to give chances for the student to practice and apply their knowledge and skills that they gain during their study in the university. Student will learn to identify problem, analyze the problem, give general solution, collect the required data regarding specific solution and do research on the solution. Finally student will be able to produce proposal report and solve the problem identified. During the course, student will be supervised by their supervisor in order to guide and monitor the students' project progress and to ensure that they can achieve the course objective.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Develop the solution based on the approved proposal (PTA1) which comply with the principles of system development process.

CO2 : Organize an appropriate unit testing and user acceptance test (UAT) for the proposed solution.



CO3 : Demonstrate good communication and presentation skills.

CO4 : Demonstrate student professional values and responsibility throughout the project completion.

DCI3063 CURRENT ISSUES IN ICT

Credit Hour: 3

Prerequisite: None

Synopsis:

This course addresses several current issues in ICT locally and globally. The issues are raised from several areas in ICT: software or application technology, internet technology, computer hardware and networking, security, current trends in Malaysia ICT environment etc.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate understanding of current issues in ICT.

CO2 : Organize a different approaches to gather the information to update with current issues in ICT, especially in Malaysia.

CO3 : Demonstrate communication skills in group discussion and presentation.

DCM2063 FUNDAMENTAL OF MULTIMEDIA

Credit Hour: 3

Prerequisite: None

Synopsis:

This course will expose students to the theoretical and fundamental concepts of multimedia, its applications and the techniques involved. Topics to be covered include five elements of multimedia such as text and audio, animation, image and video, the art of multimedia and Multimedia development.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrates conceptual understanding and knowledge in multimedia, functions of each multimedia element, its usage and processing technique..

CO2 : Manipulate multimedia elements (text, graphic, audio, video & animation) using software tools..

CO3 : Recognize self confidence, respect for others, ability to communicate in appropriate way.

DCN2033 DATA & NETWORK SECURITY

Credit Hour: 3

Prerequisite: None

Synopsis:

The course introduces fundamental of data and network security. Course's chapters explain information security concepts, fundamentals, purposes, implementation and discussion in their respective areas related to data and network security. Topics include: foundational concepts in security, principles of secure design, threats and attacks, malware, cryptographic tools, network securing, and intrusion detection and prevention systems.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Inquire and analyze theory and principles of security, cryptographic tools, user authentication and access control, security in networks, intrusion detection systems, firewalls and intrusion prevention systems and wireless security.

CO2 : Construct and organize attack and defense methods into computer and network environments.

CO3 : Identify and investigate security issues and keep abreast with current trends.

CO4 : Demonstrate and explain security issues and propose possible solutions.

DCI2093 WEB APPLICATION DEVELOPMENT

Credit Hour: 3

Prerequisite: None

Synopsis:

This course provides students with the knowledge and skills that are needed to develop web application. Students learn data

access from database to web application, create and utilize web services, create component and deploy application. The students will implement what they have learned in a mini project.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Demonstrate understanding in fundamental web-based applications within the context of framework technology.

CO2 : Manipulate web service components, configuration, securing and deployment in web application.

CO3 : Identify appropriate solution using web technology to the specified problem.

DCM2053 MULTIMEDIA INTERACTIVE DEVELOPMENT

Credit Hour: 3

Prerequisite: None

Synopsis:



This course is designed to expose the student to the multimedia interactive project using basic theories of multimedia interactive and multimedia quality framework. This course also teach student to learn and apply various multimedia scripting and tools in order to develop a prototype of multimedia interactive application.

Course Outcome:

By the end of semester, students should be able to:

CO1 : Apply basic theories of interactivity to the development of multimedia application.

CO2 : Construct multimedia interactive application using various multimedia scripting.

CO3 : Apply professional practice in multimedia project development such as copyright, accessibility and other related professional service.

**FACULTY OF CHEMICAL
& NATURAL RESOURCES
ENGINEERING**





FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

INTRODUCTION

Faculty of Chemical and Natural Resources Engineering (*Fakulti Kejuruteraan Kimia & Sumber Asli*, FKKSA) was established on 16th February 2002 with the aim of providing engineering and engineering technology programmes in the field of chemical and natural resources engineering at UMP.

In light of the establishment of the East Coast Economic Region (ECER), the faculty is expected to play an important role as a reference centre for the chemical activities. The activities include, but not limited to, technology transfer, staff exchange, training, and consultancy related to chemical and natural resources engineering. The programmes offered for the 2002/2003 enrolment were Bachelor of Chemical Engineering and Diploma of Chemical Engineering (Process Plant). Two additional programmes were offered for the enrolment in 2003/2004 namely Bachelor of Chemical Engineering (Biotechnology) and Bachelor of Chemical Engineering (Gas Technology). In 2011, all bachelor degree programmes were rebranded and Honours entitlement was included to reflect the final year projects. Board of Engineers Malaysia and Ministry of Higher Education however encouraged general bachelor degree programmes for greater employment opportunity of graduates. As a result, in 2016 only Bachelor of Engineering (Honours) Chemical Engineering remains with two modes and is embedded with elective courses from gas technology and biotechnology areas based on the other two programmes that were not offered any more. Additional specialisations were also added in the list of elective courses such as polymer engineering and technology, recycling technology, process monitoring, advanced separations, ultrasonic technology, food engineering, and electrochemical engineering. In line with the status of Technical Universities under Malaysian Technical University Network (MTUN), the faculty has offered Bachelor of Engineering Technology (Chemical) with Honours in 2017. This programme implements a more practical-based curriculum with 60% practical and 40% theories. The students under this programme are exposed to a more hands-on training throughout their 4-year programme. The diploma programme remains with a minor change in the programme name to Diploma in Chemical Engineering in 2018.

The curricula of the engineering programme are designed and structured to provide students with broad exposures and adequate experiences in chemical engineering theories and practices, design and technical hands-on, researches, and industrial exposure or internship. The aim is to produce professional, competent, and ethical chemical engineers and technicians with sound theoretical knowledge and practical experiences that can well adapt nationally and globally. The attributes of degree and diploma graduates are in accordance with Washington Accord as accredited by Engineering Accreditation Council (EAC) and Dublin Accord as accredited by Malaysia Qualification Agency (MQA), respectively. The following are the undergraduate programmes offered in FKKSA.



PROGRAMMES OFFERED

- a) B.Eng (Hons.) Chemical Engineering – Full time
- b) B.Eng (Hons.) Chemical Engineering – Part time
- c) Bachelor of Chemical Engineering Technology with Hons. – Full time
- d) Diploma in Chemical Engineering – Full time
- e) Diploma in Chemical Engineering – Part time

CAREER OPPORTUNITIES

Chemical Engineer/ Technologist/ Technician	Production Engineer/ Technologist/ Technician
Technical Executive/ Supervisor	Process Engineer/ Technician
Shift Engineer/ Field Operator	Sales Engineer
R&D Engineer/ Assistant	Bioprocess Engineer/ Technologist/ Technician
Plant Engineer/ Technologist/ Technician	Consultant
Quality Assurance Engineer	Oil & Gas Technical Executive
Technopreneur/ Manager	Lecturer/ Trainer
Researcher/ Research Assistant	

FACULTY OF CHEMICAL ENGINEERING & NATURAL RESOURCES
CURRICULUM STRUCTURE
B ENG (HONS.) ENGINEERING (HONS.) CHEMICAL ENGINEERING

YEAR SEMESTER	FIRST		SECOND		THIRD		FOURTH		
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	
COURSES	UHS1029 Islamic And Asian Civilisations 1 / UHS1021 Soft Skills 1	UHL24** English Courses	UHL24** English Courses / other university courses	UHL24** English Courses / other university courses	UHL2432 English For Professional Communication	UHF1** Foreign Languages Level 1	BKC4844 Undergraduate Research Project II	UHF2**1 Foreign Languages Level 2	
	UQB1**1 Co-Curriculum I	UHR1012 Islamic And Asian Civilisations 1 / UHS1021 Soft Skills 1	BUM2413 Applied Statistics	BKF2143 Computer Programming For Engineers	UHM2022 Ethnic Relations	UHS2021 Soft Skills 2	BKC4854 Process & Plant Design II	BKC4854 Process & Plant Design II	
	BUM2133 Ordinary Differential Equations / BUM2123 Applied Calculus	BUM2133 Ordinary Differential Equations / BUM2123 Applied Calculus	BKF2323 Electrical & Instrumentation Technology	BKF2423 Heat Transfer	BKF3142 Process Engineering Economics	BKC3**3 Elective 1	BKC4543 Environmental Engineering	BKF4812 Process Engineering Management	
	UCE2002 Technopreneurship	UC2**1 Co-Curriculum II	BKF2413 Chemical Engineering Thermodynamics	BKF2432 Mass Transfer	BKC3533 OSH in Chemical Industries	BKF3472 Chemical Reaction Engineering II	BKC3**3 Elective 2	BKC4**3 Elective 3	
	BKF1313 Engineering Mechanics	BKF1243 Analytical Chemistry	BKF2353 Fluid Mechanics	BKF2443 Numerical Methods & Optimization	BKF3463 Unit Operation	BKF3731 Unit Operation Lab			
	BKF1323 Organic Chemistry	BKF1253 Physical Chemistry	BKF2343 Material & Energy Balance	BKC2463 Science & Engineering Materials	BKF3413 Process Control & Dynamic	BKC3922 Undergraduate Research Project I			
	BKF1513 Engineering Ethics & Professionalism	BKF1333 Thermodynamics		BKF2453 Chemical Reaction Engineering I	BKC3492 Separation Process	BKF3791 Process Control & Instrumentation Lab			
	BKF1751 Basic Science & Engineering Lab				BKF3741 Chemical Reaction Engineering Lab	BKF3553 Process Simulation and Computer Aided Design			
						BKF3923 Process Synthesis			
	TOTAL CREDIT PER SEMESTER	15 - 18	13 - 17	14 - 16	17 - 19	16 - 18	17	13	10
	Note	1. UHL24** English Courses: UHL2400 Fundamentals Of English Language, UHL2412 English For Academic Communication and UHL2422 English For Technical Communication. 2. UHM2022 Ethnic Relations: International Students (starting cohort: 2016/2017) must register UHM1012 Malaysian Studies (Pre-requisite). 3. BUF1113 Basic Physics: Compulsory for new students who did not take Physics during Matriculation / Foundation Level.							
	130	OVERALL TOTAL CREDIT FOR GRADUATION							

* The structure of curriculum presented here is effective from January 2017. The university however reserves the right to amend this structure in future for any improvement.



Elective courses for B. Eng (Hons.) Chemical Engineering

No	Code	Course	Credit Hour
1	BKB3413	Applied Biochemistry (E)	3
2	BKB3423	Bioreactor Engineering (E)	3
3	BKB3433	Downstream Processing (E)	3
4	BKB3443	Bioprocess Technology (E)	3
5	BKB3453	Bioprocess Development & Optimization (E)	3
6	BKG3453	Gas Processing & Liquefaction (E)	3
7	BKG3433	Gas Transmission & Distribution (E)	3
8	BKG4463	Gas Storage & Reticulation (E)	3
9	BKG3413	Combustion & Gas Utilization (E)	3
10	BKC3783	Oil & Gas Technology (E)	3
11	BKC3643	Industrial Safety Practices In Oil & Gas Sector (E)	3
12	BKC3713	Process Optimization (E)	3
13	BKC3863	Advanced Process Control (E)	3
14	BKC3723	Advanced Process Modelling & Simulation (E)	3
15	BKC3853	Process Monitoring (E)	3
16	BKC3883	Process Integration (E)	3
17	BKC4633	Polymer Design Technology (E)	3
18	BKC4673	Polymer Testing & Characterization (E)	3
19	BKC4713	Polymer Synthesis (E)	3
20	BKC4653	Polymer Technology (E)	3
21	BKC3693	Electrochemical Engineering (E)	3
22	BKC3683	Wastewater Treatment (E)	3
23	BKC3833	Recycling Technology (E)	3
24	BKC4683	Food Engineering (E)	3
25	BKC3653	Membrane Technology (E)	3
26	BKC4663	Ultrasonics (E)	3
27	BKC3893	Scale-Up Of Chemical Process (E)	3
Total Credit Hours (3 Courses)			9

FACULTY OF CHEMICAL ENGINEERING & NATURAL RESOURCES
CURRICULUM STRUCTURE
BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY WITH HONS.

YEAR SEMESTER	FIRST		SECOND		THIRD		FOURTH		
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	
COURSES	UHL24** English Courses	UHL24** English Courses	UHL24** English Courses	UHF2021 Foreign Languages Level 2	BTR1113 Introduction to Polymer Science	UHL2432 English For Professional Communication	BTR4333 Technical Elective II - Injection Moulding Process & Design	BTR4608 Industrial Training (L)	
	UHR1012 Islamic And Asian Civilisations 1	UHS1021 Soft Skills 1	UHF1**1 Foreign Languages Level	UHS2021 Soft Skills 2	BTR1113 OSH Polymer Industry	UGE2002 Technopreneurship	BTR4146 Engineering Technology Design Project II	BTR4613 Industrial Training Report	
	BUM2133 Ordinary Differential Equations / BUM2123 Applied Calculus	BUM2133 Ordinary Differential Equations / BUM2123 Applied Calculus	BUM2132 Statistics	BTR2243 Properties of Polymeric Materials	BTR3123 Polymer Additives and Testing	BTR3213 Polymer Blend and Composites(2)	BTR4124 Project Management & Economics		
	UQB1**1 Co-Curriculum I	UQ2**1 Co-Curriculum II	BTR2143 Polymer Characterization Techniques	BTR2143 Polymer Characterization Programming for Technologist	BTR3133 Advanced Process Control In Polymer Industry	BTR3154 Engineering Technology Senior Design Project 1	BTR4433 Waste Polymer Products		
	BTR1123 Physical Chemistry	BTR2113 Fluid Mechanics	BTR2133 Polymer Rheology	BTR2213 Transport Phenomenon in Polymer	BTR3143 Failure Analysis of Polymer Product	BTR3223 Polymer Reaction Engineering			
	BTR1133 Organic Chemistry	BTR1234 Analytical Chemistry	BTR1233 Polymer Chemistry	BTR2223 Rubber Technology & Processing	BTR3233 Numerical Methods & Optimization	BTR3234 Plastic Technology & Processing II			
	BTR3152 Engineering Technologist & Society	BTR1214 Static & Strength of Materials	BTR2123 Polymer Synthesis	BTR2233 Plastic Technology & Processing I	BTR4313 Technical Elective I Material Nanocomposites	BTR4353 Technical Elective I Material Manufacturing Processes			
	BTR1112 Chemistry Laboratory	BTR1223 Thermodynamics I	BTR2153 Chemical Processes Principle						
	TOTAL CREDIT PER SEMESTER	16-18	19-21	20	17	21	21	16	12
	Note	UHL24** English Courses ; UHL2400 Fundamentals Of English Language, UHL2412 English For Academic Communication and UHL2422 English For Technical Communication							
141	OVERALL TOTAL CREDIT FOR GRADUATION								

* The structure of curriculum presented here is effective from January 2017. The university however reserves the right to amend this structure in future for any improvement.

**Elective courses for Bachelor of Chemical Engineering Technology with Hons.**

No	Code	Course	Credit Hour
1	BTR4313	Polymer Nanocomposites	3
2	BTR4353	Material Selection and Manufacturing Processes	3
3	BTR4333	Injection Moulding Process & Design	3
		Total Credit Hours (3 Courses)	9



FACULTY OF CHEMICAL ENGINEERING & NATURAL RESOURCES
CURRICULUM STRUCTURE
DIPLOMA IN CHEMICAL ENGINEERING

YEAR	SHORT SEM	FIRST			SECOND			THIRD
		FIRST	SECOND	FIRST	SECOND	FIRST		
SEMESTER	UHL1412 Foundation English	UHR1012 Islamic And Asian Civilisations 1	UHL1432 English For Occupational Communication	UJGE1002 Asas Pembelajaran Keusahawanan	DKK2373 Fluid Mechanics	DKK3919 Industrial Training		
		UHL1422 English For Academic Skills	UHS2021 Soft Skills 2	UHM2022 Ethnic Relations	DKK2462 Plant Commissioning, Start-Up & Shut Down	DKK3933 Industrial Training Report		
		DUM1113 Basic Mathematics	DUM1123 Calculus	DKK2333 Thermodynamics	DKK2473 Plant Safety & Health			
	COURSES	UBB1011 Bridged Siswa (Kokurikulum I)	DUM1113 General Chemistry I	DUM1123 Calculus	DKK2333 Thermodynamics	DKK2483 Plant Utility		
			DUF1113 Physics	DUM1123 General Chemistry II	DKK2403 Chemical Reaction Engineering	DKK2443 Process Instrumentation & Control		
		UHS1021 Soft Skills 1	DKK1413 Material & Energy Balance	DKK2363 Engineering Mechanics	DKK2464 Unit Operations			
		DKK1352 Electrical Technology	DKK1403 Transport Processes	DKK2771 Chemical Reaction Lab				
		DKK1781 Basic Science & Engineering Lab	DKK1761 Mass And Heat Transfer Lab	DKK2142 Plant Supervision				
		DKK1524 Computer Application & Engineering Graphics	DKK1771 Analytical Instrumental Lab	DKK2523 Environmental Engineering				
		6	18	17	19	18	12	
TOTAL CREDIT PER SEMESTER								
90	OVERALL TOTAL CREDIT FOR GRADUATION							

*The structure of curriculum presented here is effective from January 2017. The university however reserves the right to amend this structure in future for any improvement.



B.ENG (HONS.) CHEMICAL ENGINEERING

BKF1313 Engineering Mechanics

Credit : 3

Prerequisite : None

Synopsis

This subject will introduce students with concept of statics and dynamics and its application in related engineering field. The topics covered in this subject are static of particle, static of rigid body, distributed forces, analysis of structure, friction, kinematics and kinetics of particles. By completing the course, students will comprehend the basic mechanisms and applications of statics and dynamics in related engineering field.

Course Outcomes

- CO1: Apply the basic concepts in statics to solve problems concerning resultant of forces acting on a particle and equilibrium of a particle.
- CO2: Analyze problems involving the equilibrium of a rigid body and use the fundamental principles in statics to solve them.
- CO3: Analyze problems involving the kinematics and kinetics of rectilinear and curvilinear motions of a particle by applying the basic principles in dynamics.

BKF1323 Organic Chemistry

Credit : 3

Prerequisite : None

Synopsis

This course discuss the fundamental theory of the properties, synthesis and organic reactions where use the functional group as framework as a basic level courses with an organic chemical content. This course focuses on the key concepts of organic chemistry through a study of the reactions selected nonfunctional aliphatic, alicyclic, cyclic and aromatic molecules. Particular emphasis is placed on the underlying mechanistic pathway that are involved and their stereo chemical consequences. The stereochemistry of the molecular structure is also considered.

Course Outcomes

- CO1: Able to understand the common organics structures, properties and reactions of aliphatic and aromatic hydrocarbons, alkyl halides, alcohol groups, carbonyl groups and amines.

- CO2: Formulate chemicals reactions and steps of mechanism for the synthesis and transformation of functional group.
- CO3: Discuss the bonding properties of carbon which cause it to be present in such a large number and variety of important compounds.
- CO4: Explain the common types of reactions mechanism and modern synthesis techniques.

BKF1513 Engineering Ethics & Professionalism

Credit : 3

Prerequisite : None

Synopsis

This subject gives an overview of engineering, the profession and its requirement in Malaysia scenario. Topics that will be included are ethics, management and contribution of engineering also generic skills and study skills. Basic calculations, unit conversions, create an engineering graph and solving iterative problem using computer consisted in this subject as preparation as an engineering student. Plant visits and seminar were also conducted as an exposure to the real field of engineering.

Course Outcomes

- CO1: Define engineering and identify different branches of engineering
- CO2: Explain engineering ethics, management and contribution.
- CO3: Explain and comprehend the ethics, skills of teamwork and leadership
- CO4: Perform basic calculation and apply generic or study knowledge that used in engineering field

BKF1751 Basic Science & Engineering Lab

Credit : 1

Prerequisite : None

Synopsis

In basic engineering lab, students are required to perform laboratory works which covered the basis concept of physical and chemistry such as concepts of solubility and miscibility, buffer effect, heat determination and gravimetric analysis of chloride. The lab also contains experiments which cover the basic concepts of engineering such as pressure change analysis, head losses in piping system and material properties. The aim is to strengthen the student's fundamental knowledge as it covers some of the basic science and engineering subjects such as physical and organic chemistry, fluid mechanics, thermodynamics and science and engineering materials.



Course Outcomes

- CO1: Apply the basic science and engineering theories in the corresponding experimental works
- CO2: Apply the concepts of basic science and engineering in solving problems and interpretation of experimental data
- CO3: Adapt the team working behavior and commitment as a member while working on the group assignment

BKF1243 Analytical Chemistry

Credit : 3

Prerequisite : None

Synopsis

The syllabus covers the basic knowledge and application of sample and data handling, calibration techniques and quality of analysis in analytical laboratory. It also deals with separation techniques and its basis application such as solid phase extraction, GC and HPLC. The introduction to the theory and application of spectroscopic techniques used in chemical analysis such as UV-Vis, FT-IR, MS and AAS are discussed. The combinations of above techniques with their advantages are covered in this course.

Course Outcomes

- CO1: Explain and describe the theory and application of Analytical Chemistry
- CO2: Interpret and analyze the analytical data
- CO3: Solve the problems related to analytical chemistry
- CO4: Explain the concept and application of analytical equipment such as: GC, HPLC, FTIR, UV-Vis, and AAS.

BKF1253 Physical Chemistry

Credit : 3

Prerequisite : None

Synopsis

This course discusses some introductory to thermodynamics in physical chemistry followed by continuation topics related to liquids and their mixtures, principles of chemical equilibrium and rate reactions. The solid surfaces including their applications will be also discussed in this course. The development of key skills is facilitated by a program of tutorials and practical.

Course Outcomes

- CO1: Explain and describe the principle of thermodynamics.
- CO2: Apply basic physical chemistry principle to solve the problem.
- CO3: Ability to communicate effectively and presenting in related topic.

BKF1333 Thermodynamics

Credit : 3

Prerequisite : None

Synopsis

This course is designed to introduce basic concept in thermodynamic in a thorough way. Topics cover are properties of pure substances, thermodynamics system, heat transfer through conduction, convection and radiation, the first law of thermodynamics for closed systems, open systems and their application in steady-flow and unsteady-flow processes, the second law of thermodynamics, entropy, introduction to refrigeration and steam power plant.

Course Outcomes

- CO1: Discover the state of properties from property diagram and obtaining data from property table
- CO2: Solve energy balance (heat, mass and work) of a process for both closed and open system by using the first law of thermodynamics and the concept of entropy through its reversible and irreversible processes
- CO3: Analyze the thermal efficiency of heat engine, heat pump, and refrigerator and Carnot cycle using Second Law of Thermodynamics

BKF2332 Electrical & Instrumentation Technology

Credit : 2

Prerequisite : None

Synopsis

This course is designed to introduce the fundamental of electrical system principles for chemical engineering students. The underlying principles that will be covered in this course include an introduction to an electrical system, electrical safety, basic laws (Ohm's law, Kirchhoff laws, current/voltage divider, wye-delta transformation), simple direct current (D.C.) circuits, method of analysis, circuit theorems, single phase series and parallel circuits series, parallel combination of resistor, inductor and capacitor, power in AC circuit, single and multiphase systems and alternating current. Apart from that, student also introduce to the topics on instrumentation which include introduction to process instrumentation elements and instrumentation devices.



Course Outcomes

- CO1: Ability to describe the concepts of electrical system and its components as well as awareness on electrical safety
- CO2: Ability to analyze and solve electrical circuit problems both for direct and alternating currents
- CO3: Ability to analyze and describe the instrumentation elements and instrumentation devices for chemical processes

BKF2413 Chemical Engineering Thermodynamics

Credit : 3

Prerequisite : BKF1333 Thermodynamics

Synopsis

This subject mainly covers the topics of pure substances, heat effects, thermodynamics properties, VLE, thermodynamics solution and chemical reaction equilibrium. The course entails the theory and applications of thermodynamics concept and deals with composition-dependent thermodynamics relations. This course requires conceptual thinking and requires greater mathematical sophistication to generate ideas and problem solving.

Course Outcomes

- CO1: Apply equations of state or the generalized correlations for solving intrinsic properties PVT properties and apply energy equation for energy balance
- CO2: Analyze thermodynamics properties, phase equilibrium (VLE), solution thermodynamics and chemical reaction equilibrium problems using thermodynamics equations
- CO3: Design and solve flow sheet for a pre-determined chemical processes

BKF2353 Fluid Mechanics

Credit : 3

Prerequisite : None

Synopsis

The objective of this course is to introduce the concept and use of fluid mechanics, both static and dynamics fluid. The covered topics are fluid properties, fluid static and dynamics, Bernoulli's equation and applications, momentum equation and its application, analysis of flow in pipeline system and dimensional analysis.

Course Outcomes

- CO1: Solve the variables and properties related to material and energy balance problems.
- CO2: Analyze and solve material balance of processes in nonreactive system.
- CO3: Analyze and solve material balance of processes in reactive system.
- CO4: Analyze and solve energy balance of processes in nonreactive system.
- CO5: Analyze and solve energy balance of processes in reactive system.

BKF2343 Material & Energy Balance

Credit : 3

Prerequisite : None

Synopsis

This course aims to equip students with basic chemical engineering principles such as different unit systems, unit conversion and process variables determination. This knowledge will then be applied extensively for material and energy balances for single or multiple unit operations of non-reactive and reactive chemical processes. In addition, students will also be exposed to the behavior of single phase and multiple phases and the equations that govern their characteristic, which represents the foundation of chemical separation engineering. Computer application using MS Excel to solve the material and energy balance also imbedded in this course.

Course Outcomes

- CO1: Solve the variables and properties related to material and energy balance problems.
- CO2: Analyze and solve material balance of processes in nonreactive system.
- CO3: Analyze and solve material balance of processes in reactive system.
- CO4: Analyze and solve energy balance of processes in nonreactive system.
- CO5: Analyze and solve energy balance of processes in reactive system.

BKF2143 Computer Programming For Engineers

Credit : 3

Prerequisite : None

Synopsis

This subject aims to introduce the fundamental element and feasibilities of the computer programming by using MATLAB mathematical computing program. Students will be taught on analyzing data, developing a program using m-file and using the command window. They will learn to solve general engineering mathematical equations in



MATLAB, displaying the data via 2D and 3D graphs and to learn to develop the graphical user interface (GUI) for program.

Course Outcomes

- CO1: Organize and analyze the data by using MATLAB
- CO2: Understand and develop the program to solve the mathematical problems.
- CO3: Apply software to solve general chemical engineering and mathematical problems.
- CO4: Demonstrate the ability to transform the problem to design and from design to an operational program

BKF2423 Heat Transfer

Credit : 3

Prerequisite : None

Synopsis

The objective of this course is to provide students with the concepts of heat transfer. This course will emphasize on the principles of the heat transfer in steady state by conduction, convection and radiation. Students will be exposed to the procedure for general problem solving and its application on heat exchanger. Experiments involve shell and tube heat exchanger and plate heat exchanger have been designed. Students will be given experiment objectives and conduct the experiment in group. Subsequently, the principles of unsteady-state convective heat transfer will be covered at the end of the course.

Course Outcomes

- CO1: Solve heat transfer problems that involve conduction, convection and radiation in steady-state heat transfer.
- CO2: Utilize the design equations for heat exchanger to solve problems related to heat exchanger.
- CO3: Solve heat transfer problems related to the unsteady-state systems.

BKF2432 Mass Transfer

Credit : 2

Prerequisite : None

Synopsis

This course is to provide students with the concepts of mass transfer. This course will emphasize on the principles of the mass transfer in gases, liquids, biological solutions and gels, and solids. Subsequently, the principles of unsteady state and convective mass transfer will be covered to establish knowledge of mass transfer. The students will be exposed to the procedure for general problem solving and its application on real system.

Course Outcomes

- CO1: Apply fundamental understanding of mass transfer in diffusion phenomena in gas, fluid and solid system.
- CO2: Analyze and solve problems related to diffusion and convection mass transfer in steady/unsteady state.
- CO3: Relate the concept of mass transfer in problems related to unit operations.

BKF2443 Numerical Methods & Optimization

Credit : 3

Prerequisite : BUM2133 Ordinary Differential Equations

Synopsis

This subject teaches the techniques by which mathematical problems are formulated so that they can be solved with arithmetic operations. Topics covered in this subject are roots of equation, systems of linear algebraic equations, optimization, curve fitting, numerical differentiation & integration, ordinary differential equation and partial differential equation. Some software packages are introduced to empower the students in problem solving.

Course Outcomes

- CO1: Apply numerical methods as a problem-solving tool
- CO2: Optimize a process employing numerical methods
- CO3: Solve numerical methods problem by using MS Excel and MATLAB
- CO4: Optimize a process employing MS Excel, Design Expert and MATLAB

**BKC2463 Science & Engineering Materials****Credit : 3****Prerequisite : None****Synopsis**

This course is designed to provide a working knowledge in the solving of materials problems encountered by chemical engineers and in the engineering of new and improved materials used in chemical processes. The approach used is the correlation of engineering properties with atomic and microstructures, utilizing the analysis techniques of materials characterization and phase relationships. Topics include structure and properties of metallic and nonmetallic materials of construction; interrelations between chemical bonding, structure, and behavior of materials, corrosion resistant materials, polymers and composites as construction materials, particularly for sustainable environment. Each of the materials classes (metals, ceramics, polymer and composites) is discussed in detail in this context.

Course Outcomes

- CO1: Explain the elementary relationships between structure, properties and performance of materials that are essential for understanding the role of materials in the design of engineering systems
- CO2: Distinguish the various classes of materials (metals, ceramics, polymers and composites), their fundamental chemical and structural nature and processing methods
- CO3: Utilize the knowledge on structure and properties of materials to solve real engineering-based case studies

BKF2453 Chemical Reaction Engineering I**Credit : 3****Prerequisite : BKF2343 Material Energy Balance****Synopsis**

This subject covers the knowledge of the reaction kinetics and reactor design which distinguishes chemical engineer from other engineers. The course introduces the basic design calculation and design of chemical reactors at the ideal conditions. The topics covered in this subject are kinetics of homogenous reactions, chemical reactions in batch and continuous reactor, multiple reactions and reactor heat effect.

Course Outcomes

- CO1: Apply chemistry, thermodynamics and chemical reaction fundamentals such as reactant limitation, mole balance, rate law and stoichiometry in reactor design
- CO2: Design isothermal reactors for a single reaction
- CO3: Analyze reaction and determine reactor scheme for desired conversions, selectivity and yield
- CO4: Design reactor under various heat effect
- CO5: Optimize reactor design for chemical processes using engineering economics

BKF3142 Process Engineering Economics**Credit : 2****Prerequisite : None****Synopsis**

This course deals with cost analysis in engineering decision-making, the management aspects and control of complex projects. Engineering economics topics include cost estimation, time value of money, interest formulas and equivalence calculations, measures of investment worth, depreciation and income tax analysis.

Course Outcomes

- CO1: Discuss the need of chemical engineering graduates when they have to make financial decisions as a team member or project manager.
- CO2: Explain theoretical and conceptual basis on which the practice of engineering economics project analysis is built.
- CO3: Analyze the economic feasibility of a chemical plant, carried out by examining the capital cost and the manufacturing cost obtained from the cost estimation techniques.

BKC3533 OSH In Chemical Industries**Credit : 3****Prerequisite : None****Synopsis**

This course is primarily to expose students with the fundamental concepts, practical aspects and applications of occupational safety and health (OSH) in chemical and biotechnology industries. Among others, the students will be taught the fundamental application and day-to-day aspects of OSH and at the same time, the management aspects of it. Local and international regulations of SH&E such as OSHA and FMA will also be covered. Case studies from several chemical and biotechnology industries globally will also be discussed in details.



Course Outcomes

- CO1: Value fundamentals of technical safety for chemical and biotechnology industries.
- CO2: Explain the various features of OSH management and regulations.
- CO3: Review and analyze the cause and effects of industrial incidents and proposed for improvement.
- CO4: Evaluate OSH aspects in the design and operation of chemical and biotechnology industries such as Threshold Limit Values, Toxicology Study, Risk Assessment, HAZOP study, source model, dispersion model, fire triangle, fire protection and prevention.

BKF3463 Unit Operation

Credit : 3

Prerequisite : BKF2343 Material & Energy Balance

Synopsis

The objective of this course is to provide students with concepts of separation processes and unit operation in chemical engineering. It will cover the gas-liquid, vapor-liquid, liquid-liquid and solid-liquid separation process. By completing the subject, students will understand the basic mechanisms, operations and basic design parameters of the selected unit operations such as evaporation, distillation, absorption, liquid extraction and leaching

Course Outcomes

- CO1: Apply knowledge of chemical engineering fundamentals such as mass transfer, materials and energy balance to the solution of unit operation problems.
- CO2: Identify type of separation processes and analyze the unit operation problems to obtain number of stages and separator sizing.
- CO3: Design, optimize and/or develop an appropriate separator to solve the industrial problems by considering public health, safety and environment.

BKF3413 Process Control & Dynamic

Credit : 3

Prerequisite : BKF2343 Material & Energy Balance

Synopsis

This is an introductory level course in chemical process dynamics and control. The topics that will be included in this subject are fundamentals and concepts of control system, development of theoretical and empirical model for chemical and physical processes, dynamic behavior of processes, application of Laplace transform and transfer function, block diagram, design and analysis of control system, stability analysis, advanced process control and computer simulation/analysis.

Course Outcomes

- CO1: Summarize the basics of modelling and process control
- CO2: Analyze the feedback control system
- CO3: Construct Process and Instrumentation Diagram
- CO4: Apply the PID tuning and analyze the stability
- CO5: Evaluate the control loop interactions in multiloop control

BKC3492 Separation Process

Credit : 2

Prerequisite : BKF2343 Material & Energy Balance

Synopsis

This course aims to introduce the principles of typical unit operations involved in chemical and petrochemical industry such as drying of process material, adsorption and fixed-bed separation, membrane separation, mechanical-physical separation and crystallization. At the end of this course, it is expected that the students will understand theories, principles, calculations and basic design parameters associated with every unit operation.

Course Outcomes

- CO1: Explain, discuss and interpret the concept of unit operations i.e drying, adsorption, fixed bed separation crystallization, membrane separation and mechanical-physical separation
- CO2: Analyze problems related to unit operation in related chemical processes.
- CO3: Determine basic design parameters associated with certain unit operations.

**BKF3741 Chemical Reaction Engineering Lab****Credit : 1****Prerequisite : BKF2453 Chemical Reaction Engineering I****Synopsis**

This lab is one of the most important labs in the chemical engineering study. In this lab, student will perform experiments to support their theoretical study of Chemical Reaction Engineering. It includes the experimental studies using different type of reactors for determining kinetic and RTD data.

Course Outcomes

- CO1: Design the experiments to acquire the kinetic and RTD data
- CO2: Analyse the experimental data to obtain the reaction rate expression (reaction order and specific reaction rate constant)
- CO3: Attain competency in running the bench scale and pilot scale reactors.
- CO4: Inculcate good communication skill and team working spirit.

BKF3472 Chemical Reaction Engineering II**Credit : 3****Prerequisite : BKF2453 Chemical Reaction Engineering I****Synopsis**

This subject furthers the knowledge of chemical reactor. Topics to be covered are the heterogeneous systems of the catalytic reaction, including the effects which significantly influence the reactor performance, the study of the real scenario for nonideal reactors in industries, and introduction of biochemical reaction systems. The analysis of industrial chemical reactors frequently requires solution of non-linear algebraic and differential equations. Hence, modeling the nonideal reactor will be the crucial skill to fulfill the outcome requirement for each chemical engineer and researcher in chemical reaction engineering.

Course Outcomes

- CO1: Explain the factors that affect the performance of industrial reactor such as diffusion, mixing and other limiting situation.
- CO2: Apply the fundamental of biochemical reaction systems.
- CO3: Evaluate the performance of the reactor which is affected by diffusion and catalyst deactivation.
- CO4: Predict the non-ideal reactor performance based on the residence time distribution data using an appropriate model.

BKF3731 Unit Operation Lab**Credit : 1****Prerequisite : BKF3463 Unit Operation****Synopsis**

This laboratory course is offered to enhance student's understanding and application of theories learnt in Chemical Engineering Unit Operation by doing experiments. This lab includes experiment on absorption, solid liquid extraction, pressure swing adsorption, evaporation, crystallization, distillation and drying. In this lab, students are divided into small groups to run the experiment under supervision of the instructor (lecturer and technical staff). This lab aims to promote group work (60%) as well as individual excellence (40%). The main objective of this course is to develop student skills of presenting their findings with logical scientific based reasoning orally and in writing. Besides that, students will be exposed to environment and safety precaution related to unit operation.

Course Outcomes

- CO1: Describe the fundamental of chemical engineering unit operation.
- CO2: Applied chemical engineering knowledge on unit operation handling.
- CO3: Write technical report effectively with logical scientific based reasoning.
- CO4: Present effectively as an individual and in group throughout the semester based on individual and group-based tasks assigned.

BKC3922 Undergraduate Research Project I**Credit : 2****Prerequisite : BKF3463 Unit Operation****Synopsis**

This course is designed to expose the students to a research project. They have to apply all the knowledge they have learned in the program to complete the research project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the research project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, preliminary results, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.



Course Outcomes

- CO1: To apply knowledge of mathematics, science, engineering fundamentals or engineering specialization to the research problems
- CO2: To identify, formulate and analyse research problems using the principles of mathematics, natural sciences or engineering science
- CO3: To design and develop solutions based on research problems
- CO4: To engage in independent and life-long learning in the broader context of technological change, enhance individual's soft skill and organization skills in research activities
- CO5: To communicate effectively on research outcomes with the engineering community and society (oral)
- CO6: To communicate effectively on research outcomes with the engineering community and society (written)

BKF3791 Process Control & Instrumentation Lab

Credit : 1

Prerequisite : BKF3413 Process Control & Dynamics

Synopsis

This laboratory have been developed to address the key engineering educational challenge of realistic problem solving within the constraints of a typical lecture-style course in process dynamics and control. Students will conduct experiments based on two major process operations which are based on computer simulation and plant experimental works. In computer simulation, students will simulate a case study using Matlab software, Simulated Process Control (SPC) software and also operate a system on Distributed Control System (DCS). The students also run the experiment using pilot plant available in this laboratory. This application will encourage students to apply their process control theories into practical term and inculcate the critical thinking among the group members.

Course Outcomes

- CO1: Analyse dynamic behaviour of 1st and 2nd order process
- CO2: Develop control strategies manually and automatically using Simulated Process Control (SPC) software
- CO3: Practice control strategies using pilot plants and Simulated Process Control (SPC) software
- CO4: Adapt team working and commitment behaviour

BKF3553 Process Simulation & Computer Aided Design

Credit : 3

Prerequisite :

BKF3463 Unit Operation

BKF2453 Chemical Reaction Engineering I

Synopsis

This particular course will introduce the usage of process simulation and flow sheeting software to students, i.e; Aspen Plus or Aspen Hysys. This software will be used to simulate steady state model for chemical and oil and gas processes. This subject is very important to prepare students for future usage of the advanced modeling tool in chemical engineering and other related fields involving design and simulation.

Course Outcomes

- CO1: Learn to construct flowsheet, including adding blocks and streams, reconnecting streams, and breaking/joining streams
- CO2: Apply the software to model and simulate problems related to chemical engineering unit operations.
- CO3: Develop flowsheet to model and simulate problems related to chemical engineering processes and other related disciplines.

BKF4915 Industrial Training

Credit : 5

Prerequisite :

OSH in Chemical Industries (BKC3533)

Unit Operation (BKF3463)

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo 10 weeks of industrial training during the end of the semester of the third academic year. The performance of each student during the periods of his/her Industrial training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records and submit reports on the training received by him/her. The industrial training report should cover all periods of approved employment. The report document is expected to demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives. The student should be able to present the report to university supervisor, as a complement to their degree.



Course Outcomes

- CO1: Display independency in actual working environment with minimal supervision
- CO2: Display communication skill with different levels of staff in the organization
- CO3: Present technical documents related to the work completed
- CO4: Practice positive attitude during the training

BKF3923 Process Synthesis

Credit : 3

Prerequisite :

**Chemical Reaction Engineering I (BKF2453)
Unit Operation (BKF3463)**

This course guides students to design a process. Process is an integrated system which has material and energy balance. It is not considered feasible for production of a chemical until its synthesis goes through steps of thorough review, selections and evaluation of successive unit operations. The challenge is when all calculations carried out are interconnected among them and considering numerous variables and tremendous amount of factors with respect to process decisions. This course helps student understand the technique of process synthesis. The focus will be particularly given to the conceptual design method whereby the synthesis follows six (6) hierarchical steps of decision making on the process. Thus, the lessons from the previous courses would help them here make all necessary engineering decisions. Process selection and evaluation is optimized by using the economic potential method starting from the second step where material balance calculation begins. Six (6) steps of process decision include mode of operation, input-output structure, reactor-recycle schemes, separator trains, heat exchanger network and control. The simulation software will also be introduced to ease the calculation. The environmental impact posed by the process would also need to be considered during the process synthesis. At the end of this subject, the students are expected to come out with their own process flow diagrams whether as a grass-root plant or a retrofitted plant.

Course Outcomes

- CO 1: Review on raw material and product, synthesis route and reaction kinetics, and technology in existing processes
- CO2: Discover necessary material properties, technologies and engineering fundamentals for process decision
- CO3: Calculate material and energy balance

- CO4: Apply process synthesis method, heuristics, algorithm or rule of thumbs in decision making.
- CO5: Analyze the decided scheme/type of unit operations at respective levels of process decision
- CO6: Manage environmental aspects of process

BKC4944 Undergraduate Research Project II

Credit : 4

Prerequisite :

Undergraduate Research Project I (BKC3922)

This subject is the continuation of the subject Research Project I. In this subject, the students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of this semester, the students are required to produce a research project report and present it to faculty's evaluation panel.

Course Outcomes

- CO1: To apply knowledge of mathematics, science, engineering fundamentals or engineering specialization to the research problems
- CO2: To identify, formulate and analyse research problems using the principles of mathematics, natural sciences or engineering science.
- CO3: To design and develop solutions based on research problems
- CO4: To conduct investigation on research problems including design of experiments, analysis and data interpretation, and conclusion.
- CO5: To have good practices in laboratory and simulation
- CO6: To engage in independent and life-long learning in the broader context of technological change, enhance individual's soft skill and organization skills in research activities.
- CO7: To communicate effectively on research outcomes with the engineering community and society (written)
- CO8: To communicate effectively on research outcomes with the engineering community and society (oral)



BKC4913 Process & Plant Design I

Credit : 3

Prerequisite :

BKF3463 Unit Operation

BKF3472 Chemical Reaction Engineering II

BKF3553 Process Simulation & Computer Aided Design

BKF3923 Process Synthesis

BKC3533 OSH In Chemical Industries

Synopsis

The lessons from the previous subjects would be used by the students here to make all necessary engineering decisions in synthesizing the process flow diagram. By implementing optimization approach using the economic potential strategies, the decisions are analyzed by integrating material and energy balance through four hierarchical steps beginning with mode decision and ending with separation train decision. The students would have to use engineering calculations including design equations and heat integration by the aid of the simulation software. The environmental impact posed by the process would also need to be considered during the process synthesis. At the end of this subject, the students are expected to come out with their own process flow diagrams whether as a grass root plant or a retrofit plant.

Course Outcomes

- CO1: Review on raw material and product, synthesis route and reaction kinetics, and technology in existing processes
- CO2: Discover necessary material properties, technologies and engineering fundamentals in each decision level of process synthesis
- CO3: Analyze material and energy (when necessary) balance for each decision level of process synthesis
- CO4: Determine the scheme/type of unit operations and estimate their optimum design at respective decision level of process synthesis
- CO5: Manage safety and health aspects of process
- CO6: Manage environmental aspects of process
- CO7: Synthesize feasible design of process
- CO8: Draw process flow diagram
- CO9: Simulate the synthesized process without any non-convergence
- CO10: Present design report for the proposed case study in group

BKC4543 Environmental Engineering

Credit : 3

Prerequisite : None

Synopsis

This subject is designed to introduce to the students the principles and testing techniques of the environmental engineering. Topics includes introduction of environmental engineering, wastewater quality management, wastewater treatment, air, solid waste treatment and management. The techniques covered involved in environmental samples testing, and an ability to critically evaluate data from a sampling program. Skills gained will be directly applicable to careers in environmental engineering both in data collection and managing field assessments.

Course Outcomes

- CO1: Explain the ethics & responsibilities as engineer towards environment and expose to environmental legislation & regulation practices in Malaysia
- CO2: Review problems and its solving involving wastewater treatment
- CO3: Analyze the concept involved in air pollution control, management of solid waste and hazardous waste
- CO4: Develop various analytical methods and operate wastewater treatment pilot plant, air contaminants and its equipment for air pollution reduction

BKC4934 Process & Plant Design II

Credit : 4

Prerequisite : BKC4913 Process & Plant Design I

Synopsis

In this course, students will carry out a plant design project to demonstrate the practical aspects in designing Chemical/Bio/Gas processing plant. The students will be divided into groups where they are expected to design Chemical/Bio/Gas processing plant. They will also apply their previous knowledge from Process & Plant Design 1 and other related subject, in completing the design task given. Students will be assessed based on their individual performance, presentation and final report.

Course Outcomes

- CO1: Justify the manual calculation results of the mass and energy balance
- CO2: Evaluate mass and energy balance using commercial process simulators
- CO3: Design of process equipment



- CO4: Propose appropriate utility system
- CO5: Decide suitable control mechanism
- CO6: Conduct hazard and operability study (HAZOP)
- CO7: Propose appropriate waste management plant
- CO8: Perform process viability and economics analysis
- CO9: Rationalize the proposed design verbally and in written form
- CO10: Demonstrate the ability to work in group
- CO11: Synthesize process flow sheet

BKF4812 Process Engineering Management

Credit : 2

Prerequisite : None

Synopsis

This course deals with Process Engineering Management. It covers knowledge on roles & responsibilities, planning, organizing, time, tools & techniques, cost, constraint, quality, and risk management.

Course Outcomes

- CO1: Explain theoretical and conceptual basis on which the practice of engineering operation and project management in industry.
- CO2: Describe the need of chemical engineering graduates when they have to make management decisions as a team member or manager.
- CO3: Apply basic operation and project management concepts and principles through case study

BKB3413 Applied Biochemistry (E)

Credit : 3

Prerequisite : None

The subject provides an overview of fundamental concepts in microbiology, biochemistry and its application in biotechnology industries. The subject covers on the microorganism, cell cultures, and major biomolecules in living systems. The student will be exposed to metabolic pathway of aerobic respiration, enzyme catalyzed reaction, cell culture behavior and good manufacturing practices. The course will also emphasize on the laboratory skills which includes basic biology and biochemistry analysis.

Course Outcomes

- CO1: Describe the cell properties, microbial growth characteristic and media selection
- CO2: Determine enzymatic reaction and describe the mechanism of enzyme regulation

- CO3: Demonstrate the knowledge in microbiology handling, cell cultures and biochemistry analysis

BKB3423 Bioreactor Engineering (E)

Credit : 3

Prerequisite : None

Synopsis

This subject covers the basic concepts of microbial growth phase, growth kinetic, stoichiometry of microbial growth and bioreactor operational mode selection. This subject also emphasizes on the application of transport phenomena in bioreactor, sterilization and aseptic technique, scale up, monitoring and control of bioreactor.

Course Outcomes

- CO1: Construct conceptual design of a fermentation process according to first, second and third levels of hierarchical process synthesis.
- CO2: Solve the calculation regarding to the culture kinetic in different fermentation modes, and the stoichiometry of cell growth and product formation.
- CO3: Discuss different bioreactor designs and its related instrumentation and control.
- CO4: Solve the calculation regarding to the mixing, heat transfer and mass transfer in a bioreactor.
- CO5: Solve the calculation regarding to the sterilization in a bioreactor and analyse the effect of scale-up.

BKB3443 Bioprocess Technology (E)

Credit : 3

Prerequisite : None

Synopsis

This subject covers the basic concepts of bioreactor operational mode and its culture kinetics. This subject also emphasizes on the application of transport phenomena in bioreactor, scale up, monitoring and control of bioreactor. This subject also includes the introduction of the unit operations that commonly employed to separate biological products. An idealized process of bioseparation consists of four phases which are the removal of insoluble products, the isolation of desired biological products or concentration, the purification and lastly, polishing of biological products. The basic methods that will be covered in this course include filtration, centrifugation, cell disruption, precipitation, extraction, adsorption, and chromatography. In addition, an overview on the complete train of bioseparation will also be introduced.



Course Outcomes

- CO1: Discuss different bioreactor operational modes, designs, and its related instrumentation and control.
- CO2: Solve the calculation regarding to the culture kinetic in different fermentation mode.
- CO3: Solve the calculation regarding to the mixing and mass transfer in a bioreactor and analyse the effect of scale-up.
- CO4: Differentiate four phases involve in bioseparation which are recovery, isolation, purification and polishing.
- CO5: Explain the principles of each technique.
- CO6: Justify the underlying reasons for choosing a particular technique, as well as suggest any related improvements.

BKG3453 Gas Processing & Liquefaction (E)

Credit : 3

Prerequisite : None

Synopsis

In this subject, two main parts including upstream and downstream processes of natural gas are covered. The course mainly focuses on the treatment processes involving in transforming raw hydrocarbon gas produced from offshore fields into several valuable products. In fact, the natural gas processes such as hydrocarbon gas processing, conditioning and liquefaction are vital for meeting the pipeline specifications and customer requirements. The common natural gas processes, namely; dry or steam reforming of natural gas and Fischer-Tropsch synthesis (FTS) are also discussed in this subject.

Course Outcomes

- CO1: Explain the socioeconomic effects of having hydrocarbon gas industry and its related activities. Comprehend simple PFD of Gas Processing Plant for treating raw natural gas to become sales gas and NGLs.
- CO2: Explain the main effect of the presence of impurities such as water, acid gases, heavier hydrocarbons and others in natural gas flow. Then, solve and decide the suitable type of treatment processes.
- CO3: Explain the natural gas liquefaction process which involves refrigeration and perform related engineering calculations.

BKG3433 Gas Transmission & Distribution (E)

Credit : 3

Prerequisite : None

Synopsis

This course aims to provide fundamentals knowledge to design piping systems for oil and gas transmission and distribution. These include gas pipeline design, engineering, fabrication, installation, testing and commissioning, as well as the gas pipeline network analysis. Students will also be exposed on the requirements for installation, codes and standards used in the design and installation of gas systems. Other relevant topics such as welding, corrosion control, odorizer system and gas metering skids will also be introduced.

Course Outcomes

- CO1: Design and evaluate the gas pipeline transmission and distribution system
- CO2: Calculate the pressure losses in gas pipeline using several networking analysis method
- CO3: Illustrate gas pipeline construction from acquiring of the right of way up to the commissioning process

BKG4463 Gas Storage & Reticulation (E)

Credit : 3

Prerequisite : None

Synopsis

This subject aims to enable students to identify various types of storing methods of liquefied petroleum gas (LPG), natural gases (NG) and liquefied natural gas (LNG). Besides that, the understanding of gas reticulation system is provided. Students will be provided with a working knowledge to design the gas storage and reticulation systems.

Course Outcomes

- CO1: Explain the fundamental concepts and characteristic of LPG, NG and LNG storage systems
- CO2: Analyze the gas load consumption, pipe and storage sizing, total of gas withdraw from LPG, NG and LNG storage and others related equipment
- CO3: Respond with the current issues in gas storage technology and development
- CO4: Design LPG, NG and LNG storage system and its accompanying piping or reticulation system



BKG3413 Combustion & Gas Utilization (E)

Credit : 3

Prerequisite : None

This course enables students to understand the concept of combustion, fuel properties & characteristics, explosion phenomena and other related terms. The course also cover the application of mass & energy balance calculation related to combustion products and other important requirement i.e. theoretical air ratio, flue gases etc. Students will be exposed to the burner conversion calculation & design which is applicable in industry application. Venting systems option was also being discussed base on the appropriate circumstances. The gas fuel utilization methods and system was introduced based on current scenario application.

Course Outcomes

- CO1: Explain the concept of combustion, fuel properties & characteristics, explosion phenomena and other related terms.
- CO2: Perform mass and energy balance in combustion system and burner conversion calculation
- CO3: Classify types of gas burner and equipment, burner conversion design and related energy generated technologies
- CO4: Keep abreast with the current issues in gas utilization method and system

BKC3783 Oil & Gas Technology (E)

Credit : 3

Prerequisite : None

Synopsis

This course introduces the concept of upstream, midstream and downstream activities of the oil and gas industry. By the end of this course, students should be able to identify and describe the main branches of petroleum exploration and exploitation activities such as geology, drilling, reservoir engineering and production. Students should also be able to explain the stages and process of hydrocarbon formation, how it is found and later produced. Exposure to the reservoir and production engineering calculations will be provided to illustrate the applications of engineering principles in oil and gas production activities. To complete the understanding of the oil and gas life cycle, the midstream and downstream aspects of the oil and gas industry such as, topsides facilities, refinery operations, gas processing, product transportation as well as economy aspects and current issues affecting the industry will also be covered.

Course Outcomes

- CO1: Distinguish the fundamental concept of upstream, midstream and downstream
- CO2: Estimate reservoir volumes and hydrocarbons in place and production calculations
- CO3: Select and design separators based upon well construction, fluid properties and production scenario.
- CO4: Evaluate the current issues and environmental effects in oil and gas industry

BKC3643 Industrial Safety Practices In Oil & Gas Sector (E)

Credit : 3

Prerequisite : None

Synopsis

This subject will help to increase the undergraduate student safety knowledge and awareness plus on top of that they will know the current practice in the oil and gas industries. Topics to be covered are as follows,

- i) Introduction to OSHA 1994 & EQA 1974 Acts.
- ii) PTW Systems i.e. cold work permit, hot work permit, vessel entry permit and excavation permit.
- lii) Lock Out & Tag Out (LOTO), confined space, gas detection and energy isolation.
- iv) Transportation and Distribution Safety (TDS).
- v) Behavior Based Safety (BBS) and PPE.

Course Outcomes

- CO1: Relates and explains the various acts / legislation governing OSHA & EQA.
- CO2: Used and apply the various permits to work (PTW) systems and knows the important PTW and minimum PPE requirement in the oil & gas industries.
- CO3: Distinguished the Do's & Don't of safety practices in a running oil & gas plant.

BKC3713 Process Optimization (E)

Credit : 3

Prerequisite : None

Synopsis

This subject introduces and develops techniques in formulating and solving optimization problems. Emphases will be given in optimization basics, unconstrained and constrained optimizations, linear programming, non-linear programming, and mixed integer programming. Applications of those concepts will be found in solving optimization issues in chemical processes such as heat transfer, separation, fluid flow and reactor design and operation.



Course Outcomes

- CO1: Explain optimization basics and the scopes within the chemical processes
- CO2: Formulate mathematical models to solve optimization problems in chemical processes
- CO3: Use an optimization software i.e General Algebraic Modeling System (GAMS)
- CO4: Execute, evaluate and perform sensitivity analysis for the developed optimization models

BKC3723 Advanced Process Modelling & Simulation (E)

Credit : 3

Prerequisite : None

This course will extend the knowledge and skills introduced in the course BKF3553 (Process Simulation and Computer Aided Design). Students will be exposed to the development and solving first principle model and empirical model of chemical process. Computational tools such as Matlab and Aspen software will be applied to solve complex problems. This subject will prepare the students with advance knowledge and skills involving modelling and simulating chemical process.

Course Outcomes

- CO1: Develop and solve first principle model using Matlab and Aspen software
- CO2: Develop steady state and dynamics process model related to chemical engineering and simulating it in Aspen software
- CO3: Perform sensitivity analysis and optimization study for process improvement using Aspen software
- CO4: Adapt positive team working behaviour

BKC3853 Process Monitoring (E)

Credit : 3

Prerequisite : None

Synopsis

This is an introductory level course of statistical-based process monitoring, which includes univariate and multivariate-based systems. The topics covered are introduction to process monitoring, statistical process control (SPC), multivariate statistical process monitoring (MSPM) and also industrial monitoring applications. In particular, the last chapter mainly exposes the students with variety applications of monitoring approaches as well as reviewing the issues of various monitoring extensions.

Course Outcomes

- CO1: Critically discuss the essentials and benefits of applying process monitoring system for ensuring smooth as well as safe industrial operability
- CO2: Apply as well as analyze the univariate monitoring performance based on the progression of the means and range charts of SPC framework
- CO3: Comprehensively explain in writing as well as solve mathematically the principles of multivariate analysis based on complex monitoring problem of MSPM framework
- CO4: Develop fault detection mechanism as well as perform investigation based on a specified case study by using Matlab
- CO5: Conduct a critical review of the current industrial monitoring issues particularly on the MSPM extensions

BKC3883 Process Integration (E)

Credit : 3

Prerequisite : None

Synopsis

This course deals with the concept of process integration consisting of mass integration, heat integration and cogeneration. The course uses pinch analysis to achieve the maximum both energy and mass recovery. The course also explains the integration and combination of power and steam.

Course Outcomes

- CO1: Discuss the need of chemical engineering graduates when they have to make an evaluation on energy consumption and estimate the energy recovery achievable.
- CO2: Explain and propose alternative ways for energy and mass minimization and estimate the benefits for the industry.
- CO3: Able to design the heat exchanger network for optimal design, the mass integration as well as the cogeneration network.

BKC4633 Polymer Design Technology (E)

Credit : 3

Prerequisite : None

This course is designed to provide an introduction to polymer design technology. It covers topics such as structure and elastic properties, viscoelasticity, yield and fracture, reinforced polymers, design and manufacture of polymer materials. Upon completion of the course, the students should be able to apply the essential knowledge on the polymer mechanical behaviors in designing the polymer-based products.



Course Outcomes

- CO1: Explain the theoretical and conceptual basis on polymer design technology
- CO2: Apply knowledge of the polymer materials, structure & properties and fracture.
- CO3: Analyse the mechanical properties of polymer in the design and manufacturing process.

BKC4673 Polymer Testing & Characterization (E)

Credit : 3

Prerequisite : None

This course is designed to introduce students to polymer testing and characterization for material development. It will cover various testing methods, standards and codes for polymer testing by its properties. Emphasize will be given to mechanical properties, thermal properties, physical properties, chemical resistance, degradation effects, flammability properties and electrical properties. The course also includes polymer characterization with different method like spectroscopy and thermal analysis.

Course Outcomes

- CO1: Describe the physical/chemical properties of the polymer materials and application.
- CO2: Identify the appropriate experimental method for a particular characterization problem
- CO3: Explain the basics, capabilities and limitations of structural, morphological, thermal and mechanical characterization analyses.
- CO4: Develop a work plan to solve a characterization problem and utilize some specific instruments for materials characterization.

BKC4653 Polymer Technology (E)

Credit : 3

Prerequisite : None

Synopsis

This course will provide in depth knowledge of polymer science and technology. It will polymerization reaction, kinetics, reactor, synthesis and processing technique of different types of plastics, rubber and composites. It will also deal with the current issues on polymer. Upon completing this course, students will be able to explain how polymers are processed into end-products and can suggest specific applications for specific polymers.

Course Outcomes

- CO1: Explain what polymers are and how they can be produced and how to control the properties of polymer
- CO2: How to manufacture end product by using different manufacturing techniques
- CO3: Identify different application on the basis of properties

BKC3693 Electrochemical Engineering (E)

Credit : 3

Prerequisite : None

The course will cover the fundamental principles of electrochemistry, including electrochemical thermodynamics, kinetics, and corrosion. Students will be exposed to the application of these principles in electrowinning, electrorefining, electroplating, fuel cells, batteries, and production of fine chemicals. Students will be able to perform efficiency analysis in these systems. They will also be able to understand the differences between types of fuel cells and distinguish between electrochemical and chemical energy systems. For each of the above application areas students will learn the criteria used to determine their performance, their current state of development, and their advantages/disadvantages

Course Outcomes

- CO1: Apply the fundamentals of electrochemistry to develop kinetic models and to elucidate the kinetic parameters of electrochemical reactions
- CO2: Design the electrochemical systems on the basis of the fundamentals of electrochemistry
- CO3: Evaluate the performance of electrochemical systems

BKC3683 Wastewater Treatment (E)

Credit : 3

Prerequisite : None

Synopsis

This subject covers the basic concept of water and wastewater treatment methods that include physical, chemical, biological and advances treatment methods. The physical, chemical and biological characteristics of water and wastewater are introduced briefly in this course. The project field work will be carried out for the students to get the exposure in this field.



Course Outcomes

- CO1: Explain and discuss the methods that used to characterize water and wastewater in accordance with the engineering fundamentals and environmental legislation
- CO2: Analyze, estimate, compare and solve problems of water and wastewater using different methods/processing
- CO3: Describe, evaluate, formulate and design of the engineered system for water and wastewater purification based on sustainable development

BKC3833 Recycling Technology (E)

Credit : 3

Prerequisite : None

Synopsis

This course aims to give a perspective on the use of chemical engineering knowledge in the recycling industry. Students will be taught on the overall issues of wastes, waste management and regulation related to it. Emphasis will be given on the awareness of recycling activities in Malaysia and other parts of the world, showing the technologies involved in doing the recycling. Students will have the opportunity to prepare and present the market survey and business plan on a chosen topic of interest in recycling of waste material in Malaysia, which require them to search for the most feasible recycling activity that can convince financial institution to finance the project. Students are also required to visit a related recycling plant to understand the nature of the business. At the end of this course, it is expected that the students will be able to appreciate the importance of recycling, the nature of recycling industry and bring the interest to them to venture into recycling business after completing their studies.

Course Outcomes

- CO1: Explain, describe and interpret the issue of waste, waste management and regulation, and recycling activities
- CO2: Apply knowledge of chemical engineering in developing the recycling process suitable for a specific waste material
- CO3: Prepare market survey and business plan on recycling of waste material into high value added product.

BKC4683 Food Engineering (E)

Credit : 3

Prerequisite : None

Synopsis

This course is designed to introduce the applications of certain unit operations in the processing of different types of food products. The principles and methods of heating and dehydration, refrigeration and freezing, are discussed with emphasis on their applications in the processing of dairy, fruit and vegetables, eggs, poultry, meat and fish products. The course will also provide an appreciation on the importance of food packaging, food safety and hygiene.

Course Outcomes

- CO1: Discuss the current status and future trends of food industry in Malaysia
- CO2: Apply and analyze the principles of dehydration in food products
- CO3: Discuss and elaborate on the production of refrigerated foods
- CO4: Elaborate on the materials used and roles of food packaging
- CO5: Discuss the importance of safety and hygiene in food production

BKC3653 Membrane Technology (E)

Credit : 3

Prerequisite : None

Synopsis

This subject is primarily to expose students to the membrane separation process which involves liquid and gas separation. The students will be taught the type of membranes (i.e. microfiltration, ultrafiltration, nanofiltration and reverse osmosis), membrane module and material, membrane manufacturing mainly for phase inversion technique other new techniques (interfacial polymerization, grafting, coating etc.) and a few concepts such as transport theory, concentration polarization, osmosis phenomenon etc. Membrane characterization and performance will be taught as well including physical characterization, number of modules, required membrane area for feed processing, etc. Some common case studies and applications will be delivered in this subject to expose the students to the current and future technology for membrane separation process (i.e. forward osmosis).



Course Outcomes

- CO1: Understand the basic principle in membrane separation technology and the classification of membrane
- CO2: Gain general information regarding the membrane manufacturing techniques, membrane characterization and membrane module design.
- CO3: Know the current and future applications of membrane separation technique

BKC4663 Ultrasonics (E)

Credit : 3

Prerequisite : None

Synopsis

This course aims to introduce the complete fundamental physics of ultrasonics, describe in detail equipment and procedures for chemical process systems. The principles of ultrasonics operations involved in chemical processes such as cleaning, machining, forming and joining, liquid atomization and droplet formation, agglomeration and flocculation, extraction processes, demulsification of crude petroleum, miscellaneous chemical effects and applications, electrolysis and electroplating. At the end of this course, it is expected that the students will understand theories, principles, calculation for the basic mechanisms, basic design parameters and applications of ultrasonics and are able to solve chemical engineering problems related to them.

Course Outcomes

- CO1: Explain the fundamentals of frequency, intensity and power of ultrasonics
- CO2: Review problems and its solving involving ultrasound processing technology
- CO3: Analyze wave propagation and associated phenomena for desired ultrasound wave fields technique
- CO4: Able to apply various analytical methods and operate ultrasonic horns for processing application and use of ultrasonics in non-destructive testing of metals for chemical processes using the analytical skills, modeling skills or engineering economics

BKC3893 Scale-Up of Chemical Process (E)

Credit : 3

Prerequisite : None

Synopsis

This subject covers the aspects of scale-up of chemical and biological processes and commercialization.

The course introduces the basic concept and application of scale-up of chemical and biotechnology related processes. The topics cover in this subject are introduction to the theory of scale-up; modeling and simulation; pilot plant; reactor scale-up; unit operation scale-up; fine/specialty chemical processes scale-up.

Course Outcomes

- CO1: Master the basic fundamentals of scale-up theory, and commercialization of R&D.
- CO2: Acquire the analytical and modeling skills required for conversion of lab scale processes to commercial scale.
- CO3: Improve communication and teamwork skills through group assignments.

**BACHELOR OF CHEMICAL ENGINEERING
TECHNOLOGY WITH HONS.****BTR1123 Physical Chemistry
Credit : 3****Synopsis**

This course discusses some introductory to thermodynamics in physical chemistry followed by continuation topics related to liquids and their mixtures, principles of chemical equilibrium and rate of reactions. The solid surfaces including their applications will also be discussed in this course. The development of key skills is facilitated by a program of tutorials and practical.

Course Outcomes

- CO1: Explain the physical principles and the gas equations in perfect or real condition..
 CO2: Apply basic thermodynamics concept to solve the problem related to applied physical chemistry
 CO3: Explain the structure of surfaces and the phenomena of adsorption isothermal surfaces chemical processes.

**BTR1133 Organic Chemistry
Credit : 3****Synopsis**

This course discusses the fundamental theory of the properties, synthesis and organic reactions where use the functional group as framework as a basic level courses with an organic chemical content. This course focuses on the key concepts of organic chemistry through a study of the reactions selected nonfunctional aliphatic, alicyclic, cyclic and aromatic molecules. Particular emphasis is placed on the underlying mechanistic pathway that are involved and their stereo chemical consequences. The stereochemistry of the molecular structure is also considered.

Course Outcomes

- CO1: Able to understand the common organics structures, properties and reactions of aliphatic and aromatic hydrocarbons, alkyl halides, alcohol groups, carbonyl groups and amines.
 CO2: Formulate chemical reactions and steps of mechanism for the synthesis and transformation of functional group.
 CO3: Discuss the bonding properties of carbon which cause it to be present in such a large number and variety of important compounds.
 CO4: Explain the common types of reactions mechanism and modern synthesis techniques.

**BTR3152 Engineering Technologist & Society
Credit : 2****Synopsis**

This subject introduces the students about personality particulars and behaviors. Those are very important in their careers as engineer technologist, as well as their services given by them to other people, especially their local community. The topics that will be included in this subject are the importance, professionalism, ethics, communication, management, contribution and philosophy of engineering technologist that should be implemented in their work, to ensure their engineering services give positive impacts in social aspects. By completing this subject, students should practice themselves as competent and versatile professional engineers, at least to be respected and appreciated among their communities, societies and countries.

Course Outcomes

- CO1 Explain knowledge of economic, industrial and social contexts of engineering technologist.
 CO2 Describe the relation of philosophy in term of science, technology and engineering.
 CO3 Demonstrate ethical competent, well-performed and well-servicing people in their career and to their communities and countries.

**BTR1112 Chemistry Laboratory
Credit : 2****Synopsis**

In chemistry laboratory the students are responsible to conduct the basic physical, organic and analytical chemistry experiments such as solubility, miscibility, chemical equilibrium, buffer and pH changes, calorimetry, solvent extraction, gravimetric, UV-VIS spectrometer, FTIR, DSC and gas chromatography. At the end of experiments, the students should be able to inculcate the critical thinking and able to work in safe working condition.

Course Outcomes

- CO1 Apply physical, organic & analytical chemistry theory in laboratory.
 CO2 Apply the basic science and analytical chemistry knowledge in operation of analytical chemistry equipment.
 CO3 Able to demonstrate and operate each analytical equipment base on the theories applied in analytical chemistry.
 CO4 Able to indicate any minor/major malfunction of equipment, incorrect step/ result & troubleshoot it

**BTR2113 Fluid Mechanics
Credit : 3****Synopsis**

The objective of this course is to introduce the concept and use of fluid mechanics, both static and dynamics fluid. The covered topics are fluid properties, fluid static and dynamics, Bernoulli's equation and applications, momentum equation and its application, analysis of flow in pipeline system and dimensional analysis.

Course Outcomes

- CO1: Recognize and describe the fundamentals of fluid mechanics
- CO2: Apply the concept of fluid mechanics to overcome chemical engineering problems
- CO3: Analyze and find solutions to problems related to fluid mechanics

BTR1234 Analytical Chemistry

Credit : 4

Synopsis

The syllabus covers the basic knowledge and application of sample and data handling, calibration techniques and quality of analysis in analytical laboratory. It also deals with separation techniques and its basis application such as solid phase extraction, GC and HPLC. The introduction to the theory and application of spectroscopic techniques used in chemical analysis such as UV-Vis, FT-IR, MS and AAS are discussed. The combinations of above techniques with their advantages are covered in this course.

Course Outcomes

- CO1: Explain and describe the theory and application of analytical chemistry.
- CO2: Interpret and analyze the analytical data.
- CO3: Solve the problems related to analytical chemistry.
- CO4: Explain the concept and application of analytical equipment such as: GC, HPLC, FTIR, UV-Vis and AAS.

BTR1214 Static & Strength of Materials

Credit : 4

Synopsis

This course is an overview of the study and analysis of forces and loading conditions applied to structures and mechanical devices. An introduction to methods used to determine internal stresses present in machine parts when subjected to various loading conditions. Topics include: simple stresses, centroids, moments of inertia, torsion, shear and bending stresses. Upon completion, students should be able to analyze forces and the results of stresses and strains on structural components.

Course Outcomes

- CO1 Establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior.
- CO2 Provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.
- CO3 Discuss the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, transverse shear, and combined loading.
- CO4 Demonstrate use of critical thinking and problem solving techniques as applied to mechanical and structural systems.

BTR1223 Thermodynamics I

Credit : 3

Synopsis

This course is designed to introduce basic concept in thermodynamic in a thorough way. Topics cover are properties of pure substances, thermodynamics system, heat transfer through conduction, convection and radiation, the first law of thermodynamics for closed systems, open systems and their application in steady-flow and unsteady-flow processes, the second law of thermodynamics, entropy, introduction to refrigeration and steam power plant.

Course Outcomes

- CO1: Discover the state of properties from property diagram and obtaining data from property table.
- CO2: Solve energy balance (heat, mass and work) of a process for both closed and open system by using the first law of thermodynamics and the concept of entropy through its reversible and irreversible processes.
- CO3: Analyze the thermal efficiency of heat engine, heat pump, and refrigerator and Carnot cycle using Second Law of Thermodynamics

BTR2143 Polymer Characterization Techniques

Credit : 3

Synopsis

This courses is designed to introduce students to polymer testing and characterization for material development. It will cover various testing methods,

standards and codes for polymer testing by its properties. Emphasis will be given to mechanical properties, chemical resistance, degradation effects, flammability properties and electrical properties. The course also includes polymer characterization with different method like spectroscopy and thermal analysis.

Course Outcomes

- CO1: Demonstrate the ability to explain method and techniques for polymer characterization.
- CO2: Apply method and technique for preparation polymers characterization.
- CO3: Analyze and suggest solutions to problems related to polymers characterization.

**BTR2133 Polymer Rheology
Credit : 3**

Synopsis

This course introduces the students to some major theories in polymer rheology, their applications in polymer processing and the basic principles of extrusion, injection molding and other major processing methods. Topics include fundamental flow properties, Newtonian and non-Newtonian analyses, methods of determination of rheological properties of polymer melts and solutions, structure-flow behavior relationships, viscoelastic fluid theory, application to extrusion, injection molding and other processes. The basic mathematical modeling and engineering design analysis of extruder screws and injection molds will also be described.

Course Outcomes

- CO1 Explain the basic flow properties of polymers, analyse the polymer flow.
- CO2 Describe the effect of the elastics and viscous flow.
- CO3 Relate the polymer rheology to properties of polymeric materials and processing.
- CO4 Analyze and explain the operation of injection molding and extrusion process.

**BTR1233 Polymer Chemistry
Credit : 3**

Synopsis

This course cover the basic of polymer chemistry. Students will be introduced to the fundamental of structure and properties of polymer. Classification of material and type of polymerizations such as step-growth, chain-growth, ionic and ring opening polymerization also will be covered.

Course Outcomes

- CO1: Explain about polymer material, their structure and can be classified polymer based on their material.
- CO2: Demonstrate the ability to explain different type of polymerization
- CO3: Apply method of polymerizations for preparation of structure of polymers
- CO4: Analyze the properties of polymers based on their molecular weight and copolymerization

**BTR2123 Polymer Synthesis
Credit : 3**

Synopsis

This course will cover the basic of polymer synthesis, including traditional polymerization techniques, such as free-radical and anionic chain polymerizations, and step growth polymerization. Newer methods of polymer synthesis, such as ring-opening metathesis polymerization and living free-radical polymerizations will be discussed. Students will be introduced to the methods of preparation of advanced polymer structures, such as block, star and brush copolymers, semi-conducting and biodegradable polymers. Fundamentals of structure and physical of polymers, and methods of characterization will also be covered.

- CO1 Explain about structure and properties of macromolecular substances.
- CO2 Demonstrate the ability to explain method and techniques for polymer synthesis.
- CO3 Apply method and technique of polymerizations for preparation of polymers.
- CO4 Analyze the properties of polymers.

**BTR2153 Chemical Processes Principle
Credit : 3**

Synopsis

The course begins with basic chemical engineering calculations which involve unit conversion and process variables determination. This course is designed to emphasis students on the foundation of material and energy balance in non-reactive and reactive processes for single and multiple units. Students will be exposed to the applications of ideal and non-ideal gas calculations in single phase system. In addition, multicomponent gas-liquid system and liquid-liquid system will be covered in multiphase systems topic.

Course Outcomes

- CO1 Apply basic chemical engineering calculations involving conversion of units and determination of process variables.
- CO2 Analyze and solve material balance of process systems for nonreactive and reactive processes in single and multiple units.
- CO3 Apply the ideal and nonideal gas calculations to solve problems related to single phase system.
- CO4 Solve problems on multiphase systems related to multicomponent gas-liquid system and liquid-liquid system.
- CO5 Analyze and solves energy balance calculation in both nonreactive and reactive systems.

**BTR2243 Properties of Polymeric Materials
Credit : 3**

Synopsis

This syllabus reviewing the history, classification, definitions and terminology, raw materials, methods of manufacturing, testing-characterization of typical physical properties, and end-uses of polymeric materials systems. Molecular structural features include chemical composition, molecular size and flexibility, intermolecular order and bonding, and super molecular structure. This course also deals with application of polymeric materials, design principles, new processing techniques and the determination of the influence of the processing condition on material characteristics.

Course Outcomes

- CO1 Explain and describe the general characteristic of polymeric materials.
- CO2 Describe the structure of polymeric materials.
- CO3 Understand the design principles, processing techniques and application of polymeric materials in industry.
- CO4 Explain molecular structure, compound bonding and chemical composition

**BTR2143 Computer Programming For Engineering Technologist
Credit : 3**

Synopsis

This subject aims to introduce the fundamental element and feasibilities of the computer programming by using MATLAB mathematical computing program. Students will be taught on analyzing data, developing a program using m-file and using the command window. They will learn to solve general mathematical equations in MATLAB, displaying the data via 2D and 3D graphs and to learn to develop the graphical user interface (GUI) for program.

Course Outcomes

- CO1: Organize and analyze the data by using MATLAB
- CO2: Understand and develop the program to solve the mathematical problems.
- CO3: Apply software to solve general mathematical problems.
- CO4: Demonstrate the ability to transform the problem to design and from design to an operational program.

**BTR2213 Transport Phenomenon in Polymer
Credit : 3**

Synopsis

The objective of this course is to provide students with concepts of heat and mass transfer. In heat transfer, the principles of the heat transfer in steady state by conduction, convection and radiation will be emphasized. In mass transfer, the principles of the mass transfer in gases, liquids, biological solutions and gel and solids will be discussed. The students will be exposed to the procedure for general problem solving involving heat and mass transfer systems.

Course Outcomes

- CO1 Explain and discuss the fundamental concepts of heat transfer.
- CO2 Apply the concept of heat and mass transfer in problems related to unit operations.
- CO3 Solve problems related to transport processes.

**BTR2223 Rubber Technology & Processing
Credit : 3**

Synopsis

This course is designed to provide a overall basic understanding on rubber and latex technology. It will concentrate on the introduction to latex, production of latex concentrate and latex processing. For rubber technology, it will also cover the introduction to natural rubber and synthetic rubbers, rubber compounding, rubber processing technology and vulcanization technology.

Course Outcomes

- CO1 Apply the knowledge of rubber materials and compounds and manufacturing process.
- CO2 Explain the rubber compounding & processing technology.

- CO3 Explain and describe the application of rubber in the design and manufacturing process.
- CO4 Analyse and compare the materials and manufacturing process suitable for production of rubber products.

BTR2233 Plastic Technology & Processing 1

Credit : 3

Synopsis

This course is designed to provide in the depth knowledge on compounding technology for thermoset and thermoplastic polymer. Functions of different additives will be discussed in details. It will cover the industrially important polymers, their processing methods and applications. Polymer degradation mechanism will be discussed and protection methods will be included. Due to sustainable environment, emphasis will be given on production of principles of plastic products from thermoset and thermoplastic will be covered using finite element analysis. It will also cover the design of plastic mould.

Course Outcomes

- CO1 Classify the additives and their functions to modify properties of polymer
- CO2 Discover the importance of biodegradable polymer for sustainable environment and identify degradation mechanism of polymer
- CO3 Explain how to design plastic products and mold.

BTR1113 Introduction to Polymer Science

Credit : 3

Synopsis

This course discusses a basic knowledge of polymer science and engineering. It will emphasize on classification and naming of polymers, molecular weight and molecular weight distribution, polymerization techniques, concepts of polymer solubility, concepts of amorphous and crystalline structures, introduction to commercial plastics and rubbers, and overview of polymer processing. Upon completing this course, students will be able to explain the fundamental principles of science and engineering. The students should also be able to explain how polymers are processed into end-products.

- CO1 Explain the concept and principles of polymer science and engineering fundamentals in polymer engineering.

- CO2 Demonstrate the ability to identify, formulate and solve chemical engineering and related problems.
- CO3 Initiate the values of professional, ethical and safety issues in engineering practices.
- CO4 Analyze contemporary issues and challenges related to social, cultural and global of polymer science engineering

BTR3113 OSH in Polymer Industry

Credit : 3

Synopsis

This course is primarily to expose students with the fundamental concepts, practical aspects and applications of occupational safety and health (OSH) in chemical and biotechnology industries. Among others, the students will be taught the fundamental application and day-to-day aspects of OSH and at the same time, the management aspects of it. Local and international regulations of SH&E such as OSHA and FMA will also be covered. Case studies from several chemical industries globally will also be discussed in details.

Course Outcomes

- CO1: Value fundamentals of technical safety for chemical and biotechnology industries.
- CO2: Explain the various features of OSH management and regulations.
- CO3: Review and analyze the cause and effects of industrial incidents and proposed for improvement.
- CO4: Evaluate OSH aspects in the design and operation of chemical and biotechnology industries such as Threshold Limit Values, Toxicology Study, Risk Assessment, HAZOP study, source model, dispersion model, fire triangle, fire protection and prevention.

BTR3123 Polymer Additives and Testing

Credit : 3

Synopsis

This course is an overview of polymer additives and testing methods in plastics processing. The topics cover the types of additives, plastic additive and chemistry, organic and inorganic additives, additive and processing as well as identification and testing of additives. This course is intended to be a practical guide for achieving optimal processing and product performance in development of plastic additives.

Course Outcomes

- CO1 Analysis the properties of plastic materials and suitable additives to improve the plastic product and their specification.
- CO2 Discuss and review the current development of polymer additives and the processing as well as the testing methods.
- CO3 Conduct the related experiment on processing and testing of plastic additives.

CO4 Describe the code of ethics in processing of additive and present in project work.

BTR3133 Automation and Process Control in Polymer Industry
Credit : 3

Synopsis

Synopsis This is an introductory level course in polymer process instrumentation and control. The topics that will be included in this subject are fundamentals and concepts of control system, application of theoretical and empirical model for chemical and physical processes, instrumentation of processes, application of Laplace transform and transfer function, block diagram, process instrumentation, design and analysis of control system, stability analysis, advanced process control and computer simulation/analysis. By completing this subject, students should be able to emphasize issues relevant to process knowledge; process behavior, process operation and automatic control.

Course Outcomes

- CO1 Discuss the elements of control system, theoretical model development for chemical processes and put them into standard transfer function.
- CO2 Analyse the dynamic behavior of different element system and different closed loop control systems.
- CO3 Analyse the instrumentation in control system and execute their transfer function.
- CO4 Analyse, and construct the controller and their applications in the close loop controlling systems.

BTR3143 Failure Analysis of Polymer Product
Credit : 3

Synopsis

This course will focus on analysis of polymeric materials behaviour. Furthermore, this subject will also include topics on types of failures in polymer product and measurement and/or characterisation of properties that are associated with the failures will be some of the key focus in this subject. The course will also emphasise on the use computer-aided tools/software in both polymer product design and failure analysis.

Course Outcomes

- CO1: Analyze the data obtained from the polymeric materials behavior.
- CO2: Discuss and review types of failures in polymer the reaction rate expression reaction order and specific reaction rate constant.
- CO3: Attain competency in using computer-aided tools/software in both polymer product design and failure analysis.

BTR3233 Numerical Methods & Optimization
Credit : 3

Synopsis

This subject teaches the techniques by which mathematical problems are formulated so that they can be solved with arithmetic operations. Topics covered in this subject are roots of equation, systems of linear algebraic equations, optimization, curve fitting, numerical differentiation & integration, ordinary differential equation and partial differential equation. Some software packages are introduced to empower the students in problem solving.

Course Outcomes

- CO1: Apply numerical methods as a problem-solving tool.
- CO2: Optimize a process employing numerical methods.
- CO3: Solve numerical methods problem by using MS Excel and MATLAB.
- CO4: Optimize a process employing MS Excel, Design Expert and MATLAB.

BTR4313 Technical Elective I-Polymer Nanocomposites
Credit : 3

Synopsis

This is introductory course in polymer nanocomposites that would focus materials, manufacturing methods, characterization, and applications. It will include different types of nanomaterials that are commonly used in modifying the polymer matrix composites. The major thrust would be the challenges in manufacturing low-cost real-life components in industrial applications, commercial success stories, its impact on current established material market, and future directions.

Course Outcomes

- CO1 Gain an understanding of materials commonly used for nano-modification such as nanoclays, Halloysite nanotubes (HNT™), polyhedral oligomeric silsesquioxane (POSS™), carbon nanotubes, nano-graphene, etc.
- CO2 Understand advantages and disadvantages of different thermoplastics and thermoset polymers as matrix materials.
- CO3 Study different manufacturing techniques of dispersion of nanoparticles such as sonication,

high shear mixing, centrifugal mixer, twin-screw extrusion.

- CO4 Understand characterization techniques of these materials under mechanical (static, fatigue, and impact) and thermal (glass transition temperature) loadings and exposure to fire environments.

BTR3213 Polymer Blend and Composites (2)

Credit : 3

Synopsis

This course is designed to provide a overall basic understanding on polymer blends and composites. It will concentrate on various aspects of polymer blends and composites. The type of reinforcement, matrix and their mechanism of reinforcement will be covered. It will also cover the manufacturing technique of long and short fiber composites. Factors affecting the strength of composites, composite interface and characterization technique will be covered. It will also include of selection of composites for specific application.

Course Outcomes

- CO1 Explain the theoretical and conceptual basis on polymer blends and composite materials.
- CO2 Identify the composite processing technique and factors affecting the performance of composites.
- CO3 Apply the knowledge of polymer blend and composites.
- CO4 Select an appropriate composite for specific application.

BTR3154 Engineering Technology Senior Design Project 1

Credit : 4

Synopsis

In this subject, students will be exposed to the polymer design principles and technology. This subject will emphasize on the extrusion and injection moulding methods. Subsequently, students will be exposed to the design principles for polymer manufacturing. At the end of this subject, students are expected to propose a design project for specific polymer application.

Course Outcomes

- CO1 Review on the design principles for polymer products.
- CO2 Demonstrate the ability to explain the design consideration of extrusion and injection moulding.
- CO3 Evaluate the various types of polymer for specific application.
- CO4 Propose a technology design project

BTR3223 Polymer Reaction Engineering

Credit : 3

Synopsis

This course provides the link between fundamentals of polymerization kinetics and polymer microstructure achieved in the reactor. The aim is to install a firm understanding on the effect of polymerization kinetics on both reactor performance and polymer quality, learning how to manipulate the process variables to achieve the process goals. Coordination polymerization, free-radical polymerization, suspension polymerization, emulsion polymerization and step-growth polymerization will be covered. It will also include the control of polymerization reactors.

Course Outcomes

- CO1 Identify the types of polymerization.
- CO2 Explain the polymerization technique for different feed stock and their kinetics.
- CO3 Recommended how to control the reactor to get desired properties of polymer product

BTR3234 Plastic Technology & Processing II

Credit : 3

Synopsis

This course provide an overview of the injection molding industry-its productivity; utilization; and yield -as well as an introductory discussion of applicable materials for injection molding, the theories of plastication and morphology, and the industrial standards used to specify the types of injection molding machinery, safety considerations, and recent innovations in injection molding processing technologies. Topics covered in the course include the processing behavior of thermoplastic materials, thermoforming, pultrusion and composite processing.

Course Outcomes

- CO1 Knowledge of uses and techniques of plastics processing, including limitations.
- CO2 Ability to "cost" plastics products, including life cycle analysis.
- CO3 "Ability to evaluate company supplied information for design purposes.
- CO4 "Recognition of means to develop life-long learning habits in the area of plastics engineering.

BTR4353 Technical Elective II Material Selection and Manufacturing Processes

Credit : 3

Synopsis

This course provides an overview of material processing, material selection and process parameter determination. Processes covered include: material removal, forming, casting, polymer processing, semiconductor manufacturing and assembly processes. Laboratory activities provide opportunities for applying the design through manufacture activities of the product cycle.

Course Outcomes

- CO1 To provide an overview of manufacturing processes associated with metallic, polymeric, ceramic and semiconductor based products.
- CO2 To provide students with an understanding of the relationship between material properties and manufacturing processes.
- CO3 To provide student with an understanding of process parameters and process optimization.
- CO4 To provide students laboratory learning experiences in the operation and control of manufacturing processes.

BTR4333 Technical Elective III - Injection Moulding Process & Design
Credit : 3

Synopsis

This course is designed to provide an overall basic understanding on polymer process based on injection moulding method. It will concentrate on various aspects of materials, processing fundamentals, mould design and part design. By the end of this course the students should be able to be knowledgeable on injection moulding material, process and part design.

Course Outcomes

- CO1 Explain the theoretical and conceptual basis on injection moulding process.
- CO2 Demonstrate the ability to explain the injection moulding components.
- CO3 Apply the knowledge of injection moulding process and design.
- CO4 Analyse the process and material troubleshooting.

BTR4146 Engineering Technology Senior Design Project II

Credit : 6

Synopsis

In this subject, students will be exposed to the polymer design principles and technology. This subject will emphasize on the extrusion and injection

moulding methods. Subsequently, students will be exposed to the design principles for polymer manufacturing. At the end of this subject, students are expected to propose a design project for specific polymer application.

Course Outcomes

- CO1 Review on the design principles for polymer products.
- CO2 Demonstrate the ability to explain the design consideration of extrusion and injection moulding.
- CO3 Evaluate the various types of polymer for specific application.
- CO4 Propose a technology design project

BTR4124 Project Management & Economics
Credit : 4

Synopsis

This course deals with cost analysis in engineering decision-making, the management aspects and control of complex projects. Engineering economics topics include cost estimation, time value of money, interest formulas and equivalence calculations, measures of investment worth, depreciation and income tax analysis. Engineering project management topics include knowledge on roles and responsibilities, planning, organization, time, cost, risk and quality management.

Course Outcomes

- CO1 Discuss the need of chemical engineering graduates when they have to make financial decisions as a team member or project manager.
- CO2 Explain theoretical and conceptual basis on which the practice of engineering economics project analysis is built.
- CO3 Apply basic project management concepts and principles through case study.
- CO4 Analyze the economic feasibility of a chemical plant, carried out by examining the capital cost and the manufacturing cost obtained from the cost estimation techniques.

BTR4133 Waste Management in Polymer Products
Credit : 3

Synopsis

This subject is designed to introduce to the students the principles and technologies applicable in the polymer material waste. Topics includes introduction on the waste from polymer based industries, treatment and management of the waste.

Course Outcomes

- CO1 Describe the ethics & responsibilities as technologists towards environment and expose to environmental legislation & regulation practices in Malaysia.
- CO2 Review problems and treatment available involving solid waste treatment by physical, chemical and biological system.
- CO3 Analyze the concept involved in management of solid waste and hazardous waste .

BTR4909 Industrial Training**Credit : 9****Synopsis**

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo six months of industrial training during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations. Development of skills in dealing with people, and communication skills are part of the subject objectives.

Course Outcomes

- CO1 Work independently in actual working environment with minimal supervision
- CO2 Develop communication skill with different levels of staff in the organization.
- CO3 Construct technical documents and give oral presentations related to the work completed.
- CO4 Develop positive attitude during the training programmed such as team working, lifelong learning and able to use the latest technology in industries.

BTR4913 Industrial Training Report**Credit : 3****Synopsis**

The student is required to maintain proper records and submit reports on the training received by him/her. The industrial training report should cover all periods of approved employment. The report

document is expected to demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives.

Course Outcomes

- CO1 Work independently with minimal supervision.
- CO2 develop communication skill with different levels of staff in the organization.
- CO3 construct technical documents and give oral presentations related to the work completed.

DIPLOMA IN CHEMICAL ENGINEERING

DKK1352 Electrical Technology

Credit: 2

Prerequisite: None

Synopsis

This course is designed to introduce the fundamental of electrical system principles. The underlying principles that will be covered in this course include an introduction to an electrical system, electrical safety, basic laws (Ohm's law, Kirchhoff's laws, current/voltage divider, wye-delta transformation), direct current (d.c.) circuits, methods of analysis, circuit theorems, single phase series and parallel circuits, series and parallel combination of resistor, inductor and capacitor, power in AC circuits, multiphase systems, and also alternate current (a.c.) and direct current (d.c.) motors. A part of that, student also needs to carry out simple technical project to assess their understanding on the basic principles of electromagnetism and its applications

Course Outcomes

- CO1 To describe the concepts of electrical system and its components as well as awareness on electrical safety.
- CO2 To analyse and solve electric circuit problems both for direct and alternate currents.
- CO3 Ability to implement the concepts of electromagnetism in students' project

DKK1781 Basics Science & Engineering Lab

Credit: 1

Prerequisite: None

Synopsis

In basic science and engineering laboratory, students are required to perform experimental works which covered the basis concept of physical and chemistry such as concepts of solubility and miscibility, gravimetric analysis, buffer effect, disassociation constant estimation, specific heat and reaction heat determination, pressure change analysis and hardness testing.

Course Outcomes

- CO1 Apply the basic science and engineering theories in the corresponding experimental works
- CO2 Apply the basic science and engineering concepts in solving problems and interpretation of experimental data.
- CO3 Adapt the team working behaviour and commitment as a member while working on the group assignment.

DKK1524 Computer Applications & Engineering

Graphics

Credit: 1

Prerequisite: None

Synopsis

This course covers on history of computer and its component, computer software like Microsoft Office, Excel, PowerPoint and Visio. Other than that, engineering drawing and utilisation of AUTOCAD software.

Course Outcomes

- CO1 Able to Identify capabilities, limitations and procedures for using computer systems to solve personal, business and educational problems
- CO2 Demonstrate knowledge of the main computer applications used in education and can choose the appropriate application for a given task
- CO3 Ability to describe the engineering tools by using techniques, skills and modern engineering tools necessary for chemical engineering practice.
- CO4 Apply the engineering tools in order to create technical drawings for the chemical engineering equipment and related disciplines.

DKK1413 Material & Energy Balance

Credit: 3

Prerequisite: None

Synopsis

This course is designed to give students a foundation in the basics of chemical engineering. Students will learn basic chemical engineering principles such as different unit systems, unit conversion and process variables determination. This knowledge will then be applied extensively for material and energy balances for single or multiple unit operations of non-reactive and reactive chemical processes. In addition, problem solving techniques are introduced and many of the terms and considerations to be expanded in future classes are introduced.

Course Outcomes

- CO1 Solve the basic chemical engineering calculations involving conversion of units, determination of process variables and single-phase system.
- CO2 Solve material balance of processes in nonreactive and reactive system in single and multiple units
- CO3 Solve energy balance of processes in nonreactive and reactive system

DKK1493 Transport Processes

Credit: 3

Prerequisite: None

Synopsis

In heat transfer, the principles of the heat transfer in steady state by conduction, convection and radiation will be emphasized. In mass transfer, the principles of the mass transfer in gases, liquids, biological solutions and gel and solids will be discussed. The students will be exposed to the procedure for general problem solving involving heat and mass transfer systems.

Course Outcomes

- CO1 Explain the fundamental concepts of heat and mass transfer.
- CO2 Apply the fundamental concept of heat and mass transfer mechanism to solve the problems
- CO3 Analyse problems occur in unit operation equipment by using the fundamental concept of heat and mass transfer

DKK1761 Mass and Heat Transfer Lab

Credit: 1

Prerequisite: None

Synopsis

This laboratory course is offered to enhance student's understanding through experiments to observe the application of theories learn in Mass Transfer and Heat Transfer. Numbers of experiments have been designed such as shell and tube heat exchanger, plate heat exchanger, tray dryer, mass transfer coefficient apparatus, fixed and fluidized bed apparatus. In this lab, student will be given a main objective of each experiment and instructor will explain about the work Instruction to run the experiment. Then, by working in their group student will run the experiment under supervision of the instructor. This will encourage student to be more creative and inculcate the critical thinking among the group member. Besides that, students will be exposed to industrial environment and safety precaution.

Course Outcomes

- CO1 Apply fundamental theories of chemical unit operation
- CO2 Operate common unit operation equipment which use in industries and be familiar to their components and function
- CO3 Ability to communicate effectively and presenting the data

DKK1771 Analytical Instrumental Lab

Credit: 1

Prerequisite: None

Synopsis

In Analytical Instrument Lab, students conduct experiment which involves different types of analytical equipment. Students are given main objective of each experiment and instructor will explain about the standard operating procedure to run the experiment. Then, by working in their

group student will conduct the experiment under supervision of the instructor. Students are encouraged to be creative and inculcate the critical thinking among the group member during the lab session. In overall, this lab consists of seven experiments which involves seven analytical equipment; Melting Point Apparatus, UV-Visible Absorption Spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), Refractometer, pH meter and Conductivity Meter and Thermogravimetric Analyzer (TGA).

Course Outcomes

- CO1 Demonstrate theories applied in analytical chemistry theories in the corresponding experimental works.
- CO2 Apply all the analytical chemistry knowledge in solving problems and interpretation of experimental data
- CO3 Adapt the team working behaviour and commitment as a member while working on the group assignment.

DKK2333 Thermodynamics

Credit: 3

Prerequisite: None

Synopsis

This course covered the properties of pure substances, the first law of thermodynamics for the closed and open systems, the second law of thermodynamics, entropy and introduction to the refrigeration, heat engine and heat pump.

Course Outcomes

- CO1 Apply and solve energy balance of a process by the First Law of Thermodynamics.
- CO2 Apply and solve the problems related to the Second Law of Thermodynamics on ideal and irreversible processes.
- CO3 Apply and solve the problems related to the refrigerator, heat engine and heat pump.

DKK2433 Chemical Reaction Engineering

Credit: 3

Prerequisite: None

Synopsis

In chemical reaction engineering, the student will learn the basic concept, design and calculation of various type of reactor in chemical process such as batch reactor, CSTR, and PFR. The topics covers in this subject are mole balances, conversion, reactor sizing, rate law, isothermal and non-isothermal reactor design, multiple reaction and catalyst.

Course Outcomes

- CO1 Explain the fundamentals of chemical reaction engineering such as mole balance, rate law, and stoichiometry using concepts in reactor design.
- CO2 Apply the concepts for the reactor operations using analytical skill.
- CO3 Solve problems related to reactor operation.

DKK2363 Engineering Mechanics

Credit: 3

Prerequisite: None

Synopsis

This subject will introduce students with concept of statics and dynamics and its application in related engineering field. The topics covered in this subject are static of particle, static of rigid body, distributed forces, analysis of structure, friction, kinematics and kinetics of particles. By completing the course, students will comprehend the basic mechanisms and applications of statics and dynamics in related engineering field.

Course Outcomes

- CO1 Apply the basic concepts in statics to solve problems concerning resultant of forces acting on a particle and equilibrium of a particle
- CO2 Analyze problems involving the equilibrium of a rigid body and use the fundamental principles in statics to solve them Apply the fundamental concept of heat and mass transfer mechanism to solve the problems
- CO3 Solve problems involving the kinematics and kinetics of a particle by applying the basic principles in dynamics

DKK2771 Chemical Reaction Engineering Lab

Credit: 1

Prerequisite: None

Synopsis

In Chemical Reaction Engineering lab, students are required to perform laboratory work in investigating the effect of pressure, mixing, temperature and different of acid types on solid liquid reaction and also to determine the heat of reaction in chemical reaction process. Continuous Stirred Tank Reactor (CSTR), Tubular Flow Reactor (TFR), Plug Flow Reactor (PFR) and batch reactor will be used in this experiment in order to expose students to the industrial environment.

Course Outcomes

- CO1 Apply the engineering and chemical reaction concept to solve lab experiment problem.
- CO2 Operate and demonstrate different type of reactors with different reactions

- CO3 Able to work in group and commit with the date line.
- CO4 Commit with all the lab rules and regulations

DKK2142 Plant Supervision

Credit: 2

Prerequisite: None

Synopsis

This course will cover foundation of supervision, planning & organizing skills, staffing skills and controlling skills. Besides that, it will also expose the students the real conditions and functions of supervisor and the supervisory concept-applied in the working culture.

Course Outcomes

- CO1 State the foundation for effective supervision
- CO2 Define the key concepts of planning, organizing, staffing and controlling.
- CO3 Describe the methods for stimulating individual and group performance.
- CO4 Describe the process for coping with workplace.

DKK2523 Environmental Engineering

Credit: 3

Prerequisite: None

Synopsis

This subject is designed to introduce to the students the principles, scientific assessment and engineering solutions to environmental problems affecting water, air and solid. Topics includes on the environmental concerns, legislation and regulation practices, wastewater quality management, wastewater treatment, outdoor air pollution, solid and hazardous waste disposal. It also includes the equipment selection and problem-solving technique to prevent the pollution through different processes and technologies.

Course Outcomes

- CO1 Discuss compliance to environmental legislation & regulation practices in Malaysia.
- CO2 Analyze and solve problems involving water and wastewater treatment.
- CO3 Determine the concept involved in management of solid waste, hazardous waste and air pollution control Solve calculation problem related to Safety, Health and Environment

DKK2373 Fluid Mechanics

Credit: 3

Prerequisite: DKK2363 Engineering Mechanics

Synopsis

This course is an introduction to fluid mechanics, and emphasizes fundamental concepts and problem-solving techniques. Topics to be covered include fluid properties,

fluid statics, fluid dynamics, control volume analysis and pipeline system.

Course Outcomes

- CO1 State the foundation for effective supervision
- CO2 Define the key concepts of planning, organizing, staffing and controlling.
- CO3 Describe the methods for stimulating individual and group performance.
- CO4 Describe the process for coping with workplace.

DKK2462 Plant Commissioning, Start-Up & Shut-Down

Credit: 2

Prerequisite: None

Synopsis

The understanding of engineering practices in plant commissioning and start-up are essential for the practicing technicians. This class will provide the student with a thorough understanding of the fundamentals in commissioning and start-up of chemical plants from the view point and experience of industrialist. It will cover subjects such as plant inspection, instrument testing, leak testing, pressure testing, plant monitoring, commissioning hazards, permit to work and plant maintenance and shutdowns.

Course Outcomes

- CO1 Describe the stages and phases involved in plant commissioning, start-up and shut-down.
- CO2 Explain the activities implemented during plant commissioning, start-up and shut-down.
- CO3 Apply the best engineering practices in each activity in the process and operation of plant commissioning, start-up and shut-down.
- CO4 Analyse safety and health issues and the action taken that need to be consider for any potential hazardous situation that may occur during plant commissioning, start-up and shut-down

DKK2473 Plant Safety & Health

Credit: 3

Prerequisite: None

Synopsis

This subject is primarily to expose students with the concepts, practical aspects and applications of safety and health (SH) and some basic of environmental concern in the chemical industries. The students will be taught the day-to-day and management aspects of SHE which includes local and international regulations such as OSHA, CIMAH, EQA and other related acts will be covered. Simple common case studies would be exemplified from local and abroad.

Course Outcomes

- CO1 Explain the importance of Safety, Health and Environment (SHE) in chemical industries
- CO2 Understand common international and local regulations regarding Safety, Health and Environment
- CO3 Solve calculation problem related to Safety, Health and Environment

DKK2483 Plant Utility

Credit: 2

Prerequisite: None

Synopsis

This course designed to introduce the basic utilities system employed in the chemical related plants such as boiler, cooling tower, compressors, water and flare systems. In each module, the students will be introduced to the basic concept of theory, operations, industrial applications, and maintenance procedure and equipment safety. At the end of this course, students are expected to be able to elaborate, theorize and identify the utilities systems that are commonly employed in chemical industries.

Course Outcomes

- CO1 Explain the basic mechanisms, principles and applications of boiler, steam distribution and pump.
- CO2 Explain the basic mechanisms, principles and applications of valve, cooling tower, compressor, water and flare systems
- CO3 Demonstrate understanding of current engineering problems and good communication skills through case study presentation and analysis

DKK2443 Process Instrumentation & Control

Credit: 3

Prerequisite: None

Synopsis

This is an introductory level course about process control and instrumentation systems used in chemical industries. The topics that will be included in this subject are fundamentals and concepts of process control and instrumentation systems, working principle of various control system instruments like transmitters, control valves, various measuring instruments for flow, level, temperature, pressure and composition, data communication in computer process control, distributed control system (DCS) and alarm systems using both theory and practical methods.

Course Outcomes

- CO1 Understand the basics of process control and instrumentation systems, process and instrumentation diagram (P&ID) used in chemical industries.

- CO2 Describe the working principle of transmitters, control valves and various process measuring instruments.
- CO3 Operate the process measuring instruments used in chemical processes.
- CO4 Perform the control of various chemical processes using virtual simulator
- CO5 Demonstrate feedback controllers, alarm, data acquisition functions and process history view in a control system.

DKK2464 Unit Operations

Credit: 4

Prerequisite: DKK1413 Material & Energy Balance

Synopsis

This class will provide the student with a thorough understanding of the fundamentals in unit operations involved in chemical engineering process and industry including evaporation, drying, absorption, distillation and leaching. At the end of this course, students are expected to understand the basic mechanisms, principles, basic design parameters and applications of the selected unit operations and are able to solve chemical engineering problems related to them. To enhance operational knowledge in unit operations, the students will be exposed to the related experiments at such as evaporation, absorption, and distillation.

Course Outcomes

- CO1 Explain and describe the basic mechanisms, principles and applications of distillation, absorption, evaporation, drying, leaching and extraction.
- CO2 Determine basic design parameters associated with the unit operations.
- CO3 Solve calculation related to the unit operations.
- CO4 Apply the knowledge of unit operation in laboratory.

DKK3919 Industrial Training

Credit: 9

Prerequisite: None

Synopsis

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo 24 weeks of industrial training during the end of the semester of the third academic year. The performance of each student during the periods of his/her Industrial training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records and submit reports on the training received by him/her. The industrial training report should cover all periods of approved employment. The report document is expected to

demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives. The student should be able to present the report to university supervisor, as a complement to their diploma.

Course Outcomes

- CO1 Display independency in actual working environment with minimal supervision
- CO2 Display communication skill with different levels of staff in the organization
- CO3 Present technical documents related to the work completed
- CO4 Practice positive attitude during the training

DKK3933 Industrial Training Report

Credit: 3

Prerequisite: None

Synopsis

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo 24 weeks of industrial training during the end of the semester of the third academic year. The performance of each student during the periods of his/her Industrial training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records and submit reports on the training received by him/her. The industrial training report should cover all periods of approved employment. The report document is expected to demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives. The student should be able to present the report to university supervisor, as a complement to their diploma.

Course Outcomes

- CO1 Display communication skill with different levels of staff in the organization
- CO2 Present technical documents related to the work completed

**FACULTY OF CIVIL
ENGINEERING AND EARTH
RESOURCES**





FACULTY OF CIVIL ENGINEERING AND EARTH RESOURCES

INTRODUCTION

The Faculty of Civil Engineering & Earth Resources (FKASA) was established in 2002 and had its first intake of students in July 2003. Civil engineering involves the assessment, planning, design, construction, operation and maintenance of physical infrastructures such as roads, buildings, water supply systems, airports, port bridges and tunnels. All these infrastructures are meant to improve the quality of human life.

PROGRAMMES OFFERED

FKASA offers academic programs which are relevant to the needs of the industry. At present, FKASA offers two undergraduate academic programs :

1. Bachelor of Civil Engineering (Hons) (BAA)
2. Diploma in Civil Engineering (DAA)

CAREER OPPORTUNITIES

Graduates of UMP are equipped with skills in Civil Engineering and soft skills as an added value which allows them to build a career as:

Diploma

- Instructor
- Assistant Civil Engineer
- Assistant Project Manager
- Site Supervisor
- Civil & Structural Clerk-of-Works
- Government sector

Bachelor

- Academician
- Civil Engineer
- Environmental Engineer
- Site Engineer
- Project Engineer
- Structural Engineer
- Design Engineer
- Research & Development Engineer
- Consultant
- Contractor



**FACULTY OF CIVIL ENGINEERING AND EARTH RESOURCES
CURRICULUM STRUCTURE
B.ENG (HONS.) CIVIL ENGINEERING**

YEAR SEMESTER	FIRST		SECOND		THIRD		FOURTH			
	BAA 1112 ENGINEERING DRAWING	BAA 1037 ENGINEERING SURVEYING FIELDWORK	BAA 1151 ENGINEERING SURVEYING CAMP	BAA 2713 FLUID MECHANICS	BAA 2841 ENGINEERING LABORATORY III	BUM 2313 CONTRACT & ESTIMATION	BAA 3213 REINFORCED CONCRETE DESIGN II	BAA 4876 INDUSTRIAL TRAINING	BAA 4743 PROJECT FOR PROFESSIONAL PRACTICES	BAA 4743 ELECTIVE I
	BAA 1322 CIVIL ENGINEERING	BAA 1931 ENGINEERING LABORATORY I	BAA 1113 MECHANICS OF MATERIALS	BAA 2873 ENGINEERING LABORATORY II	BAA 2513 SOIL MECHANICS & GEOLOGY	BAA 3921 ESTIMATION LABORATORY IV	BAA 3312 BUILDING MATERIALS & MAINTENANCE	BAA 4513 ENVIRONMENTAL ENGINEERING	BAA 4513 ELECTIVE II	BAA 4743 ELECTIVE II
	BAA 1312 CIVIL ENGINEERING MATERIALS	BAA 1323 ENGINEERING SURVEYING	BAA 1113 MECHANICS OF MATERIALS	BUM 2313 MATERIALS LABORATORY METHODS	BAA 2012 CONCRETE PROGRAMMING	BAA 2213 REINFORCED CONCRETE LABORATORY V	BAA 3513 GEOTECHNICAL ENGINEERING	BAA 3922 RESEARCH METHODOLOGY & PREPROJECT	BAA 4143 RESEARCH METHODOLOGY & PREPROJECT	BAA 4143 ELECTIVE III
	UHL 2400 FUNDAMENTALS OF ENGLISH LANGUAGE	UHM 2022 ETHNIC RELATIONS	UHL 2422 ENGLISH FOR TECHNICAL COMMUNICATION	UOJ 2711 CO-CURRICULUM II	BAA 2123 STRUCTURAL ANALYSIS	BUM 2313 HYDROLOGY & WATER RESOURCES	BAA 3023 MANAGEMENT IN CONSTRUCTION	BAA 4222 ENVIRONMENTAL SOCIETY	BAA 4914 ENVIRONMENTAL PROJECT	BAA 4914 ELECTIVE III
	BUM 2123 APPLIED CALCULUS	BUM 2753 DIFFERENTIAL EQUATIONS	UHL 2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHL 3153 ENGLISH FOR PROFESSIONAL COMMUNICATION	UHE 3712 ELECTIVE COURSES	BUM 2413 HIGHWAY & TRAFFIC ENGINEERING	UHS 2021 SOFT SKILLS II	BAA 3322 ENGINEERING ECONOMICS	BAA 3322 ENGINEERING ECONOMICS	UGE 2002 TECHNICAL PRENEURSHIP
	UHL 2412 ENGLISH FOR ACADEMIC COMMUNICATION	UHL 2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHL 2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHL 3153 ENGLISH FOR PROFESSIONAL COMMUNICATION	UHS 1021 FOREIGN LANGUAGES LEVEL 1	BUM 2413 APPLIED STATISTICS	UHF 2711 FOREIGN LANGUAGES LEVEL II	BAA 3223 STEEL & TIMBER DESIGN	BAA 3223 STEEL & TIMBER DESIGN	UHL 3153 ELECTIVE III
	UHR 1012 ISLAMIC AND ASIAN CIVILISATIONS 1		UHL 1711 FOREIGN LANGUAGES LEVEL 1	UHS 1021 FOREIGN LANGUAGES LEVEL 1	UHF 1711 FOREIGN LANGUAGES LEVEL 1					
	UOB 1711 CO-CURRICULUM 1									
TOTAL CREDIT	17	16	1	13	16	15	16	6	15	15
TOTAL CREDIT FOR GRADUATION	130 (MATRICULATION – SCIENCE PHYSICS/ STPM/ DIPLOMA) 133 (MATRICULATION-LIFE SCIENCE)									

COURSES

**ELECTIVE COURSES FOR
B.ENG (HONS.) CIVIL ENGINEERING**

NO.	CODE	COURSE	CREDIT HOUR
1	BAA 4313	GEOGRAPHICAL INFORMATION SYSTEM	3
2	BAA 4823	FACILITIES AND ASSET MANAGEMENT	3
3	BAA 4723	APPLIED HYDRAULICS ENGINEERING	3
4	BAA 4483	ADVANCED WATER AND WASTEWATER	3
5	BAA 4233	FINITE ELEMENT METHOD	3
6	BAA 4253	BRIDGE ENGINEERING	3
7	BAA 4263	SOLID WASTE MANAGEMENT	3
8	BAA 4413	TRANSPORTATION ENGINEERING	3
9	BAA 4323	BUILDING INFORMATION MODELLING	3
10	BAA 4523	SOIL IMPROVEMENT	3
11	BAA 4833	BUSINESS FOR ENGINEERING	3
12	BAE 4443	WASTE MANAGEMENT	3
13	BAE 4683	HAZARDOUS WASTE MANAGEMENT	3
14	BAE 4613	ENVIRONMENTAL MANAGEMENT	3
15	BAE 4813	ADVANCED HYDROLOGY & WATER RESOURCES	3
16	BAA 4243	ADVANCED CONCRETE MATERIALS	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9



**CURRICULUM STRUCTURE FOR
B.ENG (HONS.) CIVIL ENGINEERING
(BAA)**

**BAA1112 Engineering
Drawing
Credit Hour: 2
Prerequisite: None**

Synopsis

The objective of this course is to teach civil engineering students the basic skills of civil engineering drawing and drafting by using a computer-aided design and drawing software. Autodesk product AutoCAD will be used throughout the course. The AutoCAD software is one of the most widely used design and drafting tools in the world. Students will be able to gain proficiency in AutoCAD software by creating/modifying plans, drawings, or design files used for a variety of civil and environmental engineering projects. Course topics may also include works of real field examples

Course Outcome

- CO1: Use Autocad to draw foundation key plan, foundation schedules, column schedules, beams key plan, slab key plan and column key plan.
- CO2: Use Autocad to draw foundation and column detailings of a two-storey administration building.
- CO3: Use Autocad to draw beams and slabs detailings, reinforced concrete gutters details, apron details and rain water pipe details of a two-storey administration building.
- CO4: Use Autocad to draw door and window schedule detailings of a two-storey administration building.
- CO5: Use Autocad to draw roof detailings, front elevation, rear elevation, left elevation and right elevation of a two-storey administration building.

**BAA1322 Construction Engineering
Credit Hour: 2
Prerequisite: None**

Synopsis

This compulsory and basic subject will introduce the students to the world of construction industry. As an introduction, students are given information on the current situations in construction industries including the main person in-charge and their role in the project. The students will be taught the fundamental knowledge on elements involved in construction work process that would lead towards completion of strong and stable structure at the end of project. Students who are successfully complete this course will be equipped with basic and fundamental knowledge that a civil engineer should have.

Course Outcome

- CO1: Explain the responsibilities of parties involved in construction project and construction work process including types of temporary work structure and equipments used.

- CO2: Explain the types of sub-structure and superstructure in building construction, retaining wall, highway and bridge construction.
- CO3: Explain sustainable modern construction techniques.
- CO4: Explain the application of quality control in construction project.

**BAA1113 Engineering Mechanics
Credit Hour: 3
Prerequisite: None**

Synopsis

The subject in Engineering Mechanics is the fundamental of all courses in engineering, which requires students to have basic knowledge in both statics and dynamics. The emphasis is on the development and correct application of the fundamental concepts of rigid body mechanics. Topics covered for both statics & dynamics are force system resultants, condition of equilibrium, centroid & moment of inertia; force & acceleration and work & energy.

Course Outcome

- CO1: Analyze the concept of static mechanics system in two and three dimensions problems and solve it by applying the equilibrium condition.
- CO2: Determine the location of centroid and moment of inertia for a body of arbitrary shape.
- CO3: Analyze the kinematics of motion that involves force & acceleration and work & energy principle.

**BAA1312 Civil Engineering Materials
Credit Hour: 2
Prerequisite: None**

Synopsis

This course will enable students to demonstrate understanding in the fundamental properties of construction material. Students will learn the basic properties of cement, aggregate, water, admixtures, manufacturing of concrete, masonry, timbers, metals, and other construction materials. At the end of the course students should be able to identify the suitability of each material in a construction, analyse and provide basic solution to the problematic material, and recognize the importance of sustainability practice in construction material.

Course Outcome

- CO1: Demonstrate understanding in the fundamental properties of construction materials.
- CO2: Identify the suitability of one material in civil construction.
- CO3: Analyze and provide solutions to the problematic material in civil construction.
- CO4: Understand how the concept of sustainability applies to construction materials.

**BAA1912 Engineering Surveying Fieldwork
Credit Hour: 2**

Prerequisite: To be taken simultaneously with BAA1323 Engineering Surveying

Synopsis

This course will enable students learn appropriate skills to conduct practical fieldworks in the area of linear survey, theodolite traverse, levelling, topographical and site survey, curve ranging, computation and setting-out.

Course Outcome

CO1: Carry out and conduct linear survey fieldwork.

CO2: Carry out and conduct theodolite traverse survey fieldwork.

CO3: Carry out and conduct levelling survey fieldwork.

CO4: Carry out and conduct topographical and site survey fieldwork.

CO5: Carry out and conduct curve ranging, computation and setting-out survey fieldwork.

BAA1931 Engineering Laboratory I

Credit Hour: 1

Prerequisite: None

Synopsis

This ENGINEERING LAB I covers material testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

Course Outcome

CO1: Able to apply and conduct laboratory test and use significant and limitation of properties based on related standard requirement.

CO2: Collect, analyze and interpret experimental data.

CO3: Interact professionally among themselves and able to use communication skills to transfer their findings in a formal report format.

BAA1133 Mechanics of Materials

Credit Hour: 3

Prerequisite: Passed BAA1113 Engineering Mechanics

Synopsis

The aims of this course are the study of the behavior of engineering or structural elements subjected to loads. It provides an introduction on elastic stress and strain analysis, axial deformations and analysis of column.

Thus, properties and behavior of engineering materials including stress-strain relations. This course also deals with the analysis of direct and torsional shear stresses and their deformation; shear force and bending moment of beam also the stresses in beams; transformations of stresses.

Course Outcome

CO1: Identify and analyze the state of stresses, strains and deformation response of elastic solids in the external loading and axially load assemblies and describe and determine the mechanical behavior of materials under load.

CO2: Illustrate and analyze the shear-moment diagrams accordingly calculate the bending and shear stress in determinate beams.

CO3: Identify and solve the principal stresses and angles in plane cases using analytical method and Mohr's circle.

CO4: Identify and calculate the stresses, deformation and twist of angle of a torsional bar.

CO5: Apply the Euler formula to determine the magnitude of the critical load of buckling column

BAA1323 Engineering Surveying

Credit Hour: 3

Prerequisite: None

Synopsis

This subject will expose to the civil engineering students the role of survey engineering in their field. The subject topics encompasses introduction to the engineering surveying, surveying equipment, measurement unit, bearing/angle and distance measurement for horizontal control, coordinate system, area & volume calculation, mass transfer diagram & mass transfer measure and the final setting out for construction work.

Course Outcome

CO1: Identify and describe the definition and the principle of engineering survey including the engineering surveying roles in civil engineering works [i.e. determination point location technique, coordinate system, read and understand the information shown in site plan].

CO2: Describe the procedure to perform horizontal and vertical control based on related provision i.e. theodolite and traversing and leveling [angle, horizontal distance and vertical distance measurement and cogo computation.

CO3: Understand the range of calculations that can be made with surveying data i.e. An ability to make a necessary calculation to fix position of forming a horizontal and vertical curve, area and volume of construction work project.

BAA1131 Engineering Surveying Camp

Credit Hour: 1

Prerequisite: Passed BAA1912 Engineering Surveying Fieldwork

Synopsis

This engineering surveying camp encompasses carrying out horizontal and vertical control survey, detailing survey to locate man-made and natural features, preparation of site plan, related computation and setting-out simple construction work.

Course Outcome

CO1: Organize a small survey work for project.

CO2: Practice the significant of survey work using engineering survey techniques based on related provision.

CO3: Use various survey instruments at site.

CO4: Write report effectively.

BAA2713 Fluids Mechanics

Credit Hour : 3

Prerequisite : None

Synopsis

To introduce the fundamental principles of fluid mechanics, the basic equations governing fluid statics and fluid flow, and the methods of solving engineering problems related to fluid mechanics

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe fluid properties and the fundamentals of Fluid Mechanics concept.
- CO2: Analyze fluid mechanics system and devices such as capillary tube viscometer, falling ball viscometer, manometers, and piezometer.
- CO3: Apply and analyze fluid mechanics theories such as Bernoulli's Theorem , Continuity Equation, Darcy-Weisbach Equation and Reynold's Number in Fluid Mechanics system.
- CO4: Analyze the pipeline systems as related to civil engineering and its application for water distribution

BAA2113 Theory of Structures

Credit Hour : 3

Prerequisite : None

Synopsis

In this course students will be introduced to the analysis of statically determinate and indeterminate structures. The course covers the fundamental concepts of determining the structural stability and determinacy, analysis of statically determinate beams and frames, trusses and arches. Also to determine the deflection of beam and truss, and the analysis of indeterminate beams and frames.

1. Analyze the deflection and slope of determinate beams
2. Analyze an indeterminate beams and frames to obtain the end moments
3. Analyze internal forces and compute deflection of determinate plane trusses
4. Analyze 3-pinned arch to obtain the internal forces

BAA2921 Engineering Laboratory II

Credit Hour : 1

Prerequisite :

Synopsis

This course covers structure laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

Course Outcome

By the end of semester, students should be able to:

- CO1: Able to apply and conduct laboratory tests and use significant and limitations of properties based on related standard requirement.
- CO2: Collect, analyze and interpret experimental data.
- CO3: interact professionally among themselves and able to use communication skills to transfer their findings in a formal report format.

BAA2941 Engineering Laboratory III

Credit Hour : 1

Prerequisite : Taken BAA2713 Fluid Mechanics

Synopsis

This Engineering Lab III covers the laboratory testing for subjects Fluid Mechanics, Hydraulics, Hydrology & Environmental Engineering. These all experiments are complimentary to the basic theory that students have learned in the classroom and also to expose them to the practical work at the real world application in civil engineering field.

Course Outcome

On completion of this course, students should be able to:

- CO1: Able to apply and conduct laboratory tests and use significant and limitations of properties based on related standard requirement.
- CO2: Collect, analyze and interpret experimental data.
- CO3: Interact professionally among themselves and able to use communication skills to transfer their findings in a formal report format.

BAA2513 Soil Mechanics & Geology

Credit Hour : 3

Prerequisite : BAA1113 Engineering Mechanics

Synopsis

Soil Mechanics provides students with a basic knowledge of the fundamental concepts of soil behaviour and gives an introduction into general geotechnical engineering. The course describes: the relationship between soils and its geological origins and demonstrates the significance of the particles size distribution and mineralogy; soil description; phase relationships; classification of soil; compaction of soil; soil permeability and principle of effective stress; stress distribution and shear strength of soil.

Course Outcome

1. Recognize the problems given and draft the solutions by applying the soil and geotechnical fundamental.
2. Prepare appropriate table/graph/chart/diagram in order to overcome the problems/issues in soil.
3. Analyze the data, generate solutions and evaluate the results obtained.

BAA2723 Hydraulics

Credit Hour : 3

Prerequisite : BAA2713 Fluids Mechanics

Synopsis

This course introduces the concept and use of equations for open drainage and flow analyses (uniform & non-uniform flow) in open channel. It also covers the various phenomena such as hydraulic jump and backwater, specific energy and specific force concept application, analyses of hydraulics machinery principles and dimensional analysis & hydraulic similarity concepts. The application software package (such as: HEC-RAS) will be introduced in this course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the hydraulic principles and apply the fundamental concept in analyzing uniform and non-uniform flow in open channels.
- CO2: Differentiate and analyze the Rapidly Varied Flow (RVF) & Gradually Varied Flow (GVF) phenomena, then design the open channel for steady & unsteady flow cases using HEC-RAS Hydraulics Software.
- CO3: Establish the dimensional analysis formulation and apply hydraulic similarity concepts in scaling analysis.
- CO4: Discuss hydraulics machinery principles and apply the fundamental concepts in analyzing the performance of hydraulic pump.

BAA2012 Computer Programming

Credit Hour : 2

Prerequisite : None

Synopsis

The topics learned in this course are variables and data types, input/output instruction, assignment instruction, decision instruction, repetition instruction, functions, arrays, string and reading/writing from text files. The outcome of the course is described below.

Course Outcome

At the end of this course, the students should be able to:

- CO1 Ability to write computer programs to solve computational problems.
- CO2 Ability to map/visualize problems into computational framework.
- CO3 Ability to read, analyze and understand computer program codes.

BAA2123 Structural Analysis

Credit Hour : 3

Prerequisite : BAA2113 Theory of Structures

Synopsis

Structure Analysis is the continuity studies of the Theory of Structures course that exposes the advanced analysis

in the civil engineering structures and laboratory works. The course focuses on analyzing the column, statically indeterminate trusses, arches and cables and determines the displacement by using the Stiffness Matrix method for trusses, beams and frames. The principles and methods used to meet the objectives are drawn from prerequisite courses in mechanics, physics and mathematics.

Course Outcome

On completion of this course ,students should be able to:

- CO1: Determine and construct influence lines for determinate beams.
- CO2 : An ability to analyze the trusses to determine the internal forces and displacement of indeterminate plane trusses by using the Virtual Work Method
- CO3: An ability to analyze the arches and cables to determine the reactions and internal forces in arches and cables
- CO4: An ability to apply the Stiffness Matrix Method to determine the displacement in trusses, beams and Frames, hence to understand the principle of finite elements analysis

BAA3012 Law of Contract & Estimation

Credit Hour : 2

Prerequisite : None

Synopsis

The course covers topics of tendering, contract, condition of contract, contract administration/management, contract procurement, estimation, taking-off and the importance of information technology in estimation work.

Course Outcome

By the end of this course, students will have the ability to:

- CO1: Describe and analyze the type of construction contracts and tender documents.
- CO2: Differentiate types of contracts and propose the right type of contract to suit the nature of construction.
- CO3: Describe and analyze the type of project delivery in construction.
- CO4: Describe and apply the method of estimation to estimate the cost of construction projects.
- CO5: Analyze and interpret the constructions data to estimate the cost involved in construction projects.

BAA3921 Engineering Laboratory IV

Credit Hour : 1

Prerequisite : BAA2513 Soil Mechanics & Geology, BAA2413 Highway & Traffic Engineering

Synopsis

This Engineering Lab IV covers Highway & Traffic and Soil Mechanics & Geotechnical laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

Course Outcome

- 1. Able to apply and conduct laboratory tests and

- use significant and limitations of properties based on related standard requirement.
2. Collect, analyze and interpret experimental data.
 3. Interact professionally among themselves and able to use communication skills to transfer their findings in a formal report format.

BAA2213 Reinforced Concrete Design I

Credit Hour : 3

Prerequisite : BAA2113 Theory of Structures

Synopsis

This course covers the introduction of reinforced concrete design, the limit state principles, ultimate strength analysis and flexural design. Shear, bond and torsion, analysis and design of beams and solid slab, staircases and introduction to axial column design. Using codes require for design and detailing. Group design project for double storey house.

Course Outcome

By the end of this course , students will have the ability to:

1. Analyse first principle for single and double reinforced concrete beam and design reinforced concrete beam in accordance to the relevant codes of practice in building design.
2. Analyse, design and detail reinforced concrete slab in accordance to the relevant codes of practice in building design.
3. Analyse, design and detail reinforced concrete staircase in accordance to the relevant codes of practice in building design.
4. Analyse, design and detail reinforced concrete non-slender column in accordance to the relevant codes of practice in building design.
5. Design project of a double storey house in group as project team work and apply relevant code of practice, manuals and software in the design and detailing of structural components in reinforced concrete structures.

BAA3713 Hydrology & Water Resources

Credit Hour : 3

Prerequisite : BAA2713 Fluids Mechanics

Synopsis

This course will be introduced the application of hydrological theory to solve problem in water resources engineering. The knowledge in hydrology will be used in planning, development, management and design of water resources project. This course also introduces the knowledge of reservoir management, engineering economy and determination of water demand requirement in water resources planning.

Course Outcome

By the end of semester, students should be able to:

- CO1: Define and explain the basic concept of hydrology processes.
- CO2: Analyse and solve rainfall, stream flow, flow routing, runoff, hydrograph, groundwater,

- evapotranspiration and infiltration problems using various methods.
- CO3: Estimate peak discharge and propose urban drainage dimensions using MASMA (Urban Stormwater Management Manual for Malaysia) and Probability Distribution.
 - CO4: Describe the physical characteristics of reservoir and propose the yield, capacity & reliability of reservoir.
 - CO5: Explain and analyze the elements in water resources planning such as the economic and financial feasibility of engineering projects and computation of water requirement for irrigation.

BAA2413 Highway & Traffic Engineering

Credit Hour : 3

Prerequisite : None

Synopsis

This course is designed to introduce students on the basic understanding of highway & traffic engineering with an emphasis on the design standards that being used in Malaysia. Topic covers are Malaysian Road Network, Traffic Engineering Studies which includes fundamentals principles of traffic flow and Highway Capacity Analysis, Traffic Signal System, Road Geometric Design, Pavement Design and Pavement Management System.

Course Outcome

At the end of this course, the students should be able to:

- CO1: Classifying various types of road and highways within road network system, recognize how different road user groups interact and the consequence for traffic engineering.
- CO2: Explaining speed, volume and density relationship, analyzing highway capacity and LOS for interrupted and uninterrupted flow.
- CO3: Carry out fundamentals of Road Geometric Design allowing for different terrains, horizontal and vertical alignments.
- CO4: Identify the properties of pavement materials, its structural and characteristics, design the pavement according to the principle, evaluate pavement deterioration and assess alternative maintenance schemes for highways including surface and sub-surface drainage system.

BAA3213 Reinforced Concrete Design II

Credit Hour : 3

Prerequisite : BAA2213 Reinforced Concrete Design I

Synopsis

This course covers the design of column, foundation, retaining wall and introduction to prestressed concrete design and also typical design of a reinforced concrete building under the design project.

Course Outcome

On completion of this course ,students should be able to:
CO1 Analyse structure framing and design reinforced concrete columns.

- CO2 Analyse and design shallow foundations.
- CO3 Analyse and design reinforced concrete cantilever retaining walls.
- CO4 Describe the application and design of prestressed beams.
- CO5 Design a four storey building project.

BAA3312 Building Services & Maintenance

Credit Hour : 2

Prerequisite : None

Synopsis

This course will provide the fundamental knowledge of engineering design of the building services and maintenance in building through a specific design project

Course Outcome

At the end of this course, the students should be able to:

1. Design and illustrate air flow system to the building by applying physical fundamentals of ventilation in building
2. Apply Application of Electrical Distribution Network System and Design a lighting and electrical application in a building system and Housing Development Area.
3. Apply appropriate techniques and analyses to the effective design of both drainage & sewerage systems in single building and Housing Development Area
4. Able to Calculate and design the water demand and pipe sizing systems for the water supply Housing Development Area.
5. Able to recognise and Design Fire Prevention & Fire Fighting System in Building

BAA3513 Geotechnical Engineering

Credit Hour : 3

Prerequisite : BAA2513 Soil Mechanics & Geology

Synopsis

Geotechnical Engineering provides students with further discussion and explanation related to soil engineering. The course describes: Soil compression, consolidation and settlement, Lateral pressure of soil, Slope stability, Bearing capacity of soil, Site Investigation and environment geotechnics.

Course Outcome

1. Describe the principal tests used to determine the compressibility parameters of soil and calculate consolidation, time for settlements of a foundation and embankment.
2. Describe theory of earth pressure and apply the theory in calculation and design of earth retaining wall structure.
3. Describe theory and calculate slope stability using slip surfaces and method of slices.
4. Describe theory and calculate the shear strength of soil
5. Describe the purpose and basic principle of soil investigation
6. Describe the purpose and basic principle of environmental geotechnics in civil engineering

BAA3023 Project Management in Construction

Credit Hour : 3

Prerequisite : None

Synopsis

To introduce the concept of project management which will cover the life cycle of the projects, roles of project manager, type of project organization, resource management, techniques of planning and scheduling, monitoring and controlling and types of software for project planning and scheduling that have been practiced in construction industry.

Course Outcome

- CO1: Explain the concept of project management and project life-cycle.
- CO2: Describe and explain role of project manager as an important person in construction project.
- CO3: Describe and explain role of project manager as an important person in construction project.
- CO4: Differentiate and apply methods and techniques of resource management.
- CO5: Examine and apply the appropriate techniques of project planning, scheduling, monitoring and controlling.

BAA3613 Environmental Engineering

Credit Hour : 3

Prerequisite : None

Synopsis

This course is an introduction to the different aspects of environmental engineering. The course outline is divided into six main topics: Water Quality, Water Treatment Engineering, Wastewater Treatment Engineering, Water Pollution, Air Pollution, Noise Pollution and Solid Waste Management in which contemporary issues and principles of sustainable development are highlighted.

Course Outcome

- On completion of this course ,students should be able to:
- CO1: Able to classify water samples by analyzing relevant water quality parameters
- CO2: Able to establish each phase of the potable water treatment process in detail
- CO3: Able to design a simple wastewater treatment system
- CO4: Able to evaluate the sources of solid waste, air, noise and water pollution as well as the measures that may be taken to sustainably deal with them.

BAA4976 Industrial Training

Credit Hour : 6

Prerequisite : BAA3023 Project Management in Construction, BAA3012 Law of Construct & Estimation, BAA3513 Geotechnical Engineering, BAA2723 Hydraulics, BAA2213 Reinforced Concrete Design I

Synopsis

This course involves placement of students in relevant industry for approximate 10 weeks duration to get real-world working experience. Every student will be assigned an advisor/lecturer from the faculty who will co-operate with the industrial counterpart. At the end of the industrial training, students need to submit report. In addition, the respective industrial counterpart need to evaluate and

provide comments on the students performances. CIBD structured module will be used as a part of evaluation.

Course Outcome

On completion of this course ,students should be able to:

- 1.Behave according to organisations regulation and procedures while performing to basic professional skill during the available duration.
- 2.Practice and contribute taught theories to solve real time problem through involvement in various scopes of works such as planning concept, design, construction & project administration.
- 3.Adjust to professional and quality work ethics in order to become an effective, motivated and responsible engineer.
- 4.Communicate effectively on complex civil engineering activities such as being able to comprehend and write effective reports and design documentation and make effective presentations.

BAA4023 Project for Professional Practices

Credit Hour : 3

Prerequisite : BAA2113 Theory of Structures,

BAA3213 Reinforced Concrete Design II

Synopsis

This course is a Capstone Design Project that offering experience in multidisciplinary project-based learning. This course is design to ensure minimum proficiency and equipment of the upcoming graduate. This course is conducted with numbers of partners from industry which is involve the engineer, architect, surveyor, town planner, contractor, etc in the direction of giving real exposure to the student. This course provides an opportunity for students to integrate and apply their knowledge learn in the class. This course comprises a comprehensive group design project and a series of seminars from expert.

Course Outcome

On completion of this course ,students should be able to:

- 1.Able to develop and propose planning layout for new development area that fulfilling all the necessary requirement from local authorities
- 2.Able to design, construct and scheduling proper planning for the new project development
- 3.Able to design and produce structural detailing
- 4.Able to estimate the costing for the project
- 5.Able to generate proposal for project development
- 6.Able to justify all the proposal in final presentation

BAA4513 Foundation Engineering

Credit Hour : 3

Prerequisite : BAA3513 Geotechnical Engineering

Synopsis

Focuses on geotechnical design of shallow and deep

foundations, including spread footings, mats, driven piles, and drilled piers. Coverage includes bearing capacity, settlement, group effects, and lateral load capacity of the various foundation types. Additional topics include subsurface exploration, construction of deep foundations, and analysis of pile behavior using wave equation and dynamic monitoring methods.

Course Outcome

On completion of this course ,students should be able to:

- CO1: Designing Shallow Foundation based on Bearing Capacity Analysis
- CO2: Designing Shallow Foundation Based on Settlement Analysis
- CO3: Mat Foundation
- CO4: Designing Pile Foundation
- CO5: Designing Sheet Pile
- CO6: Designing Braced Cuts

BAA3922 Research Methodology & Pre-Project

Credit Hour : 2

Prerequisite :

1.Student Year 3 and above

2.Subject related to the research area must

be 'TAKEN' before registering for Research Methodology & Pre-Project (BAA3922)

Synopsis

Students are required to attend a research workshop at the beginning of the course, where they will be taught on how to do research; research methodology, conducting literature review, data sampling, collection, analysis, and interpretation. Students will be guided by their respective supervisors on how to plan for the research, which will be conducted later in PSM 2 course. Students will have to carry out weekly discussion with their supervisors on the research topic, objective, scope, research program, and the extent of the development of the research proposal. A report and a presentation of the research proposal are required at the end of the course.

Course Outcome

At the end of this course, the students should be able to:

- CO1: Select topic, identify the objectives, categorize the scope of works and prepare schedule for the implementation of a civil engineering related projects
- CO2: Choose, review, discuss and interpret issues and problems related to particular project by conducting adequate literature review.
- CO3: Choose, propose, employ, and develop or formulate the appropriate methodology to carry out the experiment and or data collection as to achieve the objectives of an engineering project.
- CO4 : Demonstrate, describe, discuss, illustrate, argue and predict about the selected topic, objectives, project approach, schedule, budget and expected outcomes for an engineering project in an oral presentation.
- CO5: Solve and meet all deadlines and project commitments.

BAA4222 Engineers in Society

Credit Hour : 2

Prerequisite : None

Synopsis

Qualified engineers of tomorrow will need to be market conscious, commercially adept, environmentally sensitive and responsive to needs of society. They must also be good communicators, organizers and managers. Therefore, this course is designed to enrich the students and intended to introduce them to the professional practice of civil engineering, with emphasis on the roles of practicing engineers, professional practice organization, engineering ethics, professional registration and communication skills.

Course Outcome

This course will cover three scopes which is technology in society, organization of engineering society and communication. The course features several guest speakers and all are civil engineering practitioners and professional, providing the students an opportunity to interact with professionals in their major field of interest.

1. Adopt and show concern to professional, regulation and ethical responsibilities.
2. Ability to function as an individual, member or leader in diverse teams and multi-disciplinary settings
3. Ability to communicate effectively and write effective reports and make effective presentation
4. Adopt and show concern the relationship between technology, engineering, and safety issues
5. Ability to apply the aspects of project management and quality in engineering

BAA3322 Engineering Economics

Credit Hour : 2

Prerequisite : None

Synopsis

This subject covers the principles and applications of economic analysis in the field of engineering to make sound decision among alternatives.

Course Outcome

By the end of semester, students should be able to:

- CO1: Realize the importance and role of economic decision in final decision making process of engineering project.
- CO2: Identify the sources of data, and analyze the cost and benefit (financial matter) of engineering project.
- CO3: Analyze the time value of money problem and apply the principles and techniques of engineering economics for effective decision making among alternatives.

BAA3223 Steel & Timber Design

Credit Hour : 3

Prerequisite : BAA2123 Structural Analysis

Synopsis

This course covers the analysis and design steel structures to EC3 for beams, column, connections,

trusses, compression members and tension members.

This course is also covered an introduction to Timber design to MS544.

Course Outcome

At the end of this course, the students are expected to fulfill the following course outcomes:

- CO1: Analyse & design beam according to the relevant codes of practice in building design.
- CO2: Analyse & design column according to the relevant codes of practice in building design.
- CO3: Analyse & design steel trusses in according to the relevant codes of practice in building design.
- CO4: Analyse & design steel connection in according to the relevant codes of practice in building design.
- CO5: Analyse and design a typical timber structure
- CO6: Communicate effectively within a team designing a multi-storey steel building project using appropriate design software and modern tools to produce a report and present the project according to a given time.

BAA4413 Transportation Engineering

Credit Hour : 3

Prerequisite : None

Synopsis

This course is designed to introduce students to fundamental aspects in transportation engineering. The topics covered include four step travel demand models, traffic management and public transport.

Course Outcome

At the end of this course, the students should be able to:

- CO1: Evaluate transport related problems using theoretical and/or practical calculations and observations.
- CO2: Assess the performance of infrastructure or public service provision and recommend improvement

BAA4233 Finite Element Analysis

Credit Hour : 3

Prerequisite : BAA2123 Structural Analysis

Synopsis

This course will expose to students various techniques in analyzing common structures using stiffness methods, truss equations and beam equations. Students are taught how to analyze frame structures using frame and grid equations. In addition, finite element analysis procedures such as plane stress, plane strain stiffness equations and linear-strain triangle equations will be delivered in class. Axisymmetric elements and isoparametric formulations are second last topic for this course. Towards the end, students will learn various ways in analyzing three-dimensional stress and use finite elements software - ANSYS to solve structural engineering problems.

Course Outcome

1. Able to analyze common structures using stiffness methods, truss equations and beam equations.
2. Able to analyze frame structures using frame and grid equations

3. Able to analyze finite element using plane stress, plane strain stiffness equations and linear strain triangle equations
4. Able to analyze axisymmetric elements and isoparametric formulations
5. Able to analyze three-dimensional stress and use finite elements software - ANSYS to solve structural engineering problems

BAA4253 Bridge Engineering

Credit Hour : 3

Prerequisite : BAA2213 Reinforced Concrete Design I

Synopsis

This course covers on prestressed concrete bridge design, prestressing system, loss of prestress for bridge beams, analysis and design of section for flexural, shear and also principles and design of prestressed concrete members for prestressed concrete bridge. The course also covers prestressed concrete one-way slab and two-ways slab design for prestressed concrete bridge.

Course Outcome

1. Able to design prestressed concrete beam with prestressing tendon for bridges
2. Able to design deck slabs and calculate prestressed losses, deflection, camber for concrete bridges
3. Able to design piers and shear reinforcement for concrete bridges
4. Able to design anchorages, pile caps and foundations for bridges
5. Able to conduct overall design for serviceability limit state and ultimate limit state and use CIVILFEM softwares for bridges design

BAA4313 Geographical Information System

Credit Hour: 3

Prerequisite : None

Synopsis

The goal of this course is to give knowledge and understanding about application of GIS in Civil Engineering. The main content of this course is about an application of GIS in Civil Engineering. Amongst the main topics discussed are:

1. Fundamental and development of GIS in civil engineering
2. Data processing such as data capture, data management, spatial analysis, data manipulation and data output.
3. Current application of GIS (focus in Malaysia)

Course Outcome

By the end of semester, students should be able to:

CO1: Student will be able to identify and describe the main component of GIS and

- advantages of GIS in civil engineering.
 CO2: Student will be able to explore about the data capture, processing and organization spatial data.
 CO3: Student will be able to analyze and solve the spatial problem.
 CO4: Student will be able to use GIS software.

BAA4323 Building Information Modelling

Credit Hour : 3

Synopsis

This course focuses on theoretical and technical knowledge of Building Information Modelling (BIM). The theoretical aspect emphasises on the fundamental concept of BIM. It covers the three crucial elements of People, Process and Technology. In the process element, the student will learn about the different stages of BIM delivery. Additionally, BIM standards and BIM manual of work process are also included to provide a better understanding. In the people elements, the focus of teaching concentrates on different responsibilities of BIM associated roles. It covers the function of each role to deliver the BIM scope of work effectively. Lastly, the technology elements focus specifically on the technical aspect of BIM. It will covers four interconnected activities of delivery to use 3D Parametric Authoring Tools. (INPUT, SETUP, MODELLING, OUTPUT) . At the end of the class, the students should be able to produce 3D Information rich BIM models.

Course Outcome

- On completion of this course ,students should be able to
 CO1: Analyze complex engineering structures using truss, beam, plane stress and plane strain equations for static and dynamic structural analysis, heat transfer, fluid flow and electrostatic analysis
 CO2: Apply finite element techniques to perform simulations of structures subjected to static and dynamic loading, heat transfer, and fluid flow through porous media
 CO3: Analyze complex engineering structures using Finite Element Software
 CO4: Develop finite element formulations as well as solution algorithms for various types of analyses, structural elements and materials

BAA4253 Soil Improvement

Credit Hour : 3

Prerequisite : BAA2513 Soil Mechanics & Geology, BAA3513 Geotechnical Engineering

Synopsis

This course deals with the principles of ground improvement and soil stabilization. Among the topics covered are mechanical compaction, preloading and vertical drain, dynamic deep compaction, vibro compaction and replacement, grouting, deep soil mixing, earth reinforcement, tiebacks, soil nailing and sustainability in ground improvement.

Course Outcome

At the end of this course, students should be able to:

CO1: Apply and analyse the principles, application and design procedure for various soil improvement methods.

CO2: Calculate and analyse theoretical/numerical calculation and field observation of engineering performance to evaluate rationality of a particular soil/ground improvement procedure applied.

CO3: Evaluate alternative solutions and evaluate their effectiveness in solving problems.

BAA4723 Applied Hydraulics Engineering

Credit Hour : 3

Prerequisite : BAA2723 Hydraulics

Synopsis

This course is to provide students with the advanced principles in applied methods towards hydraulic problems. It covers application and analysis of urban stormwater facilities, sedimentation processes and erosion problems which will equip the students with the skills on techniques of hydraulics analysis. Few examples and case studies from the MSMA 2nd Edition will be introduced as a guideline to assist and expose student in real world applications.

Course Outcome

1. Define and analyze the hydraulics concept of uniform and non uniform flow in open channels and the hydraulics machinery principles
2. Apply and design the roof property drainage, rainwater harvesting system and on-site detention facilities
3. Classify and determine the pavement drainage and the drain and swales for urban stormwater management
4. Identify and analyze the sedimentation & erosion process and recommend the suitable erosion & sediment control plan (ESCP).
5. Define and calculate scour at piers and abutments.
6. Classify and discover the characteristics and application of hydraulics structures in various water related project

BAA4833 Business for Engineering and Construction

Credit Hour : 3

Prerequisite : None

Synopsis

The module provides an introduction to Business Skills for Engineers in Construction practice. It highlights how management theory and established practice. It highlights how management theory and established practice and procedures are applied to support the non core business of an organisation. It also develops an understanding of the requirement of a contractor in relation to the management of services which support an organisation.

Course Outcome

1. Apply Business philosophy in Construction Sector relate to construction economy, market system and basic concept of economy

in the market system.

2. Explain the related legal system in the country and their potential contribution to construction environment.
3. To evaluate the project management life cycle, construction accounting and financial management used this in making decision and sets out to explain this key aspect of business.
4. To evaluate the potential enhancements to systems and techniques
5. Analyses overall project planning and cash flow analysis for construction project.

BAE4443 Waste Management

Credit Hour : 3

Prerequisite : None

Synopsis

Waste management is the module focuses on waste management such as solid waste management. In this module student will be exposed on the regulation, processes and design for safe waste management begin from generation, storage, and transportation until disposal of solid waste. In this subject, the students will be introduced to the sustainability technique of waste management such as the application of Life Cycle Assessment (LCA). It is important for student to learn and understand this subject in order to develop clean and safe environment for human and health.

Course Outcome

1. Apply the engineering fundamental for solving practical waste management challenges
2. Demonstrate their ability to research existing and emerging technologies for the treatment of waste and recovery of value from waste.
3. Apply the role of decision making tools in the assessment of waste issues such as Life Cycle Assessment (LCA) and appreciate the role of recycling.
4. Summarize the increasing importance of waste management in achieving environmental sustainability and able to demonstrate waste minimization and monitoring system in solid or hazardous waste for environmental concern and public health.

BAE4483 Advanced Water and Wastewater Treatment

Credit Hour : 3

Prerequisite : BAA3613 Environmental Engineering

Synopsis

This course aims to extend and deepen the scope of the water and wastewater treatment engineering. The purpose of this course is to provide and educate students the theory and practices of advanced technologies for water and wastewater treatment. The syllabus is designed to include the topics on water treatment engineering (water characteristics, water quality, conventional water treatment process, advanced water treatment technologies and water reuse) and wastewater treatment engineering (wastewater characteristics, effluent quality standard, conventional wastewater treatment process,

advanced wastewater treatment technologies and wastewater reuse.

Course Outcome

1. Apply the fundamental of engineering to solve the engineering problems related to water and wastewater process engineering.
2. Analyse the requirement and system design which address practical of advanced technology for the treatment of water
3. Analyse advanced wastewater treatment components and systems to determine overall process and individual unit effectiveness
4. Evaluate the increasing importance of water and wastewater management in achieving environmental sustainability

BAE4813 Advanced Hydrology & Water Resources

Credit Hour : 3

Prerequisite : BAA3713 Hydrology & Water Resources

Synopsis

This course is to provide students with the knowledge in advanced hydrological methods towards water resources problems. It equips the students with the skills on techniques of hydrological and water resources data analysis, modeling and prediction. This course begins with advanced methods in runoff model, hydrograph analysis and flood routing analysis. Other topics will be covered are probability and frequency analysis, the introduction of Urban Stormwater Management Manual for Malaysia (MSMA) in stormwater quantity control and water resources management including water uses, policy and regulation, system and economics analysis of water resources system. The knowledge in this course will be used in planning, development, management and design of water resources project.

Course Outcome

1. Apply and analyse the rainfall runoff relationship and flow routing using multiple components and methods
2. Analyse and evaluate the various approaches in probability and frequency distribution in the hydrological data analysis
3. Analyse and design the stormwater quantity control such as detention pond and infiltration facilities using Urban Stormwater Management Manual for Malaysia Second Edition (MSMA2) and software
4. Evaluate and relate the characteristics and applications of water resources management in various water related projects

**FACULTY OF CIVIL ENGINEERING AND EARTH RESOURCES
CURRICULUM STRUCTURE
DIPLOMA IN CIVIL ENGINEERING**

YEAR SEMESTER	FIRST			SECOND			THIRD			
	SHORT SEMESTER	FIRST	SECOND	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	
	UHL 1412 FOUNDATION ENGLISH	UHL 1422 ENGLISH FOR ACADEMIC SKILLS	UHL 1432 ENGLISH FOR OCCUPATIONAL COMMUNICATION	UHS 1021 SOFT SKILLS I	UHS 2021 SOFT SKILLS II	DAA 3912 INDUSTRIAL TRAINING				
	UQB 1011 BRIGED SISWA	DUM 1123 CALCULUS	UHR 1012 ISLAMIC AND ASIAN CIVILISATIONS I	DAA 1951 ENGINEERING LABORATORY I	UGE 1002 ASAS PEMBUDAYAAN KELOSAHAWANAN					
	DUM 1113 BASIC MATHEMATICS	DUF 1113 PHYSICS	UHM 2022 ETHNIC RELATIONS	DAA 2313 ENGINEERING SURVEYING	DAA 2951 ENGINEERING LABORATORY III					
COURSES		DUK 1113 GENERAL CHEMISTRY I	DUM 2113 TECHNICAL MATHEMATICS	DAA 2322 ENGINEERING SURVEYING FIELDWORK	DAA 2023 PROJECT MANAGEMENT					
		DAA 1032 ENGINEERING DRAWING	DAA 2931 ENGINEERING LABORATORY II	DAA 2123 THEORY OF STRUCTURES	DAA 2213 STRUCTURAL DESIGN I					
		DAA 1312 ENGINEERING MATERIALS	DAA 1212 COMPUTER PROGRAMMING	DAA 2513 SOIL MECHANICS AND GEOLOGY	DAA 2222 STRUCTURAL DESIGN II					
		DAA 1113 ENGINEERING MECHANICS	DAA 1123 MECHANICS OF MATERIALS	DAA 2612 ENVIRONMENTAL ENGINEERING	DAA 2523 GEOTECHNICAL ENGINEERING					
			DAA 1723 FLUID MECHANICS	DAA 2723 HYDRAULICS & HYDROLOGY	DAA 2413 TRAFFIC & HIGHWAY ENGINEERING					
	TOTAL CREDIT	6	18	18	18	18	12			
	TOTAL CREDIT FOR GRADUATION									90

**CURRICULUM STRUCTURE FOR
DIPLOMA IN CIVIL ENGINEERING
(DAA)**

**DAA 1032
ENGINEERING DRAWING
CREDIT HOUR: 2**

SYNOPSIS

This subject aims to expose civil engineering students to engineering drawing and to prepare this knowledge in their future profession. This includes the structural, section and structural detailing drawings. Hands-on sessions using drawing software packages will equip the students with first hand practice on producing the drawings for some idealized and actual projects. Mini project covers several disciplines of civil engineering profession integrated through a series of these hands-on sessions.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 - Describe the basic characteristics and features of civil engineering drawing.
- CO2 - Identifying drafting tools.
- CO3 - Execute computer-aided software to produce engineering drawing
- CO4 - Interpret the civil engineering drawings to the actual construction.

**DAA 1312
CIVIL ENGINEERING MATERIALS
CREDIT HOUR: 2**

SYNOPSIS

This course will enable students to demonstrate understanding in the fundamental properties of construction material. Students will learn the basic properties of cement, aggregate, water, admixtures, manufacturing of concrete, masonry, timbers, metals, and other construction materials. At the end of the course students should be able to identify the suitability of each material in a construction, analyse and provide basic solution to the problematic material, and recognize the importance of sustainability practice in construction material.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Demonstrate understanding in the fundamental properties of construction materials.
- CO2 – Identify suitability of one material in civil construction.
- CO3 – Analyze and provide solutions to the problematic material in civil construction.
- CO4 – Understand how the concept of sustainability applies to construction materials.

**DAA 1113
ENGINEERING MECHANICS
CREDIT HOUR: 3**

SYNOPSIS

The emphasis on the development and correct application of the fundamental concepts of rigid body mechanics. Topics covered for both statics & dynamics are force system resultants, condition of equilibrium, centroid & moment of inertia; force & acceleration and work & energy.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Analyze the concept of static mechanics system in two and three dimensions problems and solve it by applying the equilibrium condition.
- CO 2 – Determine the location of centroid and moment of inertia for a body of arbitrary shape.
- CO3 – Analyze the kinematics of motion that involves force & acceleration and work & energy principle.

**DAA 2931
ENGINEERING LABORATORY II
CREDIT HOUR: 1**

SYNOPSIS

This ENGINEERING LAB II covers material and structural testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Observe and detect the failure from destructive and non-destructive testing
- CO 2 – Conduct concrete mix design and produce the output from the design.
- CO3 – Conduct tensile strength test and discuss the properties of steel from the test.

**DAA 1212
COMPUTER PROGRAMMING
CREDIT HOUR: 2**

SYNOPSIS

The subject focusses on development of programming skills using computer programming language that is suitable for the current computer operating system.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Describe basic computer programming and its functionalities
- CO 2 – Construct and adopt a pseudo code and flow chart for solving a computing problem
- CO3 – Analyze a simple computing-based project
- CO4 – Design and develop computer program using basic language programming

**DAA 1123
MECHANICS OF MATERIALS
CREDIT HOUR: 3**

SYNOPSIS

The course covers the introduction and concepts of material stress and strain in a variety of different loading situation within a given material's elastic limit. This course also concerned with the calculation of forces acting on static objects and structures. Major concepts include: material properties; loads, reactions, axial load; stress and deformation, including statically indeterminate systems, axial force, shear force, bending moments, flexural and shear stresses in beams, beam deflections and torsion: stress and deformation.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Solve the state of stresses, strains and deformation response of elastic solids in the external loading and axially load assemblies.
- CO 2 – Solve the mechanical behavior of materials under load and provide insight for modeling the behavior to theory.
- CO3 – Analyze the shear-moment diagrams accordingly calculate the bending and shear stress in determinate beams.
- CO4 – Analyze the principal stresses and angles in plane cases using analytical method and Mohr's circle.
- CO5 - Analyze the stresses, deformation and twist of angle of a torsional bar.

**DAA 1723
FLUID MECHANICS
CREDIT HOUR: 3**

SYNOPSIS

To introduce the fundamental principles of fluids mechanics, the basic equations governing fluid statics and fluid flow and the methods of solving engineering problems related to Fluid Mechanics

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Define the fluid properties and the fundamentals of Fluid Mechanics concept.
- CO 2 – Explain Fluid Mechanics system and devices such as Manometer and Peizometer.

- CO3 – Apply Fluid Mechanics theories such as Bernuolli's Theorem and Continuity Equation.
- CO4 – Demonstrate the pipeline system as related to Civil Engineering

**DAA 1951
ENGINEERING LABORATORY I
CREDIT HOUR: 1**

SYNOPSIS

Engineering Lab I for diploma covers laboratory experiments in the field of Water and Environment. The laboratory experiments are complementary to the theory that students have learnt in their classrooms and will expose them to the practical work in the working industry.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Collect, analyze, interpret and apply experiment data using significant and limitations of properties based on related standard requirement as well as use communication skills to transfer their findings in a formal report format.
- CO 2 – Interact professionally among themselves and able to conduct laboratory tests.

**DAA 2313
ENGINEERING SURVEYING
CREDIT HOUR: 3**

SYNOPSIS

This subject will expose to the civil engineering students the role of survey engineering in their field. The subject topics encompasses introduction to the engineering surveying, surveying equipment, measurement unit, bearing/angle and distance measurement for horizontal control, coordinate system, area & volume calculation, mass transfer diagram & mass transfer measure and the final setting out for construction work.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Identify and describe the definition and the principle of engineering survey including the engineering surveying roles in civil engineering works [i.e: determination point location technique, coordinate system, read and understand the information shown in site plan.
- CO 2 – Describe the procedure to perform horizontal and vertical control based on related provision i.e theodolite and traversing and levelling [angle, horizontal distance and vertical distance measurement and cogo computation.

CO3 – Understand the range of calculations that can be made with surveying data i.e An ability to make a necessary calculation to fix position of forming a horizontal and vertical curve, area and volume of construction work project.

**DAA 2322
ENGINEERING SURVEYING FIELDWORK
CREDIT HOUR: 2**

SYNOPSIS

This fieldwork emphasizes on handling of survey equipments, carry out linear survey, traverse survey, leveling, establishing temporary bench mark, detail survey, techniques of gathering the locating man-made and natural features, preparation of site plan, related computation, and setting-out simple construction work.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Organize a small survey work for project.
- CO 2 – Practice the significant of survey work using engineering survey techniques based on related provision
- CO3 – Use various survey instruments at site.
- CO4 – Write report effectively

**DAA 2123
THEORY OF STRUCTURES
CREDIT HOUR: 3**

SYNOPSIS

To introduce the concept of project management which will provide the students with the knowledge of managing of construction project. As an introduction, students will be given general information on basic elements involved in management and phases in construction project. Then they will be given exposure to the methods to properly plan and schedule the project plus knowledge to do cost estimation of the construction project.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Determine the deflection and slope for statically determinate beams
- CO 2 – Analyze the an indeterminate beams and frames to obtain the end moments
- CO3 – Analyze the internal forces and compute the deflection of determinate plane trusses
- CO4 – Construct the influence lines and determine the reaction, shear and moment due to moving loads
- CO5 - Analyze the three-hinges arch to obtain the internal forces

**DAA 2513
SOIL MECHANICS AND GEOLOGY
CREDIT HOUR: 3**

SYNOPSIS

This course provides an elementary introduction and the basic mechanics necessary for Geotechnical Engineering. This course aims to provide the basic understanding of the engineering geology, the soil origin and formation, basic soil engineering properties, the soil classification, the compaction of the soil, the effect of water in soil in term of permeability and seepage and also the stresses in the soil mass.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Acknowledge and explain the geological background and rock cycle.
- CO 2 – Understand the fundamental of weight-volume relationship in soil and able to produce the compaction curve from soil compaction.
- CO3 – Identify the soil classification , its consistency properties and able to produce particle distribution curve.
- CO4 – Identify the soil's permeability, calculate the amount of water flowing by producing the flow net diagram.
- CO5 - Acknowledge the principle of effective stress and able to analyze the soil stresses in various cases.

**DAA 2612
ENVIRONMENTAL ENGINEERING
CREDIT HOUR: 2**

SYNOPSIS

Introduction to environmental engineering; physical, chemical and biological processes; water and wastewater treatment; air pollution; solid and hazardous waste; sewage treatment and disposal and treatment plant design

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Identify and calculate the physical, chemical and biological water quality parameters
- CO 2 – Illustrate water treatment processes
- CO3 – Demonstrate wastewater treatment processes
- CO4 – Analyze the environmental pollution such as solid waste, water and air pollution

**DAA 2723
HYDRAULICS & HYDROLOGY
CREDIT HOUR: 3**

SYNOPSISYS

Hydraulics introduces the basic concepts of fluid flow in open channel including uniform flow, non-uniform flow and hydraulic jump. Water distribution through pipeline and hydraulic machinery, especially pumps are covered in this course. Whilst hydrology includes, the hydrological cycle, precipitation, measurement and analysis of rainfall, hydrological losses, runoff and hydrograph.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Define the type of channel flow and analyze the uniform flow, non-uniform flow in open channel.
- CO 2 – Apply Loop method for pipe network and Nodes method for branching pipes in pipelines water distribution also identify the types of pumps, their selection criteria and performance evaluation.
- CO3 – Define and solve the basic concept of hydrology processes and precipitation.
- CO4 – Apply and solve hydrological losses, runoff and hydrograph problems using various methods.

**DAA 2951
ENGINEERING LABORATORY III
CREDIT HOUR: 1**

SYNOPSISYS

This ENGINEERING LAB III covers Highway and Geotechnical laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practical work at the construction industry.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Conduct pavement material and soil testing and analyze the data.
- CO 2 – Demonstrate flexible pavement design based on JKR Standard.
- CO3 – Produce soil related graphs/curves/diagrams.

**DAA 2023
PROJECT MANAGEMENT
CREDIT HOUR: 3**

SYNOPSISYS

To introduce the concept of project management which will provide the students with the knowledge of managing of construction project. As an introduction, students will be given general information on basic elements involved in management and phases in construction project. Then they will be given exposure

to the methods to properly plan and schedule the project plus knowledge to do cost estimation of the construction project.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Understand the overall construction project management process and the function of each party involved in construction.
- CO 2 – Identify and explain types of project organization practiced in construction industry.
- CO3 – Discover and uses the appropriate techniques of project planning, scheduling, monitoring and controlling.
- CO4 – Apply the method of estimation to estimate the cost of construction projects.
- CO5 - Uses the appropriate software in performing the project planning and scheduling tasks.

**DAA 2213
STRUCTURAL DESIGN I
CREDIT HOUR: 3**

SYNOPSISYS

This subject is intended to give students a good understanding of the design and behaviour of reinforced concrete structures at the design ultimate limit state. We will look at the design of building structures in some detail with particular emphasis on the design of beams, slabs, columns and pad footing. Emphasis is placed on understanding structural behaviour and the background to the design methods in EC2 and other codes where appropriate. By the end of this module student will have a good understanding of the design and behaviour of reinforced concrete beams, slabs, columns and pad footing.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Explain the basic concepts of reinforced concrete design and load involved in structural design. Analysis first principle for single and double reinforced concrete beam. Analyse and design reinforced concrete beam
- CO 2 – Analyse and design reinforced concrete slab by using relevant codes of practice and carry out the concrete structures detail.
- CO3 – Analyse and design reinforced concrete column by using relevant codes of practice and carry out the concrete structures detail.
- CO4 – Analyse and design reinforced shallow foundation by using relevant codes of practice and carry out the concrete structures detail
- CO5 - Interpret the architect drawing to engineering drawing thus construct structural drawing in designing a one-storey building project via manual calculation, and then comparing with ESTEEM software tasks.

DAA 2222

STRUCTURAL DESIGN II
CREDIT HOUR: 2

SYNOPSIS

To introduce the concept of project management whereby this will provide the students with the knowledge of managing of construction project. As an introduction, students will be given general information on basic elements involved in management and phases in construction project. Then they will be given exposure to the methods to properly plan and schedule the project plus knowledge to do cost estimation of the construction project.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Analyse & design beam according to the relevant codes of practice in building design.
- CO 2 – Analyse & design column according to the relevant codes of practice in building design.
- CO3 – Analyse & design steel trusses in according to the relevant codes of practice in building design.
- CO4 – Analyse & design steel connection in according to the relevant codes of practice in building design.
- CO5 - Analyse and design a typical timber structure
- CO6 - Communicate effectively within a team designing a project using modern tools to produces a report according to a given time.

DAA 2523
GEOTECHNICAL ENGINEERING
CREDIT HOUR: 3

SYNOPSIS

This subject provides further discussion and explanation related to soil engineering. The topics cover in the subjects includes the shear strength of soil, lateral earth pressure, slope stability, site investigation, shallow foundation, compressibility of soil and environmental geotechnics. at the end of this course, student should be able to have ample knowledge regarding the soil engineering and behaviour and also able to practice the knowledge outside.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Define the Mohr Coulomb criterion and describe the laboratory tests to obtain the shear strength parameters and also explain the soil behaviour that relate to soil shear strength.
- CO 2 – Solve the lateral earth pressure based on various cases and method of analysis and Compute the stability of the slope in term of factor of safety using various approach of analysis.
- CO3 – Describe the important things in site investigation process that need to be consider before a construction can take place.

- CO4 – Illustrate the types of shallow foundation and its function, able to describe bearing capacity and also apply the soil bearing capacity under various conditions.
- CO5 - Define the concept of soil compressibility, describe the laboratory test to obtain various consolidation parameters and able to predict future settlement and Use the modern technology to manage the landfill by using the geosynthetics materials.

DAA 2413
TRAFFIC & HIGHWAY ENGINEERING
CREDIT HOUR: 3

SYNOPSIS

To introduce the concept of project management which will provide the students with the knowledge of managing of construction project. As an introduction, students will be given general information on basic elements involved in management and phases in construction project. Then they will be given exposure to the methods to properly plan and schedule the project plus knowledge to do cost estimation of the construction project.

COURSE OUTCOME

At the end of semester, student should be able to:

- CO1 – Categorized Malaysian road network system according to road design standard and explain the fundamentals of traffic engineering elements such as road, driver and vehicles characteristics
- CO 2 – Analyze the fundamental traffic studies data of speed, volume and capacity and outline the intersection design principal based on local standard
- CO3 – Carry out specific highway geometric design attributes based on JKR standards
- CO4 – Identify mix design properties and conduct flexible pavement designs based on JKR Standard

DAA 3912
INDUSTRIAL TRAINING
CREDIT HOUR: 12

SYNOPSIS

Students are exposed to the industrial practice as associate to engineers through attachment at public and private sectors. They need to be attached at the workplace for six months or at least through the final semester as set by the faculty. Achievement of every student will be assessed by visiting supervisor (tutors and lecturers) and host supervisor (the representative of the industry where the student is attached). At the end of the industrial training period, students are required to write a report of all recorded activities in the log book in a standard format, present it and submit a copy to the industrial training coordinator for evaluation.

COURSE OUTCOME

At the end of semester, student should be able to:



CO1 – Experience actual working environment at the workplace and use information and data collected in the logbook as prime source for writing a technical report

CO 2 – Practice relevant theory in carrying duties at the workplace as well as making arrangement, assessing and discuss the results of the data while making reference to prevailing standards and specifications

CO3 – Argue or support about the fulfillment of the project objectives and recommend for further works. and use logbook as diary for technical personal

CO4 – Learn new skills at workplace and later demonstrate, describe, discuss, illustrate , argue and predict about the finding of the project in an oral presentation.

CO5 - Communicate and work as team member with all level of work force.

FACULTY OF MECHANICAL ENGINEERING





FACULTY OF MECHANICAL ENGINEERING

INTRODUCTION

The Faculty of Mechanical Engineering, Universiti Malaysia Pahang is situated in the royal town of Pekan in the State of Pahang. The state is located on the waterfront facing the South China Sea, approximately 270 km to the east of the capital city of Malaysia, Kuala Lumpur. The university was established more than a decade ago and since then has been making significant contributions as a research and learning institution, equipped with high-end facilities and driven by capable faculties. Apart from undergraduate programmes in Mechanical Engineering, the faculty offers postgraduate degrees in a wide range of research fields including:

- Advanced Structural Integrity & Vibration
- Automotive Engineering
- Structural Materials & Degradation
- Energy Sustainability
- Human Engineering
- Manufacturing
- Advanced Fluid

The faculty has strong links with various strategic partners in the automotive, manufacturing and oil & gas industries especially in the East Coast Region of Malaysia. Our undergraduate students are trained and developed through various structured soft-skill programmes and industrial schemes thus gaining vital professional competencies and enhancing their employment prospects.

The faculty is actively engaged with research and development activities in the areas of automotive, structural integrity & vibration, manufacturing, computer simulation, product design and development human engineering, corrosion & fracture and material engineering to generate technologies relevant to the needs of the industry. The faculty aims to be the centre for industries particularly in the East Coast Region of Malaysia.

The latest updated information regarding our faculty is available at: <http://fkm.ump.edu.my/>

PROGRAMMES OFFERED

Three degree programmes and one diploma programme are offered by the faculty for the 2018/2019 academic session, as follows:

- B.Eng (Hons.) Mechanical Engineering
- B.Eng (Hons.) Mechanical Engineering (Automotive)
- B.Eng (Hons.) Automotive Engineering (Collaboration Programme with HsKA Germany)
- Diploma of Mechanical Engineering



CAREER OPPORTUNITIES

Mechanical engineering is a discipline highly sought after by almost all working fields spanning from heavy industrial to agricultural including medical and financial sectors. The discipline with high analytical and innovative skillset possessed by mechanical engineers let them to assume main roles in providing technologies to serve the community and ease their everyday life. Examples of such technologies are; satellites, space ships, airplanes, ships, commercial vehicles, home utilities and healthcare products. Examples of industries and sectors that require the expertise of mechanical engineers are:

- Automotive industry
- Manufacturing, control system, robotic and automation industry
- Rail industry – designs, constructs, manages and maintains rail system components from trains and tracks to electrical power systems and train control systems
- Marine industry – develops and helps operate vessels
- Petrochemicals, gas and mineral industry
- Plantations and food products industry
- Defence industry – provides equipment, support and services for the armed forces and national security
- Biotechnology and biomedical industry
- Service, research and development (R&D) and engineering management firm
- Electronics industry – designs and manufactures components and complete equipment for sectors from automotive to medicine and the military
- Fast moving consumer goods industry – manufactures products such as household cleaning items, personal hygiene goods and convenience foods
- Aerospace and satellites industry
- Construction industry – designs and builds infrastructure, buildings and buildings services
- Medical sector
- Academic sector.

**FACULTY OF MECHANICAL ENGINEERING
CURRICULUM STRUCTURE
B. ENG. (HONS.) MECHANICAL ENGINEERING**

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEM	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	UHL2400 Fund. of English Language	UHL2422 English for Technical Comm.	UHS1021 Soft Skills 1	UHL2432 English for Professional Comm.	UHS3**2 Elective Social Science	BMM3533 Measurement & Instrumentation	UHS2021 Soft Skills 2	UHM2022 Ethnic Relations
	UHL2412 English for Academic Comm.	UHR1012 Islamic and Asia Civilisation	BMM2673 Thermodynamics	BMM2683 Applied Thermodynamics	BMM3513 Heat Transfer	BMM3531 Eng. Thermodynamics Lab	UGE2002 Technopreneurship	BMM4022 Engineer and Society
	BMM1313 Computer Programming	BMM1553 Dynamics	BMM2583 Strength of Materials 2	BMM2521 Eng. Mechanics Lab 2	BMM3613 Automatic Control	BMM3553 Mechanical Vibrations	BMM4912 Final Year Project 1	BMM4924 Final Year Project 2
	BMM1011 Introduction to Engineering	BMM1533 Strength of Materials 1	BMM2583 Strength of Materials 2	BMM2521 Eng. Mechanics Lab 2	BMM3623 Mechanical Design	BMM3701 Integrated Design Project Proposal	BMM4903 Integrated Design Project	
	BMM1563 Statics	BMM1511 Eng. Mechanics Lab 1	BMM2533 Fluids Mechanics 1	BMM2543 Fluids Mechanics 2	BMM3521 Eng. Fluids Mechanics Lab	BMM3563 FEM	BMM4**3 Elective 1	BMM4**3 Elective 3
	BMM1523 Engineering Materials	BUM2133 Ordinary Differential Equations	BUM2313 Numerical Methods	BUM2413 Applied Statistics		BMM3023 Engineering Management and Safety	BMM4**3 Elective 2	BMM4**3 Elective 4
	BUM2123 Applied Calculus	BMM1821 Mechanical Laboratory 2	UHF11*1 Foreign Language Level 1	BMM2433 Electrical & Electronics Technology	UHF21*1 Foreign Language Level 2	BMM3633 Industrial Engineering		
	BMM1811 Mechanical Laboratory 1	UQB2**1 Co. Curriculum 2	BMM2612 Computer Aided Design	BMM2623 Advanced Computer Aided Design	BMM3643 Manufacturing Processes	BMM3611 Manufacturing Processes Lab		
	UQB1**1 Co. Curriculum 1					BMM3996 Industrial Training		
	17	16	16	18	16	24	14	14
TOTAL CREDIT								
TOTAL CREDIT FOR GRADUATION								

COURSES



Elective course to be offered in B. Eng. (Hons.) Mechanical Engineering

NO.	CODE	COURSE	CREDIT HOUR
1	BMM4693	Biomechanics	3
2	BMM4703	Hydraulics & Pneumatics	3
3	BMM4713	Stress Analysis	3
4	BMM4723	Mechanism Design	3
5	BMM4733	Power Plant Technology	3
6	BMM4753	Renewable Energy Resources	3
7	BMM4763	Fatigue Design and Analysis	3
8	BMM4773	Materials Characterization	3
9	BMM4783	Computational Fluid Dynamics (CFD)	3
10	BMM4793	Welding and Joining Technology	3
11	BMM4803	Corrosion Science and Engineering	3
12	BMM4813	Ergonomics	3
13	BMM4823	Production Planning Control	3
14	BMM4833	Quality Engineering	3
15	BMM4843	Plastics Injection Technology	3
16	BMM4853	Air Conditioning and Refrigeration	3
17	BMM4863	Design for Manufactured & Assembly	3
18	BMM4873	CAD/CAM	3
19	BMM4883	Metal Castings	3
20	BMM4893	Mechanics of Composite Materials	3
Total Minimum Credit of Elective Subjects for Graduation			12

**FACULTY OF MECHANICAL ENGINEERING
CURRICULUM STRUCTURE
B. ENG. (HONS.) MECHANICAL ENGINEERING (AUTOMOTIVE)**

YEAR SEM	FIRST		SECOND		THIRD		FOURTH	
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	UHL2400 Fund. of English Language	UHL2422 English for Technical Comm.	UHS1021 Soft Skills 1	BMA2523 Internal Combustion Engine	UHE3**2 Elective Social Science	UHM2022 Ethnic Relations	UHS2021 Soft Skills 2	BMM4022 Engineer and Society
	UHL2412 English for Academic Comm.	UHR1012 Islamic and Asia Civilisation	BMM2673 Thermodyna- mics	BMM2543 Fluids Mechanics 2	BMM3513 Heat Transfer	BMM3533 Measurement & Instrumen- tation	UGE2002 Technoprene- urship	BMA4924 Final Year Project 2
	BMM1811 Mechanical Laboratory 1	BMM1821 Mechanical Laboratory 2	BMM 2533 Fluids Mechanics 1	BMM2521 Eng. Mechanics Lab 2	BMM3511 Eng. Thermo- fluids Lab	BMM3553 Mechanical Vibrations	BMA4912 Final Year Project 1	BMA48*3 Elective 2
	BMM1313 Computer Programming	BMM1553 Dynamics	BMM2612 Computer Aided Design	BMA2623 Automotive Design & Styling	BMM3613 Automatic Control	BMM3023 Engineering Management and Safety	BMA4723 Vehicle Dynamics	BMA48*3 Elective 3
	BMM1563 Statics	BMM1543 Strength of Materials	BUM2313 Numerical Methods	UHF11**1 Foreign Language Level 1	BMA3623 Engine Design	BMA3701 Integrated Design Project Proposal	BMA4903 Integrated Design Project	BMA4763 Vehicle Noise & Vibration
	BMM1523 Engineering Materials	BMM1511 Eng. Mechanics Lab 1	BMM2433 Electrical & Electronics Technology	BUM2413 Applied Statistics	UHF21**1 Foreign Language Level 2	BMM3563 Finite Element Method (FEM)	BMA48*3 Elective 1	
	BMM1011 Introduction to Engineering	BUM 2133 Ordinary Differential Equations	BMA2312 Intro. to Automotive Engineering	UHL2432 English for Professional Comm	BMM3643 Manufacturing Processes	BMM3633 Industrial Engineering		
	BUM 2123 Applied Calculus	UQB2**1 Co. Curriculum 2				BMM3996 Industrial Training		
	UQB1**1 Co. Curriculum 1							
TOTAL CREDIT	17	16	17	16	16	24	14	15
TOTAL CREDIT FOR GRADUATION	135							

COURSES

**Elective course to be offered in B. Eng. (Hons.) Mechanical Engineering (Automotive)**

NO.	CODE	COURSE	CREDIT HOUR
1	BMA4803	Automotive Advance Technology	3
2	BMA4813	Automotive Product Development	3
3	BMA4823	Energy Efficient Vehicle	3
4	BMA4833	Automotive Electric and Electronics	3
5	BMA4843	Alternative Fuel	3
6	BMA4853	Diesel Engine Technology	3
7	BMA4863	Motorsports Engineering	3
8	BMA4873	Railway Technology	3
Total Minimum Credit of Elective Subjects for Graduation			9

**FACULTY OF MECHANICAL ENGINEERING
CURRICULUM STRUCTURE
B.Eng (Hons.) Automotive Engineering Programme with HsKA, Germany**

YEAR	FIRST			SECOND			THIRD			FOURTH			FIFTH
	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND	FIRST	FIRST
SEM	BHA1113 Engineering Materials	BHA1413 Fundamentals Electrical Engineering 1		BHA1133 Dynamics	BHA2613 Machine Elements		BHA3413 Fundamentals Electrical Engineering 2	BHA3402 Vehicle Electronics	BHA3912 Internship	UGE2002 Technopren eurship		BHA4022 Project Management	
	BHA1103 Statics	BHA2123 Materials of Metals		BHA2513 Thermodyn amics	BHA3602 Automotive Product Development		BHA2313 Microcomputer Technology	BHA3323 Automatic Control	BHA3931 Internship Follow-up	BHA3223 Internal Combustion Engine		BHA4902 Preparations for Bachelor Thesis	
	BHA1602 Technical Drawing	BHA2612 Computer Aided Design (CAD)		BHA2342 Technical Informatics 1	BHA2403 Manufacturing Processes		BHA3313 Signals and Systems	BHA3523 Mechanical Vibrations		BHA4704 Team Oriented Project Study		BHA4804 Bachelor Thesis	
	BHA1811 Mechanical Laboratory	BHA1821 Mechanical Laboratory 2		BUM2413 Applied Statistics	BHA2533 Fluid Mechanics		BHA3622 Mechanical Design	BHA3922 Internship Preparation		BHA4224 Automotive Engineering		BHA4931 Final Examination (Viva)	
	BUM2123 Applied Calculus	BUM2133 Ordinary Differential Equations		UHS1011 Soft Skills 1	BHA2021 Occupational Safety & Health		BHA3921 Engineers and Society	BHA3513 Heat Transfer		BHA4532 Computation al Fluid Dynamics			
	UHR1012 Islamic & Asian Civilizations	UQB1011 Co-Curriculum 1		UQB2091 Co-Curriculum 2	UHS2011 Soft Skills 2		BHA3342 Technical Informatics 2	BHA3011 Quality Management		BHA4012 Finite Element Method 2			
	UHG1003 Deutsche Sprache 1	UHG1013 Deutsche Sprache 2		*UHG2003 Deutsche Sprache 3 (optional)	*UHG2013 Deutsche Sprache 4 (optional)	*UHG2016 Internship Germany 2 (optional)	BHA3012 Numerical Programming	BHA3302 Sensors					
				UHG1016 Intensive German I			UHM2022 Ethics Relations	BHA3102 Finite Element Method 1					
TOTAL CREDIT	17	16	6	16	16	6	18	18	13	17	9		
TOTAL CREDIT FOR GRADUATION	140												

COURSES

**FACULTY OF MECHANICAL ENGINEERING
CURRICULUM STRUCTURE
DIPLOMA IN MECHANICAL ENGINEERING**

YEAR SEM	FIRST			SECOND			THIRD	
	ZERO	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST
	UHL1412 Foundation English	UHL1422 English For General Communication	UHL1432 English for Occupational Communication	UGE1002 Basic Entrepreneurship	DMM3011 Occupational Safety & Health			DMM3912 Industrial Training
	UQB1011 Bridged Siswa	UHR1012 Islamic & Asian Civilizations I	UHM2022 Ethnic Relation	DUM2413 Engineering Statistics	DMM2533 Fluid Mechanics			
	DUM1113 Basic Mathematics	DUF1113 Physics	UHS 1021 Soft skills 1	DMM2633 Manufacturing Technology	DMM2632 Industrial Design			
		DUK1113 General Chemistry	DMM1911 Mechanical Technology Lab 1	UHS2021 Soft skills 2	DMM3623 Hydraulics & Pneumatics Technology			
		DUM1123 Calculus	DMM1423 Electrical and Electronic Technology	DMM2513 Solid Mechanics	DMM3673 Mechanical Design			
		DMM1312 Computer Programming	DMM1523 Engineering Materials	DMM2523 Dynamics	DMM3663 CNC Technology			
		DMM1413 Engineering Drawing & CAD	DMM1532 Statics	DMM2543 Thermodynamics	DMM3914 Final Year Project			
			DMM2412 Metrology	DMM1921 Mechanical Technology Lab 2				
	6	18	16	19	19			12
TOTAL CREDIT	90							
TOTAL CREDIT FOR GRADUATION	90							

CURRICULUM STRUCTURE FOR DEGREE PROGRAMME 2018/2019

BMM1011 Introduction to Engineering

Credit Hour: 1

Prerequisite: None

Synopsis

Introduction to Engineering introduces students to the range of engineering disciplines, emerging technologies and the engineering method of problem-solving, as well as sustainability and other issues associated with the practice of engineering. This introduction is made through a mix of lectures, group-based activities, site visits, and presentations from practising engineers. Since a key attribute of successful professional engineers is the ability to communicate effectively, the course focuses on improving core engineering communication skills.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply sustainable knowledge and emerging technologies to meet engineering tasks' objectives.
- CO2: Value the responsibilities associated with engineering scope of works toward societal, health, safety, legal and cultural needs.

BMM1313 Computer Programming

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces input and output, variables, constants, arithmetic operations and mathematical functions, user-defined functions, selection making decision and repetitive construct, and array data structure. The programming language used for the course is C language.

Course Outcome

By the end of semester, students should be able to:

- CO1: Create C programs using variables, constants declarations and arithmetic operations and mathematics function and selection making decision construct and loops.
- CO2: Create C programs using user-defined functions and numeric arrays.
- CO3: Develop C programs via team work to solve engineering problems

BMM1563 Statics

Credit Hour: 3

Prerequisite: None

Synopsis

An introduction to solving engineering static problem, involving: force vector, equilibrium of particle and rigid body, friction effect on rigid body equilibrium, structural analysis, frame and machines, centroids, center of gravity and moment of inertia.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze equilibrium of particle and rigid body.
- CO2: Analyze equilibrium of rigid body involve friction and structural analysis
- CO3: Evaluate centroids and moment of Inertia, of composite cross-sectional area.
- CO4: Demonstrate the solution of the problems.

BMM1523 Engineering Materials

Credit Hour: 3

Prerequisite: None

Synopsis

This course is an introduction to materials science and engineering. Students are expected to have understanding on crystal structure, mechanical and physical properties of materials, phase diagrams, phase transformation and strengthening mechanism of metal alloys, also application and processing of metals, ceramics, polymers and composites.

Course Outcome

By the end of semester, students should be able to:

- CO1: Identify the material structure, properties and their application..
- CO2: Analyse the phase diagram, phase transformations and the strengthening mechanisms for metal alloys.
- CO3: Illustrate the processing techniques for selected material.
- CO4: Investigate the influence of material characteristics towards environmental and sustainability.

BMM1811 Mechanical Laboratory 1

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces students with safe working habits, identify common materials used in metal fabrication, reading blueprints, identification, care & use basic measuring instruments, layout methods and basic hand tools. Emphasis is placed on operation of metrology, benchwork and lathe project.

Course Outcome

By the end of semester, students should be able to:



- CO1: Describes the lathe machine, tools and procedures.
- CO2: Demonstrates the appropriate techniques for basic measuring instrument.
- CO3: Practice safety for the mechanical laboratory activities.
- CO4: Interprets the mechanical laboratory works in a presentation.

BMM1821 Mechanical Laboratory 2

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces student basic application of the dial indicator, gauge block, gauges, measuring instruments, milling machines and processes, and surface grinding machines and processes.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describes the milling machine, tools and procedures.
- CO2: Demonstrates the appropriate techniques for basic measuring instrument.
- CO3: Practice safety for the mechanical laboratory activities.
- CO4: Interprets the mechanical laboratory works in a presentation.

BMM1511 Engineering Mechanics Lab 1

Credit Hour: 1

Prerequisite: BMM1523 (Engineering Materials) and BMM1563 (Statics)

Synopsis

This lab introduces the engineering materials and statics principles through practical experiments. The covered topics for engineering materials experiments comprise steel microstructure microscopy, Vickers hardness test, rapid quenching and tempering of plain carbon steel, creep test and impact test. The statics experiments covered are forces resolutions in basic roof truss and crane jib, moments application in bell crank lever, precision friction measurement and friction forces on an inclined plane.

Course Outcome

By the end of semester, students should be able to:

- CO1: Identify mechanical properties of materials such as: hardness, tensile strength, creep responses at different temperature, toughness, friction coefficient, impact test and microstructure of materials.
- CO2: Assemble tools to construct the experiment based on labsheets.

- CO3: Organize the work within team members to analyze distribution of forces in simple girder structure and central force system. Investigate lever principle and application of moment on a crank with varied transmission ratio. Illustrate and analyze property and structural changes of several plain carbon and low alloy steels at different heat treatment.

BMM1533 Strength of Materials 1

Credit Hour: 3

Prerequisite: BMM1563 Statics

Synopsis

This course introduces the concept of stress, stress and strain under axial loading, torsion, pure bending, analysis and design of beams for bending, shearing stresses in beam and thin-walled members.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze stress/strain problems in structural members under axial loadings.
- CO2: Analyze the circular member problems which are subjected to torques.
- CO3: Analyze the stresses and strains problems in members subjected to pure bending and transverse loading.
- CO4: Analyze and design of beams for bending.

BMM1553 Dynamics

Credit Hour: 3

Prerequisite: BMM1563 Statics

Synopsis

This course introduces kinematics (motion of rigid body) inclusive of absolute and relative motion (displacement, velocity and acceleration) and dynamics (forces, work, energy, inertia and momentum).

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse dynamics problems involving kinematics (motion of rigid body) inclusive of absolute and relative motion (displacement, velocity and acceleration).
- CO2: Analyse dynamics problems involving kinetics of rigid bodies inclusive forces based from Newton's Second Law.
- CO3: Analyse kinetics of rigid body involving work, energy and momentum problem using Working Model 2D.

BMM2433 Electrical & Electronics Technology

Credit Hour: 3

Prerequisite: None



Synopsis

This course introduces fundamental of electric circuit, circuit network analysis, inductance, capacitance, magnetic field and DC motor. The electronics technology covers diodes, bipolar junction transistor (BJT), operational amplifiers and digital logic circuits.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse circuit network for the resistance in series and parallel, voltage and current divider, Kirchhoff's Law.
- CO2: Conduct analysis on a transformer, generator and DC motor. Analyse circuit of Op-amp, diode and BJT. Finally, simplification of a logic circuit by Boolean algebra and Karnaugh Map.
- CO3: Demonstrate appropriate technique in conducting experiment on various analogue circuits while maintaining safety and awareness in the laboratory.
- CO4: Proposing a solution to address a simple electrical and electronic problem.

BMM2521 Engineering Mechanics Laboratory 2

Credit Hour: 1

Prerequisite: BMM1533 Strength of Materials and BMM1553 Dynamics

Synopsis

This lab course introduces students to basic properties of material and kinetics and kinematics of particles and rigid bodies through a series of experiment. Students will conduct experiment of tensile, compression, torsion, fatigue, bending moment, shearing stress, transformation of stress and strain in material lab. Experiment on dynamic aspect includes inertia in rotational motion and rolling disc on an incline plane. Students will learn experimental technique, data collection, analysis of results and presentations of results.

Course Outcome

By the end of semester, students should be able to:

- CO1: Identify the common properties of material under tension, compression, torsion, fatigue, bending moment, shearing force, free fall, accelerating principle, kinematic of rigid body on incline planes through experiments.
- CO2: Assemble tools to construct the experiment based on lab-sheets.
- CO3: Organize the work within team members to analyze the purpose of experimental task.

BMM2533 Fluid Mechanics 1

Credit Hour: 3

Prerequisite: None

Synopsis

The objective of the course is to introduces knowledge and understanding about principle, properties and basic methods of fluid mechanics, and provide some understanding and analysis of some problems related to fluid mechanics. The subject covers topics such as concept of pressure and flow with its application, stability of floating bodies, and fluid in motion analysis, fluid momentum analysis, flow measurement devices, fluid friction in piping system and dimensional analysis. The students are also expected to do mini project dealing with problem regarding the course outcomes

Course Outcome

By the end of semester, students should be able to:

- CO1: relate the basic principles and applications of various fluid condition.
- CO2: analyse problem in Fluid Statics and Fluid Dynamics.
- CO3: analyse problem in Pipes flow, Flow measurement and Dimensional Analysis.
- CO4: Justify the construction of an engineering problem accurately based on fundamental of fluid mechanics.

BMM2543 Fluid Mechanics 2

Credit Hour: 3

Prerequisite: BMM2533 Fluid Mechanics 1

Synopsis

This course provides the students with the principal concepts and methods of fluid mechanics. The topics covered include flow over immersed bodies, boundary layer analysis, compressible fluids flow, and application in pumps and turbines. Students will work to formulate the models necessary to study, analyze, and design fluid systems through the application of these concepts, and to develop the problem-solving skills essential to good engineering practice of fluid mechanics in practical applications.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse and describe the basic principles and applications of various flows.
- CO2: Analyse problems related to external flow, boundary layer, and compressible flow using governing equations and correlation.
- CO3: Evaluate problems related to pumps and turbine systems.
- CO4: Arrange as effective team member of a team to solve problems related to fluid mechanics.

BMM2583 Strength of Materials 2

Credit Hour: 3

Prerequisite: BMM1533 Strength of Materials 1

Synopsis

This course introduces students to establish understanding in solid body mechanics including analysing shearing stresses in beams and thin-walled members, understanding transformation of stress and strain state, calculating stresses under combined loading, and analysing effect of force to the deflection of beams and buckling of columns.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse shearing stresses in beams and thin-walled members and transformations of stress and strain.
- CO2: Evaluate the designed calculation based on state of stresses under combined loadings.
- CO3: Analyse deflection and slope of a beam under transverse loading by using direct determination, singularity function, method of superposition and moment-area theorems.
- CO4: Analyse stability of column by deriving Euler's formula for centric loading and Secant formula for eccentric loading.

BMM2612 Computer Aided Design

Credit Hour: 3

Prerequisite: None

Synopsis

Computer Aided Design provides comprehensive introduction to Computer-Aided Design software. It is an introductory level where the students will learn the basics of technical drawing and use the software to create two-dimensional design in engineering. Students shall be able to demonstrate competency in sketching a model and using certain standard features available in the CAD environment for creating, manipulating and modifying assigned objects or elements. Students shall be able to change object properties and to undertake printing or plotting activity associated with the delivery outputs.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse the fundamentals of engineering drawing for designing a mechanical parts requirement.
- CO2: Analyse the engineering drawing to construct a design according to standards.
- CO3: Construct mechanical drawing using engineering norms and CAD software to produce objects and elements.

BMM2613 Advanced Computer Aided Design

Credit Hour: 3

Prerequisite: BMM2612 Computer Aided Design

Synopsis

Advanced Computer Aided Design combines theoretical approaches with advanced tools in geometric modelling and parametric design for engineering design applications. The students shall be able to demonstrate the impact of computer aided design (CAD) in engineering design and analysis, build up techniques and use advanced tools in 3D shape modelling and parametric design for real-world engineering problems. Through the course the students shall also be able to execute comprehensive and professional engineering projects. The interdisciplinary nature of geometric modelling and engineering design is addressed through the hands-on nature of the course work.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse the fundamentals of engineering drawing and interpret main features and specification of 2D engineering drawing.
- CO2: Analyse and interpret main features and specifications of 3D solid model using CAD software
- CO3: Prepare and organise 3D solid models & assembly of mechanical parts.

BMM 2673 Thermodynamics

Credit Hour: 3

Prerequisite: None

Synopsis

This course focuses on the application of thermodynamics fundamentals in various engineering system including properties of pure substance, perpetual motion machine, first law, second law and entropy.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse and apply Thermodynamics concepts including perpetual motion machine and statements of Thermodynamics law in general energy analysis.
- CO2: Analyse properties of pure, simple compressible substances and ideal gases from property tables and equations.
- CO3: Analyse the concept of 1st law in close and open system, 2nd law of thermodynamics and solve related engineering thermodynamics applications.
- CO4: Perform the concept of thermodynamics law related to the engineering thermodynamics applications through presentation.

BMM2683 Applied Thermodynamics

Credit Hour: 3

Prerequisite: BMM2673 Thermodynamics

Synopsis

This course focuses on fundamental, application and evaluation of various engineering thermodynamics systems. The course covers gas and vapour power cycles, refrigeration and heat pump, air conditioning system, and the concepts of chemical reactions in combustion process.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain concisely the basic of thermodynamics power cycles for gas and vapour, and vapour-compression refrigeration cycles supported with knowledge of law of thermodynamics and engineering consideration.
- CO2: Evaluate thermodynamic parameters in applied problems which related to thermodynamics processes in gas and vapour power cycles, vapour-compression refrigeration cycles, air conditioning, and combustion.
- CO3: Evaluate the performance of gas power cycles, vapour power cycles, vapour-compression refrigeration cycles and air conditioning based on thermodynamics principles.
- CO4: Demonstrate the work effectively in a team in solving applied problems related to a thermodynamics processes of gas and vapour power cycles, vapour-compression refrigeration cycles, and air conditioning based on thermodynamics principles.

BMM3023 Engineering Management and Safety

Credit Hour: 3

Prerequisite: None

Synopsis

This course covers the basic management knowledge, safety and engineering economy. The management part will examine key issues in project management and organization. OSHA 1994, Factories and Machinery Act 1967, and basic principles of accident prevention and occupational health will be covered in safety part. In engineering economy, students are exposed to engineering economic principles and method of engineering economic analysis. At the end, student will manage an engineering project, implement an effective safety program and also perform engineering economic analysis.

Course Outcome

By the end of semester, students should be able to:

- CO1: Organize the project engineering characteristics, life cycle and its importance, project integrated approach, portfolio management and skill.
- CO2: Interpret and differentiate the strategic project management process steps, financial and non-financial portfolio criteria
- CO3: Perform, develop, apply and analyze various organization structure, project frameworks and techniques of strategic plans of management,

Work Breakdown Structure (WBS) and project estimation.

- CO4: Verify and analyze methods for engineering economic principles and analysis.
- CO5: Interpret accident prevention and occupational safety and health based on OSHA 1994 and Factories and Machineries Act 1967.

BMM3513 Heat Transfer

Credit Hour: 3

Prerequisite: BMM2563 Applied Thermodynamics

Synopsis

The basic modes of thermal energy transfer viz., conduction, convection and radiation are introduced with emphasis on understanding the fundamental concepts to be used in analysing and solving real-life problems. The applicability of 1-D heat conduction in various geometries, the validity of one dimensional heat conduction in fins, the distinction between steady and unsteady states, the concept of boundary layer, the analogy between fluid flow and convective heat transfer, the distinction between free and forced convection, the properties of materials which are responsible for energy transfer by radiation, the principles in the design of heat exchangers with emphasized on fundamental concepts and design methods.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse the concept of conduction, convection and radiation heat transfer through appropriate mathematical equation.
- CO2: Formulate and Evaluate one-dimensional heat transfer for different geometries.
- CO3: Summarise the problem in single phase free and forced convection heat transfer and simple radiation heat transfer.
- CO4: Design heat Exchanger for application in Industries.

BMM3521 Engineering Fluid Mechanics Lab

Credit Hour: 1

Prerequisite: BMM2543 Fluid Mechanics 2

Synopsis

This course introduces to fundamental concepts of fluid mechanics experimentation, the virtual instrumentation and data acquisition requirements to subsequent data analysis techniques. The fields of study being emphasized include topics such as flow pattern over immersed bodies, fluid flow determination and validation of Bernoulli's theorem, friction losses in pipes, turbomachinery and pump performance analysis.

Course Outcome

By the end of semester, students should be able to:



- CO1: Adapt appropriate fluid mechanics knowledge for the investigation of fluid mechanical behaviour through suitable experimental setup.
- CO2: Evaluate the fluid mechanical behaviour by analysing and synthesising information obtained through experimental setup; and
- CO3: Interpret the results obtained from the fluid mechanics experiments by means of writing effective reports with appropriate data analysis and data presentation.

BMM3531 Engineering Thermodynamics Lab
Credit Hour: 1
Prerequisite: BMM 2683 Applied Thermodynamics

Synopsis

This lab introduces practical applications in thermodynamics and heat transfer disciplines. It cover the areas of properties of pure substance, first law and second law of thermodynamics, ideal gas law and perfect gas characteristics, gas compressors, refrigeration cycles, heat conduction, heat convection, as well as heat radiation.

Course Outcome

By the end of semester, students should be able to:

- CO1: To implement thermodynamics and heat transfer knowledge for investigating the thermodynamics and heat transfer behavior through suitable experimental setup.
- CO2: To evaluate the behavior of thermodynamics and heat transfer parameters by analyzing and systemizing parameters obtained from the experiment.
- CO3: Demonstrate detailed experimental methods and present experiments to prove thermodynamics and heat transfer concepts.

BMM3533 Measurement & Instrumentation
Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces the principles of measurement, signal analysis and provides the students hands-on laboratory experience with a variety (or selected) transducers and instruments (including 'virtual instruments'). Students also expose on how to write professional technical reports.

Course Outcome

By the end of semester, students should be able to:

- CO1: explain in details the basic element in measurement and instrumentation system.

- CO2: justify the appropriate/suitable basic of signal analysis in measuring analogue signal from transducers.
- CO3: design the instrumentation system to acquire data from transducer and analyse the data in time and frequency domain.
- CO4: integrate between physical demonstration and oral presentation to deliver project outcome.

BMM3553 Mechanical Vibrations
Credit Hour: 3
Prerequisite: BMM1553 Dynamics

Synopsis

This course introduces fundamental of vibration, un-damped vibration single degree of freedom (SDOF), damped vibration single degree of freedom (SDOF), two degree of freedom (2DOF) multi degree of freedom (MDOF) and some applications of vibrations in engineering.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate and explain the solutions to vibration problems of single degree of freedom systems based on basic dynamics characteristics.
- CO2: Evaluate and explain the solutions to vibration problems that contain free and forced-vibration analysis of two and multi degree of freedom systems.
- CO3: Design the vibration measurement by considering appropriate techniques, tools and methods.
- CO4: Relate the vibration principles with actual vibration system.

BMM3563 Finite Element Methods
Credit Hour: 3
Prerequisite: BMM1533 Strength of Materials 1

Synopsis

This course covers the basics of Finite Element Method, some related mathematics and continuum mechanics, theory of Finite Element Method (FEM), application of FEM to solving solid mechanics, structural and scalar field problems, and finite element analysis of real world problems using FE software (s).

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain basics of FEM in mechanical engineering and its importance in industrial application.
- CO2: Formulate and solve FE equations for structural problems, scalar field problems, and solid mechanics problems.
- CO3: Set up an appropriate FE model of real world problems and analyze the resulting system using FE software.



BMM3611 Manufacturing Processes Laboratory

Credit Hour: 1

Prerequisite: BMM3643 Manufacturing Processes

Synopsis

This lab provides hands-on experience for students to learn about manufacturing processes with emphasis on safety requirements, knowledge on engineering material application and processing tools/machines. At the end of this course, student activities during lab activities will be evaluated based on their technical report.

Course Outcome

By the end of semester, students should be able to:

- CO1: Execute manufacturing process technique consist of injection moulding, sand casting, sheet metal forming, CNC and EDM machine and welding with standard operation procedure.
- CO2: Apply ethical principles during operation such as dress code, code of practice, punctuality and recognize all ethical issues.

BMM3613 Automatic Control

Credit Hour: 3

Prerequisite: BMM 1553 Dynamics

Synopsis

This course introduces linear, time-invariant (LTI) control system modelling, analysis and design. The covered topics are frequency domain modelling of mechanical, electrical and electro-mechanical systems; time response analysis, frequency response analysis, stability analysis and steady-state analysis. Control system design and analysis using PID controller technique.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the basic control system concepts and illustrate the required control system into block design process.
- CO2: Develop frequency domain transfer function of linear, time invariant (LTI) control systems for mechanical system
- CO3: Synthesize the transient response, steady-state response and system stability of LTI control system compensators to achieve specified control system performances which is related to the real world problems by utilizing root-locus technique and PID

BMM3623 Mechanical Design

Credit Hour: 3

Prerequisite: BMM2583 Strength of Material 2

Synopsis

This course is an introduction to analysis of static and fatigue failure and design of machine elements/mechanical components. Students are exposed to design of machine elements/mechanical components including shafts, keys, springs, bolts and nuts, screws, welding, bearings, belts and chains, clutches and brakes.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the components to prevent failure due to static and dynamic service loads, and assess the suitable helical compression springs using table of parameters.
- CO2: Evaluate the shafts for fatigue failure, and bolts, nuts and screws for static failure, as well as welding parameters in torsion and bending.
- CO3: Evaluate bearings and flexible elements including brakes, clutches, belts and pulleys, and assess gears based on given parameters to predict wear and bending.
- CO4: Show the ability to explore and expand various new information and complete required work related to welding cases in torsion and bending and assessment of gears for wear and bending.

BMM3633 Industrial Engineering

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces Industrial engineering, productivity, total quality management lean manufacturing, work study, human factors engineering, production planning and control, inventory management and engineering management.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate best practices for the attainment of total quality management using QC techniques.
- CO2: Support production planning through total quality management, productivity measurement and work study.
- CO3: Evaluate lean manufacturing tools, techniques and human factors engineering.
- CO4: Evaluate economy engineering through production planning, control, inventory management and engineering management.
- CO5: Adapt industrial engineering knowledge into selected case study.

BMM3643 Manufacturing Processes

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces students to manufacturing processes 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. Sustainable manufacturing process will be discussed in student project presentation.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate different types of metal & polymer solidification processes.
- CO2: Interpret forming processes for bulk metal, sheet metal and powder metallurgy.
- CO3: Justify major types of material removal process, joining process and surface treatments.
- CO4: Justify a process flow to manufacture a conceptual product by considering sustainable manufacturing process.

BMM3701 Integrated Design Project Proposal

Credit Hour: 1

Prerequisite: BMM3623 Mechanical Design

Synopsis

Integrated Design Project 1 prepares a detailed comprehensive design project considering the different stages of their design, manufacturing and assembly. Students is required to put into considerations the project management, communication, documentation, working in teams, design methodology in their proposals. Design of mechanical engineering systems components, including problem definition, analysis, and synthesis, and develop a computational as well as the physical model of their design.

Course Outcome

By the end of semester, students should be able to:

- CO1: Propose a complex mechanical system with optimised selection of components and design using engineering drawing for meeting the requirements of a sustainable system.
- CO2: Evaluate a complex mechanical system and components concept design by developing concept combination and improvement, concept selection, screening and ranking for further refinement and analysis.

BMM3996 Industrial Training

Credit Hour: 6

Prerequisite: Minimum 70 credit taken

Synopsis

This course introduces students to industrial training, expose them to professional skills and experience in the aspect of mechanical engineering field. The exposure will

help to produce an excellent, responsible with good ethical for their personal development.

Course Outcome

By the end of semester, students should be able to:

- CO1: Practice basic professional engineering skills at industry level; relate the theory that had been learned when the students involve in problem solving in industry.
- CO2: Identify, solve and reports the practical problems that exist.
- CO3: Analyse and evaluate problems area and design solution planning for industrial project.
- CO4: Build up interpersonal skill to be an excellent, motivated and responsible to the creator.
- CO5: Practice and apply ethical principles professionally in industry.

BMM4022 Engineer and Society

Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces the engineering profession, local industries sector, issues in local industries, ethics and public responsibility, engineer and law, and contract law.

Course Outcome

By the end of semester, students should be able to:

- CO1: Demonstrates understanding in engineering profession and code of ethics.
- CO2: Reports the issues in local industries, working ethics and public responsibilities
- CO3: Explain the law which governs the engineering profession

BMM4903 Integrated Design Project

Credit Hour: 3

Prerequisite: BMM3701 Integrated Design Project Proposal

Synopsis

Integrated Design Project challenges students to apply the knowledge and skills they learned throughout their degree to real-world problems. Application of the design process to solve an engineering problem which includes interdisciplinary parameters such as human factors, engineering economy, safety, environmental, and societal aspects of their design, etc. The students work in small teams under the close supervision of faculty members. Each team produces detailed drawings, comprehensive specifications, a presentation, and a prototype of the proposed design. They also write design reports and prepare posters describing their work. All reports are expected to meet professional standards.

Course Outcome



By the end of semester, students should be able to:

- CO1: Construct and coordinates engineering materials for an engineering application and its design by demonstrating relevant free body diagram with static, dynamic, fracture, fatigue, thermodynamic, fluid analysis.
- CO2: Arrange, complete, integrates and modifies design fabrication or model by relevant manufacturing technique, process, assemblies and testing together with proper system control (automation, sensors, actuation, pneumatic, hydraulic or PLC control) and system maintenance by coordinates knowledge and understanding of engineering and management principles and apply these as a member and leader in a team, to manage projects and in multidisciplinary environments.
- CO3: Demonstrate a mechanical system to accommodate engineering economic analysis (break even calculation, return of investment, internal rate of return and present worth/ net present value) for marketing purpose and engineering management.
- CO4: Construct and coordinate the design assembly together with design for static and dynamic strength, factor of safety, design of fastener and connections and, design of load-carrying members and proposed and applying it either by innovating a new design/ method using conventional or modern engineering model creation IT tool.

Elective Subjects offered for Mechanical Engineering (BMM)

- BMM4693 Biomechanics
- BMM4703 Hydraulics and Pneumatics
- BMM4723 Mechanism Design
- BMM4733 Power Plant Technology
- BMM4763 Fatigue Design and Analysis
- BMM4783 Computational Fluid Dynamics (CFD)
- BMM4793 Welding and Joining Technology
- BMM4803 Corrosion Science and Engineering
- BMM4813 Ergonomics
- BMM4823 Production Planning Control
- BMM4833 Quality Engineering
- BMM4843 Plastics Injection Technology
- BMM4853 Air Conditioning and Refrigeration
- BMM4893 Mechanics of Composite Materials

*The above information are subjected to amendment of the Senate from time to time.

BMM Elective courses:

BMM4693 Biomechanics

Credit Hour: 3

Prerequisite: BMM1533 Strength of Materials and BMM1553 Dynamics

Synopsis

This course introduces the principles and application of biomechanics, statics, dynamics, kinetics and identifies instrumentation used for measuring kinetics and kinematics quantities. Concept and theories of human skeletal, human upper and lower extremities and human spine from a biomechanical perspective.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse the biomechanics concepts on human skeletal, human upper and lower extremities, human spine, cardiovascular and neurovascular system from a biomechanical perspective.
- CO2: Investigate the human system and any types of mechanical loading on the human body by qualitative and quantitative approaches.
- CO3: Evaluate the human biomechanics system to perform specific task.

BMM4703 Hydraulics and Pneumatics

Credit Hour: 3

Prerequisite: BMM2543 Fluid Mechanics 2

Synopsis

This course introduces hydraulic and pneumatic systems, including the theoretical knowledge, components and the circuit design. Beside the basic hydraulic and pneumatic system, this course also introduces the electro fluid power system, as well as programmable logic controller (PLC) to control the system.

Course Outcome

By the end of semester, students should be able to:

- CO1: Assess basic and electro-hydraulic systems for optimum design.
- CO2: Evaluate advanced pneumatic and Programmable Logic Controller for fluid power system.
- CO3: Appraise the hydraulic and pneumatic system using different control system.
- CO4: Recognize the needs for using different control system for hydraulic and pneumatic.

BMM4723 Mechanism Design

Credit Hour: 3

Prerequisite: BMM1553 Dynamics and BMM3623 Mechanical Design

Synopsis

This course introduces the fundamental and design of mechanism. Theory of mechanism will be carried out in series of lectures and analysis and design of mechanism will be carried out in integrated project. Topics that will be covered are mechanisms and kinematics, vector and position analysis, velocity analysis, acceleration analysis and cam design.

Course Outcome

By the end of semester, students should be able to:

- CO1: Identify mechanism and design mechanism parameters related to motion, degree of freedom and analyze the position of the links in a mechanism.
- CO2: Analyze the velocities and accelerations of links and points on mechanisms.
- CO3: Design and construct the cam profile/mechanism and design mechanisms system using synthesis and analysis method.
- CO4: Use related computer programs to design, model and analyze mechanisms.
- CO5: Present technical work in a written report

BMM4733 Power Plant Technology

Credit Hour: 3

Prerequisite: BMM2683 Applied Thermodynamics , BMM2543 Fluid Mechanics 2

Synopsis

This course discusses power plant systems such as steam turbines, gas turbines, combined cycle power plants and sustainable energy power systems. This course also covers fuels and combustions, economics of power generation, and environmental issues on power generation.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate conventional power plants based on thermodynamics principle.
- CO2: Evaluate fuels and combustions for steam cycle power plants based on air-fuel cycle.
- CO3: Evaluate environmental problems and sustainable power generation systems based on efficiency and environment perspective.
- CO4: Evaluate sustainable power generation systems based on efficiency, economic, environment performance.

BMM4763 Fatigue Design and Analysis

Credit Hour: 3

Prerequisite: BMM3563 Finite Element Analysis

Synopsis

Introduction to factors affecting fatigue behaviour and characteristics of design approach. Study on cycle counting techniques. Fatigue design methods including

stress-life, strain-life and Linear elastic fracture mechanics methods under constant and variable amplitude loadings.

Course Outcome

By the end of semester, students should be able to:

- CO1: Implement fatigue design criteria.
- CO2: Evaluate a component under fatigue loadings.
- CO3: Construct Finite Element Analysis for fatigue design.
- CO4: Show their ability to find new information to solve fatigue problem in engineering application.

BMM4783 Computational Fluid Dynamics (CFD)

Credit Hour: 3

Prerequisite: BMM2543 Fluid Mechanics 2, BMM1313 Computer Programming

Synopsis

This course aims to introduce the fundamental and application of simulation of fluid mechanics and heat transfer phenomenon and solving thermo-fluids problem via computational method. Holistic approaches of programming and commercial software are essential towards solving, analysing and evaluating the results of thermo-fluid problem-based. It focuses on solving of two and three dimensional fluid flow and heat transfer problems utilize commercial softwares.

Course Outcome

By the end of semester, students should be able to:

- CO1: Interpret the governing equations in thermo-fluid problems.
- CO2: evaluate basic discretization methods to solve thermo-fluid problems.
- CO3: explain detail guidelines for designing CFD simulation and perform error analysis.
- CO4: evaluate thermo-fluid problems using modern simulation tools.
- CO5: function as effective team member of a team to solve problems related to CFD.

BMM4793 Welding and Joining Technology

Credit Hour: 3

Prerequisite: BMM3643 Manufacturing Processes and BMM2583 Strength of Materials 2

Synopsis

This course introduces about welding & joining technology. The topic includes the overview of welding processes, fusion welding, arc physics, solid state welding, soldering, brazing as well as welding design, welding defects and its countermeasure. It also includes quality management system in welding and defect detection technology.

Course Outcome



By the end of semester, students should be able to:

- CO1: Compare various processes of fusion welding and contrast various joining processes of solid state joining, brazing, soldering and modern joining technique.
- CO2: Interpret welded structure and evaluate the welding strength.
- CO3: Evaluate welding metallurgy and defects of welded structure.
- CO4: Explain the quality management system, categorise welding defect repair and defect detection technique.

BMM4803 Corrosion Science and Engineering

Credit Hour: 3

Prerequisite: None

Synopsis

The course is aimed to investigate the fundamental causes of corrosion problems and materials failures. Emphasis on studying electrochemical reactions of corrosion process, material selections and corrosion protections. In the laboratory, students involve with experiments to evaluate corrosion reactions, environmental failure, and basic methods for protection of materials.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate specifically the fundamental concepts of electrochemistry of aqueous corrosion process.
- CO2: Describe corrosion forms and their mechanism for different corrosive environments.
- CO3: Justify corrosion test and methods for estimating corrosion failures in industrial facilities under several environments conditions.
- CO4: Evaluate material selection and corrosion protections systems by using advance tools.

BMM4813 Ergonomics

Credit Hour: 3

Prerequisite: BMM1563 Statics

Synopsis

This course introduces students to ergonomics principles and their application in the design of work, equipment and the workplace. Consideration is given to musculoskeletal disorders, manual handling, and ergonomics aspects of the workplace.

Course Outcome

By the end of semester, students should be able to:

- CO1: Understand and apply ergonomic principles to the creation of safer, healthier and more efficient and effective activities in the workplace.

- CO2: Understand the causes of upper limb disorders and how to reduce them.
- CO3: Apply ergonomic risk assessments and appropriate control measures.
- CO4: Analyse workplace layout and equipment design.
- CO5: Evaluate workplace aspects of good ergonomic design.

BMM4823 Production Planning Control

Credit Hour: 3

Prerequisite: BMM3633 Industrial Engineering

Synopsis

This course introduces production planning and control, forecasting, aggregate planning, production scheduling, Just-in-Time production, inventory management, material requirements planning. Simulation on production operation using Witness software is assigned.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate forecasting method using qualitative and quantitative methods.
- CO2: Evaluate the aggregate planning using level, chase and transportation methods.
- CO3: Propose the best solution using Lean manufacturing and Material Requirement Planning.
- CO4: Arrange a new production layout by using Witness software.

BMM4833 Quality Engineering

Credit Hour: 3

Prerequisite: BMM3633 Industrial Engineering

Synopsis

This course introduces students to fundamentals of quality management and statistical quality improvement concepts. A practical state-of-the-art approach is stressed to ensure sufficient theory is presented to develop robust understandings on quality principles to monitor, control, improve product and processes.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe and apply the fundamentals of quality, total quality management, six sigma and basic quality tools.
- CO2: Summarize the findings from frequency distribution, central tendency, dispersion, population of data, probability, sampling, life history of test data and control charts.
- CO3: Display effective leadership and teamworking ability in completing the report and presentation.

BMM4843 Plastic Injection Technology

Credit Hour: 3

Prerequisite: BMM1811 Mechanical Technology Lab 1, BMM1821 Mechanical Lab 2, BMM2613 Advanced Computer Aided Design

Synopsis:

This course is an introduction to the plastic injection mould design for producing thermoplastic materials. It focuses on the basic of plastic injection mould and its' machine, proper selection of thermoplastic materials, calculation and design of mould based on the proposed plastic product design. It uses CAD software for designing and modelling of the mould and uses CAE Moldflow simulation tool to optimize the correlation of the mould design with the injection moulding process. Designed mould would be fabricated and plastic products are produced by injecting the fabricated mould with plastic injection moulding machine.

Course Outcome:

By the end of semester, students should be able to:

- CO1: Describe and familiar the basic of mould structure.
- CO2: Compare suitable type of mould and plastic material.
- CO3: Evaluate the correlation between mould design and injection moulding process.
- CO4: Explain the design, modeling, fabrication, injection pressure, and mould suitability to produce plastic products.

BMM4853 Air Conditioning And Refrigeration

Credit Hour: 3

Prerequisite: BMM2683 Applied Thermodynamics

Synopsis

The course content covers the topics such as basic heat transfer, and the working fluid thermodynamics, vapour compression and absorption system of refrigeration, psychrometric charts and its use, cooling load calculations, study of air conditioning components, ducting and piping, pumps and fans and blowers, cooling coils and dehumidification process, expansion valves, evaporation and condensation process, temperature control systems; noise and vibration controls in air conditioning. The practical project work will include design and calculate the cooling load requirement of a building air conditioning system using PBL methodology.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the various concept of air conditioning system and components for commercial system in building.
- CO2: Evaluate the heat transfer and moist air properties and mixtures using psychrometric chart in vapour compression system.
- CO3: Evaluate various cooling load calculation problems for designed building air conditioning.

CO4: Performs well as a member or leader in diverse team.

BMM4893 Mechanics of Composite Materials

Credit Hour: 3

Prerequisite: -

Synopsis

This course introduces students to current views and theories in polymer based composite materials, on the types of materials, production methods, quality assurance, failure analysis, test methods and the mechanics of lamina and laminated composites.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain different types of composite materials and production methods to produce polymer matrix composites.
- CO2: Evaluate the main properties of a lamina and the laminated of composite materials.
- CO3: Compare the failure modes of composites and evaluate different types of failure criterions in laminated composites, and composite materials in the future.
- CO4: Perform mechanical test/simulation on laminated composites.
- CO5: Communicate effectively on engineering problem solving activities

BMM4912 Final Year Project 1

Credit Hour: 2

Prerequisite: Refer to PSM handbook (Students should have passed more than 80 Credit hours)

Synopsis

The final year project focuses on the real professional approach to engineering studies. Students will utilise their engineering knowledge and technical skill from the previous training to solve engineering and for integration of subject areas is strongly encouraged throughout the program.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate complex problems and summarized the specific literature review according to the project niche area with standard citation format.
- CO2: Design innovative solving plans and methodology to evaluate engineering problems with the consideration of standards, limitations, professional ethical principles.
- CO3: Demonstrate appropriate measurements, techniques and data validation in solving the engineering problem with proper safety awareness and efficiency

- CO4: Demonstrates effective communication with supervisor, laboratory, project members and panels throughout the program using modern tools.
- CO5: Display the constraints and, niche and potential of engineering research topic for continuous improvement, innovation for sustainability achievement.

BMM4924 Final Year Project 2

Credit Hour: 4

Prerequisite: Refer to PSM handbook (Has passed more than 80 Credit hours)

Synopsis

The final year project focuses on the real professional approach to engineering studies. Students will utilise their engineering knowledge and technical skill from the previous training to solve engineering and for integration of subject areas is strongly encouraged throughout the program.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate complex problems and summarized the specific literature review according to the project niche area with standard citation format.
- CO2: Design innovative solving plans and methodology to evaluate engineering problems with the consideration of standards, limitations, professional ethical principles.
- CO3: Demonstrate appropriate measurements, techniques and data validation in solving the engineering problem with proper safety awareness and efficiency.
- CO4: Demonstrates effective communication with supervisor, laboratory, project members and panels throughout the program using modern tools.
- CO5: Display the constraints and, niche and potential of engineering research topic for continuous improvement, innovation for sustainability achievement.

BMA COURSES

BMA2312 Introduction to Automotive Engineering

Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces workshop safety, the workings of automotive engines and the supporting systems, the workings of the automotive electrical, electronic and HVAC systems, the operation of the drive train, and the whole automotive chassis.

Course Outcome

By the end of semester, students should be able to:

- CO1: Dress safely for the workshop, behave safely in the workshop, recognize the importance of keeping the workshop clean and tidy, and demonstrate an awareness of the workshop safety rules written in the safety contract.
- CO2: Understand the working principles of automotive engines and their supporting systems, automotive electrical and electronic systems, automotive HVAC, drivetrain, the chassis system and body.
- CO3: Conduct investigation into complex problems using experimental demonstration- based knowledge.

BMM1543 Strength of Materials

Credit Hour: 3

Prerequisite: BMM1563 Statics

Synopsis

This course introduces the concept of stress, stress and strain under axial loading, torsion, pure bending, analysis and design of beams for bending, shearing stresses in beam and thin-walled members.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze stress/strain problems in structural members under axial loadings.
- CO2: Analyze the circular member problems which are subjected to torques.
- CO3: Analyze the stresses and strains problems in members subjected to pure bending and transverse loading.
- CO4: Analyze and design of beams for bending.

BMA2523 Internal Combustion Engine

Credit Hour: 3

Prerequisite: BMM2673 Thermodynamics

Synopsis

This course provides the foundation understanding on the fundamental of internal combustion engine which including design, operating parameters, thermo-chemistry reaction for various combustion cycles, emission formation, effect to environment and its control method. By accomplish significant projects such as component assembly, flow, performance, emission test and etc, student own a platform to build up professional techniques to design and conduct validating experiment.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describes the engine performance and the effect of design towards parametric changes.
- CO2: Analyse the engine performance using the fundamental principles of thermodynamic.

- CO3: Evaluate the engine performance using various thermodynamic cycles for ideal engines analysis.
- CO4: Explains the engine performance using detail analysis and differentiate the normal, abnormal combustion, and the effect of operational parametric changes on exhaust pollutant emissions and combine the engine types, instrumentation and conduct the actual analysis of engines.

BMA2623 Automotive Design & Styling

Credit Hour: 3

Prerequisite: BMM2612 Computer Aided Design

Synopsis

This course introduces fundamental techniques of vehicle styling and the components associated such as sketching, rendering, surfacing, as well as model making. During the course students are exposed to techniques in automobile styling design through basic conceptual sketches, finished rendering, 2D and 3D graphics and clay model. This course also exposes students to automotive product planning, automotive packaging, engineering design, homologation, and automotive manufacturing and assembly.

Course Outcome

By the end of semester, students should be able to:

- CO1: Modelling the 3D automotive parts.
- CO2: Design the project flow and product management plan detail for the automotive related component, system, vehicle design within a development period.
- CO3: Identify the design requirements, parameters of automotive related product development and generate functioning model using 3D modelling tools, sketches and rendering.
- CO4: Analyse the performance and characteristics of automotive related components systems using simulation tools using presentation equipment, including concept, sketching, styling, rendering and scaled model.

BMM3511 Engineering Thermo-fluids Lab

Credit Hour: 1

Prerequisite: BMM2673 Thermodynamics & BMM2543 Fluids Mechanics 2

Synopsis

This lab introduces the students to fundamental concepts of thermo-fluids, and heat transfer experimentation, from the virtual instrumentation and data acquisition requirements to subsequent data analysis techniques. It cover the areas of properties of first law and second law of thermodynamics, ideal gas law and perfect gas characteristics, flow patterns over different immersed bodies, fluid flow determination and validation of Bernoulli's theorem, friction losses in pipes, heat conduction and heat convection.

Course Outcome

By the end of semester, students should be able to:

- CO1: perform hands-on experiments, analyze, and interpret the experimental data in Thermo-fluid.
- CO2: generate experimental data for relatively simple thermo-fluid problems and analyze the information.
- CO3: devise detailed experimental data collection method by communicating effectively with their peers and present the results in writing through detailed Professional reports.

BMA3623 Engine Design

Credit Hour: 3

Prerequisite: BMM1543 Strength of Materials

Synopsis

This course extends the knowledge on mechanics of materials towards engine components design. The design of essential machine elements is demonstrated. The internal combustion engines kinematics and dynamics are analysed. The design of internal combustion engine components is examined. Finally, computer-aided engineering tools are utilised in analysing internal combustion engine components.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the kinematics and dynamics of internal combustion engines.
- CO2: Design internal combustion engine components.
- CO3: Manipulate computer-aided engineering tools for internal combustion engine components design and analyses.

BMA3701 Integrated Design Project Proposal

Credit Hour: 1

Prerequisite: BMA3623 Engine Design

Synopsis

Integrated Design Project 1 prepares a detailed comprehensive design project considering the different stages of their design, manufacturing and assembly. Students is required to put into considerations the project management, communication, documentation, working in teams, design methodology in their proposals. Design of mechanical engineering systems components, including problem definition, analysis, and synthesis, and develop a computational as well as the physical model of their design.

Course Outcome

By the end of semester, students should be able to:

- CO1: Propose a complex mechanical system with optimised selection of components and design

using engineering drawing for meeting the requirements of a sustainable system.

- CO2: Evaluate a complex mechanical system and components concept design by developing concept combination and improvement, concept selection, screening and ranking for further refinement and analysis.

BMA4903 Integrated Design Project

Credit Hour: 3

Prerequisite: BMA3701 Integrated Design Proposal

Synopsis

Integrated Design Project challenges students to apply the knowledge and skills they learned throughout their degree to real-world problems. Application of the design process to solve an engineering problem which includes interdisciplinary parameters such as human factors, engineering economy, safety, environmental, and societal aspects of their design, etc. The students work in small teams under the close supervision of faculty members. Each team produces detailed drawings, comprehensive specifications, a presentation, and a prototype of the proposed design. They also write design reports and prepare posters describing their work. All reports are expected to meet professional standards.

Course Outcome

By the end of semester, students should be able to:

- CO5: Construct and coordinates engineering materials for an engineering application and its design by demonstrating relevant free body diagram with static, dynamic, fracture, fatigue, thermodynamic, fluid analysis.
- CO6: Arrange, complete, integrates and modifies design fabrication or model by relevant manufacturing technique, process, assemblies and testing together with proper system control (automation, sensors, actuation, pneumatic, hydraulic or PLC control) and system maintenance by coordinates knowledge and understanding of engineering and management principles and apply these as a member and leader in a team, to manage projects and in multidisciplinary environments.
- CO7: Demonstrate a mechanical system to accommodate engineering economic analysis (break even calculation, return of investment, internal rate of return and present worth/ net present value) for marketing purpose and engineering management.
- CO8: Construct and coordinate the design assembly together with design for static and dynamic strength, factor of safety, design of fastener and connections and, design of load-carrying members and proposed and applying it either by innovating a new design/ method using conventional or modern engineering model creation IT tool.

BMA4723 Vehicle Dynamics

Credit Hour: 3

Prerequisite: BMM1553 Dynamics

Synopsis

This course focuses on the fundamental of vehicle dynamics, vehicle acceleration and braking performance, mechanics of pneumatic tires, vehicle ride, cornering characteristics. suspension and steering system behaviour. By accomplish a series of laboratories such as car handling, acceleration, braking, double lane change and suspension performance, student are able to build up independent skill in design, conduct and validate experiment results.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse and formulate the fundamental of vehicle dynamics.
- CO2: Analyse the performance characteristic of vehicle dynamics under various driving circumferences.
- CO3: Calibrates all the sensors at the test car before perform the on-road experiment.
- CO4: Explain the safety requirement when perform the on-road experiment and compose a report.

BMA4763 Vehicle Noise & Vibration

Credit Hour: 3

Prerequisite: BMM3553 Mechanical Vibration

Synopsis

This course introduces to automotive NVH, fundamental of noise, vehicle noise source, exterior and interior noise vehicle, vibration modal analysis, normal mode finite element analysis, experimental modal analysis and source of vehicle vibration.

Course Outcome

By the end of semester, students should be able to:

- CO1: Formulate the solutions to vehicle noise problems by using noise source analysis.
- CO2: Evaluate and design the solutions to automotive structural vibration by using normal mode and experimental modal analysis.
- CO3: Demonstrate investigation on vehicle noise and vibration problems.
- CO4: Effective in an investigative team to solve vehicle noise and vibration problems.

BMA Elective Courses

- BMA4803 Automotive Advance Technology
- BMA4813 Automotive Development Process
- BMA4823 Energy Efficient Vehicle
- BMA4833 Automotive Electric and

- Electronics
- BMA4843 Alternative Fuel
- BMA4853 Diesel Engine Technology
- BMA4863 Motorsports Engineering
- BMA4873 Railway Technology

BMA4803 Automotive Advance Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course is the advance construction, development and operational analysis of the state-of-the-art vehicle system which including engine advance control system for higher efficiency, lower emission, advance suspension for excellent ride and comfort, advance driveline for spacious, precision, minimum slips control, advance material for lighter, cheaper and stronger component, chassis and body, advance energy powering system for renewable and sustainability future and advance vehicle mobility control.

Course Outcome

By the end of semester, students should be able to:

- CO1: Compares the antilock braking, vehicle aerodynamics, tire tread design advances.
- CO2: Combines electronically controlled anti-vibration engine mountings and transport refrigeration.
- CO3: Differentiates electricity, alcohol, and hydrogen fuel cells, as well as advanced additives and oils, in environmentally sustainable transport.
- CO4: Explain of engine diagnosis and troubleshooting of automotive engine control systems including digital storage oscilloscopes, fuel injection and ignition system diagnoses, five-gas exhaust analysis and emission testing. Generate Seat belts, brake lights, and air bags, of safer vehicles and fewer fatalities. Evaluate the automotive industry to make sure that they are reliable and prevent failures

BMA4813 Automotive Development Process

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the concept of automotive product development process. It covers the research and development process, stages of tooling process, production line process as well as the quality system used in automotive production line.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the research and development process of automotive product and its organization.

- CO2: Compare the tooling process in products development based on parts function.
- CO3: Evaluate the manufacturing process flow in car production line based on safety and human factors.
- CO4: Identify the effect of manufacturing process on the quality of the production parts.

BMA4823 Energy Efficient Vehicle

Credit Hour: 3

Prerequisite : None

Synopsis

Energy Efficient Vehicle or EEV is a new concept of categorise automotive technology towards the low fuel consumption, alternative and sustainable automotive system. Under the EEV definition, there are multiple approaches, technology, alternative fuels, materials and etc. In this course, some foundation of automotive highlighted and followed by sustainability of different green technology, electrification and detail hybrid electric vehicle design, operation, construction and diagnosis.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the evolution of automotive electrification and technology sustainability.
- CO2: Analyze the design of various energy efficient vehicle technology combination.
- CO3: Summarize the architecture of different hybrid electric vehicle, safety design and influent of local policy & enforcement
- CO4: Criticizes the construction and operation mechanism for hybrid electric vehicle low voltage and high voltage system thus analyze its performance under different fault code driving condition

BMA4833 Automotive Electric and Electronics

Credit Hour: 3

Prerequisite: BMM2433 Electrical & Electronics Technology

Synopsis

This course covers comprehensive overview in the area of automotive electrical and electronics and familiarises students with both analytical and computational approaches in evaluating and designing vehicle electrical and electronics components and systems as well as innovative approach in automotive electronics systems.

Course Outcome

By the end of semester, students should be able to:

- CO1: Appraise the fundamental theory in automotive electrical components.
- CO2: Critically evaluate major automotive electronic system designs and performance.

- CO3: Compare innovative vehicle electronic components, sub-systems and networking.
 CO4: Manipulate embedded system for vehicle electronic systems and networking.

BMA4843 Alternative Fuel

Credit Hour: 3

Prerequisite: None

Synopsis

This course provides the foundation understanding on the existing energy sources and renewable energy sources such as biodiesel, biomass from wastes or hydrogen and electricity. The alternative fuels contribute to the reduction of prices and dependence on fossil fuels. In addition, energy sources such as these could partially replace the use of what is considered as the major factor responsible for global warming and the main source of local environmental pollution. The course also discuss on the fundamental of alternative fuels which include on to create and utilize the alternative sources of the energy. The course will also to provides the understanding on the impacts of fossil fuels and the alternative fuels on the society and environment.

Course Outcome

By the end of semester, students should be able to:

- CO1: To analyze the advantages on main source of energy.
 CO2: To analyze the alternative source of energy and its potential.
 CO3: To evaluate the performance of alternative fuel (liquid and gaseous) on the internal combustion engine
 CO4: To evaluate the potential of electricity and hydrogen technology for vehicles.

BMA4853 Diesel Engine Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course focuses on the introduction of diesel engine technology. The topics include diesel engine cycle, fuel injection system, combustion and exhaust emission, auxiliary system and alternative fuels for diesel engine.

Course Outcome

By the end of semester, students should be able to:

- CO1: Illustrates the diesel cycle and associated working principle of diesel engine
 CO2: Analyse the diesel fuel injection system and management
 CO3: Demonstrate the combustion phenomenon and exhaust emission from the diesel engine.
 CO4: Categorize the various alternatives fuel for diesel engine

BMA4863 Motorsports Engineering

Credit Hour: 3

Prerequisite: None

Synopsis

This course focuses on the introduction to motorsports engineering, types of racing engines, advanced vehicle materials and structure, and manufacturing technique extant in this field. It also covers the modification as enhancement in motorsport system feature, racing theories and strategies, regulation and safety in motorsports engineering.

Course Outcome

By the end of semester, students should be able to:

- CO1: Appraise the fundamental of motorsports engineering in the basis of racing theories, strategies, regulations, and safety. (C)
 CO2: Evaluate the advancement of motorsport in the aspect of advanced materials and structure usage and modification techniques as well as manufacturing techniques utilize in the production of components and parts for motorsports. (C)
 CO3: Perform the developed responds effectively to unexpected experiences, modify instruction to meet the requirements in performing the technique teaches (P).
 CO4: Carry out and display good teamwork spirit and discipline in group activities (A)

BMA4873 Railway Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course provides an overview on railway technology including permanent way/track, rolling stocks, signalling and train control, electrification system and railway communication and information technology systems. The current issues, challenges and future technologies are also covered in this course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate knowledge on the railway technology.
 CO2: Summarize available technology including permanent way/track, rolling stocks, signalling and train control, electrification system and railway communication and information technology systems.
 CO3: Evaluate the complex solutions in railway engineering technology.
 CO4: Identify the problems in railway engineering technology and solve the problem effectively.

CURRICULUM STRUCTURE FOR COLLABORATION PROGRAMME WITH HSKA (BHA) 2018/2019

BHA1113 Engineering Materials

Credit Hour: 3

Prerequisite : None

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, micro structural analysis, phase diagram, ferrous and non-ferrous alloys, and polymer and advance materials.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse and Illustrate the materials' atomic bonding and crystal structure.
- CO2: Evaluate and explain the mechanical, physical properties of engineering materials and concept of corrosion and metal alloys microstructure, phase diagram and heat treatment processes.
- CO3: Evaluate and explain ferrous and non-ferrous alloys microstructure strengthening mechanism and its applications.
- CO4: Analyse the polymeric materials and advanced materials classification, structure and properties.

BHA1103 Statics

Credit Hour: 3

Prerequisite: None

Synopsis

An introduction to solving engineering static problem, involving: force vector, equilibrium of particle and rigid body, friction effect on rigid body equilibrium, structural analysis, frame and machines, centroids, center of gravity and moment of inertia.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse equilibrium of particle and rigid body
- CO2: Evaluate equilibrium of rigid body involve friction and structural analysis
- CO3: Evaluate centroids and moment of Inertia, of composite cross sectional area.

BHA1602 Technical Drawing

Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces technical drawing and engineering drawing base on BS 8888. It consists of basic shapes, tangencies, curve of intersection,

orthographic views include sectioning, auxiliary view, isometric view, geometric dimensioning and tolerancing, and detail assembly drawings.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse tangencies, basic shapes and sketching of engineering components.
- CO2: Evaluate orthographic view and sectional view with dimensioning.
- CO3: Analyze auxiliary view, curve of intersection and isometric drawing.
- CO4: Analyze knowledge to use for geometric dimensioning and tolerancing and assembly drawing with Bill Of Materials.

BHA1811 Mechanical Laboratory 1

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces students with safe working habits, identify common materials used in metal fabrication, reading blueprints, identification, care & use basic measuring instruments, layout methods & basic hand tools. Emphasis is placed on operation of drill press, lathe & pedestal grinder.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse basic manual production techniques.
- CO2: Analyse basic turning processes according to given dimensions, specifications and tolerances.
- CO3: Integrates communication skills based on task given

BHA1413 Fundamentals Electrical Engineering 1

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces DC resistive network analysis, AC network analysis, diodes, bipolar junction transistors (BJT), operational amplifier (op-amp) and digital logic circuits..

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate DC resistive and AC network analysis.
- CO2: Evaluate circuits involving diodes, bipolar junction transistor (BJT) and operational amplifier
- CO3: Integrate solutions to solve simple logic circuits problem.

BHA2123 Mechanics of Materials

Credit Hour: 3

Prerequisite: BHA1113 Engineering Materials

Synopsis

This course introduces the concept of stress and strain under axial, torsion, bending, and transverse shear and combined loadings in elastic structural members. Plane stress transformation is also included.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the stress and strain in structural members subjected to axial loads and torsion loads.
- CO2: Evaluate the stress and strain in structural members subjected to bending loads and shear loads.
- CO3: Construct stress and strain in structural members subjected to combined loads and conduct the stress transformation.

BHA2612 Computer Aided Design

Credit Hour: 2

Prerequisite: BHA1602 Technical Drawing

Synopsis

This course introduces the types of fastener and spring types, AutoCAD, 2 – D drawing command, coordinate system, organizing the drawing, AutoCAD drawing setting, Introduction to Solid Works, 3 – D solid modeling, 3 – D drawing, Blue print drawing, 3 – D functioning and organizing, Solid Works Animator.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze drawing information in CAD and Solid Works
- CO2: Evaluate 2-D drawings using AutoCAD and 3-D solid modelings using Solid Works
- CO3: Prepares mechanical engineering parts using learned software

BHA1821 Mechanical Laboratory 2

Credit Hour: 1

Prerequisite: BHA1811 Mechanical Laboratory 1

Synopsis

This course introduces student basic application of the dial indicator, gauge block, gauges, measuring instruments, milling machines and processes, CNC milling simulator operation and surface grinding machines and processes.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze appropriate techniques when handling basic measuring equipment and instruments
- CO2: Analyze conventional milling and CNC milling simulator operation and surface grinding process
- CO3: Integrate skills based on professional ethics and responsibilities

BHA1133 Dynamics

Credit Hour: 3

Prerequisite: BHA1103 Statics

Synopsis

This course introduces the principles of kinematics of a particle and a planar rigid body, kinetics of a particle and a planar rigid body utilizing force and acceleration method, work and energy method and impulse and momentum method.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate and solve problems involving kinematics of a particle.
- CO2: Evaluate and solve problems involving kinetics of a particle utilizing force and acceleration method, work and energy method and impulse and momentum method.
- CO3: Create solutions involving kinematics of a planar rigid body, and kinetics of a planar rigid body utilizing force and acceleration method.

BHA2513 Thermodynamics

Credit Hour: 3

Prerequisite: None

Synopsis

This course focuses on the application of the thermodynamics knowledge in various engineering systems. The subject covers the review and analysis of energy, gas power cycles, vapour power cycles, refrigeration cycles, gas mixtures, gas-vapour mixture & air-conditioning and combustion.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the fundamentals of mass balance, 1st law, 2nd law of energy to identify, differentiate and solve engineering problem involving closed, open systems and unsteady-flow processes.
- CO2: Evaluate the properties of pure, simple compressible substances and ideal gases, the concept of heat, work and mass to the typical problems and the entropy changes problems for pure substances and ideal gas.
- CO3: Demonstrate skills based on task given

BHA2342 Technical Informatics 1 Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces input and output, variables, constants, arithmetic operations and mathematical functions, user-defined functions, selection making decision and repetitive construct, and array data structure. The programming language used for the course is C language.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate C program using variables, constants declarations, arithmetic operations and mathematics function and selection making decision construct and loops.
- CO2: Evaluate C program using user-defined functions, numeric arrays and develop C programmes for engineering applications.

BHA2021 Occupational Safety & Health

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces OSH in Malaysia, identification, types and inspection of industrial hazard, analysis and control of industrial hazard, mechanical hazard, chemical hazard, physical hazard, psycho-social hazard, industrial hygiene, accident causation phenomenon, accident investigation and analysis, managing safety and health, and industrial safety and health regulation.

Course Outcome

By the end of semester, students should be able to:

- CO1: Identify OSHA regulations and its implementation in Malaysia
- CO2: Analyse industrial hazards and industrial hygiene programs
- CO3: Identify causation of accident phenomenon, accident investigation and analysis
- CO4: Integrates lifelong learning for safety and health management

BHA2403 Manufacturing Processes

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the various type of manufacturing processes including metal casting processes, forming and shaping processes for metal, plastics and composites, material removal processes, joining processes and finishing processes.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate metal-casting processes and forming processes
- CO2: Evaluate material removal processes and joining processes
- CO3: Identify the appropriate surface technology processes for advanced applications

BHA2533 Fluid Mechanics

Credit Hour: 3

Prerequisite: None

Synopsis

After successfully completed the course, the students should have basic knowledge of one-dimensional flows of incompressible fluids, be able to evaluate the effect of flow circulation on bodies and understand energy loss in the flow process.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe and evaluate the basic principles and applications of various fluid condition discussed in Fluid Mechanics 1.
- CO2: Devise solutions for problems in fluid statics, dynamic pipe flow, flow measurement and dimensional analysis.
- CO3: Evaluate problems related to fluid mechanics

BHA2613 Machine Elements

Credit Hour: 3

Prerequisite: None

Synopsis

Introduction to design process. Study of static and dynamic loading resulting normal and shear stresses, principles stresses. Engineering materials, static and fatigue failure theories. Machine element design including screws, bolts, fasteners, welded joints, keys and coupling and springs.

Course Outcome

By the end of semester, students should be able to:

- CO1: Identify loading of the machine elements, stress and fatigue failure and to perform deformation and stress analysis to design safe machine components
- CO2: Evaluate design shafts, keys, coupling, gear and spring to meet desired specifications, mechanical elements for non-permanent joint including screws, bolts, fasteners, keys and coupling to meet desired specifications and permanent joints
- CO3: Organize and coordinate team to design mechanical components

BHA3602 Automotive Product Development

Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces the concept of product development process and organizations, product planning, identifying customer needs, product specifications, concept generation, concept selection, concept testing, industrial design, prototyping, patents and intellectual properties.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate product development process, its organization, planning stages and process of identifying customer needs in products development.
- CO2: Evaluate establishing the target specification, refining the specification process and design, select and perform testing analysis.
- CO3: Display professional engineering practice in contextual knowledge

BHA2313 Microcomputer Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course is an introduction to PLC and microcontroller. Students are exposed to input/output PLC interface, PLC programming, input/output microcontroller interface and microcontroller programming.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate input/output of PLC interfacing and PLC programming.
- CO2: Evaluate input/output of microcontroller interfacing and microcontroller programming.
- CO3: Construct actuator and signal device through programming and interfacing

BHA3012 Numerical Programming

Credit Hour: 2

Prerequisite: BUM 2413 Applied Statistics

Synopsis

This course covers how to handle the numeric standard tools MATLAB and Simulink Solution of differential equations and modelling simple dynamic systems with MATLAB and Simulink.

Course Outcome

By the end of semester, students should be able to:

- CO1: Creates programmes using the numeric software MATLAB,
- CO2: Evaluate numerical programme to solve engineering-related problems and construct programmes to simulate dynamic systems

BHA3313 Signal and Systems

Credit Hour: 3

Prerequisite: None

Synopsis

This course covers topics under signals: energy and power signals, discrete-time and continuous, linear systems and convolutions, Fourier transform, complex Fourier series; signal spectral properties and bandwidth, Laplace transform and transient analysis. Emphasis is also given to transfer functions, block diagrams, baseband and pass band signals with applications to communications systems. Matlab and Simulink is used as the tool for simulation and application.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the sampling theorem, its meaning and consequences for signal processing, understand the characteristic of stochastic signals and fundamental methods of stochastic signal analysis.
- CO2: Develop description and design of analogue linear time invariant systems using appropriate tools
- CO3: Characterize and design digital linear analogue linear time invariant systems using appropriate tools

BHA3342 Technical Informatics 2

Credit Hour: 2

Prerequisite: BHA 2342 Technical Informatics 1

Synopsis

This course cover topics under software process, software requirements, analysis, design concepts and principals. By completing this subject, the student will be able to explain the software engineering principles and techniques that are used in developing quality software products.

Course Outcome

By the end of semester, students should be able to:

- CO1: Propose a broad range of concepts from software engineering, spanning all aspects the software engineering process and use of accepted software engineering terminology
- CO2: Develop a software for engineering project by applying a representative cross section of software engineering techniques



BHA 3413 Fundamentals Electrical Engineering 2

Credit Hour: 3

Prerequisite: BHA1413 Fundamentals Electrical Engineering 1

Synopsis

This course cover topics with a comprehensive knowledge in the area of automotive mechatronics and familiarizes students with both analytical and computational approaches in evaluating and designing vehicle electrical and electronics components and systems as well as future automotive electronics systems.

Course Outcome

- CO1: Evaluate the principle of designing an electro-mechanical drive-train.
- CO2: Analyse actuators, power electronics, converters, power supply and control of a vehicle with electrical and electronics equipment.
- CO3: Integrate electrical and electronics signals and circuit using hardware and software

BHA3622 Mechanical Design

Credit Hour: 3

Prerequisite: None

Synopsis

This course involves the application of knowledge of mathematics and mechanic for design in mechanic element. The students will gain experience in designing the abstractions for similar elements.

Course Outcome

By the end of semester, students should be able to:

- CO1: Design mechanic elements by applying knowledge of mathematics and mechanic for design
- CO2: Evaluate design of the abstractions for similar elements.
- CO3: Adapt complex engineering activities with the engineering community.

BHA3921 Engineers and Society

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces the engineering profession, local industries sector, issues in local industries, ethics and public responsibility, engineer and law, and contract law

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply engineering profession and code of ethics

CO2: Analyse the issues in local industries and public responsibilities

CO3: Explain the law which governing the engineering profession

BHA3011 Quality Management

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces the basics of process-oriented management systems, seven quality tools that have been used for quality improvement such as check sheets, scatter diagrams, cause and effect diagram, pareto charts, flow charts, histograms and statistical process control (spc). Besides that, students are introduced to quality management systems in the automotive industry (TS 16949), international quality standard (ISO 9000 series) and human factor engineering in quality management.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply key management concepts, quality and total quality management, Deming's management principles, ISO 9000, application of management tools.
- CO2: Analyse fundamental knowledge on quality control, engineering, Management and basic quality tools
- CO3: Construct frequency distribution, central tendency, dispersion and population analysis by using statistical analysis method on data

BHA3102 Finite Element Method 1

Credit Hour: 2

Prerequisite: None

Synopsis

This course covers introduces student to the commercial finite element software based on the tutorial and exercises provided. The students should capable to independently work in comparable calculation tools. To complete the module, the students should be able to perform the stress analysis with the help of commercial software independently and in team where the result should be tested based on accuracy plausibility. A comparison with the analytical solutions from the Technical Mechanics will show the advantages and disadvantages of the numerical methods.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate and perform stress analysis with the help of commercial software independently and in team where the result should be tested based on accuracy plausibility

CO2: Evaluate and compare the analytical solutions with Technical Mechanics and demonstrate understanding of the advantages and disadvantages of the numerical methods.

BHA3302 Sensors

Credit Hour: 2

Prerequisite: None

Synopsis

Fundamentals of measurement and test engineering - terms such as accuracy, resolution, linearity, reproducibility and error. Physics of different sensors frequently used in automotive applications. Influence of electromagnetic disturbance. Electronic signal processing (usually analogue electronics). Physical fundamentals and functional principles of various (electrical) actuators.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyse fundamentals to measurement engineering, electro-magnetic compatibility (EMC) and signal conditioning.
- CO2: Analyse appropriate sensors for measuring temperature, pressure, speed magnetic fields, angle, acceleration, rotation rate and flow, and understand types of actuators and electronic motors.

BHA3513 Heat Transfer

Credit Hour: 3

Prerequisite: BHA 2513 Thermodynamics

Synopsis

The basic modes of thermal energy transfer viz., conduction, convection and radiation are introduced with emphasis on understanding the fundamental concepts to be used in analysing and solving real-life problems. The applicability of 1-D heat conduction in various geometries, the validity of one dimensional heat conduction in fins, the distinction between steady and unsteady states, the concept of boundary layer, the analogy between fluid flow and convective heat transfer, the distinction between free and forced convection, the properties of materials which are responsible for energy transfer by radiation, the principles in the design of heat exchangers with emphasized on fundamental concepts and design methods.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the fundamental concept of conduction, convection and radiation heat transfer and related to one-dimensional heat flow and in different geometries.
- CO2: Evaluate problem in single phase forced and free convection heat transfer, problem related to simple radiation heat transfer.

CO3: Integrate design and apply the heat transfer problem for application in the system of heat exchangers.

BHA3323 Automatic Control

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces linear, time-invariant (LTI) control system modelling, analysis and design. The covered topics are frequency domain modelling of mechanical, electrical and electro-mechanical systems; time response analysis, frequency response analysis, stability analysis and steady-state analysis. Control system design and analysis using PID controller technique.

Course Outcome

- CO1: Develop basic control system concepts and illustrate the required control system into block design process.
- CO2: Develop frequency domain transfer function of linear, time invariant (LTI) control systems for mechanical system
- CO3: Develop the transient response, steady-state response and system stability of LTI control system compensators to achieve specified control system performances utilizing root-locus technique

BHA3402 Vehicle Electronics 1

Credit Hour: 2

Prerequisite: None

Synopsis

This course aims to familiarise students with the basics of the digital electronics and to the foundations of the alternating current calculation. In addition, student will also provide with the basic knowledge of the energy supply in the automobile, the lighting and electrical wiring.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate the basic theories alternating variables: Mean value, mean (root mean square) value, average absolute value and to master/control superposition of sinusoidal vibrations, the meaning of the complex pointer and to perform the circuit analysis by using complex calculation. To understand simple filter circuits, to design and to build up.
- CO2: Assess the function of the three - phase generator and the controller in the vehicle and apply correct term of the colour temperature and to understand the usage of different lamp (light source) as well as its functional principles
- CO3: Manipulate skills to translate logical expressions into electronic circuits, build and analyse logic

circuits and to display simple, time-dependent variables in the frequency domain.

BHA3523 Mechanical Vibrations

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces fundamental of vibration, free vibration response for single, two and multi degree of Freedom, harmonically excited vibration response for single and two DOF system, vibration absorbers and isolators, whirling of shafts, basics of modal testing, balancing of rotating machines and others vibration measurement techniques.

Course Outcome

By the end of semester, students should be able to:

- CO1: Synthesise vibrational elements and dynamic behaviour of the mechanical systems.
- CO2: Formulate the solutions to vibration problems that contain free-vibration and forced-vibration analysis of one, two and multi degree of freedom systems
- CO3: Justify vibration measurement techniques, tools and methods

BHA3922 Internship Preparation

Credit Hour: 2

Prerequisite: None

Synopsis

This training exposes the students to professional skills and experience in aspect of mechanical engineering practice. The exposure will help to produce an excellent, responsible and good attitude.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate basic professional engineering skills at industry level relate the theory that had been learned during the involvement of real problems solving such as planning, design, construction and management of the projects.
- CO2: Devise a practical problem that exists, identify the company or department structure and recognize the job scope of specific post in the organization.
- CO3: Integrate interpersonal skills with professional ethics to be excellent, motivated and responsible to the creator.

BHA3912 Internship

Credit Hour: 2

Prerequisite: None

Synopsis

This course is practical task in an industrial company or related with the appropriate training for the duration of 95 days. The student involved in actual project of the company from the fields of development, production or distribution. The projects studied by the students deal with topics from the vehicle technology and related fields and allow the practical application of the knowledge acquired at the university. It provides an insight view to the future professional life. The students are responsible to find a suitable project at the training company.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate professional engineering skills required in the industry
- CO2: Evaluate the theory that had been learned during the involvement of real problems solving such as planning, design, construction and management of the projects.
- CO3: Organise practical solution for problems in companies or department and recognize the job scope of specific post in the organization.
- CO4: Integrate interpersonal skills with professional ethics to be an excellent, motivated and responsible to the creator

BHA3931 Internship Follow Up

Credit Hour: 1

Prerequisite: None

Synopsis

This training exposes the students to professional skills and experience in aspect of mechanical engineering practice. The exposure will help to produce an excellent, responsible and good attitude.

Course Outcome

By the end of semester, students should be able to:

- CO1: Relates the theory that had been learned during the involvement of real problems and practice basic professional engineering skills at industry level solving such as planning, design, construction and management of the projects
- CO2: Evaluate solutions to practical problems in companies or department structures and recognize the job scope of specific post in the organization.

BHA3223

Internal Combustion Engine

Credit Hour: 3

Prerequisite: None

Synopsis

This course provides the foundation understanding on the fundamental of internal combustion engine which includes the kinematics of combustion engine, the charge cycle and mixture formation in engine, the combustion process in engine, various combustion

processes, such as petrol, diesel and HCCI engines. This course will also cover charging methods in internal combustion and the effect of combustion engine to the environment

Course Outcome

By the end of semester, students should be able to:

- CO1: Construct engine performance and engine combustion design using fundamental principles of thermodynamics, construction elements and parameters.
- CO2: Combining performances using knowledge from exhaust treatment, ignition, cooling and lubricant, charge cycle, combustion and mixture formation for diesel and gasoline engine, combustion engine and crank mechanism
- CO3: Compiling engine performance using detail analysis to understand combustion and mixture formation for diesel engine, gas exchange process (supercharging/ turbocharging)
- CO4: Organizing the impact of professional engineering solutions in the engine types, instrumentation and conduct the actual analysis of engines.

BHA4102 Finite Element Method 2

Credit Hour: 2

Prerequisite: BHA Finite Element Method 1

Synopsis

In this course, the students are to carry out simple mechanics tasks by using finite element method where the calculation should follow the matrices calculation. At the end of the course, students should be able to interpret the result of modern finite element program and test the plausibility.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate matrices calculations following finite element methods
- CO2: Evaluate the result of modern finite element program and test the plausibility.

BHA4224 Automotive Engineering

Credit Hour: 4

Prerequisite: None

Synopsis

This course provides the complete foundation and working principles on the automotive engineering which including vehicle dynamics, powertrain, auxiliary system, vehicle safety, HVAC, drivetrain, tires, suspension, steering, braking unit and active safety system. In addition, significant projects are match with fundamental topics for practical utilization of techniques, skills and tools to solve engineering issues.

Course Outcome

By the end of semester, students should be able to:

- CO1: Develop foundation knowledge and parameters of vehicle dynamics analysis & calculation.
- CO2: Evaluate the performance characteristic of vehicle dynamics topics under various driving circumferences
- CO3: Compile and evaluate powertrain designs, engine cycles and digital engine control parameters while analysing engine testing and performance parameters.
- CO4: Demonstrate understanding drivetrain designs, gear selections, traction diagram, body control and alternative powertrains.

BHA4532 Computational Fluid Dynamics

Credit Hour: 2

Prerequisite: None

Synopsis

This subject is to introduce the fundamental and application of simulation of fluid mechanics phenomenon and solving fluids problem via simulation. Holistic approaches of programming and commercial software are essentials towards solving, analysing and evaluating the results of fluid mechanics problem-based simulation. The objective of this subject is to provide the basic of simulation focusing on fluid problem which is from mathematical model such as Navier Stokes equation and solve it numerically with the aid of programming software. The next step is to understand and utilize commercial software to solve engineering fluid problem base on actual physical shape appearance which is more complex boundaries.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the fundamental concepts of CFD and governing equations
- CO2: Evaluate computational methods and simulation results of fluid problem

BHA4704 Team Oriented Project Study

Credit Hour: 4

Prerequisite: None

Synopsis

After the students have analyzed the main problem, they independently design and determine the specifications and requirements of the product. The documents are presented in form of a role play in which the participants act as another character, e.g. manager or customer, to discuss and improve the relevant documents. This mid-term presentations emulate industrial project team meetings with a fixed agenda, protocol, leadership, voting procedures, kick-off etc. They are followed by the evaluation phase which includes an assessment of the solution and problem solving as required from engineering and management principles. After the final kick-off meeting of the team session phase, the design

and manufacturing process starts. This phase is critically accompanied by more reviews and laboratory presentations. At the end of the semester, the finished product will be presented to the panel.

Course Outcome

By the end of semester, students should be able to:

- CO1: Create model of dynamic systems
- CO2: Design dynamic systems with modern software
- CO3: Assemble proposed design and manufacturing of product.
- CO4: Create solutions to solve problems as required by engineering and management principles

BHA4022 Project Management

Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces the project management concepts in order to enhance the skills and managerial abilities and provide a holistic and integrative view of project management. The covered areas for project management are strategic management, organization structure and culture, project management, cost estimating and budgeting and project plan.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze life cycle of the projects and project management organizational structures
- CO2: Evaluate various frameworks and techniques of strategic plans of management and work breakdown structure (WBS) and project scheduling
- CO3: Construct various methods for estimating project costs and analyze the project risk management.

BHA4902 Preparation For Bachelor Thesis Bachelor Thesis

Credit Hour: 2

Prerequisite:

Synopsis

Preparation for Bachelor thesis prepares students for real professional approach to engineering studies. It will teach students to structure/plan time and the content their final year project as well as approaches / procedure and tools for making scientific work/research. The task description and fundamental information of the bachelor thesis will be designed and structured.

Course Outcome

By the end of semester, students should be able to:

- CO1: Evaluate project planning, design, construction and management of the project and theory that had been learned to solve the problems.
- CO2: Evaluate project solution based on project methodology.

BHA4904 Bachelor Thesis

Credit Hour: 4

Prerequisite: Has passed more than 80 Credit hours

Synopsis

This course aims to train students to utilise their engineering knowledge and technical skill to solve an engineering problems. For this reason, the use of projects as a transport for teaching and for integration of subject area is strongly encouraged throughout the programme. Students should be capable of handling the problem independently with scientific and methodical in a given time.

Course Outcome

By the end of semester, students should be able to:

- CO1: Devise solution to solve through project planning, design, construction and management.
- CO2: Develop project solution based on project methodology.
- CO3: Evaluate practical solution for problems in project through data collection, data analysis and discussion
- CO4: Analyse research findings into a technical report.

BHA4931 Final Examination

Credit Hour: 1

Prerequisite: None

Synopsis

This course will test the mastery of the basic principles and important facts in learning content of the automotive studies and the bachelor thesis via written viva session between UMP/Company supervisor as well as HsKA supervisor.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply related content of the lectures and bachelor thesis to show profound technical knowledge
- CO2: Explains and practice communication on technical subjects

CURRICULUM STRUCTURE FOR DIPLOMA OF MECHANICAL ENGINEERING 2018/2019

DMM1312 Computer Programming

Credit Hour: 2

Prerequisite: None

Synopsis

This course formally introduces the concept of computers, algorithms, problem solving, and programming languages. The programming language introduced in this course is C. Students will use the C language programming to solve simple mechanical engineering problem.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Construct C program that utilizes standard input output operations, variables, arithmetic operation, and math functions.
- CLO2: Apply C program that utilizes control structure, looping, functions, and numeric arrays to solve Mechanical Engineering problems.

DMM1413 Engineering Drawing & CAD

Credit Hour: 2

Prerequisite: None

Synopsis

This subject is design to teach engineering drawing to the student using drawing tools such as free hand drawing, instrument drawing & Computer Aided Design Drawing (CAD) software. This will include from beginning to intermediate level of CAD. Student should be able to draw 2D as well as 3D drawing standard upon complete this course..

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Explain a knowledge in engineering drawing principles and standard practice using drawing tools.
- CLO2: Apply the orthographic view, section view, auxiliary view, isometric views and tolerances in engineering drawings to solve visualization problem.
- CLO3: Interpret blue print of working drawing.
- CLO4: Apply knowledge and techniques to create standard drawing relating to design engineering by using 2D CAD software
- CLO5: Apply knowledge and techniques to create standard drawing relating to design engineering by using 3D CAD software

DMM1423 Electrical & Electronic Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces fundamental of electric circuit, circuit network analysis, inductance and capacitance. The electronics technology involved with basic understanding of usage and application of semiconductor devices: diodes, transistor, and digital logic circuits.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Apply knowledge of basic electrical circuit and semiconductor devices in mechanical engineering.
- CLO2: Construct electrical circuit based on basic electrical and electronic knowledge.
- CLO3: Solve mechanical engineering problem involving basic electrical and electronic.

DMM1523 Engineering Materials

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the engineering materials application, atomic bonding, crystal structure, mechanical and physical properties, microstructure, phase diagram, ferrous and non-ferrous alloys, polymer and advance materials.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Explain the materials' atomic bonding and crystal structure.
- CLO2: Prepare the mechanical testing to investigate the mechanical properties of engineering materials.
- CLO3: Relates microstructures of alloys with phase diagram
- CLO4: Distinguish the microstructure, properties and applications of ferrous and non ferrous alloys.
- CLO5: Explain the polymeric and advanced materials classification, structure and properties.
- CLO6: Demonstrate material selection process, with focus on selecting materials that optimize product performance, reliability and cost.

DMM1532 Statics

Credit Hour: 2

Prerequisite: DUF 1113



Synopsis

This course is an introduction to solving engineering static problems involving force vector, equilibrium of particle and rigid body in structures, frame and machines, friction effect on rigid body equilibrium, centroids, center of gravity and moment of inertia.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Solve equilibrium of particle using scalar method and vector notation
- CLO2: Solve equilibrium of rigid body in structure, frame and machine problems
- CLO3: Solve equilibrium of rigid body involving friction and structure
- CLO4: Compute centroid, center of gravity and moment of inertia of composite cross sectional area

DMM1911 Mechanical Technology Laboratory 1

Prerequisite: None

Synopsis

This course introduces students with safe working habits, reading blueprints, identification, care and use basic measuring instruments, layout methods & basic hand tools. Emphasis is placed on operation of drill press, lathe, pedestal grinder and grinding operations..

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Explain the fundamentals of safety and regulation in mechanical lab
- CLO2: Apply bench work and drilling operation
- CLO3: Apply various basic turning operations
- CLO4: Apply grinding process
- CLO5: Respond to team members in completing task

DMM 1921 Mechanical Technology Laboratory 2

Credit Hour: 1

Prerequisite: DMM1911 Mechanical Technology Laboratory 1

Synopsis

The course provides students hands-on experience of milling operations using conventional milling machine, welding operations using different types of welding equipments including electrode, MIG, TIG and spot weld and basic application of sheet metal fabrication.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Explain various basic conventional milling operations.
- CLO2: Apply various welding operations using different types of welding
- CLO3: Apply basic application of sheet metal fabrications.
- CLO4: Respond to team members in completing task

DMM2412 Metrology

Credit Hour: 2

Prerequisite: None

Synopsis

This course covers the engineering measuring instruments such as micrometer, Vernier caliper, mechanical dial indicator, gauge block, surface plate, instruments of testing angles and gauges. Additionally, we will cover the principle of surface metrology and roundness measurement. Lastly, we will learn the relationship between drawing dimensions and the measurement parts, aspect of accuracy, precision and measurement errors.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Apply the fundamental of metrology, measurement errors and basic inspection by utilizing various methods and techniques.
- CLO2: Demonstrate linear and angular measurements and inspection by using various measurement instruments.
- CLO3: Apply the principles of surface metrology in order to calculate surface roughness by various methods.
- CLO4: Understand the principles of roundness measurement by various methods.

DMM2513 Solid Mechanics

Credit Hour: 3

Prerequisite: DMM 1532

Synopsis

This course introduces the concept of stress and strain under axial loading, torsion, pure bending, and analysis and design of beam for bending.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Compute the simple stress problems in load-bearing structures.
- CLO2: Estimate the stresses and strains in structural members subjected to axial loads.

- CLO3: Solve the circular shafts subjected to twisting couples or torques.
 CLO4: Calculate the stresses in beams subjected to pure bending.
 CLO5: Solve the stresses in beams subjected to transverse loading by using shear force and bending moment diagram.

DMM2523 Dynamics

Credit Hour: 3

Prerequisite: DMM 1532

Synopsis

This course introduces kinematics of particles, kinetics of particles utilizing force and acceleration principles, kinetics of particles utilizing work and energy principles and kinetics of particles utilizing impulse and momentum principles.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Solve kinematics of particle problem
 CLO2: Solve kinetics of particle problem utilizing force-acceleration principles
 CLO3: Analyse kinetics of particle problem utilizing work-energy principles
 CLO4: Analyse kinetics of particle problem utilizing impulse and momentum principles

DMM2533 Fluid Mechanics

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces properties of fluids, fluid statics, fluid in motion, flow measurement, friction in fluid flow and pumps & pumping.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Solve fluids properties and fluids statics problems
 CLO2: Apply concept of fluid in motion and solve the problems involving flow measurements and friction
 CLO3: Analyze the concept flow, work and pump to the typical problems

DMM2543 Thermodynamics

Credit Hour: 3

Prerequisite: None

Synopsis

This course includes a study of properties of a system, properties of pure substance, first law and second law of thermodynamics and entropy

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Apply the basic concepts of thermodynamics and properties of pure substances to the typical problems
 CLO2: Solve the problems involving first law, second law, and entropy changes of thermodynamics systems
 CLO3: Display teamwork ability through solving and presenting thermodynamics complex problems

DMM2632 Industrial Design

Credit Hour: 2

Prerequisite: None

Synopsis

This course cover several aspects related to product design and industrial design. The aspects covered are product planning and customer needs, product specification, concept generation and concept selection, industrial design, design of environment and design of engineering.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Apply the understanding of customer needs and product design specification in concept generation
 CLO2: Produce a 3D design product by using Solidwork software
 CLO3: Relate DFM and DFE with quality of product
 CLO4: Build a positive communication within group members to present the project work

DMM2633 Manufacturing Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the student to various types of manufacturing processes used for converting raw material into finished products. This course will cover basic principles in metal casting processes, plastics processes, metal and sheet metal forming processes, powder metallurgy processes, materials removal processes, rapid prototyping and joining processes. Student will construct and present a process flow to manufacture a conceptual product.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Explain different types of manufacturing processes
- CLO2: Apply different types of manufacturing processes
- CLO3: Construct and present a process flow to manufacture a conceptual product

DMM3011 Occupational Safety & Health

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces OSH in Malaysia, identification, types and inspection of industrial hazard, analysis and control of industrial hazard, mechanical hazard, chemical hazard, physical hazard, psycho-social hazard, industrial hygiene and diseases, accident causation phenomenon, accident investigation and analysis, managing safety and health, and industrial safety and health regulation.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Demonstrate the OSHA regulation and implementation in Malaysia
- CLO2: Explain the industrial hazards and industrial hygiene
- CLO3: Analyse the accident phenomenon

DMM3623 Hydraulics & Pneumatics Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces hydraulic and pneumatic systems, actuators, sensors, valves and accessories. This course also introduces the design, analysis and simulation method of hydraulic and pneumatic system. Electromechanical control and programmable logic control of hydraulic/pneumatic system are introduced to enhance the hydraulic and pneumatic system design.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Understand basic hydraulic/ pneumatics components and circuits
- CLO2: Analyze basic hydraulic/ pneumatics components and circuits
- CLO3: Analyze electro- hydraulic/ pneumatics components and circuits

CLO4: Assemble and test actual electro- hydraulic/ pneumatics systems

CLO5: Produce and simulate actual electro- hydraulic/ pneumatics system model using software

DMM3663 CNC Technology

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the student to modern manufacturing processes which focused on CNC machining technology. This course will teach manual CNC programming and simulation using CNC simulator. This course will also cover troubleshooting for common programming errors. Student will construct a CNC program to manufacture a workpiece according to a technical engineering drawing..

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Construct CNC programme for CNC milling machine
- CLO2: Construct CNC programme for CNC lathe machine
- CLO3: Apply CNC programme to develop a CNC project
- CLO4: Constructs and present a CNC project

DMM3673 Mechanical Design

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces simple design process of machine components for static and dynamic loading. Machine elements design including screws, bolts, nuts, welded joints, springs and shafts.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Identify static failure on structures and fatigue failure on shafts.
- CLO2: Select the helical compression springs.
- CLO3: Determine the non-permanent joints including bolts, nuts and screws.
- CLO4: Analyse the welding in torsion and bending.

DMM3914 Final Year Project

Credit Hour: 4

Prerequisite: DMM2513

Synopsis



This course involves the project assignment to the students concerning selected topics related to the mechanical engineering. The technical project requires a particular design of appropriate equipment/system, development of the manufacturing process, testing and analysis of the system or equipment, preparation and presentation of the project report.

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Deconstructs a project and its development process based on proper knowledge of engineering and current practices of engineering tools.
- CLO2: Prepares the project report in both writing and oral communication with regard to ethical and professional practices in technology and engineering.
- CLO3: Organizes techniques for literature review and independently formulates the gather information towards of accomplishment of the project
- CLO4: Perform entrepreneurship knowledge in managing projects by considering cost effectiveness, practicality, and marketability.

DMM3912 Industrial Training

Credit Hour: 12

Prerequisite: Pass all core subjects with the status "Kedudukan Baik (KB)" on current evaluation.

Synopsis

This training exposes the students to professional skills and experience in aspect of mechanical engineering practice. The exposure will help to produce an excellent, responsible and good attitude..

Course Learning Outcomes

By the end of semester, students should be able to:

- CLO1: Apply and practice basic professional engineering knowledge/skills at industry level.
- CLO2: Identify and solve the industrial problem using available or learnt modern tools such as CAD, CNC machine etc.
- CLO3: Analyse and solve the industrial problems such as planning, design, construction and management of the projects.
- CLO4: Build communication/presentation skill when dealing with colleagues at industry.
- CLO5: Identify the company or department structure and recognize the job scope of specific post in the organization.
- CLO6: Explain the industrial training at industry in a complete report by end of the industrial training program.
- CLO7: Organize/manage a small group of people for special task/assignment.

**FACULTY OF INDUSTRIAL
SCIENCES & TECHNOLOGY**





FACULTY OF INDUSTRIAL SCIENCES & TECHNOLOGY

INTRODUCTION

Faculty of Industrial Sciences & Technology offers three Bachelor of Applied Sciences programmes with Honours in the field of industrial chemistry, industrial biotechnology and material technology. All the programmes are accredited by Malaysian Qualifications Agency (MQA). The programmes are designed to be aligned with the industry needs and the national policy towards complying for 4th Industrial Revolution (4IR). The faculty has established a linkage with reputable universities and industries at national and international levels. Six month industrial internship is compulsory for all students as part of the study period. Faculty also offers special programme known as Structured Early Industrial Exposure Program (SEIEP) to enhance industry experience. Our graduates are eligible to apply for professional body membership. Students have the opportunity to go for student exchange programme at national and international institutions.

In 2017, the faculty has successfully achieved 98% of graduate employability and the graduates have been employed by numerous national and multinational companies.

PROGRAMMES OFFERED

- Bachelor of Applied Science (Hons.) - Industrial Chemistry
- Bachelor of Applied Science (Hons.) - Industrial Biotechnology
- Bachelor of Applied Science (Hons.) - Material Technology



CAREER OPPORTUNITIES

Bachelor of Applied Science (Hons.) - Industrial Chemistry

- Academician
- Analyst
- Chemical Process Engineer
- Chemist
- Marketing and Sales Personnel
- Manufacturing Officer
- Process Development Chemist
- QA/QC Executive
- Research / Science Officer
- Technical Service Personnel
- Technopreneur
- Any related positions.

Bachelor of Applied Science (Hons.) - Industrial Biotechnology

- Academician
- Clinical Researcher
- Diagnostic Executive
- Marketing and Sales Personnel
- Medical Laboratory Technologist
- Project Manager
- Production Engineer
- Quality Control Analyst
- Research / Science Officer
- Scientist (Biochemist, Microbiologist, Molecular Biologist etc)
- Technical Service Personnel
- Technical Regulatory Affairs Officer
- Technopreneur
- Safety Officer
- Any related positions.

Bachelor of Applied Science (Hons.) – Material Technology

- Academician
- Application engineer
- Compounding engineer
- Material Technologist
- Material analyst
- Manufacturing officer
- Marketing and Sales Personnel
- Production engineer
- Packaging development engineer
- QA/QC executive
- Research / Science Officer
- Technopreneur
- Any related positions.

**FACULTY OF INDUSTRIAL SCIENCES & TECHNOLOGY
CURRICULUM STRUCTURE
BACHELOR OF APPLIED SCIENCES (HONS.) INDUSTRIAL CHEMISTRY**

YEAR SEM	FIRST		SECOND		THIRD		FOURTH	
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	UHL2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHR1012 Islamic and Asian Civilization	UHL2412 Academic Communication	UHL2432 English for Professional Communication	UHF2**1 FOREIGN LANGUAGE II	BSK3143 UNIT OPERATION	BSK4153 ADVANCED INSTRUMENTATION TECHNIQUE	BSK4608 INDUSTRIAL TRAINING
	BCS1023 PROGRAMMING TECHNIQUES	UQB1**1 CO-CURRICULUM	UHS1012 SOFTSKILL I	UGE2002 TECHNO- PRENEURSHIP	UHL4012 ELECTIVE SOCIAL SCIENCES	BSK3472 UNIT OPERATION LABORATORY	BSK4314 FINAL YEAR PROJECT II	BSK4614 INDUSTRIAL TRAINING REPORT
	BSK1103 ORGANIC CHEMISTRY	BSK1143 INORGANIC CHEMISTRY	UHF1**1 FOREIGN LANGUAGE I	UHS2011 SOFTSKILL II	UC2**1 CO-CURRICULUM II	BSK3153 ORGANIC CHEMISTRY PROCESS	BSK3**3 ELECTIVE IV	
	BSK1402 ORGANIC CHEMISTRY LABORATORY	BSK1422 INORGANIC CHEMISTRY LABORATORY	BSK2143 INSTRUMENTATIO N METHOD	UHM2022 ETHNIC RELATIONS	BSK3103 ORGANIC SPECTROSCOPY	BSK3302 FINAL YEAR PROJECT I	BSK3**3 ELECTIVE V	
	BSK1133 PHYSICAL CHEMISTRY LABORATORY	BSK1153 ANALYTICAL CHEMISTRY LABORATORY	BSK2442 INSTRUMENTATIO N METHOD LABORATORY	BSK2133 SEPARATION TECHNIQUE	BSK3462 OPTICAL SPECTROSCOPY LABORATORY	BSK3**3 ELECTIVE II		
	BS1412 PHYSICAL CHEMISTRY LABORATORY	BSK1432 ANALYTICAL CHEMISTRY LABORATORY	BSK2183 THERMO DYNAMICS	BSK2123 MATERIAL CHEMISTRY	BSK3163 INORGANIC CHEMISTRY PROCESS	BSK3**3 ELECTIVE III		
	BUM2123 APPLIED CALCULUS	BUM2413 APPLIED STATISTICS	BSK2223 LABORATORY QUALITY MANAGEMENT & VALIDATION	BSK2452 MATERIAL CHEMISTRY LABORATORY	BSK3**3 ELECTIVE I			
		BSF1212 LABORATORY SAFETY MANAGEMENT	BPT1113 OPERATION & PRODUCTION IN INDUSTRIAL MANAGEMENT	BSF2112 INDUSTRIAL QUALITY MANAGEMENT				
TOTAL CREDIT	18	18	18	17	15	16	13	12
TOTAL CREDIT FOR GRADUATION	127							

FACULTY & PROGRAMME COURSES



**Elective Courses For
Bachelor Of Applied Sciences (Hons.) Industrial Chemistry**

NO.	CODE	COURSE	CREDIT HOUR
1	BSK3513	PETROCHEMISTRY	3
2	BSK3523	OLEOCHEMISTRY	3
3	BSK3533	POLYMER CHEMISTRY	3
4	BSK3573	FLAVOR AND FRAGRANCE CHEMISTRY	3
5	BSK3583	ELECTROCHEMISTRY	3
6	BSK3593	ENVIRONMENTAL CHEMISTRY	3
7	BSK3503	FUNCTIONAL FOOD	3
8	BSK3633	MEDICINAL CHEMISTRY	3
Total Credit Hours			24

**FACULTY OF INDUSTRIAL SCIENCES & TECHNOLOGY
CURRICULUM STRUCTURE
BACHELOR OF APPLIED SCIENCES (HONS.) INDUSTRIAL BIOTECHNOLOGY**

YEAR SEM	FIRST			SECOND			THIRD			FOURTH	
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	
	UHM2022 ETHNIC RELATIONSHIP	UHL2312 TECHNICAL ENGLISH	UOB1011 CO-CURRICULUM	UHS1011 SOFT SKILLS I	UHF2**FOREIGN LANGUAGE II	BSB3163 PLANT AND MAMMALIAN CELL TECHNOLOGY	BSB4173 EXTRACTION AND BIOSEPARATION	BSB4608 INDUSTRIAL TRAINING			
	UHR1012 ISLAMIC & ASIAN CIVILIZATION I (TITAS)	BCS1023 PROGRAMMING TECHNIQUES	UHL2322 TECHNICAL WRITING	UC*20** CO-CURRICULUM	UHS1011SOFT SKILLS II	BSB3442 PLANT AND MAMMALIAN CELL TECHNOLOGY LABORATORY	BSB422 EXTRACTION AND BIOSEPARATION LABORATORY	BSB4604 INDUSTRIAL TRAINING REPORT			
	BUM2123 LABORATORY CALCULUS	BUM24113 APPLIED STATISTICS	BSB2223 LABORATORY QUALITY MANAGEMENT & VALIDATION	UHF1**1 FOREIGN LANGUAGE I	UHL2332 ACADEMIC REPORT WRITING	BSB3312 FINAL YEAR PROJECT I	BSB4324 FINAL YEAR PROJECT II				
	BSF1202 LABORATORY SAFETY MANAGEMENT	BSB1173 MICROBIOLOGY	BSB2173 CELL AND CELLULAR MOLECULAR BIOLOGY	BSB2143 ENZYME TECHNOLOGY	BSB3113 GENE TECHNOLOGY	BSB35*3 ELECTIVE I	BSB35*3 ELECTIVE III				
	BSB1113 BIOCHEMISTRY	BSB1432 MICROBIOLOGY LABORATORY	BSB2472 CELL AND MOLECULAR BIOLOGY LABORATORY	BSB2452 ENZYME TECHNOLOGY LABORATORY	BSB3472 GENE TECHNOLOGY LABORATORY	BSB35*3 ELECTIVE II					
	BSB1402 BIOCHEMISTRY LABORATORY	BSB1133 ORGANIC CHEMISTRY	BSB2173 BIOANALYTICAL CHEMISTRY	BSB2193 INDUSTRIAL MICROBIOLOGY	BSB3123 BIOPROCESS TECHNOLOGY	UGE2002 TECHNO- PRENEURSHIP					
	BSB1102 BIOPHYSICAL CHEMISTRY	BSB1422 ORGANIC CHEMISTRY LABORATORY	BSB2442 BIOANALYTICAL CHEMISTRY LABORATORY	BSB2462 INDUSTRIAL MICROBIOLOGY LABORATORY	BSB3482 BIOPROCESS TECHNOLOGY LABORATORY						
	BSB1112 INDUSTRIAL BIOTECHNOLOGY		BSB2122 GENETICS	BSF2112 INDUSTRY QUALITY MANAGEMENT	UHE33**2 ELECTIVE CIMHLS						
				BPT1113 OPERATION & PRODUCTION IN INDUSTRIAL MANAGEMENT							
TOTAL CREDIT	18	18	18	18	16	15	12	12			
TOTAL CREDIT FOR GRADUATION	127										



**Elective Courses For
Bachelor Of Applied Sciences (Hons.) Industrial Biotechnology**

NO.	CODE	COURSE	CREDIT HOUR
1	BSB3573	REACTOR DESIGN	3
2	BSB3583	ADVANCED ENZYME TECHNOLOGY	3
3	BSB3593	BIOSENSOR TECHNOLOGY	3
4	BSB3503	BIOMANUFACTURING	3
5	BSB3563	BIOREMEDIATION	3
6	BSB3543	NUTRACEUTICALS AND FUNCTIONAL FOODS	3
Total Credit Hours			15

**FACULTY OF INDUSTRIAL SCIENCES & TECHNOLOGY
CURRICULUM STRUCTURE
BACHELOR OF APPLIED SCIENCES (HONS.) MATERIAL TECHNOLOGY**

YEAR SEM	FIRST		SECOND		THIRD		FOURTH		
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	
FACULTY & PROGRAMME COURSES	BSP1113 MECHANICS & THERMODYNAMICS	BSP133 ORGANIC CHEMISTRY	BSP2153 MATERIAL SCIENCE & TECHNOLOGY	BSP2163 COLLOID & SURFACE SCIENCE	BSP3112 CERAMICS	BSP3183 FAILURE ANALYSIS	BSP4172 MATERIAL SELECTION & PROCESSING	BSP4608 INDUSTRIAL TRAINING	
	BSP1123 ELECTRICITY, MAGNETISM & OPTICS	BSP173 INORGANIC CHEMISTRY	BSP2123 MATERIAL CHARACTERIZATI ON	BSP2193 RHEOLOGY	BSP3153 POLYMERS	BSP3173 CORROSION	BSP493 ELECTIVE III	BSP4614 INDUSTRIAL TRAINING REPORT	
	BSP1402 PHYSICS LABORATORY	BSP1432 CHEMISTRY LABORATORY	BSP2422 MATERIAL SCIENCE & SOLID STATE LAB	BSP2432 RHEOLOGY & COLLOID LAB	BSP3462 POLYMER & COMPOSITE LABORATORY	BSP3462 ADVANCE MATERIAL LABORATORY	BSP493 ELECTIVE IV		
	UHR 1012 ISLAMIC AND ASIAN CIVILIZATION	BSP1113 PHYSICAL CHEMISTRY	BSP2113 SOLID STATE PHYSICS	BSP3143 METAL & ALLOY	BSP3472 METAL & CERAMIC LABORATORY	BSP3302 FINAL YEAR PROJECT I	BSP4314 FINAL YEAR PROJECT II		
	BCS 1023 PROGRAMMING TECHNIQUE	BSF1212 LABORATORY SAFETY MANAGEMENT	BSF2112 INDUSTRY QUALITY MANAGEMENT	BPT 1113 OPERATION & PRODUCTION IN INDUSTRIAL MANAGEMENT	BSP3162 COMPOSITES	BSP493 ELECTIVE I	UHF 2**1 FOREIGN LANGUAGE II		
	BUM2123 APPLIED CALCULUS	BUM2413 APPLIED STATISTICS	UHM 2022 ETHNIC RELATIONS	UGE 2002 TECHNOPRENU RSHIP	UHF 3**2 ENGLISH PBM/SUSCENSE SOCIAL	BSP493 ELECTIVE I			
		UHS1011 SOFT SKILLS I	UHL 2412 ENGLISH FOR ACADEMIC COMMUNICATION	UHL 2422 ENGLISH FOR TECHNICAL COMMUNICATION	UHL 2432 ENGLISH FOR PROFESSIONAL WRITING REPORT	UHF 1**1 FOREIGN LANGUAGE I			
			UGB 1**1 CO-CURRICULUM I	UHS 2011 SOFT SKILLS II	UG* 2**1 CO-CURRICULUM 2	UG* 2**1 CO-CURRICULUM 2			
	16	17	18	19	16	17	13	12	
	TOTAL CREDIT	128							13
TOTAL CREDIT GRADUATION								13	12



**Elective Courses For
Bachelor of Applied Sciences (Hons.) Material Technology**

NO.	CODE	COURSE	CREDIT HOUR
1	BSP3503	SOLAR CELL TECHNOLOGY	3
2	BSP3513	ELECTRONIC CERAMICS	3
3	BSP3523	LIQUID CRYSTAL TECHNOLOGY	3
4	BSP3533	SUPERCAPACITOR TECHNOLOGY	3
5	BSP3543	THIN FILM TECHNOLOGY	3
6	BSP3553	ADVANCE SOLID STATE PHYSICS	3
7	BSP4523	RECYCLE TECHNOLOGY	3
8	BSP4533	MOLECULAR MODELING	3
9	BSP4543	SEMICONDUCTOR DEVICES	3
10	BSP4553	COMPUTATIONAL PHYSICS	3
11	BSP4563	NANOMATERIAL TECHNOLOGY	3
Total Credit Hours			12

CURRICULUM STRUCTURE FOR BACHELOR OF APPLIED SCIENCES (HONS.) INDUSTRIAL CHEMISTRY

BSK1153 Analytical Chemistry

Credit Hour: 3

Prerequisite: None

Synopsis

This course will provide students with a basic understanding of analytical chemistry and major aspects of quantitative chemical analysis. The course is an introductory part of a series of analytical chemistry courses for industrial chemistry program. It will concentrate upon descriptive analytical chemistry and analytical methods based on chemical equilibrium which include precipitation and volumetric analysis.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the theory and basic technique in analytical chemistry.
- CO2: Solve problems involving both the qualitative and quantitative analysis.
- CO3: Apply the essential facts, concepts, principles and theories relating to analytical chemistry to solve the real chemical analysis problems.

BSK1432 Analytical Chemistry Laboratory

Credit Hour: 2

Prerequisite: None

Synopsis

The objective of this course is to provide students with a basic skills of analytical chemistry field, the science of chemical characterization and measurement. The course is an introductory part of a series of analytical chemistry courses for industrial chemistry majors. It will concentrate upon descriptive analytical chemistry and analytical methods based on chemical equilibria which include precipitation, volumetric and thermal analysis. A brief introduction to instrumental methods, separation methods, instruments calibration and methods validation, process analytical chemistry as well as good laboratory practice will also be practice in lab.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the relationship of the chemical and physical properties of a system to the analytical process undergone.
- CO2: Demonstrate the several chemical monitoring using several analytical methods and evaluate the obtained data with group member.
- CO3: Express the optimal analytical chemical method in terms of the application or analyte to group

member.

BSK1103 Organic Chemistry

Credit Hour: 3

Prerequisite: None

Synopsis

This course discuss the fundamental theory of properties, synthesis and organic reactions where use the functional group as framework. Focus on the key concepts of organic chemistry through a study of the reactions of selected functional groups. Particular emphasis is placed on the underlying some mechanistic pathways that are involved. The stereochemistry of the molecular structure is also considered. The development of key skills is facilitated by a program of consultancy and practical.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the chemical structures, properties of common organic compounds and their reaction.
- CO2: Explain the fundamental organic reactions, mechanism and reaction conditions.
- CO3: Apply the fundamental organic chemistry in various industrial application.

BSK1402 Organic Chemistry Laboratory

Credit Hour: 2

Prerequisite: None

Synopsis

Practical comprises several laboratory experiments related to organic chemistry. In organic chemistry experiments, students are exposed to melting point determination, extraction, distillation, isolation, crystallization, determination of optical activity and identification of an organic functional groups.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply the knowledge of organic chemistry to solve the problem
- CO2: Report and discuss the data and information of the experiment
- CO3: Communication by explain the questions given based on experiments

BSK1143 Inorganic Chemistry

Credit Hour: 3

Prerequisite: None

Synopsis

The objective of this course is to give the student a basic understanding of theoretical inorganic chemistry and to apply this understanding to problem solving

involving critical thinking. The topics covered in this course include periodic trends, foundations of bonding theory, basic coordination chemistry, chemistry of the main group elements and block d elements. Some of the important concepts in bioinorganic chemistry as well as nanomaterials, nanoscience and nanotechnology will be discussed. This basic understanding is to prepare the student for additional coursework, either in chemistry or in other disciplines, and to help the student function in a technological society.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain certain key introductory concepts in inorganic chemistry (e.g. crystal field theory, common structural types, bonding) as well as the physical and chemical properties of inorganic compounds.
 - CO2: Use these concepts in problem solving, describe the chemistry of main group elements and transition metals.
 - CO3: Use resources to follow the current interests in inorganic chemistry.

BSK1422 Inorganic Chemistry Laboratory

Credit Hour: 2

Prerequisite: None

Synopsis

This course will provide the students a clear idea of the reactivity of the elements in different groups.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain the chemical reactions of the main group elements.
 - CO2: Ability to design, conduct experiments as well as to analyze and interpret data in relation to laboratory works.
 - CO3: Use resources to explain the chemical reactions.

BSK1113 Physical Chemistry

Credit Hour: 3

Prerequisite: None

Synopsis

The course discusses the concepts and fundamental principles of physical chemistry. These include the properties of solid, liquid and gas, chemical equilibrium, dissolution and solution properties, chemical colloid and surface, thermodynamics, chemical kinetics and catalyst. In order to achieve technical development in the advanced technologies that requires the ultimate precision of atomic level, it is indispensable to understand the physical phenomena involved in the Industrial technology on the basis of fundamental principles.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Define the various laws in terms of chemical reactions.
 - CO2: Analyze /solve the given problem from physical chemistry.
 - CO3: Applications the important physical laws in industrial processes.

BSK1412 Physical Chemistry Laboratory

Credit Hour: 2

Prerequisite: None

Synopsis

Practical comprises laboratory experiments involving theory in the physical chemistry course. Students will be exposed to chemical equilibrium, thermochemistry, calorimetry, electrochemistry and kinetic theory of gases and various experiments related to physical chemistry concepts.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Understanding the theory of physical chemistry.
 - CO2: Ability to conduct experiments, analyze and interpret data from laboratory works.
 - CO3: Problem solving skills thru laboratory experimental data.

BSK2143 Instrumentation Method

Credit Hour: 3

Prerequisite: BSK1133

Synopsis

This course is designed to introduce the modern instrumental methods that are used to solve analytical problems in chemistry. A qualitative and quantitative analysis which is studied in Analytical Chemistry course will be further developed. The course will begin with the explanation of instrumentation methods concept and the tools of quantitative analysis. Students will expose to spectroscopy (AAS, HPLC, GC, IC, MS, UV/VIS, FTIR, , and NMR) and deals with the methods of electroanalytical chemistry.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Demonstrate knowledge of instrumental analysis principles.
 - CO2: Select the most appropriate instrumental analysis technique to solve an analytical problem.
 - CO3: Able to discuss new application in instrumental analysis technique relevant to the fast progressing of chemical analysis area..

BSK2442 Instrumentation Method Laboratory**Credit Hour: 2****Prerequisite: None****Synopsis**

This course is exposed students to modern instrumental methods including UV-visible spectrophotometers (UV/VIS), Atomic Absorption Spectrometer (AAS), High performance Liquid chromatography (HPLC), and Gas Liquid Chromatography (GC) with different detectors that are used to solve analytical problems in chemistry. Students will develop skills like being a team player through working in groups and technical writing skills through report writing.

Course Outcome

By the end of semester, students should be able to:

- CO1: Show appropriate experimental technique in instrumentation method.
 CO2: Identify principles in instrumentation laboratory.
 CO3: Show the ability to operate the instrument correctly.
 CO4: Write scientific report with relevant reference materials.

BSK2123 Material Chemistry**Credit Hour: 3****Prerequisite: None****Synopsis**

This course introduces students to the science of materials, including the scopes of physics, chemistry and basic engineering which complement the so called interdisciplinary area of materials science. Emphasis is given on three main elements: Structures, Properties and Performances, with an additional material's applications. Atomic/sub-atomic structures, bonding, crystal structure and defects will be described. Properties (electrical, mechanical, optical) and Performances (processes and deformation) will be included. The uses of selected materials will also be considered.

Course Outcome

By the end of semester, students should be able to:

- CO1: Acquire fundamental knowledge of each material that covers in this course.
 CO2: Apply calculation related to mechanical, electrical, magnetic, thermal and optical properties of materials and their composites.
 CO3: Correlate the material chemistry logic and knowledge to industrial landscape.
 CO4: Recognize the needs for, and possess the capability in life-long learning.

BSK2452 Material Chemistry Laboratory**Credit Hour: 2****Prerequisite: None****Synopsis**

This course exposes students to the handling of various materials and their laboratory preparations and characterizations. The students will acquire the skill and experimental techniques for the synthesis, determination of their properties and characterizations of some important materials discussed in the Material Chemistry course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Practice the procedures in handling of industrial materials and the role of materials scientist in the future development of industry.
 CO2: Analyze the mechanical, electrical, magnetic, thermal and optical properties of materials and their composite as well as the influence of fillers on these properties.
 CO3: Acquire a working knowledge on the relationship between the raw material properties and the processing.
 CO4: Perform creativeness ideas as well as teamwork and communication skills.

BSK2183 Thermodynamics**Credit Hour: 3****Prerequisite: BSK1113****Synopsis**

This course discusses thermodynamic in greater detail. Changes in physical properties will be extensively discussed in each law of thermodynamics. A special emphasis will be placed on the basic concepts of work, heat, internal energy, heat capacity and enthalpy changes in First Law of Thermodynamic. In the Second Law, entropy changes in reversible and irreversible processes will be discussed. Absolute entropy will be discussed in Third Law. Also discussed in this course is thermal equilibrium in the Zeroth Law, principles and applications of ionic interactions and electrochemical systems.

Course Outcome

By the end of semester, students should be able to:

- CO1: Elaborate on thermodynamic concept.
 CO2: Use thermodynamic concept to explain chemical phenomena.
 CO3: Calculate thermodynamic variables.

BSK2133 Separation Technique**Credit Hour: 3****Prerequisite: None****Synopsis**

This course introduces the basic principles and instrumentation of separation methods in chemistry. The major separation method used in chemical analysis, including chromatography and electrophoresis will be discussed. Characterization, mechanism involved in

separation, instrumental systems, advantages and limitation of methods will also be discussed. Students will be exposed to development and application of knowledge in explaining the concepts and principles of separation.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the relationship of the chemical and physical properties of a system to the separation process undergone.
 CO2: Planning the separation method by using several separation mechanisms.
 CO3: Adopt the optimal separation method for the application or targets.

BSK2223 Laboratory Quality Management and Validation

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the Good Laboratory Practice (GLP) and ISO 17025 Principles and Requirements for high-stakes testing and calibration laboratories. The quality infrastructure supporting testing and research laboratory management will be introduced with many aspects of laboratory quality management and the way to achieve recognition and certification. In addition, different perspectives and theories of method validation including issues in validating, testing, research method and measurement of uncertainty will be addressed.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the GLP Principles and the ISO 17025 requirements to Laboratory Quality Management and certification.
 CO2: Solve the theoretical problems on method validation and uncertainty comprehensively.
 CO3: Demonstrate teamwork skills in assigned task.

BSK3143 Unit Operation

Credit Hour: 3

Prerequisite: BSK2183

Synopsis

This course discusses material balance on steady and recycle states and material balance based on chemical processes. Emphasis will be placed on energy balance concept based on chemical processes including calculation of heats of reactions and application of the steam table. Also covered in this course are fluid pressure and fluid dynamics, liquid flow measurement, heat transfer and heat exchangers.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply the equation in solving problems of energy balance, materials balance, fluid mechanics and heat transfer.
 CO2: Respond to a given problem based on unit operation.
 CO3: Propose the concept of energy balance, material balance, fluid mechanics and heat transfer to overcome chemical processes problems.

BSK3472 Unit Operation Laboratory

Credit Hour: 2

Prerequisite: None

Synopsis

Laboratory experiments are designed and structured for the course is related to several unit operations in an open laboratory concept. Laboratory practice are based on pilot-scale apparatus i.e. tray drier, mixers, fixed and fluidised unit, batch and continuous distillation column unit, liquid-liquid extraction unit etc.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply theory in project scale-up of bench-scale laboratory into pilot scale environment.
 CO2: Follow good laboratory skill in an open laboratory concept and relate into several industrial processes.
 CO3: Display effective communication in written (lab reports) with compile experimentally generated data into concise, clearly written laboratory reports, present the reports within the timeline.
 CO4: Work as a team member to finish the given task.
 CO5: Build a company which produce the product by applying unit operation knowledge.

BSK3163 Inorganic Chemistry Process

Credit Hour: 3

Prerequisite: None

Synopsis

This course gives an overview of modern inorganic chemical processes in the framework of global, sustainable and technical innovation involving major inorganic chemistry industries, traditional and novel inorganic processes, new chemical science and engineering technology, process design and development, manufacturing and operation, the future of inorganic chemical processes and the R&D activities for new inorganic processes.

Course Outcome

By the end of semester, students should be able to:

- CO1: Discuss confidently the technology progress and related development related in inorganic chemistry processes.

CO2: Develop skills of innovative practices in industrial inorganic processes.

CO3: Seek information on the state of art and express innovative suggestions for betterment of inorganic processes.

BSK3153 organic Chemistry Process

Credit Hour: 3

Prerequisite: None

Synopsis

This course reviews the whole spectrum of today's most commonly used industrial organic chemicals. It explains their origins, uses, preparations. It answers questions of today of chemical industry, such as, what are the industrial chemicals and where do they come from? How are they made? What are the factors that affect their level of production and pricing? The course covers the sorces, their competitive process and commercial uses of main building blocks starting from 1 carbon structure to other cycle building blocks as well as other important industrial products such as organic pigments , oils and fats, soap & detergents etc.

Course Outcome

By the end of semester, students should be able to:

CO1: Elaborate the basic concept of the industrial organic chemical process, their chemistry and basic chemicals reactions their sources used in the production of large scale industrial chemicals products.

CO2: Explain the synthesis and applications of various industrial chemicals products and their commercial importance.

CO3: Communicate the knowledge, their benefits, daily life use of industrial chemicals compounds effectively.

CO4: Identify and select appropriate problems and work independently in the chemical industry.

BSK3103 Organic Spectroscopy

Credit Hour: 3

Prerequisite: None

Synopsis

This course deals with the four major instrumental methods such as ultra-violet/visible, infrared, mass spectroscopy and nuclear magnetic resonance spectroscopy. It provides a concise introduction to the physical background of each, describing how molecules interact with electromagnetic radiation or how they fragment when excited sufficiently, and how this information may be applied to the determination of chemical structures of organic compounds. It also includes simple descriptions of instrumentation and emphasizes modern methodologies such as the Fourier transform approach to data analysis. Each chapter is related with a set of problems to be solved in the tutorial lectures to test the understanding of organic

spectroscopy.

Course Outcome

By the end of semester, students should be able to:

CO1: Point out detail the concepts, theories and application of spectroscopy in organic chemistry.

CO2: Utilize the concepts and understanding of spectroscopy in organic structure determination and for quantitative purposes.

CO3: Communicate effectively in written and oral form through group discussion and presentation session.

CO4: Build up a strong knowledge in qualitative analysis in relations with various type of spectrum.

BSK3462 Organic Spectroscopy Laboratory

Credit Hour: 2

Prerequisite: None

Synopsis

The aim of this course is to provide students with a basic understanding of spectroscopic analysis suitable for the determination of the structure of organic molecules. The course will concentrate upon the most commonly used techniques in organic structure determination, i.e. infrared spectroscopy (IR), ultraviolet-visible (UV-Vis) spectroscopy and gas-chromatography-mass spectrometry (GC/MS). The amount of time devoted to each technique in this course is meant to be representative of their current usage for structure determination.

Course Outcome

By the end of semester, students should be able to:

CO1: Explain the basic concept of spectroscopic analysis in determining the chemical structure of organic molecules.

CO2: Show the appropriate analytical method in conducting the respective experiments and interpret the spectral data acquired.

CO3: Explain the principles of spectroscopy and determine the chemical structure using spectrum.

BSK4153 Advance Instrumentation Techniques

Prerequisite: None

Synopsis

This course is designed to produce graduates who have knowledge of advanced instrumentation involved in chemical-related industries and sectors (i.e. oil and gas, material, bio-related, commercial testing laboratory, environment). Topics discussed in this course cover physical and chemical testing, surface analysis, trace element analysis, thermal analysis and molecular testing. Students will learn the theory of the selected

advanced instrumentation techniques, their operation and apply them into different chemical-related applications. Upon completion, students should be able to interpret and analyse the data obtained from each instruments.

Course Outcome

- By the end of semester, students should be able to:
- CO1: To explain the theory of advanced instruments used in chemical-related industries and sectors.
 - CO2: To relate the advanced instruments to the applications in chemical-related industries and sectors.
 - CO3: To interpret the results from various advanced instrumentation techniques.

BSK3302 Final Year Project I

Credit Hour: 2
Prerequisite: None

Synopsis

To expose and encourage student in doing research, define problems, give an opinion on how to overcome the problems and get related information regarding the problems. The topics that will discuss in this subject are literature review and methods that has been used by previous research, research report (proposal), research ethics and project management.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Solve related problems in a project topic using the appropriate principles.
 - CO2: Analyze the appropriate concepts learned and suitable solutions to be applied.
 - CO3: Defend ideas effectively in both oral and written forms
 - CO4: Initiate and commit to participate in gaining and sharing knowledge.

BSK4314 Final Year Project II

Credit Hour: 4
Prerequisite: None

Synopsis

The students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, each student is required to present their findings and submit a dissertation. Evaluation is based on oral presentation and submitted dissertation.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Analyze, interpret and relate experimental data with fundamental theories.

- CO2: Demonstrate good organization of laboratory logbook in recording experimental methods and data.
- CO3: Assemble research proposal in professional format such as oral presentation.
- CO4: Report satisfactory project progress within the timeline.

BSK4608 Industrial Training

Credit Hour: 8
Prerequisite: All faculty and programme courses

Synopsis

This course aims to give chances for the student to practice and apply their knowledge and skills that they gain during their study. During the placement, we expect students to keep a log book, in which they make regular entries describing the work they are undertaking. Students are supervised by industrial and university supervisors to guide and ensure they can do their work as good as possible and achieve the objective for this course.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Design an appropriate strategy to complete the given task.
 - CO2: Construct possible solution to a given real problem in the industry.
 - CO3: Adapt working culture in project, consultant, construction and related industry.
 - CO4: Work effectively with others in organization to perform task given.
 - CO5: Demonstrate interpersonal skills and professional ethics in organization.

BSK4614 Industrial Training Report

Credit Hour: 4
Prerequisite: All faculty and programme courses

Synopsis

During the placement, we expect students to keep a log book, in which they make regular entries describing the work they are undertaking. Then, student need to provide industrial training report to describe their technical and personal development during their placement. The industrial training report need to hand in to the university supervisor. Students need to do final presentation for assessment.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Organize the industrial training knowledge, experience and skill in the preparation of the industrial training report.
 - CO2: Build effective communication skills in written and oral presentation.
 - CO3: Practice the related approach to get relevant information from various sources.

CO4: Demonstrate good attitude in fulfilling the requirement of Industrial Training Unit.

BSF1212 Laboratory Safety Management

Credit Hour: 2

Prerequisite: None

Synopsis

This course exposes students to basic concepts of industrial and laboratory safety. Topics include quality systems (Good laboratory Practice and ISO/IEC 17025) for laboratory management, occupational health & safety and acts and related regulations. Students will be introduced to laboratory and industrial safety, laboratory and industrial accident, safety policy and procedure, emergency response plan, introduction to basic toxicology and first aid.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain the basic concepts of industrial and laboratory safety.
 - CO2: Apply the information of quality systems and safety policies, procedures and laboratory safety manual based on a task given.
 - CO3: Relate hazard communication and emergency preparedness and response.
 - CO4: Report the laboratory and industry functions to comply with safety rules and regulations, write a laboratory safety manual and work in a team for a task given.

BPT1113 Operation and Production in Industrial Management

Credit Hour: 3

Prerequisite: None

Synopsis

The subject is intended to provide an understanding on the operational aspects of management techniques. It will focus on the nature of operations management and its impact on competitiveness, and the role of the operations manager and the relationship with other business functions.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Apply fundamental concept of operation and production management.
 - CO2: Measure production and operation parameters.
 - CO3: Propose operations management decision making in solving operation and production problems.

BSC1023 Programming Technique

Credit Hour: 3

Prerequisite: None

Synopsis

This course discusses on understanding problems and translating them into computer solution techniques using programming language. This course enables students to apply programming techniques, write programming codes from given problems and execute programming codes successfully.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Demonstrate various techniques in solving a problem.
 - CO2: Construct and run programs.
 - CO3: Differentiate various techniques in solving a problem.

BUM2123 Applied Calculus

Credit Hour: 3

Prerequisite: None

Synopsis

Calculus is widely used in solving problems in science and engineering applications. Students are exposed limits and continuity; the derivative; the derivative in graphing and applications; integration; applications of the definite integrals in geometry, science and engineering; exponential, logarithmic, and inverse trigonometric functions; principle of integral evaluation; interpolation, extrapolation, errors.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Analyze and apply appropriate calculus concepts to solve various science and engineering problems.
 - CO2: Use appropriate software and tool to solve the graphical and computational problems in calculus.
 - CO3: Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
 - CO4: Relate and applied the concepts and methods studied into other courses.

BUM2413 Applied Statistics

Credit Hour: 3

Prerequisite: None

Synopsis

Students are introduced to statistics including statistical problem-solving methodology and descriptive statistics, probability distribution commonly used, sampling distribution and confidence interval, hypothesis testing, analysis of variance (ANOVA), goodness of fit and contingency tables and regression and correlation including simple and multiple linear regressions. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Analyze data using statistical theory and methodology, and recommend a conclusion or suggestion based on the analyzed data.
 - CO2: Perform statistical data analysis by using appropriate software and scientific calculator.
 - CO3: Apply statistical concepts and methods learned to solve any related problems in various disciplines.

BS2112 Industrial Quality Management

Credit Hour: 2

Prerequisite: None

Synopsis

This course focuses on the management of quality for manufacturing and service sectors to achieve global competitiveness. Emphasis is placed on new techniques for managing quality. This course is divided into two parts. Part one provides an introduction to quality assurance principles, including (i) Good Manufacturing Practices (GMP), (ii) ISO 9000 family and (iii) various continuous improvement techniques and (iv) audit process. Part two focuses on the quality control system, which is concerned with (i) quality control tools used in industries, (ii) acceptance sampling, (iii) statistical data analysis, (iv) reliability and maintainability, and (v) cost of quality.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain the concept of industrial quality management which comply with Good Manufacturing Practice and other related regulations.
 - CO2: Apply philosophies of quality in an industrial management system.
 - CO3: Demonstrate leadership characteristic in assigned task.

BSK3593 Environmental Chemistry

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the concepts of environmental science, environmental analysis, and environmental issues. It covers some fundamental aspects of the science of atmosphere, waters, and soil. This course covers environment quality guidelines used in Malaysia. It also covers the environmental monitoring strategies and analysis of inorganic and organic analyte in environment.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Construct well-reasoned solutions to environmental predicaments, testing them

against relevant criteria and standards.

- CO2: Classify and explain the complex physical, chemical and biochemical systems of natural environments and different types of environmental monitoring strategies.
- CO3: Show the ability to communicate effectively through group assignment or presentation.
- CO4: Read appropriate reference materials regarding environmental issues to solve the problem.

BSK3573 Flavor and Fragrance Chemistry

Credit Hour: 3

Prerequisite: None

Synopsis

This course is an introduction to aroma chemicals, essential oils, fragrances and flavor compositions for the food, cosmetics and pharmaceutical industry. The present state-of-the-art technology, the future use of resources and approaches for the production of the respective chemical compounds will be discussed. Another section is devoted to the description of the renewable resources of flavors: spice plants, fruits from moderate to tropical climates, vegetables, fermented and heated plants. Analytical methods, such as gas chromatography coupled to human or electronic noses or to a mass spectrometer, will be outlined. Consumer trends, legal and safety aspects will also be discussed. Novel renewable resources are sourced from biotechnology; enzymes, for example, bio-transform cheap substrates to produce flavors de novo.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain fundamental process formation and formulation fragrance from plants.
 - CO2: Propose extraction, analysis and application of fragrance based on essential oil.
 - CO3: Seek information on the contemporary fragrance industries and technology independently.

BSK3633 Medicinal Chemistry

Credit Hour: 3

Prerequisite: None

Synopsis

The medicinal chemistry course discusses the introduction of Medical plants, their role in drugs discovery. This course describes the Extraction of lead compounds, their chemistry, isolation and purification of novel drugs. This course focusing on the key concepts of drugs and their synthesis application human health. Med. Chem. course targeting the chemistry of drugs and their metabolism, and how a drug can act in human body. These contents of course have potential understanding about enzymes inhibitions and mechanism in drugs synthesis and application. This course also focusing on the key concepts of Structure

Activity Relationship of drugs and affects and importance. Finally the course will help to the students can work pharmaceutical industry. This course comprises about Nucleic acid, DNA and RNA and medicinally importance in genetic and role in mutation.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain the medicinal plants, drugs discovery, extraction of lead Bioactive compounds, to understand their chemistry and isolation and purification novel drugs.
 - CO2: Formulate the drugs, synthesis, their mechanism of action, enzymes inhibitions and mechanism in drugs application antibiotics, antibacterial drugs effects on cell wall inhibition.
 - CO3: Apply the knowledge of medicinal chemistry into pharmaceutical industry, Structure Activity Relationship of various drugs. The role of importance of nucleoside and nucleotides, the role RNA and DNA in cell.

BSK3513 Petrochemistry

Credit Hour: 3
Prerequisite: None

Synopsis

This course gives an overview on related processes and issues involved in petroleum and petrochemical industry. The first part of the course will introduce the concept of petroleum refining including the main processes such distillation, reforming, cracking, coking and blending. The parameter affecting each process will be discussed. The characterization and analysis of various petroleum feedstocks and products using basic and advanced instruments will be introduce in this course. The second part of the course will cover the downstream processes to produce fine chemicals and other petro-based products from different feedstock i.e. C1 to C4 alkanes, olefins and aromatics hydrocarbon. Besides, this course will also introduce alternative hydrocarbon feedstocks other than petroleum including biobased feedstock. Lastly, some of the environmental aspects and pollution prevention in petroleum refining and petrochemical industry will be discussed.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Describe the different parts in petroleum refining, petrochemical and other hydrocarbons related processes as well as the factor affecting the overall process and its safety aspects.
 - CO2: Analyse the relationship between the properties of feedstocks and products in chemical transformations of petroleum and other hydrocarbons including their reaction pathways.
 - CO3: Propose suitable method and/or instrument for

analyzing and testing any petroleum and petrochemicals related samples.

- CO4: Seek information on the contemporary processes/methods in petroleum and petrochemical industries independently.

BSK3533 Polymer Chemistry

Credit Hour: 3
Prerequisite: None

Synopsis

The course highlight the fundamental principles of polymer chemistry and technology. The discussion covers the reactions mechanism and types of polymers based on reactions category. The general characteristics of polymer, polymerization process, polymer synthesis, specific characteristic of polymer including thermal, morphological and rheological properties. The progress / development of industrial polymers using the advanced technologies. The role played by polymer in the universe, earth, living system and human society is realized and a better understanding of polymeric materials in daily life.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain the fundamental principle of polymerisation reactions in terms of various reaction categories.
 - CO2: Analyzing the rheological properties of advanced polymeric materials to improve the applications demand in market.
 - CO3: Build up awareness on polymers and plastic materials useful in daily life.

BSK3583 Electrochemistry

Credit Hour: 3
Prerequisite: None

Synopsis

This course gives an overview of electrode processes, showing the way in which the fundamental components of the subject come together in an electrochemical experiment. There are individual discussions of thermodynamics and potential, electron-transfer kinetics and mass transfer in electrochemical system. Concept from these basics areas are integrated together in treatments of various methods. The interfacial structure, adsorption and modified electrode will also be discussed. By mastering the fundamental in electrochemical processes, their applications in various aspects will be discussed.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain fundamental electrode processes in terms of thermodynamics and kinetics.
 - CO2: Propose electrochemical methods to solve industrial-based problem.



CO3: Seek information on the contemporary electrochemical methods independently.

CO3: Appreciating the application of oleochemistry

BSK3503 Functional Food

Credit Hour: 3

Prerequisite: None

Synopsis

This course focuses on the usage and application of plant and animal-based food products with their important functional properties and health benefits. Students will learn about constituents that make the food product functional and they will learn about chemistry and physiological effects of functional food.

Course Outcome

By the end of semester, students should be able to:

CO1: Identify the chemical constituents in functional food that affects the health benefits.

CO2: Describe the structure and function of chemical constituents in the functional foods.

CO3: Select functional food products and describe their health benefits with other group members for market.

BSK3523 Oleochemistry

Credit Hour: 3

Prerequisite: None

Synopsis

This course covers various aspects of oils and fats, including oleochemical derivatives. Oleochemical compounds are environmentally friendly chemicals that can be produced from raw material of oils and fats from plant, animal and petroleum by cracking process, or modification. In recent times, with depleting oils from fossil origin, oils and fats of non-fossil origin have started to make great re-entries into various industries including the fuel sector. The advantage of such oils and fats is that their sources are renewable. Research in the field of Oleochemistry has been progress rapidly in Malaysia. This allows our country to continue to emerge as a developed country that is competitive and continues to lead the global oleochemical industry. In this course, recent trends in research and development of Oleochemistry will be discussed.

Course Outcome

By the end of semester, students should be able to:

CO1: Understand the general concept of oleochemistry (lipids, triacylglycerols, fatty acids ect)

CO2: Studied the oleochemical feedstocks, production, analyses, biocatalyst, structures and applications



CURRICULUM STRUCTURE FOR BACHELOR OF APPLIED SCIENCES (HONS.) INDUSTRIAL BIOTECHNOLOGY

BSF2222

LABORATORY QUALITY MANAGEMENT

Credit Hour: 2

Prerequisite : None

Synopsis:

The purpose of this course is to introduce to you the comparable GLP and ISO 17025 Principles and Requirements for high-stakes testing and calibration laboratories. The course will address the quality infrastructure supporting testing and research laboratory management so one become familiar with many aspects of laboratory quality management and how to achieve recognition and certification. Upon successful completion of this course, students will have a firm grasp of the technical and philosophical aspects of laboratory quality management and will have the skills to initiate laboratory quality management for high-stakes testing and research programs.

Course outcome:

- CO1: Demonstrate understanding of 12 Essentials of Lab Quality Management System.
- CO2: Communicate effectively of 12 Essentials of Lab Quality Management System.
- CO3: Demonstrate awareness of the important of Lab Quality Management System to the institution, environment and community.

BSB2133

CELL AND MOLECULAR BIOLOGY

Credit Hour: 3

Prerequisite : None

Synopsis:

This course discusses fundamental concepts of cell biology, structure and function of cellular organelles and it's their biomolecules. Emphasis will be given on compositions, structures and functions of cell membrane and concepts of cell division. The course also includes discussions on applications of cell biology such as cancer, pathogen infections and stem cells. Concepts of molecular biology, gene expressions and its control are also discussed. Brief introductions on techniques of molecular biology such as DNA/RNA extraction, polymerase chain reaction (PCR), and gene cloning also explained in this course.

Course Outcome:

By the end of semester, students should be able to:

- CO1: Describe the concept of cell and molecular biology.
- CO2: Discuss the principle of basic techniques in cell and molecular biology.
- CO3: Relate the principles of basic techniques in cell and molecular biology to their suitable application.
- CO4: Demonstrate cell structures and able to relate to its function.
- CO5: Convey ideas clearly and effectively, as well as giving feedback on given topics.

BSB2472

CELL AND MOLECULAR BIOLOGY LABORATORY

Credit Hour: 2

Prerequisite : None

Synopsis

In this course, students will be introduced and practice modern biotechnology laboratory techniques and theories. The topics that will be covered are proper laboratory equipment handling and techniques such as nucleic acid isolation and purification for Deoxyribo-Nucleic Acid (DNA) cloning, polymerase chain reaction (PCR) and gel electrophoresis analysis. In addition, students will be exposed to basic tools for analysis of genes.

Course Outcome

- CO1: Relate the fundamental theories with laboratory experiments
- CO2: Demonstrate skills in performing cell and molecular biology experiments
- CO3: Demonstrate skills in handling cell and molecular biology-related equipment
- CO4: Analyze, Interpret and relate experimental data with the fundamental theories
- CO5: Communicate through report writing
- CO6: Work in team during laboratory session

BSB1113

BIOCHEMISTRY

Credit Hour: 3

Prerequisite : None

Synopsis

The course is designed to study the physical and biochemical characteristics of biomolecules including nucleic acids, proteins, carbohydrates and lipids. Important pathways for biosynthesis and degradation of nucleic acids, proteins, carbohydrates and lipids will be

discussed. Production of energy from carbohydrate and lipids and the related metabolisms will also be discussed. Besides that, the principle of cellular signaling in living organisms also will be described in this course.

Course Outcome

- CO1: Describe the structure, properties and biochemical roles of the biomolecules
- CO2: Illustrate the energy productions in cell by glucose and its intermediates.
- CO3: Explain biomolecules biosynthesis and degradation in metabolism
- CO4: Compare the functionality of various metabolic pathways and importance of their integrations in organisms
- CO5: Present idea in verbal and written form effectively and provide feedback on the given topic
- CO6: Demonstrate structure illustrations of various biochemical compounds

BSB2173
BIOANALYTICAL CHEMISTRY
Credit Hour: 3
Prerequisite : BSB1113

Synopsis

This course introduces spectroscopic methods for matrix characterization, principles of electrophoresis, isoelectric focusing, capillary electrophoresis, centrifugation methods, chromatography and mass spectrometry of biomolecules.

Course Outcome

- CO1: Explain and interpret the principles of different bioanalytical methods for their appropriate application
- CO2: Apply fundamental knowledge of analytical biochemistry for their applications
- CO3: Compare and contrast the function of each analytical instrument with their potential application in research as well as industries
- CO4: Work in group to solve biochemical calculation assignment related to analytical instrument

BSB1402
BIOCHEMISTRY LABORATORY
Credit Hour: 2
Prerequisite : None

Synopsis

The course introduces student with the basic calculation and techniques that are commonly used in a

biochemical lab. The principle of spectrophotometry and the application of spectrophotometry in biochemistry. Several quantitative and qualitative tests on important biomolecules such as Lowry assay, Bradford assay and DNS assay.

Course Outcome

- CO1: Relate the fundamental theories with laboratory experiments
- CO2: Demonstrate skills in performing biochemistry experiments
- CO3: Demonstrate skills in handling basic biochemistry-related equipment
- CO4: Analyze, Interpret and relate experimental data with the fundamental theories
- CO5: Demonstrate written communication skills through laboratory reports
- CO6: Work in team during laboratory session

BSB2442
BIOANALYTICAL CHEMISTRY LABORATORY
Credit Hour : 2
Prerequisite: BSB1113 and BSB1402

Synopsis

This course introduces spectroscopic methods for matrix characterization, principles of electrophoresis, isoelectric focusing, capillary electrophoresis, centrifugation methods, chromatography and mass spectrometry of biomolecules.

Course outcome:

- CO1: Relate the fundamental theories with laboratory experiments
- CO2: Demonstrate an array of biotechnology equipment efficiently with the knowledge of functionalities and calibration
- CO3: Demonstrate skills in handling analytical instrument
- CO4: Analyze, interpret and relate experimental data with the fundamental theories
- CO5: Demonstrate written communication skills through laboratory reports
- CO6: Work in team during laboratory sessions

BSB1102
BIOPHYSICAL CHEMISTRY
Credit Hour: 2
Prerequisite : None

Synopsis



The goal of this course is to emphasize the principle and biochemical calculation that are commonly used in biological studies including preparation of buffers and solutions, acids and bases chemistry, aqueous ionic equilibrium, bioenergetics and kinetics. All of the assignments in this course are carried out in group to develop team work skills among the students. Besides that, this course emphasized on information managing skills and lifelong learning by gathering the information on biophysical chemistry application from various sources.

Course Outcome

- CO1: Describe the principle of physical chemistry in biological studies
- CO2: Apply biochemical calculation for biological studies
- CO3: Construct graph based on data calculated using specific formula
- CO4: Work in group to answer biochemical calculation tasks.
- CO5: Summarize information related to biophysical chemistry applications from multiple sources

**BSB1112
INDUSTRIAL BIOTECHNOLOGY**

Credit Hour: 2
Prerequisite : None

Synopsis

This multi-disciplinary course provides student to introduction policy, scope and research area in industrial biotechnology sector in Malaysia and global scenario. This subject focus on interaction between scientific discovery, applications and challenge impact in biotechnology. There are four focus field includes industrial microbiology, agricultural, healthcare, biomaterial, enzyme and bioinformatics potential process will be discussed. Students also will be exposed to important and related components in commercialization such as issues, biosafety, bioethics, regulations, intellectual rights, facilities and expertise needed in biotechnology industries.

Course Outcome:

- CO1: Explain the important principles and applications of industrial biotechnology related fields
- CO2: Relate biotechnology related products with their suitable applications
- CO3: Discuss current issues related to industrial biotechnology

- CO4: Be aware on biosafety, bioethics and important of IP for biotechnology related products
- CO5: Identify commercialization potential of biotechnology related products

**BSB2143
ENZYME TECHNOLOGY**

Credit Hour: 3
Prerequisite : None

Synopsis

This course provides the theory and knowledge relevant to the enzymology principles including fundamental properties of enzymes, enzyme catalytic mechanisms and enzyme kinetics. Techniques employed in enzymes purification and characterization are also emphasized in this course. Students will also be introduced to the theory as well as applications of enzyme technology in food, medical, and household industries. Finally this course serves to provide an awareness of the current and possible future applications of enzyme technologies. This course also emphasizes on the development of attitude and capability of the students to work in a group and gather information on the related field for lifelong learning.

Course outcome

- CO1: Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and mechanisms
- CO2: Apply biochemical calculation for enzyme kinetics
- CO3: Compare methods for production, purification, characterization and immobilization of enzymes
- CO4: Discuss various application of enzymes that can benefit human life
- CO5: Discover the current and future trends of applying enzyme technology for the commercialization purpose of biotechnological products.
- CO6: Plot graphs based on kinetics data

**BSB2452
ENZYME TECHNOLOGY LABORATORY**

Credit Hour: 2
Prerequisite : None

Synopsis

An introduction in theory, techniques and practical in modern enzyme technology laboratory. Emphasis will be given in concept and technique on basic laboratory and instrumentation handling, extraction and purification process, and polyacrylamide gel electrophoresis for enzyme/protein separation.

Course outcome

- CO1: Relate the fundamental theories with laboratory experiments
- CO2: Demonstrate skills in performing enzymology experiments
- CO3: Demonstrate skills in handling enzymology-related equipment
- CO4: Analyze, Interpret and relate experimental data with the fundamental theories
- CO5: Communicate through report writing
- CO6: Work in team during laboratory session

**BSB2193
INDUSTRIAL MICROBIOLOGY**

Credit Hour: 3

Prerequisite : MICROBIOLOGY

Synopsis

- This course introduces various industrial applications of microorganisms in traditional fermentation process and advanced contemporary applications such as productions of biological materials and vaccines, biopharmaceutical, bioemulsifier, biopolymers, and biodegradation. Discussion includes biotechnology unit operation, bioprocess design, process modulation, kinetics and analysis. In addition, students will be introduced to work flow and operation of an industry through a site-visit to a related industry.

Course Outcome:

- CO1: Explain the basic concept of industrial microbiology.
- CO2: Describe the flow of product development in industrial microbiology.
- CO3: Apply concept of primary and secondary metabolites pathways for the biosynthesis of microbial products.
- CO4: Analyze the microbial production of food, beverage, biomass, fuel and Chemicals and health-care products.
- CO5: Discuss on various emerging areas in industrial microbiology that can benefit human life.

**BSB1133
ORGANIC CHEMISTRY**

Credit Hour: 3

Prerequisite : None

Synopsis

In this course, we will be introduced to the basic fundamental principles of organic chemistry. Structure, properties and stereochemistry of organic molecules and basic organic reaction to prepare common functional groups will be studied.

Course Outcomes:

- CO1: Describe characteristics and physical properties of organic molecules
- CO2: Classify chemical compounds based on their structures
- CO3: Recognize the main functional groups in organic chemistry and predict their reactions
- CO4: Analyze of organic structure backbonds with their functional groups
- CO5: Cooperate in group to complete the assigned tasks in a given time

**BSB2462
INDUSTRIAL MICROBIOLOGY LABORATORY**

Credit Hour: 2

Prerequisite : MICROBIOLOGY

Synopsis

This course covers practical in the application of microbes in industries. Emphasis will be given on techniques for screening of potential industrial microbes, identification of microorganisms, water and food analyses, fermentation processes and antibiotic tests.

Course Outcomes:

- CO1: Relate the fundamental theories with laboratory experiments.
- CO2: Analyze, Interpret and relate experimental data with the fundamental theories.
- CO3: Demonstrate written communication skill through report writing.
- CO4: Work in team during laboratory session.

**BSB1422
ORGANIC CHEMISTRY LABORATORY**

Credit Hour: 2

Prerequisite : None

Synopsis

This practical course comprises several laboratory experiments related to organic chemistry. In organic chemistry experiments, students are exposed to melting point determination and mixture melting points, extraction, distillation, isolation and crystallization.

Course Outcomes:

- CO1: Relate the fundamental theories with laboratory experiments
- CO2: Demonstrate skills in performing organic chemistry experiments



- CO3: Demonstrate skills in handling organic chemistry-related equipment
- CO4: Analyze, Interpret and relate experimental data with the fundamental theories
- CO5: Demonstrate written communication skill through laboratory writing
- CO6: Work in team during laboratory session

BSB3163

PLANT AND MAMMALIAN CELL TECHNOLOGY

Credit Hour: 3

Prerequisite : None

Synopsis

Topics will be discussed in this course includes concepts, techniques and applications of plant and mammalian cell culture; principle of totipotency; essential equipment of a tissue and cell culture facility; growth media preparation; methods for growing and store suspension and adhesion cultures; different cell type such as embryogenic culture, callus, independent cell, and stem cells; as well as benefits from clone reproduction in agriculture, livestock, medicine, and other related fields. Principle and benefit of cryo preservation and germplasm collection also will be discussed further.

Course outcome

- CO1: Describe the principle and techniques of plant and mammalian cell/tissue culture
- CO2: Discuss plant and mammalian cells technology approaches to be used in related biological applications.
- CO3: Compare the advantages, disadvantages and application of each techniques used in culturing plant and mammalian cell/tissues
- CO4: Relate the current scenario/challenges in commercialization of cell/tissue culture products

BSB3442

PLANT AND MAMMALIAN CELL TECHNOLOGY LABORATORY

Credit Hour: 2

Prerequisite : None

Synopsis

This course introduce techniques and skills required in both plant and animal cell/tissue culture laboratories. Aseptic techniques and sterilization are emphasized in this course. For plant cell and tissue culture practical, students are exposed to media preparation and several tissue culture techniques including callus induction,

organogenesis, shoot and root induction, and acclimatization of tissue cultured plantlets. While in animal cell practical, students are exposed to the techniques of handling mammalian cells, preparation of primary cell culture, calculating viability of cells and also cell toxicity studies.

Course outcome

- CO1: Relate the fundamental theories with laboratories experiments
- CO2: Demonstrate skills in performing plant and animal cell/tissue culture practices
- CO3: Demonstrate skills in handling plant and animal cell/tissue culture related equipment
- CO4: Analyse, interpret and relate experimental data with the fundamental theories
- CO5: Demonstrate written communication skill through report writing
- CO6: work in team during laboratory section

BSB3113

GENE TECHNOLOGY

Credit Hour: 3

Prerequisite : BSB2133 and BSB2472

Synopsis:

Topics discussed include the advanced techniques in gene technology including application of polymerase chain reaction (PCR) and real-time PCR, recombinant technology, genomic and cDNA libraries, molecular markers, DNA hybridization, functional genomic and genetic engineering in plants and animals. This course emphasize on the application of gene technology in agriculture, medical and forensic. Students are also trained to participate in group discussion and present on the application of gene technology and related ethical issues.

Course outcome:

- CO1: Describe the principle of advanced techniques in gene technology
- CO2: Relate the application of advanced techniques in gene technology with their requirement in agriculture, medicine and forensics
- CO3: Compare the principle and applications of gene technology techniques
- CO4: Recommend suitable gene technology techniques for medicine, agriculture and forensics applications
- CO5: Discuss related ethical issues on genetically modified organisms (GMOs)

BSB3312

FINAL YEAR PROJECT I

Credit Hour: 2

Prerequisite : None

Synopsis:

To expose and encourage student in doing research, define problems, give an opinion on how to overcome the problems and get related information regarding the problems. The topics that will discuss in this subject are literature review and methods that has been used by previous research, research report (proposal), research ethics and project management.

Course outcome:

CO1: Originate problem statement, objective, scope of the research and methodology based on literature review.

CO2: Demonstrate good organization of laboratory logbook in recording experimental methods and data.

CO3: Assemble research proposal in professional format such as oral presentation.

CO4: Report satisfactory project progress within the timeline.

BSB3472

GENE TECHNOLOGY LABORATORY

Credit Hour: 2

Prerequisite : BSB2133 and BSB2472

Synopsis:

Students will be exposed to the techniques in gene technology such as total DNA/RNA extraction, gene detection and analysis using conventional PCR contrasting with analysis using real-time PCR. In addition, DNA molecular marker techniques also will be also be covered in this course. Students will also be exposed to the application of bioinformatics softwares for gene analysis and sequence confirmation. The mini project included in this course exposed students to the essential workflow of molecular and gene analysis studies.

Course outcome:

CO1: Relate the fundamental theories with laboratory experiments

CO2: Demonstrate skills in performing gene technology experiments

CO3: Demonstrate skills in handling gene technology-related equipment

CO4: Analyze, Interpret and relate experimental data with the fundamental theories

CO5: Communicate through report writing

6. Manage experiment in laboratory following rules and regulations

BSB3123

BIOPROCESS TECHNOLOGY

Credit Hour: 3

Prerequisite : None

Synopsis:

The course discuss on the basic operational in bioprocess technology, unit, dimension, mass transfer at the equilibrium phase, stoichiometry of microbial growth and product formation. This course explicates the connection between microbial growth, product formation, mass transfer and environment. Likewise, this course gives an overview of the bioprocess from raw material to product. Upstream and downstream processing will be discussed. This course explains the processes and techniques used for extraction and purification of a product from culture medium. Also, bioprocess consideration in using animal and plant cell cultures will discuss using different techniques.

Course outcome:

CO1: Describe the principle and applications of bioprocess technology.

CO2: Apply fundamental calculation in bioprocessing.

CO3: Illustrate the schematic diagram of upstream and downstream processing for product recovery and purification.

CO4: Analyze the mass transfer and material balance calculation in different types of application in bioprocess.

CO5: Analyze the kinetics parameter values in different types of fermentation modes.

CO6: Discuss the important aspects in bioprocess technology for commercialization purpose of biotechnology products

BSB3583

ADVANCED ENZYME TECHNOLOGY

Credit Hour: 3

Prerequisite : None

Synopsis:

This course provides the advanced knowledge and information on enzyme technology. It will emphasize on the production of enzyme, industrial enzymes and innovative application of some specialized enzyme. Techniques employed in enzymes engineering and hybridization are also



emphasized in this course. Students will also be introduced to the theory as well as applications of enzyme technology in food, medical, and diagnostic industries. Finally this course serves to provide an awareness of the social/ ethical issues related to possible future applications of enzyme technologies.

Synopsis

Course outcome:

CO1: Explain the concept and applications of enzymes technology in biotechnology-related industries.

CO2: Choose the best strategies to produce the enzymes suitable for biotechnology-related industries.

CO3: Differentiate enzymes production and currently industrial enzymes that are used in biotechnology-related industries.

CO4: Propose a strategy of industrial enzymes production suitable for industrial scale application.

CO5: understand and be aware of commercial, ethical, legal and socio-cultural impacts on the advanced application of enzyme in food, medicine and industry.

CO6: Illustrate the new application of enzymes as biosensor in a schematic diagram.

BSB3482

BIOPROCESS TECHNOLOGY LABORATORY

Credit Hour: 3

Prerequisite : None

Synopsis:

This course provides the advanced knowledge and information on enzyme technology. It will emphasize on the production of enzyme, industrial enzymes and innovative application of some specialized enzyme. Techniques employed in enzymes engineering and hybridization are also emphasized in this course. Students will also be introduced to the theory as well as applications of enzyme technology in food, medical, and diagnostic industries. Finally this course serves to provide an awareness of the social/ ethical issues related to possible future applications of enzyme technologies.

Synopsis

Course outcome:

CO1: Explain the concept and applications of enzymes technology in biotechnology-related industries.

CO2: Choose the best strategies to produce the enzymes suitable for biotechnology-related industries.

CO3: Differentiate enzymes production and currently industrial enzymes that are used in biotechnology-related industries.

CO4: Propose a strategy of industrial enzymes production suitable for industrial scale application.

CO5: Understand and be aware of commercial, ethical, legal and socio-cultural impacts on the advanced application of enzyme in food, medicine and industry.

CO6: Illustrate the new application of enzymes as biosensor in a schematic diagram.

BSB4173

EXTRACTION AND BIOSEPARATION

Credit Hour: 3

Prerequisite : None

Synopsis

This course introduces the basic principle of extraction, separation and purification of bioproducts together with theory and principle of related separation instrument. In extraction parts, students will be exposed on extraction methods of nucleic acids, proteins and metabolic compounds. While in bioseparation parts, students will be exposed on separation and purification principles, techniques including separation by liquid chromatography, filtration, precipitation, sedimentation, crystallization and drying process.

Course outcome:

CO1: Explain the principle of extraction and bioseparation of bioproducts

CO2: Apply fundamental calculation in extraction and bioseparation

CO3: Compare and contrast different bioseparation approaches of biological materials

CO4: Recommend suitable extraction and bioseparation approaches for small and large scale production of biological materials

CO5: Outline and propose a suitable extraction and bioseparation methods, flow and equipment for production of products from different samples in a schematic diagram

CO6: Discuss the important aspects in extraction and bioseparation of biotechnological products for commercialization purpose

BSB4608

INDUSTRIAL TRAINING

Credit Hour: 8

Prerequisite : to pass all subjects prior to LI (or total credits of graduation less by 12 credits)

Synopsis

This course aims to give chances for the student to practice and apply their knowledge and skills that

they gain during their study. During the placement, we expect students to keep a log book, in which they make a regular entries describing the work they are undertaking. Student are supervised by industrial and university supervisors to guide and ensure they can do their work as good as possible and achieve the objective for this course.

Course outcome:

- CO1: Design an appropriate strategy to complete the given task
- CO2: Construct possible solution to a given real problem in the industry
- CO3: Adapt working culture in project, consultant, construction and related industry
- CO4: Work effectively with others in organization to perform task given
- CO5: Demonstrate interpersonal skills and professional ethics in organization

**BSB4422
EXTRACTION AND BIOSEPARATION LABORATORY**

**Credit Hour: 2
Prerequisite : None**

Synopsis
This course exposes students to the principle of extraction, separation and purification of bioproducts together with related separation instrument. Students will be exposed to the methods of extraction of nucleic acids, proteins and metabolic compounds. Students will also be exposed to various separation and purification techniques.

- Course outcome:
- CO1: Relate the fundamental theories with laboratory experiments.
 - CO2: Demonstrate skills in extraction and separation procedure of bioproducts.
 - CO3: Demonstrate skills in handling equipment related to extraction and bioseparation.
 - CO4: Analyze, Interpret and relate experimental data with the fundamental theories.
 - CO5: Demonstrate written communication skills through laboratory reports.
 - CO6: Manage experiment in laboratory following rules and regulations.

**BSSB4604
INDUSTRIAL TRAINING REPORT**

**Credit Hour: 4
Prerequisite : to pass all subjects prior to LI (or total credits of graduation less by 12 credits)**

Synopsis
During the placement, we expect students to keep a log book, in which they make a regular entries describing the work they are undertaking. Then, student need to provide industrial training report to describe their technical and personal development during their placement. The industrial training report need to hand in to the university supervisor. Student need to do final presentation for assessment.

Course outcome:

- CO1: Organize the industrial training knowledge, experience and skill in the preparation of the report
- CO2: Build effective communication skills in written and oral presentation
- CO3: Practice the related approach to get relevant information from various sources
- CO4: Demonstrate good attitude in fulfilling the requirement of Industrial Training Unit

**BSB4324
FINAL YEAR PROJECT II
Credit Hour: 4
Prerequisite : None**

Synopsis:
This course is intended as the second part of Final Year Project I (BSB3302). The students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, each student is required to present their findings and submit a dissertation. Evaluation is based on oral presentation and submitted dissertation.

- Course outcome:
- CO1: Analyze, interpret and relate experimental data with fundamental theories.
 - CO2: Demonstrate good organization of laboratory logbook in recording experimental methods and data.
 - CO3: Assemble research finding in professional format in the form of oral presentation. Assemble research finding in professional format in the form of oral presentation.
 - CO4: Report satisfactory project progress within the timeline.

**BSB3503
BIOMANUFACTURING**

Credit Hour: 3

Prerequisite : None

Synopsis

This course provides a brief description about process plant design and basic fundamental of Good Manufacturing Practice (GMP). It is important to know all processes in plant and distinguish between them. Nowadays, GMP is known as an essential backbone for compliance in good manufacturing practices. Therefore, students will learn how to design flow sheets in process plant and able to explain all processes that involved in manufacturing for example up streaming, scale up and down streaming process. Other than that, students will learn how to construct a feedback and feedforward system in biomanufacturing. Students also will be introduced to aspects of GMP such as facilities related documentation as well as will be exposed to important and related components in commercialization such as issues, biosafety, regulations, facilities and expertise needed in biotechnology industries.

Course Outcomes

CO1: Describe flow sheet as well as feedback and feedforward system in biomanufacturing process.

CO2: Illustrate proper facilities, quality control method and documentation in Good Manufacturing Practice (GMP) as well as in HACCP

CO3: Compare and contrast different types of downstream processing in biomanufacturing

CO4: Invent new products by using requirements of Good Manufacturing Practice (GMP)

CO5: Discuss related ethical issues in biomanufacturing including rules and regulation as well as impact to human and environment.

CO6: Demonstrate the new invented product with their suitable applications.

**BSB3593
BIOSENSOR TECHNOLOGY**

Credit Hour: 3

Prerequisite : None

Synopsis

This course discusses current concepts, terms and applications of biosensor technology. This course integrates knowledge from various fields such as genetic engineering, immuno techniques and protein engineering for the production of biosensor devices in multitude of applications such as medical, food analysis, clinical diagnostics and environmental monitoring. The course also focuses on the classification and the

principles of the various types of biosensors, various measurements involved, biological materials or bioreceptors, transducer descriptions, biosensor characteristics and their recent applications.

Course Outcomes

CO1: Classify the components of a biosensor and differentiate methods for immobilization that can be used for surface derivatization. Classify the components of a biosensor and differentiate methods for immobilization that can be used for surface derivatization.

CO2: Relate the application of biosensor in industry.

CO3: Compare and contrast the principle and applications of biosensors.

CO4: Design a hypothetical biosensor device which can be used in a related field based on the fundamental knowledge learned in biosensor technology.

CO5: Discuss related ethical issues in biosensor technology including rules and regulation as well as impact to human and environment.

CO6: Demonstrate the newly designed hypothetical biosensor in related applications

**BSB3563
BIOREMEDIATION**

Credit Hour: 3

Prerequisite : None

Synopsis

This course introduces various advanced applications of plants and microorganisms in evaluating whether bioremediation is a viable strategy for remediation of a contaminated site, factors that influence the rate and extent to which environmental contaminants are metabolized by microorganisms in the environment as well as bioremediation techniques for clean-up the mess according to bioremediation classifications as Biotransformation, Biodegradation and Mineralization.

In addition, the student will be able to dealing with an effective innovative technology for treatment of a wide variety of

contaminants. This technology includes phytoremediation (plants) and rhizoremediation (plant and microbe interaction). Rhizoremediation, which is the most evolved process of bioremediation, involves the removal of specific contaminants from contaminated sites by mutual interaction of plant roots and suitable microbial flora.

Course Outcome:

CO1: Describe the fundamental principles and applications relating to bioremediation.

CO2: Relate the concept of bioremediation technology to real-life.

CO3: Compare and contrast various advantages, disadvantages and limitations approaches of bioremediation in a commercial setting.

CO4: Discuss the impact and interactions between contaminants, soil, water and its bioavailability for biodegradation microorganisms.

CO5: Propose a new and suitable technique to clean-up the environmental contaminants using the knowledge in bioremediation technology.

CO6: Discuss related ethical issues in bioremediation technology including rules and regulation as well as impact to human and environment.

CO7: Demonstrate a schematic diagram for the proposed new suitable techniques for bioremediation applications.

CO5: Present and contribute to the need of group work in assigned task

CO4: Illustrate and propose the latest bioavailability and bioequivalence requirements to benefit human life

CO5: Understand and be aware of commercial, ethical, legal and socio-cultural impacts on the advanced application of nutraceuticals and functional foods in food, medicine and industry

CO6: Illustrate the future trends of nutraceutical and functional food industries

BSB3543

NUTRACEUTICALS AND FUNCTIONAL FOODS

Credit Hour: 3

Prerequisite : None

Synopsis

There is a global growing awareness on the contributions of nutraceutical and functional food that promotes health benefits. This course gives an overview of the bioactive compounds that are currently regarded as functional foods and nutraceuticals. The identification and related assessment methods of these bioactive compounds are discussed. This course includes new and innovative technologies for the processing of functional foods and nutraceuticals. These technologies are developed to address consumers' concerns on quality and safety issues. The safety guidelines and regulations in the development of nutraceutical and functional food are also highlighted in this course.

Course Outcome:

CO1: Explain the concept and applications of nutraceuticals and functional foods in biotechnology related industries

CO2: Illustrate the process of large scale production of nutraceuticals and functional food products for biotechnology related industries

CO3: Distinguish between nutraceuticals and functional food products those are currently used in biotechnology-related industries



CURRICULUM STRUCTURE FOR BACHELOR OF APPLIED SCIENCES (HONS.) MATERIAL TECHNOLOGY

BSP1153 Mechanics & Thermodynamics

Credit Hour: 3

Pre-requisite : None

Synopsis:

This course introduces basic Physics principle in mechanics and thermodynamics field. Topics covered in this course including measurement, vectors, kinematics, Newton's law of motion, work, energy, power, fluid mechanics, static equilibrium, temperature, heat and also first law of thermodynamics. Learners need to sit for four quizzes (either offline quizzes during class or online quizzes during class week), two tests and one final examination. An assignment is also given to encourage the learners' to have sufficient depth of study. First test will be held before semester break and second test before study week; which will cover certain topics. There are two main topics will be delivered to the learners; i.e., mechanics and thermodynamics. Students centered learning (SCL) approach will be applied during the class; which the learners will be the main role, whereas the lecturer's role is limited as a facilitator. Learners should be able to (i) explain theories learned to solve problems of mechanics including kinematics and dynamics and also thermodynamics, (ii) analyze the appropriate concepts learned using the right principle and laws and (iii) respond and contribute to the need of group work in assigned task; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the basic conceptual knowledge of physics
- CO2: Explain theories learned to solve problems of mechanics including kinematics and dynamics and also thermodynamics
- CO3: Solve related problems in physics using the appropriate principles
- CO4: Analyze the appropriate concepts learned using the right principle and laws of physics
- CO5: Present and contribute to the need of group work in assigned task

BSP1163 Electricity, Magnetism & Optics

Credit: 3

Pre-requisite: None

Synopsis:

Learning topics are focused on three fields: (i) electricity, (ii) magnetism, and (iii) optics physics. The stated focus

are planned to be delivered during lectures; which cover twelve main chapters. For electricity, the chapters covered are: (i) electric charge & electric field, (ii) Gauss's law (iii) electric potential, (iv) capacitance & dielectric, and (v) current & resistance and (vi) DC circuit. Magnetism part is covered in (i) magnetic field and forces, (ii) sources of magnetic field, and (iii) electromagnetic induction; whereas for optics; i.e., (i) the nature of light and the law of optics, (ii) Interference and (iii) diffraction. An assignment is designed to encourage the learners to incorporate social and teamwork skills; and cultivate good presentation skills. Learners need to sit for mid-term, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online based quizzes); to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) explain theories learned to solve problems of electricity, magnetism and optics, (ii) analyze the appropriate concepts learned using the right principle and laws and (iii) respond and contribute to the need of group work in assigned task; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the basic conceptual knowledge of physics
- CO2: Explain theories learned to solve problems of electricity, magnetism and optics
- CO3: Solve related problems in physics using the appropriate principles
- CO4: Analyze the appropriate concepts learned using the right principle and laws of physics
- CO5: Present and contribute to the need of group work in assigned task

BSP1113 Physical Chemistry

Credit: 3

Pre-requisite: None

Synopsis:

The course discusses the concepts and fundamental principles of physical chemistry. These include the properties of solid, liquid and gas, chemical equilibrium, dissolution and solution properties, chemical colloid and surface, thermodynamics, chemical kinetics and catalyst. In order to achieve technical development in the advanced technologies that requires the ultimate precision of atomic level, it is indispensable to understand the physical phenomena involved in the Industrial technology on the basis of fundamental principles

Course Outcome

By the end of semester, students should be able to:

- CO1: Define the various laws in terms of chemical reactions.
 CO2: Analyze /solve the given problem from physical chemistry.
 CO3: Demonstrate a good ethics and professionalism in completing the given task

BSP1133 Organic Chemistry**Credit: 3****Pre-requisite: None****Synopsis:**

The course is focused on basic fundamental principles of organic chemistry. The main focus is on the structure, properties and stereochemistry of organic molecules and basic organic reaction (including oxidation & reduction and radical) to prepare common functional groups. The stated focus is planned to be delivered during lectures; which emphasise on several organic compounds including (i) alkanes, (ii) alkenes, (iii) alkynes (iv) alkyl halides, (v) alcohols, ethers & epoxides and (vi) benzene & aromatic compounds. Two assignments (mini project) is designed to encourage students to evaluate individual & teamwork skills (e.g., group activities, data handling and evaluation, work coordination and vocal presentation). A tests, four quizzes and final semester examination is designed to assess student's understanding of the course. Students should be able to (i) solve the characteristics and physical properties, (ii) classify and differentiate chemical compounds based on their structures and (iii) the practice and cultivate teamwork co-operation during mini project/presentation; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe characteristics and physical properties of organic molecules
 CO2: Classify chemical compounds based on their structures
 CO3: Recognize the main functional groups in organic chemistry and predict their reactions
 CO4: Analyze of organic structure backbonds with their functional groups
 CO5: Cooperate in group to complete the assigned tasks in a given time

BSP1173 Inorganics Chemistry**Credit: 3****Pre-requisite: None****Synopsis:**

Learning activities are focused on foundations of bonding theory, periodic trends, synthesis and application of elements. This subject was divided to three parts. Part I consist of fundamental on atomic structures, arrangement of elements in periodic table and bonds formation in the compounds. Part II contains a systematic study of the elements and some of their compounds. This includes the systematic survey of descriptive inorganic chemistry of the main group elements (1 to 18) including physical and chemical properties, preparation of hydride, halides, carbonates, bicarbonates, sulphates and nitrates. Part III emphasizes on the chemistry of the d-block elements including occurrence and chemical reactions. In Part I and II, the students will also expose to some glimpse at the practical uses of important classes of inorganic compounds and their industrial applications.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the basic conceptual knowledge of inorganic chemistry.
 CO2: Explain theories learned to solve problems of inorganic chemistry in related task given.
 CO3: Solve related problems in inorganic chemistry using the appropriate principles
 CO4: Analyze the appropriate concepts learned about inorganic chemistry comprehensively.
 CO5: Present and contribute to the need of group work in assigned task

BSP1422 Physics Laboratory**Credit: 2****Pre-requisite: None****Synopsis:**

Learners are introduced to practical and hands-on activities; inclusive of (i) manipulation of instruments to conduct guided experiments, and (ii) composition of technical report. Learners need to conduct and perform the experiments based on the theory and principle learned in Mechanics & Thermodynamics and Electricity, Magnetism & Optics. Learners are expected to perform eight out of ten experiments (in group); vis., Heat Capacity of Metals with Cobra-3, Thermal Expansion in Solids and Liquids, Density of Liquids, Projectile Motion, Newton's Law of Motion with Cobra-3,

Diffraction of Light at a Slit an Edge experiments, Kirchhoff's Law, Small Resistance, Dielectric Constant of Different Materials and Transformer. Experiment demonstration, and safety talk is scheduled to be delivered by senior academician, and trained technical staff respectively; during second week of academic semester. Laboratory manual is given to each learner; which consists of theory, background of experiment, series of instructions, objectives, equipment/apparatus and references. An online forum platform (accessible via kalam.ump.edu.my) is developed for discussions purposes. Learners are divided in group of three and will be assessed based on (i) peer review, (ii) technical report, and (iii) ability to manipulate instruments (which will be carried out during a practical test). Learners are aimed to be able to (i) conduct the experiments correctly and be able to explain each of the function of the instruments used, and (ii) contribute to the need of group work.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems in material science and technology using the appropriate principles
- CO2: Identify and explain the function of equipment
- CO3: Follow the guided experiments using the correct procedures
- CO4: Present and contribute to the need of group work in assigned task

BSP1432 Chemistry Laboratory

Credit: 2

Pre-requisite: None

Synopsis:

Learners are introduced to practical and hands-on activities; inclusive of (i) manipulation of instruments to conduct guided experiments, and (ii) composition of technical report. Learners need to conduct and perform the experiments based on the theory and principle learned in organic, inorganic and physical chemistry. Learners are expected to perform eight experiments (in group); inclusive of, (i) melting point determination of mixed chemical, (ii) Technique of crystallization (iii) esterification of butanol with acetic acid, (iv) reactivity of group I A elements, (v) reactivity of nitrogen and its compounds, (vi) reactivity of halogens, (vii) dissociation of a weak acid by potentiometric titration, (viii) Hess' Law and the heat of formation of magnesium oxide. Experiment demonstration, and safety talk is scheduled to be delivered by senior academician, and trained technical staff respectively; during second week of academic semester. Laboratory manual is given to each

learner; which consists of theory, background of experiment, series of instructions, objectives, problem statement, and references. An online forum platform (accessible via kalam.ump.edu.my) is developed for discussions purposes. Learners are divided in group of three and will be assessed based on (i) peer review, (ii) technical report, and (iii) ability to manipulate instruments (which will be carried out during a practical test). Learners are aimed to be able to (i) conduct the experiments correctly and be able to explain each of the function of the instruments used, and (ii) contribute to the need of group work.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems in organic, inorganic and physical chemistry using the appropriate principles
- CO2: Identify and explain the chemical reactions of the main group elements
- CO3: Follow the guided experiments using the correct procedures
- CO4: Present and contribute to the need of group work in assigned task

BUM2123 Applied Calculus

Credit: 3

Pre-requisite: None

Synopsis:

This course introduces Polar Coordinates and Vector, Vector-Valued Functions, Partial Derivatives, and Multiple Integrals. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

By the end of semester, students should be able to:

- CO1: Acquire fundamental calculus concepts of equations and vectors
- CO2: Solve and analyze various problems involving derivatives and integrals
- CO3: Provide solution for a wide range of problems in science and engineering by using concept of calculus

BUM2413 Applied Statistics

Credit: 3

Pre-requisite: None

Synopsis:

This course discusses on statistical problem-solving methodology and descriptive statistics; sampling

distribution and confidence interval; hypothesis testing; analysis of variance (ANOVA); goodness-of-fit test and contingency tables; regression and correlation including simple and multiple linear regressions. Statistical packages such as Microsoft Excel, SPSS, R Language, S Plus, EViews and Minitab shall be used in this course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Acquire fundamental principle of statistic
- CO2: Perform statistical analysis by using appropriate statistical theory and methodology.
- CO3: Analyse real life data to solve related problems in various disciplines.

BSF1212 Laboratory Safety Management

Credit: 2

Pre-requisite: None

Synopsis:

This course exposes students to basic concepts of industrial and laboratory safety. Topics include quality systems (Good laboratory Practice and ISO/IEC 17025) for laboratory management, occupational health & safety and acts and related regulations. Students will be introduced to laboratory and industrial safety, laboratory and industrial accident, safety policy and procedure, emergency response plan, introduction to basic toxicology and first aid.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the basic concept of Laboratory and Industrial safety management that comply the good practices and related regulations practices and related regulations
- CO2: Apply the information related to quality system, policies, procedures and safety manuals
- CO3: Present and contribute to the need of group work related to laboratory and industrial safety in assigned task

BSF2112 Industry Quality Management

Credit: 2

Pre-requisite: None

Synopsis:

This course focuses on the management of quality for manufacturing, service and public sectors to achieve global competitiveness. Emphasis is placed on new techniques for managing quality. This course is divided

by two parts. Part one provides an introduction to quality assurance principles, including (i) Good Manufacturing Practices (GMP), (ii) ISO 9000 family and (iii) various continuous improvement techniques such as six sigma, lean manufacturing, 5S and total quality management and (iv) audit process.

Part two focuses on the quality control system, which is concerned with (i) quality control tools used in industries, (ii) acceptance sampling, (iii) statistical data analysis, (iv) reliability and maintainability, and (v) cost of quality. Lectures will be conducted two hours per week; with one assignment throughout the semester. Learners are required to sit for one test, and series of quizzes to ensure sufficient fundamental knowledge. Upon completion of the course, the learners should be able to (i) hypothesize alternative approaches to solve problems related to industrial quality management systems, and (ii) gather information from multiple sources related to quality assurance and quality control in industries

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe the basic concept of quality assurance (QA) and quality control (QC) in industries
- CO2: Analyze suitable approach to solve problems related to industrial quality management
- CO3: Gather information from multiple sources related to quality assurance and quality control in industries

BPT1113 Operation and Production in Industrial Management

Credit: 3

Pre-requisite: None

Synopsis:

The subject is intended to provide an understanding on the operational aspects of management techniques. It will focus on the nature of operations management and its impact on competitiveness, and the role of the operations manager and the relationship with other business functions.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply fundamental concept of operation and production management
- CO2: Measure production and operation parameters
- CO3: Propose operations management decision making in solving operation and production problems



BCS1023 Programming Technique

Credit: 3

Pre-requisite: None

Synopsis:

This course discusses on understanding problems and translating them into computer solution techniques using programming language. This course enables students to apply programming techniques, write programming codes from given problems and execute programming codes successfully.

Course Outcome

By the end of semester, students should be able to:

- CO1: Demonstrate various techniques in solving a problem.
- CO2: Construct and run programs.
- CO3: Differentiate various techniques in solving a problem.

BSP2173 Solid State Physics

Credit: 3

Pre-requisite: None

Synopsis:

This course is designed to expose origin of properties of crystalline materials. The emphasis is on semiconductors, superconductors, dielectrics, and ferroelectrics; which are the basis of multibillion electronic and magnetic devices. There are five (5) headlines in this course, viz., semiconductor crystals, Fermi surface and metals, Superconductivity, Dielectrics, and Ferroelectrics. The stated focus are planned to be delivered during lectures. A problem-based assignment is designed to encourage the learners to incorporate the ethics and professional values. Learners need to sit for two tests, final semester examinations, and four quizzes to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) develop new ideas and identify alternative approaches for problem solving related to electrical properties of crystalline solids, and (ii) demonstrate a good ethics and professionalism in completing a given task; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply the basic knowledge about crystal structure and wave mechanics and explain the properties of the crystals using various model learned

CO2: Display problem solving and critical thinking skills that associated with the learned properties in the given assignment

CO3: Analyse the appropriate concepts learnt about solid state physics.

CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to solid state physics

CO5: Demonstrate the ethical values and professionalism character in completing a given task

BSP2153 Material Science & Technology

Credit: 3

Pre-requisite: None

Synopsis:

This course is designed to expose the concept of structure and scaling. There are seven (7) headlines in the course; atomic structure, bonds and crystal structure, defect structure and strengthening mechanisms, failure, diffusion, material properties (mechanical, electrical, magnetic & optic), economic, and environmental issues. Student will be taught in lecture room; and the assessments which include quiz, test, assignment and final exam will be carried out throughout the semester. At the end of semester, students are expected should be able to explain, solve, analyze and develop new ideas during problem solving; related to material science and technology. Furthermore, students also should be able to demonstrate good ethics and professional skills.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories learned to solve problems of Material Science and technology in related task given
- CO2: Solve related problems in material science and technology using the appropriate principles
- CO3: Analyze the appropriate concepts learned about Material Science and Technology comprehensively
- CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to material science and technology
- CO5: Demonstrate a good ethics and professionalism in completing the given task

BSP2163 Colloid & Surface Science

Credit: 3

Pre-requisite: None

Synopsis:

The course contains two part i.e., (i) colloid, and (ii) surface science. The first section discusses about behaviour of suspension of small particles in another substance; whereas the latter discusses about properties of colloidal system e.g., surface tension, interfacial tension, and contact angle. Five state of the art methods of contact angle measurement are included in the syllabus i.e., Wilhelmy plate, Du Nuoy ring, drop-weight, spinning-drop, and maximum bubble pressure methods. Lectures will be conducted three hours per week; with two assignments throughout the semester. Learners are required to sit for two tests, and series of quizzes to ensure sufficient fundamental knowledge. Upon completion of the course, the learners should be able to (i) hypothesize alternative approaches to solve problems in respective field using fundamental approach, and (ii) demonstrate good ethics and professionalism during accomplishment of tasks.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories learned to solve problems related to colloid and surface science in related task given.
- CO2: Solve related problems in colloid and surface science using the appropriate principles.
- CO3: Analyze the appropriate concepts learned about colloid and surface science comprehensively
- CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to colloid and surface sciences
- CO5: Demonstrate a good ethics and professionalism in completing the given task

BSP2123 Material Characterization

Credit: 3

Pre-requisite: None

Synopsis:

This course will provide an introduction to materials characterization techniques along with the analyses required for each instruments. Learning activities cover three main aspects in materials characterizations: (i) working principles, (ii) specimen preparation and (iii) analysis. Students will learned the basic principles in optical microscopes prior to learn advanced characterization like X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and also Scanning Probe Microscopy. The spectroscopy techniques like Energy

Dispersive X-ray, Infrared and Fourier Transform Infrared will be taught too. Characterization techniques using UV-Visible Spectrometer, Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) are expected to enhanced the knowledge for chemical analysis and thermal analysis. Lectures will be conducted three hours per week; with two problem based assignments throughout the semester. Students are required to sit for two tests, and series of quizzes to ensure sufficient fundamental knowledge. Upon completion of the course, the students should be able to (i) have a thorough understanding of the various types of materials analytical methods, leading to high quality characterization and measurement results, (ii) hypothesize alternative approaches to solve problems related to materials characterization techniques, and (iii) demonstrate good ethics and professionalism during accomplishment of tasks.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories related to principles of material's surface characterization techniques
- CO2: Solve the theories and knowledge learned related to the technique in surface analysis
- CO3: Analyze the appropriate problems related to the material's surface characterization comprehensively
- CO4: Develop new ideas and identify alternative approaches to characterizing material's surfaces
- CO5: Demonstrate the ethical values and professionalism character in completing the given task

BSP2193 Rheology

Credit: 3

Pre-requisite: None

Synopsis:

Learning activities are focused on rheological concepts in daily life; along with definition some scientific terminologies such as (i) flow deformation, (ii) Newtonian and Non-Newtonian fluid behavior, (iii) viscometry characteristics, (iv) polymer rheology, and (v) food and surfactant behavior. The stated focus are planned to be delivered during lectures; which cover with industrial application (i.e., oil and gas production, food production, and packaging production). Industry visit to food and packaging based companies (e.g., Grandeur Chocolate Industries & Yakult (M) SDN BHD) is scheduled; to ensure sufficient industrial exposure to the learners. Assignment is given to further strengthen

the understanding of the course. The activities incorporated in this course are to create an active participation (psychomotor/ critical thinking & problem solving) during the lecture sessions. Learners need to sit for mid-term, final semester examinations, and four quizzes; to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) hypothesize alternative approaches to solve problems using the knowledge of rheology, and characterizations in industry and research domains, and (ii) practice and cultivate entrepreneurial skills during presentation of idea; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Maintaining good ethics and professionalism in completing the given task.
- CO2: Analyze the appropriate concepts learned about rheology.
- CO3: Explain the theories involved to solve the problems associated with rheology along with necessary principles.
- CO4: Solve the problem with the appropriate concepts learned about rheology and rheological properties.
- CO5: Develop and identify alternative approaches for problem solving appropriate to rheology.

BSP2422 Material Science & Solid State Lab

Credit: 2

Pre-requisite: None

Synopsis:

This course introduces students to fundamentals of experiment in material science and solid state field; which includes mechanical, electrical and optical measurements. Students will experience hands on learning using related experimental set ups and methods, quantitative and qualitative characterization of materials, and composition of scientific report. Experiment demonstration, and safety talk is scheduled to be delivered by senior academician, and trained technical staff respectively; during second week of academic semester. Laboratory manual is given to each learner; which consists of theory, background of experiment, series of instructions, objectives, problem statement, and references. An online forum platform (accessible via kalam.ump.edu.my) is developed for discussions purposes. Learners are divided in group of nine; required to perform nine experiments, which will be assessed based on (i) peer review, (ii) technical report, and (iii) ability to manipulate instruments for characterizations (which will be carried out during a

practical test). Learners are aimed to develop psychomotor skills in manipulation of instruments to characterize properties of the synthesized/prepared materials using various laboratory instruments and advanced machineries.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems in material science and technology using the appropriate principles
- CO2: Follow the guided experiments using the correct procedures
- CO3: Organize and complete with confidence the experiments using the correct procedures
- CO4: Initiate and commit to participate in gaining and sharing knowledge.

BSP2432 Rheology & Colloid Lab

Credit: 2

Pre-requisite: None

Synopsis:

In this course, learners will study on material properties through laboratory experiments. This course consists of two related field of study, colloidal systems and rheology. Learning activities are focused on the practical and hands-on activities; inclusive of (i) manipulation of instruments to perform synthesis/preparation of materials, quantitative and qualitative characterization of materials, and (ii) composition of scientific report. Learners need to prepare, and characterize Newtonian and non-Newtonian fluids; melting temperature of polymer, surface tension, contact angle of fluid, colloidal behavior and hydrophobic and hydrophilic behavior. Experiment demonstration, and safety talk is scheduled to be delivered by senior academician, and trained technical staff respectively; during second week of academic semester. Laboratory manual is given to each learner; which consists of theory, background of experiment, series of instructions, objectives, problem statement, and references. An online forum platform (accessible via kalam.ump.edu.my) is developed for discussions purposes. The class is divided into groups. Each group will perform different experiment each week which will be assessed based on (i) peer review, (ii) technical report, and (iii) ability to manipulate instruments for characterizations (which will be carried out during a practical test). Learners are aimed to develop psychomotor skills in manipulation of instruments to characterize properties of the synthesized/prepared materials; i.e., DATAPHYSICS Contact angle using sessile drop method, Brookfield

Viscometry, Melt Flow Indexer and De Nouy Ring Surface Tension.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze an experimental data and be able to relate with theories learned.
- CO2: Follow the guided experiments using the correct procedures
- CO3: Conduct and complete with confidence the experiments using the correct procedures
- CO4: Initiate and commit to participate in gaining and sharing knowledge

BSP3112 Ceramics

Credit: 2

Pre-requisite: None

Synopsis:

This course exposes students to ceramic materials in general. Learning activities cover several main aspects of ceramics: i.e. (i) The crystal structure of ceramics, (ii) the grain growth of ceramics during sintering, (iii) oxide and non-oxide ceramics, (iv) defects in ceramics, (v) interfaces in polycrystal ceramics, (vi) phase boundaries and (vii) mechanical properties of ceramics. Lectures will be conducted two hours per week; with two assignments throughout the semester. Learners are required to sit for two tests, and series of quizzes to ensure sufficient fundamental knowledge. Upon completion of the course, the learners should be able to (i) hypothesize alternative approaches to solve problems related to ceramics using fundamental approach, and (ii) demonstrate good ethics and professionalism during accomplishment of tasks.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories learned to solve problems of ceramic in related task given.
- CO2: Solve related problems in ceramic using the appropriate principles
- CO3: Analyze the appropriate concepts learned about ceramic comprehensively
- CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to ceramic
- CO5: Complete the given task by relate with empathy, responsibility, integrity and social issues related to ceramic

BSP3153 Polymers

Credit: 3

Pre-requisite: None

Synopsis:

Polymers study requires a good understanding of fundamental knowledge of sciences; which involves investigation of structure, properties, polymerization process, characterization, viscoelasticity, rheology and molecular weight . This course also will cover industrial polymers and technology, including engineering and specialty polymers, industrial polymerization technique and polymer processing. Learning activities are planned to be delivered during lectures which will focused on (i) Introduction to polymers (i.e., classification, structure and molecular weight), (ii) Polymerization process (i.e., step-growth polymerization, chain growth polymerization, polymerization conditions and polymer reactions), (iii) Polymerization techniques (i.e., bulk, solution, suspension, emulsion), (iv) Characterization (i.e., measurement of molecular weight, analysis and testing of polymers), (v) Solid-state properties of polymers (i.e., Amorphous state, crystalline state, thermal transition properties and mechanical properties), (vi) (Viscoelasticity and rubber elasticity (i.e., mechanical models of viscoelastic behaviour, introduction to rubber elasticity), (vii) Thermoplastic, thermosets and elastomers (i.e., general purposes thermoplastic, engineering thermoplastic, thermosets and elastomers (natural rubber and synthetic rubber), (viii) (Polymer processing (i.e., extrusion, molding, calendaring additives and compounding). Industry visit to polymers based company (i.e., Polyplastic, Kaneka, MTBE Petronas, Gebeng) is scheduled; to ensure sufficient exposure to polymers manufacture and processing in industry to the students. Two problem-based assignments are designed to develop students' ability to analyze and carry out polymer investigations, apply theoretical knowledge, and write a good technical report. Students need to sit for test 1, test 2, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online-based quizzes); to ensure sufficient theoretical and fundamental knowledge. Students should be able to (i) apply comprehensive knowledge, identify problems and formulate creative and innovative solutions in polymer manufacture, and processing in industry, and (ii) practice empathy, responsibilities, integrity, and professionalism in their endeavors; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories learned to solve problems of polymer in related task given.
- CO2: Solve related problems in polymers using the appropriate principles
- CO3: Analyze the appropriate concepts learned about polymers comprehensively
- CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to polymers.
- CO5: Complete the given task by relate with empathy, responsibility, integrity and social issues related to polymers.

BSP3162 Composites

Credit: 2

Pre-requisite: None

Synopsis:

This course exposes students to composites materials in general. Learning activities cover several main aspects of composites: i.e. (i) composites matrices and their properties, (ii) specialty and high performance thermosets, (iii) thermoplastic composites, (iv) ceramic and metal matrix composites, (v) reinforcement, (vi) composite design and (vii) the application of composites. Lectures will be conducted two hours per week; with two assignments throughout the semester. Learners are required to sit for two tests, and series of quizzes to ensure sufficient fundamental knowledge. Upon completion of the course, the learners should be able to (i) hypothesize alternative approaches to solve problems related to composites using fundamental approach, and (ii) demonstrate good ethics and professionalism during accomplishment of tasks.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories learned to solve problems of composites in related task given.
- CO2: Solve related problems in composites using the appropriate principles
- CO3: Analyze the appropriate concepts learned about composites comprehensively
- CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to composites
- CO5: Complete the given task by relate with empathy, responsibility, integrity and social issues related to composites

BSP3183 Failure Analysis

Credit: 3

Pre-requisite: None

Synopsis:

Learning activities are focused on principles and general procedures of failure analysis in metallic, polymeric, ceramic, and electronic materials. The stated focus planned to be delivered during lectures are;(i) basic features and characteristics of different failure mechanisms, and (ii) methods and procedures to determine the cause of the failures. Industry visit to companies is scheduled; to ensure sufficient knowledge of failure analysis procedure in industry to the learners. A hands-on assignment is designed to enhance learner's skills in identifying the material's flaw, surface and sub-surface (e.g., cracks, seams, shrinkages, porosity, incomplete root penetration, undercut, lack of fusion). Learners need to sit for mid-term, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online-based quizzes); to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) explain and compare the basic features and characteristics of different failure mechanisms, (ii) solve related problems of failures using appropriate methodology and tools, and (ii) develop new idea and create alternative approaches for problem solving of various case studies; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain and compare the basic features and characteristics of different failure mechanisms.
- CO2: Solve related problems of failures using appropriate methodology and tools.
- CO3: Differentiate and analyze the procedures that can help determine the cause of the failures.
- CO4: Develop new idea and create alternative approaches for problem solving of various case studies.
- CO5: Complete the given task by cooperating in group while perform good ethics and professionalism during discussion.

BSP2133 Metals & Alloys

Credit: 3

Pre-requisite: None

Synopsis:

Metals and alloys study requires a good understanding of fundamental knowledge of sciences; which involves investigation of chemical and physical properties of

metallic elements, compounds and alloys. The course will cover metal-related technologies and metalworking processes such as casting, forging and sintering. Learning activities are planned to be delivered during lectures which will focused on (i) fundamental of crystal bonding and defects (i.e., atomic bonding in solids, imperfection, and diffusions), (ii) phase diagrams (i.e., interpretation of phase diagram, eutectic system, eutectoid system, and iron-carbon diagram), (iii) heat treatment processes (i.e., annealing, tempering, and surface hardening), (iv) ferrous and non-ferrous metals (i.e., steels classification, cast iron, and alloys), (v) metal fabrications, and (vi) mechanical properties and testing of metals. Industry visit to metal-based company (Asturi Metal Builder (M) Sdn Bhd) is scheduled; to ensure sufficient exposure of metal fabrication and processing in industry to the learners. Two problem-based assignments are designed to develop learners' ability to analyze and carry out metallurgical investigations, apply theoretical knowledge, and write a good technical report. Learners need to sit for test 1, test 2, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online-based quizzes); to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) apply comprehensive knowledge, identify problems and formulate creative and innovative solutions in metals and alloys processing, and fabrications in industry, and (ii) practice empathy, responsibilities, integrity, and professionalism in their endeavors; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories learned to solve problems of metal and alloy in related task given
- CO2: Solve related problems in metal and alloy using the appropriate principles
- CO3: Analyze the appropriate concepts learned about metal and alloy comprehensively
- CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to metal and alloy
- CO5: Demonstrate a good ethics and professionalism in completing the given task

BSP3173 Corrosion

Credit: 3

Pre-requisite: None

Synopsis:

Learning activities are focused on (i) introduction to corrosion (i.e., main reasons to study corrosion), (ii)

mechanism (i.e., polarization, passivation, and corrosion rate,) (iii) types of corrosion, and (iv) corrosion control (material selection, corrosion inhibitor, cathodic and anodic protection). This course will be delivered via lectures; which begin with explanation on the principle of corrosion including related electrochemical reactions, polarization and passivity as well as applications of thermodynamics to corrosion and electrode kinetics. All types of corrosion namely aqueous and non-aqueous corrosion, atmospheric corrosion, biological corrosion, and corrosion in selected environments such as soil, concrete, marine and sulphur bearing solutions are discussed. Introduction on basic principle of corrosion control for all types of corrosion are also discussed. A problem-based assignment is designed to develop learners' ability to analyze and carry out corrosion investigations, apply theoretical knowledge, and develop technical report writing skills. Learners need to sit for mid-term, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online-based quizzes); to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) apply comprehensive knowledge, identify problems and formulate creative and innovative solutions to corrosion problems in industry, (ii) practice empathy, responsibilities, integrity, and professionalism in their endeavors, and (iii) apply managerial, entrepreneurial skill, and demonstrate leaderships characteristics; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain theories learned to solve problems of corrosion & corrosion control in related task given
- CO2: Solve related problems in corrosion & corrosion control using the appropriate principles
- CO3: Analyze the appropriate concepts learned about corrosion & corrosion control comprehensively
- CO4: Develop new ideas and identify alternative approaches for problem solving appropriate to corrosion & corrosion control
- CO5: Demonstrate a good ethics and professionalism in completing the given task

BSP3462 Polymer & Composite Lab

Credit: 2

Pre-requisite: None

Synopsis:

This course consists of three related field of study, polymer, composite. Learners are introduced to practical and hands-on activities; inclusive of (i) manipulation of



instruments to perform synthesis/preparation of materials, quantitative and qualitative characterization of materials, and (ii) composition of scientific report. Learners need to synthesis, prepare and characterize polymer and composite; using step-growth, free radical, resin transfer molding, press laminating and extruder. Experiment demonstration, and safety talk is scheduled to be delivered by senior academician, and trained technical staff respectively; during second week of academic semester. Laboratory manual is given to each learner; which consists of theory, background of experiment, series of instructions, objectives, problem statement, and references. An online forum platform (accessible via kalam.ump.edu.my) is developed for discussions purposes. The class is divided into groups. Each group will perform different experiment each week which will be assessed based on (i) peer review, (ii) technical report, and (iii) ability to synthesis polymers (which will be carried out during a practical test). Learners are aimed to develop psychomotor skills in manipulation of instruments to characterize properties of the synthesized/prepared materials; i.e., FTIR, DSC, TGA, UTM, XRD, compression, tensile and impact.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve problem using experimental procedure to accomplish given objectives during material synthesis and characterization, and device fabrication
- CO2: Follow the guided experiments using the correct procedures
- CO3: Manipulate instruments to accomplish given objectives using correct procedure
- CO4: Demonstrate the ability to deliver and participate in knowledge sharing

BSP3472 Metal & Ceramic Lab

Credit: 2

Pre-requisite: None

Synopsis:

This course consists of two related field of study, metal and ceramic. Learners are introduced to practical and hands-on activities; inclusive of (i) manipulation of instruments to perform synthesis/preparation of materials, quantitative and qualitative characterization of materials, and (ii) composition of scientific report. Learners need to synthesis, prepare and characterize metal and ceramic; using sol-gel, solid state reaction and metallography. Experiment demonstration, and safety talk is scheduled to be delivered by senior

academician, and trained technical staff respectively; during second week of academic semester. Laboratory manual is given to each learner; which consists of theory, background of experiment, series of instructions, objectives, problem statement, and references.

An online forum platform (accessible via kalam.ump.edu.my) is developed for discussions purposes. The class is divided into groups. Each group will perform different experiment each week which will be assessed based on (i) peer review, (ii) technical report, and (iii) ability to conduct experiment and synthesis metal and ceramic (which will be carried out during a practical test). Learners are aimed to develop psychomotor skills in manipulation of instruments to characterize properties of the synthesized/prepared materials; i.e., UTM, XRD, metallurgical microscopy and vickers hardness.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve problem using experimental procedure to accomplish given objectives during material synthesis and characterization, and device fabrication
- CO2: Follow the guided experiments using the correct procedures
- CO3: Manipulate instruments to accomplish given objectives using correct procedure
- CO4: Demonstrate the ability to deliver and participate in knowledge sharing

BSP3452 Advance Material Lab

Credit: 2

Pre-requisite: None

Synopsis:

Learners are introduced to practical and hands-on activities; inclusive of (i) manipulation of instruments to perform synthesis/preparation of materials, quantitative and qualitative characterization of materials, and (ii) composition of scientific report. Learners need to synthesis functional materials i.e., quantum dots, nanowires, nanoparticles, liquid crystals, organic dyes, organometallic frameworks, and solid polymer electrolytes; using wet chemical process, electrospinning machine, and microwave technique. Demonstration, and safety talk is scheduled to be delivered by senior academician, and trained technical staff respectively; during second week of academic

semester. Laboratory manual is given to each learner; which consists of theory, background of experiment, series of instructions, objectives, problem statement, and references. An online forum platform (accessible via kalam.ump.edu.my) is developed for discussions purposes. Learners are divided in group of three; required to perform ten experiments, which will be assessed based on (i) peer review, (ii) technical report, and (iii) ability to manipulate instruments for characterizations (which will be carried out during a practical test). Learners are aimed to develop psychomotor skills in manipulation of instruments to characterize properties of the synthesized/prepared materials; i.e., Ball Miller, Ultra Violet-Visible absorption spectrometer, Photoluminescence spectrometer, Fourier Transformed Infra-Red spectrometer, Polarized Light Microscope, Thermogravimetric Analysis, Potentiostat-Galvanostat, X-Ray Diffractometer, and Ab-Initio Density Functional Theory calculations.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Solve problem using experimental procedure to accomplish given objectives during material synthesis and characterization, and device fabrication
 - CO2: Follow the guided experiments using the correct procedures
 - CO3: Manipulate instruments to accomplish given objectives using correct procedure
 - CO4: Demonstrate the ability to deliver and participate in knowledge sharing

BSP4172 Material Selection & Processing

Credit: 2
Pre-requisite: None
Synopsis:

The course is designed to offer a generic and broad view of material selection and processing technology. Learning activities are focused on industrial scale-material selection and processing concepts; such as (i) product identification, (ii) design and concept education, (iii) materials selection (iv) product development, and (v) product presentation. This course will provide learners an opportunity to develop personal skills and knowledge while working with metal, polymer, ceramic and composite materials which commonly used in the manufacturing and construction industries. Industry visit to polymer and metal production based companies (e.g., Top Glove Sdn Bhd, Asturi Sdn Bhd & Amsteel Sdn Bhd) is scheduled; to ensure sufficient industrial

exposure to the learners. Assignment is given to further strengthen the understanding of the course. The activities incorporated in this course are to create an active participation (psychomotor/ critical thinking & problem solving) during the lecture sessions. Learners need to sit for mid-term, final semester examinations, and four quizzes; to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) hypothesize alternative approaches to solve problems using the knowledge of rheology, and characterizations in industry and research domains, and (ii) practice and cultivate entrepreneurial skills during presentation of idea; upon completion of the course.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Explain the theories involved to solve the problems associated with material selection and processing.
 - CO2: Solve the problem with the appropriate concepts learned about materials processing and theological properties.
 - CO3: Analyze the appropriate technique of material selection and processing
 - CO4: Develop and plan a solution for the existing technology of material selection and processing.
 - CO5: Propose a scientific report effectively in written form

BSP3302 Final Year Project I

Credit: 2
Pre-requisite: None
Synopsis:

Learning activities are focused on developing workable research proposal comprising identification of (i) problem statement, (ii) research objectives and question, (iii) literature reviews and (iv) research methodology. Each student is assigned to an advisor (lecturer); based on field of expertise. The stated focus are planned to be delivered by direct active/engaged learning with the advisor (weekly basis); to understand the direction of project. Students are also required to gather information through reading of recently published articles on related field. Identification of chemicals and suitable characterization tools to ensure completion of project will be finalized and justified with guidance of advisor. A problem-based assignment is designed to encourage the students to incorporate managerial skills (e.g., project management, research ethics, time management and log book keeping). Students are assessed based on written proposal, and efficiency of



communications of research strategies during oral presentation. Students will continue lab work upon approval of proposal by faculty members. Learners should be able to analyze appropriate techniques and suitable solutions to be applied for their project upon completion of the course.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Apply appropriate principles of material science and technology to the given research project.
 - CO2: Analyze the appropriate techniques and suitable solutions to be applied in research project.
 - CO3: Explain effectively in written and oral form through project proposal presentation.
 - CO4: Organize in a given research task and identify own responsibility in a project and behave accordingly.
 - CO5: Demonstrate a good ethics and professionalism in completing the given task.

BSP4314 Final Year Project II

Credit: 4

Pre-requisite: BSP4314 Final Year Project I

Synopsis:

This course is a continuation of BSP3023–Final Year Project II. Learning activities are directed on completion of individual research project (by advisor monitoring), thesis preparation and project presentation. The stated focus are planned to be delivered by active/engaged learning with advisor, practical laboratory work, self-reading and draft preparation. Students will gather suitable data to answer research objectives; handling data analysis and discussion prior thesis writing. Students are assessed based on complete draft of thesis; effective communications of their findings during oral presentation and log book arrangement. At the end of this term, each student is expected to submit a fully developed and presented project that reflects the student’s command of the tools and processes of material technology knowledge.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Apply appropriate principles of material science and technology to the given research project.
 - CO2: Construct the experiment independently in a given task.
 - CO3: Develop new ideas and identify alternative approaches for problem solving appropriate to research project.

CO4: Explain effectively in written and oral form through project proposal presentation.

CO5: Identify new ideas and information from multiple sources independently and organize into meaningful categories.

BSP4608 Industrial Training

Credit: 8

Pre-requisite: Pass ALL compulsory courses

Synopsis:

Student are required to undergo industrial training at selected industry or research institution for six month. During the training there will be two visits from the faculty panel to monitor their work progress and to get feedback from their industrial supervisor. At the end of the training, students must prepare and submit a report regarding their work. An oral presentation of the industrial training to the faculty panel is mandatory.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Analyze the real industrial problem based to fundamental theories and identified the strategy to complete the task
 - CO2: Adapt the related working culture and practice the knowledge to the problem solving in projects
 - CO3: Construct possible solution to given real problem in the industry
 - CO4: Demonstrate interpersonal skills and professional ethics to be excellent and responsible in the organization
 - CO5: Initiate and commit to participate in gaining and sharing knowledge

BSP4614 Industrial Training Report

Credit: 4

Pre-requisite: BSP4608 Industrial Training

Synopsis:

Student are required to undergo industrial training at selected industry or research institution for six month. During the training there will be two visits from the faculty panel to monitor their work progress and to get feedback from their industrial supervisor. At the end of the training, students must prepare and submit a report regarding their work. An oral presentation of the industrial training to the faculty panel is mandatory.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the real industrial problem based to fundamental theories and identified the strategy to complete the task
- CO2: Adapt the related working culture and practice the knowledge to the problem solving in projects
- CO3: Construct possible solution to given real problem in the industry
- CO4: Propose a scientific report effectively in written form

BSP3503 Solar Cell Technology

Credit: 3

Pre-requisite: None

Synopsis:

Learning activities are focused on (i) fundamental of photoelectric conversion (i.e., charge excitation, transportation, separation, and collection), (ii) mechanisms (i.e., electron injection efficiencies, energy loss, and multi exciton generation), (iii) fabrications, and (iv) characterizations of solar cell. The stated focus are planned to be delivered during lectures; which cover four main technologies (i.e., monocrystalline, thin film, dye sensitized, and quantum dots solar cell). Industry visit to solar cell-based companies (e.g., AUO Sunpower Sdn Bhd, RadTech Sdn Bhd, and HBE Gratings Sdn Bhd) is scheduled; to ensure sufficient exposure of Silicon-based solar cell processing in industry to the learners. A problem-based assignment is designed to encourage the learners to incorporate technopreneurial skills (e.g., identifying new materials for solar cell, proposing a business plan, and installation of solar cell during community service activity). Learners need to sit for mid-term, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online-based quizzes); to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) hypothesize alternative approaches to solve problems in solar cell fabrications, and characterizations in industry and research domains, and (ii) practice and cultivate entrepreneurial skills during presentation of idea; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems in solar cell technology using appropriate principles
- CO2: Analyze the appropriate concepts learned about solar cell technology comprehensively
- CO3: Develop new ideas and identify alternative approaches for problem solving in solar cell technology

- CO4: Identify the ability to incorporate entrepreneur skills in assigned task
- CO5: Demonstrate leadership characteristics in assigned task

BSP3513 Electronic Ceramic

Credit: 3

Pre-requisite: None

Synopsis:

This course introduces and discusses the types and properties of electronic ceramics. The course covers ceramic materials for such applications; i.e., conductor, magnetic materials, electro-optic materials, superconductor, pyroelectric and piezoelectric materials as well as their fabrication and characterizations. Industrial visit is planned to introduce students in depth understanding for electronic ceramics applications. Students will be assigned to have a topic of electronic ceramics application and give a presentation to incorporate with technopreneurial skills. Written test such as quizzes (both offline and online), mid-term test and final test will be given to evaluate the students learning. Upon completion of the course, the students are able to solve the basic problem of electronic ceramics development and applications as well the capability in analyzing and providing the alternative solution of problem regarding the electronic ceramics applications.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve the basics problems associated with electronic ceramic
- CO2: Analyze the appropriate concepts learned about electronic ceramic.
- CO3: Plan a solution for the existing technology and discuss the method involved to solve problem in electronic ceramic
- CO4: Identify the ability to incorporate entrepreneur skills assigned work
- CO5: Demonstrate leadership characteristics in assigned work

BSP3523 Liquid Crystal Technology

Credit: 3

Pre-requisite: None

Synopsis:

This course covers the basic concept of liquid crystals along with technology review such as unisotropic fluids, phase of liquid crystals, chemistry of liquid crystal,

alignment of liquid crystals, photoisomerization effects in liquid crystals, and the future aspects of LCD. Industrial visit is planned to introduce students in depth understanding for development and current issue of LCD. Industrial visit is planned to introduce students in depth understanding for the LCD technology and recent issues. Students will be assigned to have a topic of electronic ceramics application and give a presentation to incorporate with technopreneurial skills. Written test such as quizzes (both offline and online), mid-term test and final test will be given to evaluate the students learning. Upon completion of the course, the students are able to solve the basic problem of LCD development as well the capability in analysing and providing the alternative solution of problem regarding the LCD technology development.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve the basics problems associated with liquid crystals and liquid crystal technology
- CO2: Analyze the appropriate concepts learned about liquid crystals and liquid crystal technology
- CO3: Plan a solution for the existing technology and discuss the method involved to solve
- CO4: Identify the ability to incorporate entrepreneur skills assigned work
- CO5: Demonstrate leadership characteristics in assigned work

BSP3533 Supercapacitor Technology

Credit: 3

Pre-requisite: None

Synopsis:

The course is focused on (i) fundamental of energy storage protocols (i.e., capacitors, batteries, supercapacitors, and link between energy and power requirements), (ii) supercapacitor principles (i.e., electrochemical double layer capacitance, pseudocapacitance, hybrids and device taxonomy), (iii) fabrications (i.e., positive electrode, negative electrode, electrolyte and assembly selection), and (iv) characterizations (i.e., setup configuration, cyclic voltammetry, charge-discharge, electrochemical impedance spectroscopy and procedure to evaluate device performance). The stated focus are planned to be delivered during lectures; which emphasise on the recent advancement on supercapacitors technology (including symmetric supercapacitor, asymmetric supercapacitor, solid state supercapacitor, advancement on electrode materials and applications). Industry visit to supercapacitor-related companies is scheduled; to

ensure sufficient exposure of device assembly in industry to the students. A hands-on based assignment (mini project) is designed to encourage students to incorporate managerial and leadership skills (e.g., group activities, data handling and evaluation, work coordination and vocal presentation). A mid-term, four quizzes and final semester examination is designed to assess student's understanding of the course. Students should be able to (i) solve problems in supercapacitor fabrications, and characterizations in industry and research domains, and (ii) identify energy-power density requirement in certain device/application and (iii) the practice and cultivate managerial skills during mini project/presentation; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems in supercapacitor technology using the appropriate principles
- CO2: Analyzed the appropriate concepts learned about supercapacitor technology comprehensively
- CO3: Develop new ideas and identify alternative approaches for problem solving appropriate to supercapacitor technology
- CO4: Identify the ability to incorporate managerial skills in assigned task
- CO5: Demonstrate leadership characteristics in assigned task

BSP3543 Thin Film Technology

Credit: 3

Pre-requisite: None

Synopsis:

This course exposes students to overview the Thin Film Technology in various industries. This course covers methods of deposition, deposition growth, and thin film properties such as optical, electrical, magnetic and mechanical properties. The reactions and several techniques for thin film characterization are also discussed in details in the second half semester. Industrial visit is planned to introduce students in depth understanding for thin film applications. Students will be assigned to discuss a topic of thin film application and deliver a presentation to encourage them to practice technopreneurial skills. Written test such as quizzes (both offline and online), mid-term test and final test will be given to evaluate the students learning output. Upon completion of the course, the students are able to solve the basic problem of thin film applications as well the capability in analysing and providing the alternative

solution for problem solving regarding the thin film technology and their applications.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve the basic problems associated with preparation of thin film using the appropriate principles.
- CO2: Analyze the appropriate concepts learned to solve a given situations in thin film technology comprehensively.
- CO3: Develop new ideas and identify alternative approaches for problem solving appropriate to thin film technology
- CO4: Identify the ability to incorporate entrepreneur skills in assigned task

BSP4523 Recycle Technology

Credit: 3

Pre-requisite: None

Synopsis:

Material resources to support our industrial age have become increasingly scarce. On the other hand, garbage or trashes or solid wastes resulted from our economic system that urges disposable lifestyles have become difficult problem to solve for those responsible for their management. Much of these discarded materials which could not be otherwise reused, sold, or salvaged may contain valuable amount of materials and or energy if appropriate technology and management are applied to convert these wastes to wealth. This course deals with materials recycling and recovery. The course content includes four parts, i.e. (1) Principles of Solid Waste Management, (2) Materials Recycling, (3) Hazardous Waste Recovery, and (4) Future Strategies for Waste Management.

A problem-based assignment is designed to encourage the learners to incorporate technopreneurial skills (e.g., identifying materials to be recycled, proposing a business plan and recycling methods). Learners need to sit for mid-term, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online-based quizzes); to ensure sufficient theoretical and fundamental knowledge.

Learners should be able to (i) hypothesize alternative approaches to solve problems related to recycle technology, and (ii) practice and cultivate entrepreneurial skills during presentation of idea; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems in recycle technology using the appropriate principles
- CO2: Analyzed the appropriate concepts learned about recycle technology comprehensively
- CO3: Develop new ideas and identify alternative approaches for problem solving appropriate to recycle technology
- CO4: Identify the ability to incorporate managerial skills in assigned task
- CO5: Demonstrate leadership characteristics in assigned task

BSP4533 Molecular Modeling

Credit: 3

Pre-requisite: None

Synopsis:

The course emphasized on validation of realistic cluster model using state of the art modelling tool i.e., Ab Initio Density Functional Theory calculations. The calculations and modelling procedure is planned to be carried out using Gaussian 09W, and Gaussview 5.0 respectively. Five important analysis of materials are included in the syllabus i.e., structure, opto-electronic, reduction-oxidation energy level, adsorption-desorption mechanisms, and electron dynamics in opto-electronic devices. A combination of lecture and hands-on activities is designed to ensure sufficient experience, and efficient delivery. Additionally, two visits are planned i.e., (i) Advanced Analysis and Modelling (ADAM), and Advanced Computing facilities at MIMOS Berhad, and (ii) DFT simulation facility at Universiti Malaysia Terengganu; to expose the learners to available career in the respective field. Learners are expected to accomplish a problem-based assignment; which needs combination of realistic cluster modelling, and technopreneurial skills. Learners are required to sit for a test, four quizzes (i.e., two offline quizzes during class, and two online-based quizzes) to ensure sufficient theoretical and fundamental knowledge. Upon completion of the course, the learners should be able to (i) hypothesize alternative approaches to solve problems in respective field using realistic cluster modelling procedure, and (ii) practice entrepreneurial skills during presentation of idea.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve problems related to realistic modelling using appropriate principles



- CO2: Analyze the appropriate concepts learned about density functional theory calculations comprehensively
- CO3: Construct realistic cluster model using correct procedure to accomplish given problem
- CO4: Identify the ability to incorporate managerial skills in assigned task
- CO5: Demonstrate leadership characteristics in assigned task

BSP4543 Semiconductor Devices

Credit: 3

Pre-requisite: None

Synopsis:

This course introduces the major application of solid state physics. This course covers the most basic semiconductor devices as a p-n junction, JFET, MOSFET, MESFET as well as the fabrication techniques of the devices on silicon wafer. The application of the devices for diode, LED, photodetector and solar cell are also introduced. Industrial visit is planned to introduce students in depth understanding for semiconductor devices fabrication. Students will be assigned to have a topic of semiconductor devices application and give a presentation to incorporate with technopreneurial skills. Written tests such as quizzes (both offline and online), mid-term test and final test will be given to evaluate the students learning. Upon completion of the course, the students are able to solve the basic problem of semiconductor devices applications as well the capability in analyzing and providing the alternative solution of problem regarding the semiconductor devices fabrication and their applications.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Solve the basics problems associated with semiconductor devices
 - CO2: Analyze the appropriate concepts learned about semiconductor devices.
 - CO3: Plan a solution for the existing technology and discuss the method involved to solve
 - CO4: Identify the ability to incorporate entrepreneur skills assigned work
 - CO5: Demonstrate leadership characteristics in assigned work

BSP4553 Computational Physics

Credit: 3

Pre-requisite: None

Synopsis:

This course will provide an introduction to techniques and applications in computational Physics. This course focuses specifically on methods for solving Physics/Mathematics problems using modern computational tools such as MATLAB, MAPLE or MATHEMATICA or etc. The emphasis of the course will be on using computational methods to solve physics problems that cannot be solved analytically. Student will be taught about theory in lecture room and hands on practice in laboratory. At the end of semester, student should be able to plan a solution to solve Physics problem. Furthermore, student should be able to incorporate managerial and express their leadership skills.

Course Outcome

- By the end of semester, students should be able to:
- CO1: Solve physics problems using appropriate tools and technique
 - CO2: Analyze problems using appropriate methods
 - CO3: Plan a solution for a given problem and discuss the method involved comprehensively
 - CO4: Identify the ability to incorporate managerial skills in assigned task
 - CO5: Express leadership characteristics in assigned task

BSP4563 Nanomaterial Technology

Credit: 3

Pre-requisite: None

Synopsis:

Learning activities are focused on (i) basic theory, (ii) classification of nanomaterials (i.e., 0-D, 1-D, 2-D and 3-D), (iii) synthesis of nanomaterials (i.e., inert-gas inspection, sol-gel deposition, molecular self-assembly, physical vapour deposition and milling mechanical alloying), (iv) characterization techniques (i.e., scanning tunneling microscope, atomic force microscope, energy dispersive spectroscopy and Raman spectroscopy technique), and (v) application of nanomaterials in science and technology. The stated focus are planned to be delivered during lectures; which cover the functions of nanomaterials (i.e., nanosensors, carbon nanotubes, quantum dots nanoparticles) which acts as optical, chemical and biosensors in various applications (i.e., food and agriculture, medical, water treatment and automotive industry). A project-based assignment is designed to enhance learner's cognitive and psychomotor skills (e.g., nanostructures in nature and nanomaterial in art and culture heritage). Learners need



to sit for mid-term, final semester examinations, and four quizzes (i.e., two offline quizzes during class, and two online-based quizzes); to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) explain and solve related problems in nanotechnology based on the tools, methods and applications and (ii) develop new idea and create alternative approaches for problem solving by considering the concerns and challenges in nanotechnology; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems of nanotechnology based on their tools, methods and applications.
- CO2: Analyze the nanomaterial and nanostructures for future application
- CO3: Develop new ideas and identify alternative approaches for problem solving appropriate to supercapacitor technology
- CO4: Identify the ability to incorporate managerial skills in assigned task
- CO5: Demonstrate leadership characteristics in assigned task

BSP3553 Advance Solid State Physic

Credit: 3

Pre-requisite: None

Synopsis:

This course is designed to expose wave mechanics and wave propagation through crystals, fundamental and reciprocal lattice types, Brillouin zones, lattice vibrations, phonon, density of state, Debye and Einstein model of specific heats, Fermi free electron, Hall effect, energy band, Bloch functions, Kronig Penney model. There are seven (7) headlines in the course; introduction to quantum mechanics, Schrodinger equation, reciprocal lattice vectors, crystal vibrations, Fermi free electrons and energy bands. The stated focus are planned to be delivered during lectures. A problem-based assignment is designed to encourage the learners to incorporate the ethics and professional values. Learners need to sit for two tests, final semester examinations, and four quizzes to ensure sufficient theoretical and fundamental knowledge. Learners should be able to (i) develop new ideas and identify alternative approaches for problem solving related to solid state physics, and (ii) demonstrate the ethical values and professionalism character in completing a given task; upon completion of the course.

Course Outcome

By the end of semester, students should be able to:

- CO1: Solve related problems on industrially relevant crystals such as semiconductors, superconductors, dielectrics, and ferroelectrics
- CO2: Use the learnt properties of crystalline solids to analyze related phenomena thereby solving related problems
- CO3: Develop new ideas and identify alternative approaches for problem solving appropriate to electrical properties of crystalline solids.
- CO4: Identify the ability to incorporate managerial skills in assigned task
- CO5: Demonstrate leadership characteristics in assigned task

FACULTY OF MANUFACTURING ENGINEERING





FACULTY OF MANUFACTURING ENGINEERING

INTRODUCTION

The Faculty of Manufacturing Engineering was established in 2008 with the target to produce competent professionals for the manufacturing industry. Being an industry-driven faculty, the faculty offers several academic programs which are significant in preparing students with essential engineers attributes such as solid scientific foundation, psychomotor skills, critical thinking skills, communication skills, and entrepreneurship.

PROGRAMMES OFFERED

At the undergraduate level, FKP offers degree programmes related to manufacturing engineering as follows:

- B. Eng (Hons.) Manufacturing Engineering
- B. Eng (Hons.) Mechatronics Engineering
- B. Eng (Hons.) Mechatronics Engineering - (Collaboration Programme with Hska, Germany)

CAREER OPPORTUNITIES

- Project Engineer
- Design Engineer
- Operation Engineer
- Mechatronic Engineer
- Manufacturing Engineer
- Robotic Engineer
- Research & Development Engineer
- Energy Engineer
- Process Plant Engineer
- Sales Engineer
- QA Engineer
- Production Engineer
- Material Engineer
- Consultant
- Instrumentation & Control Engineer
- CAD/CAM Engineer
- Technopreneur
- Lecturer



**PROGRAMME CURRICULUM
B. ENG (HONS.) MANUFACTURING ENGINEERING**

YEAR SEMESTER	FIRST FIRST & SECOND	SECOND FIRST & SECOND	THIRD FIRST & SECOND	FOURTH FIRST & SECOND
	BFF1801 MACHINING 1	BFF2612 COMPUTER AIDED ENGINEERING DESIGN	BFF3313 SENSOR AND INSTRUMENTATION SYSTEMS	BFF4103 CONTROL SYSTEM ENGINEERING
	BFF1113 ENGINEERING MATERIALS	BFF1123 DYNAMICS	BFF3103 VIBRATIONS	BFF4902 FINAL YEAR PROJECT 1
	BFF1811 MACHINING 2	BFF2801 ELECTRICAL/ELECTRONICS LAB	BFF3622 COMPUTER AIDED MANUFACTURING	BFF4**3A MANUFACTURING ELECTIVE 3
	BFF2003 COMPUTER PROGRAMMING	BFF1133 MECHANICS OF MATERIALS	BFF3242 HEAT TRANSFER	BFF3123 MACHINE DESIGN
	BFF1103 STATICS	BFF2423 MANUFACTURING PROCESSES	BFF3**3A MANUFACTURING ELECTIVE 1	BFF4911 ENVIRONMENT SAFETY & HEALTH
	BFF1602 TECHNICAL DRAWING	BFF2233 THERMODYNAMICS	BFF2513 MANUFACTURING SYSTEM	BFF4914 FINAL YEAR PROJECT 2
	BFF1502 PROJECT MANAGEMENT	BFF2223 FLUID MECHANICS	BFF1922 ENGINEERING ECONOMY	BFF3523 PRODUCTION PLANNING AND CONTROL
	BFF1343 FUNDAMENTAL OF ELECTRICAL ENGINEERING	BFF2821 MECHANICS LAB	BFF3573 PRODUCT DESIGN AND DEVELOPMENT	BFF4**3B MANUFACTURING ELECTIVE 4
	BFF1932 ENGINEERS IN SOCIETY	BFF2523 QUALITY ENGINEERING	BFF3**3B MANUFACTURING ELECTIVE 2	BFF4533 MANUFACTURING AUTOMATION
	BFF1353 FUNDAMENTAL OF ELECTRONICS ENGINEERING	BFF3632 DESIGN OF JIGS & FIXTURES	BFF3801 THERMAL-FLUID ENGINEERING LAB	
			BFF2433 ADVANCED MANUFACTURING PROCESSES	
			BFF4653 INTEGRATED DESIGN PROJECT	
109	17+16	17+16	17+17	17+15
29	University Required Courses : Applied Calculus, Applied Statistics, Ordinary Differential Equations, English For Academic Communication, English for Technical Communication, Fundamental of English Language, English for Professional Communication, Islamic And Asian Civilisations 1, Ethnic Relations, Foreign Languages Level 1, Foreign Languages Level 2, Soft Skills 1, Soft Skill 2, Co-Curriculum I, Co-Curriculum II, Entrepreneurship, Elective Courses.			
138	Total Unit For Graduation			



**ELECTIVE COURSES FOR
B. ENG (HONS.) MANUFACTURING ENGINEERING**

NO.	CODE	COURSE	CREDIT HOUR
1	BFF3403	ADVANCED MACHINING	3
2	BFF3603	PLASTICS PRODUCT DESIGN	3
3	BFF4603	MOLD 1	3
4	BFF4613	MOLD 2	3
5	BFF3613	SHEET METAL PRODUCT DESIGN	3
6	BFF4613	DIE 1	3
7	BFF4633	DIE 2	3
8	BFF3553	MECHANIZATION APPROACH TO PROCESS IMPROVEMENT	3
9	BFF3563	PROCESS AUDITING TECHNIQUES	3
10	BFF4563	PRODUCTION LINE MANAGEMENT	3
11	BFF4573	SIX SIGMA	3
12	BFF4503	FACTORY MANAGEMENT	3
13	BFF4513	LEAN PRODUCTION SYSTEM	3
14	BFF3583	INDUSTRIAL ERGONOMICS	3
15	BFF4663	MAINTENANCE AND RELIABILITY	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			12

**PROGRAMME CURRICULUM 2018/2019
B. ENG (HONS.) MECHATRONICS ENGINEERING**

YEAR SEMESTER	FIRST		SECOND		THIRD		FOURTH	
	FIRST & SECOND		FIRST & SECOND		FIRST & SECOND		FIRST & SECOND	
MANUFACTURING ENGINEERING CORE COURSES	BFF1801 MACHINING 1	BFF2612 COMPUTER AIDED ENGINEERING DESIGN	BFF3313 SENSOR AND INSTRUMENTATION SYSTEMS	BFF4103 CONTROL SYSTEM ENGINEERING				
	BFF113 ENGINEERING MATERIALS	BFF1123 DYNAMICS	BFF3103 VIBRATIONS	BFF4002 FINAL YEAR PROJECT 1				
	BFF1811 MACHINING 2	BFF3622 COMPUTER AIDED MANUFACTURING	BFM3333 MICROCONTROLLER SYSTEM	BFM3**3A MECHATRONICS ELECTIVE 1				
	BFF2003 COMPUTER PROGRAMMING	BFF1133 MECHANICS OF MATERIALS	BFF3242 HEAT TRANSFER	BFF3123 MACHINE DESIGN				
	BFF1103 STATICS	BFF2423 MANUFACTURING PROCESSES	BFF3801 THERMAL FLUID ENGINEERING LAB	BFF4653 INTEGRATED DESIGN PROJECT				
	BFF1602 TECHNICAL DRAWING	BFF1932 ENGINEERS IN SOCIETY	BFF2821 MECHANICS LAB	BFM4914 FINAL YEAR PROJECT 2				
	BFF1502 PROJECT MANAGEMENT	BFF2233 THERMODYNAMICS	BFM2013 PROGRAMMING FOR ENGINEERS	BFM3**3B MECHATRONICS ELECTIVE 2				
	BFF1343 FUNDAMENTAL OF ELECTRICAL ENGINEERING	BFF2223 FLUID MECHANICS	BFF1922 ENGINEERING ECONOMY	BFM4503 ROBOTICS FOR ENGINEERS				
		BFM2303 ANALOG ELECTRONICS	BFM3002 COMPUTER SIMULATION	BFF4911 ENVIRONMENT SAFETY & HEALTH				
		BFM2313 DIGITAL ELECTRONICS	BFM3403 FLUID DRIVE SYSTEM	BFM3**3C MECHATRONICS ELECTIVE 3				
		BFM2831 FUNDAMENTAL OF ELECTRICAL ENGINEERING LAB	BFM3303 ELECTRICAL DRIVE SYSTEM	BFF3573 PRODUCT DESIGN & DEVELOPMENT				
	109	18	28	26	6	31		
	29	University Required Courses: Applied Calculus, Applied Statistics, Ordinary Differential Equations, Fundamentals of English Language, English for Technical Communication, English for Academic Communication, English for Professional Communication, Islamic And Asian Civilisations 1, Ethnic Relations, Foreign Languages Level 1, Foreign Languages Level 2, Soft Skills 1, Soft Skills 2, Co-Curriculum I, Co-Curriculum II, Entrepreneurship.						
	138	Total Unit For Graduation						

**ELECTIVE COURSES FOR
B. ENG (HONS.) MECHATRONICS ENGINEERING**

NO.	CODE	COURSE	CREDIT HOUR	FIELD
1	BFM3323	POWER ELECTRONICS	3	ELECTRICAL & ELECTRONICS
2	BFM3313	ELECTRICAL POWER AND MACHINES	3	ELECTRICAL & ELECTRONICS
3	BFM3003	ARTIFICIAL INTELLIGENCE SYSTEM	3	SOFTWARE
4	BFM4603	CONTROL SYSTEM 2	3	COMPUTER & CONTROL
5	BFM4613	DIGITAL SIGNAL PROCESSING	3	COMPUTER & CONTROL
6	BFM4513	AUTOMATION SYSTEM	3	MECHANICS & AUTOMATION
7	BFM4313	INDUSTRIAL ELECTRONICS	3	ELECTRICAL & ELECTRONICS
8	BFM4323	DIGITAL SYSTEM IN MECHATRONICS DESIGN	3	ELECTRICAL & ELECTRONICS
9	BFM4523	AUTONOMOUS ROBOTIC SYSTEM	3	MECHANICS & AUTOMATION
10	BFM4533	ROBOTIC PROTOTYPE DESIGN	3	MECHANICS & AUTOMATION
11	BFM4013	COMPUTER NETWORK IN MECHATRONICS SYSTEM	3	SOFTWARE
12	BFM4633	DATA ANALYTICS	3	SOFTWARE
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9	

**PROGRAMME CURRICULUM 2018/2019
B.ENG (HONS.) MECHATRONICS ENGINEERING (COLLABORATION PROGRAMME WITH HSKA, GERMANY)**

YEAR SEMESTER	FIRST & SECOND	SECOND	THIRD	FOURTH	FOURTH	FIFTH	
MANUFACTURING ENGINEERING CORE COURSES	BHM1103 STATISTICS	BHM2323 ELECTRONICS ENGINEERING 2	BHM3313 MICROCOMPUTER TECHNOLOGY	BHM3712 HYBRID INTEGRATION	BHM4003 INFORMATION SYSTEM	BHM403 INFORMATION SYSTEM	
	BHM1113 ENGINEERING MATERIALS	BHM2103 DYNAMICS	BHM4704 INDUSTRIAL AUTOMATION	BHM3702 CLEAN ROOM TECHNOLOGY	BHM4942 PREPARATION FOR BACHELOR THESIS	BHM4942 PREPARATION FOR BACHELOR THESIS	
	BHM1602 TECHNICAL DRAWING	BHM2203 THERMAL-FLUID ENGINEERING 1	BHM3722 SMD TECHNOLOGY	BHM3303 SENSOR AND INSTRUMENTATION SYSTEMS	BHM4914 BACHELOR THESIS	BHM4914 BACHELOR THESIS	
	BHM1801 MACHINING 1	BHM2003 COMPUTER PROGRAMMING	BHM3102 VIBRATIONS	BHM4002 ELECTRONICS IN MECHATRONICS SYSTEMS	BHM4931 FINAL EXAMINATION	BHM4931 FINAL EXAMINATION	
	BHM1313 ELECTRONICS ENGINEERING 1	BHM2333 ELECTRONICS ENGINEERING 3	BHM3623 PRODUCT DEVELOPMENT AND DESIGN	BHM3922 INTERNSHIP PREPARATION			
	BHM1123 MECHANICS OF MATERIALS	BHM2342 MECHANICAL AND ELECTRICAL COMPONENTS	BHM3012 NUMERICAL PROGRAMMING	BHM3912 INTERNSHIP PREPARATION			
	BHM1612 CAD MODELING	BHM2213 THERMAL-FLUID ENGINEERING 2	BHM3941 ENGINEERING COMMUNICATION	BHM3912 INTERNSHIP PREPARATION			
	BHM1811 MACHINING 2	BHM2403 MANUFACTURING PROCESSES 1	BHM4911 ENVIRONMENTAL SAFETY AND HEALTH	BHM3931 INTERNSHIP FOLLOW-UP			
		BHM2013 PROGRAMMING FOR ENGINEERS	BHM4103 CONTROL SYSTEM ENGINEERING				
		UHG2003 GERMAN 3 (OPTIONAL)	BHM3612 OPTOELECTRONICS				
		UHG20013 GERMAN 3 (OPTIONAL)	BHM323 SOFTWARE ENGINEERING				
		UHG2016 (HL) INTENSIVE GERMAN 2 (OPTIONAL)	BHM3602 QUALITY INSPECTION				
	115	18	26 (12)	28	15	18	10
	31	University Required Courses / Applied Calculus, Applied Statistics, Ordinary Differential Equations, Islamic And Asian Civilisations 1, Ethnic Relations, Deutsch Sprache 1, Deutsch Sprache 2, Deutsch Sprache 3, Deutsch Sprache 4, intensive German Language 1, Soft Skills 1, Soft Skills 1, Soft Skill 2, Co-Curriculum II, Technopreneurship.					
146	Total Unit for Graduation						

**CURRICULUM STRUCTURE FOR
MANUFACTURING PROGRAMME
(BFF)**

BFF1103 Statics

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the concepts of force vector algebra and free-body diagrams to solve problems on equilibrium of forces. The course covers six major chapters in engineering mechanics of statics as follows:

1. equilibrium of forces on a particle, 2. equilibrium of forces on single rigid body, 3. equilibrium of forces on simple trusses, frames and machine structures (multi-rigid bodies), 4. equilibrium of forces in dry friction, 5. centre of gravity and centroid and 6. moments of inertia.

Course Outcome

By the end of semester, students should be able to:

- CO1 : Solve problems on equilibrium of forces for particles and rigid bodies using the equation of equilibrium
- CO2 : Analyse problems on equilibrium of forces for trusses, frames and machines
- CO3 : Analyse problems on equilibrium of rigid bodies subjected to dry frictional forces
- CO4 : Determines the centre of gravity, centroid and moment of inertia for a body of arbitrary shape
- CO5 : Design solutions for complex engineering problems for a simple structure in equilibrium

BFF1113 Engineering Materials

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the fundamental concepts of engineering materials which includes the structure of materials, mechanical and physical properties of materials, binary phase diagrams, isothermal diagram, heat treatment, applications and current developments of metal, polymer, ceramic, composite and advanced materials. Also, basic understanding on the environmental degradation of engineering materials.

- CO1 : Identify the atomic bonding and the crystal structures as well as the mechanical and physical properties of engineering materials.
- CO2 : Analyse various types of engineering materials based on their microstructures, properties and failure behaviours..
- CO3 : Illustrate structure-property correlations of materials based on phase diagram, heat treatment and strengthening mechanism.

CO4 : Recommend a suitable material for engineering applications based on product design requirements.

CO5 : Identify the importance of environmental considerations and sustainability in engineering materials.

CO6 : Communicate effectively regarding materials-related project in oral presentation.

BFF1123 Dynamics

Credit Hour: 3

Prerequisite: BFF1103

Synopsis

This course covers rigid body kinematics and kinetics of 2D planar motions. At the of the course, the students should be able to analyse the position, velocity and acceleration of a 2D planar mechanism. Furthermore, by applying either the principle of force-acceleration, work-energy, and/or impulse-momentum, the students should be able to solve the kinetics problems of 2D planar motion. This course also requires the students to design a 2D planar mechanism that performs a specific function.

- CO1 : Analyse the linear velocity and acceleration of a point, or angular velocity and angular acceleration of remaining links including the Coriolis acceleration if applicable.
- CO2 : Apply the Newton's Second Law of Motion to determine the acceleration and angular acceleration of a body.
- CO3 : Apply the Principle of Work and Energy to determine the velocity and angular velocity of a body.
- CO4 : Apply the Principle of Impulse and Momentum to determine the velocity and angular velocity of a body.
- CO5 : Design a 2D planar mechanism that performs a specific function and to prepare report that demonstrates the knowledge of velocity and acceleration.

BFF1133 Mechanics of Materials

Credit Hour: 3

Prerequisite: BFF1103; BFF1113

Synopsis

This course introduces the concept of stress, strain and mechanical properties of materials under axial, torsion, bending, transverse, shear and combined loadings in elastic structural members. Plane stress transformation is also included.

- CO1 : Identify the concept of stress, strain and different mechanical properties of materials.
- CO2 : Analyse the stress and strain in structural members subjected to the axial loads and torsional loads.
- CO3 : Analyse the stress and strain in structural members subjected to the bending loads and shear loads.
- CO4 : Analyse the stress and strain in structural members subjected to the combined load and analyse the stress transformation to solve the mechanics of materials problems.
- CO5 : Design solutions for complex engineering problem related to mechanics of materials

BFF1343 Fundamental of Electrical Engineering

Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces DC circuit and AC circuit analyses. It covers the fundamental laws and theorems, circuit techniques, transient analysis, sinusoidal steady-state analysis and three-phase systems.

- CO1 : Apply fundamental laws, circuit theorems and method of analysis to solve electrical circuit
- CO2 : Analyse transient response and steady-state response of circuit applications
- CO3 : Analyse balanced and unbalanced three-phase systems
- CO4 : Analyse electrical circuit using simulation software

BFF1353 Fundamental of Electronics Engineering

Credit Hour: 3
Prerequisite: BFF1343

Synopsis

This course covers the fundamental and applications topics of analog and digital electronics including devices, circuitry, system, and analysis techniques. For analog electronics, it also covers diode, bipolar junction transistor (BJT), field effect transistor (FET), and operational amplifier (Op-Amp). For digital electronics, it also covers different number systems, Boolean Algebra theorems, and combinatorial logic circuits.

- CO1 : Explain the principle operation and

characteristics of diode, bipolar junction transistor (BJT), and field effect transistor (FET) devices and analyse its operation

- CO2 : Explain and analyse the operation of various type of operational amplifier circuits and applications
- CO3 : Use different number system to represent data and binary codes for representing numeric and alphanumeric data and apply the Boolean Algebra theorems for simplification of complex logic expression
- CO4 : Analyse and design of combinatorial logic

BFF1502 Project Management

Credit Hour: 2
Prerequisite: None

Synopsis

This course embraces a broad basic overview and principles of project management which has become central to operations in manufacturing enterprises throughout five stages of managing project; initialization, planning, execution, control and closing.

- CO1 : Develop a project charter which describes a preliminary framework of project's goal, scopes and high level deliverables.
- CO2 : Develop a project planning using management tools
- CO3 : Propose task scheduling using an ordered sequence of activities with time allotted
- CO4 : Evaluate actual performance at any of project duration

BFF1602 Technical Drawing

Credit Hour: 2
Prerequisite: None

Synopsis

This course introduces fundamental knowledge and skill of technical drawing for engineers. Both hand sketching and CAD approach will be used in this course. Student will be exposed with Fundamental of Engineering Graphic Language; Layout and Lettering; Technical Sketching; Geometric Constructions; Basic and Advanced Dimensioning; Orthographic Drawing; Section and Auxiliary Views; Geometric Dimensioning and Tolerance (GD&T); and 2D Parametric Drawing Construction. This course also preparing the student to create and interpret working technical drawing according to ISO standards

- CO1 : Apply standard procedures in sketching and

technical drawing.

- CO2 : Manipulates CAD for 2D drawing based on orthographic projections and section views.
- CO3 : Analyze the geometric dimensioning and tolerance (GD&T) to explicitly describe geometry, variation and accuracy in engineering drawing
- CO4 : Develop standard drawing package consists of 2D assembly drawing, parts list and details part drawing.
- CO5 : Show the ability to be an effective team player based on the completion of tasks and involvement in group activities.

BFF1801 Machining 1

Credit Hour: 1
Prerequisite: None

Synopsis

This course introduces the students to the fundamental knowledge and principle of metal removing process. In this course, student will apply the theoretical knowledge to perform the actual material removal operation using appropriate tools and technique according to required dimensions, tolerance, specification and safety regulations.

- CO1 : Apply the role of safety and regulatory compliance of hand tools and lathe machine
- CO2 : Analyse various types of drawings, material removal processes and machining parameters
- CO3 : Perform basic material removal processes using hand tools and lathe machine with correct sequence of machining operation

BFF1811 Machining 2

Credit Hour: 1
Prerequisite: None

Synopsis

This course introduces student on safety rules, metrology, milling process and surface grinding and machining process.

- CO1 : Apply the safety and health procedures during machining
- CO2 : Apply skill in part inspection during machining
- CO3 : Apply technical skill in milling process
- CO4 : Apply technical skill in surface grinding process
- CO5 : Practice right standard operation procedure and ethics for machining work

BFF1932 Engineer in Society

Credit Hour: 2
Prerequisite: None

Synopsis

This course introduces the engineering profession, local industries sector, issues in local industries, ethics and public responsibility, engineer and law, and contract law.

- CO1 : Discuss the engineering practices in local manufacturing industries.
- CO2 : Adheres the practice and laws which govern engineering population for environmental and sustainable development.
- CO3 : Apply responsibility for ones working ethics and public responsibility in engineering practices.

BFF1922 Engineering Economy

Credit Hour: 2
Prerequisite: None

Synopsis

This course introduces concept of life cycle cost, interest and equivalent. Formula and factors for single and multiple cash flow. Method for investments assessment and alternative comparison and project evaluation using cost worth ratio, inflation and cash flow method.

- CO1 : Analyse the cost concept, cost structure and estimation
- CO2 : Analyse the money-time relationship with/without taxes consideration
- CO3 : Justify the best economical alternative in private and public engineering projects

BFF2003 Computer Programming

Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces the basics of C programming language. The contents of this course includes coding input and output, variables, constants, arithmetic operations, mathematical functions, user-defined functions, loops, selection making decision and repetitive construct, array, and also data structure. The programming language used for the course is C/C++ language.

- CO1 : Solve a mathematical problem using variables, constants, arithmetic operations, mathematic functions and user-defined functions with the correct rules.
- CO2 : Organizes the flow of a program that uses decision making, repetition and loop statements without any errors.
- CO3 : Write an organised and readable C program code without producing compile and output result errors.
- CO4 : Develop a program code that is related to manufacturing applications that follows a design

specification.

CO5 : Analyse the handling of arrays in a program to ensure correct calculated output is produced.

BFF2223 Fluid Mechanics

Credit Hour: 3

Prerequisite: BFF1103

Synopsis

This course is a fundamental course for engineering students which presents unlimited practical applications from daily life to related industrial fields. Students taking this course are expected to have adequate background of calculus, physics and engineering mechanics. Lesson will be covering the fundamental concepts of fluids, fluid properties, problem analysis for fluids at static and in motion, fluid flow in pipeline and dimensional homogeneity concept. Students will be also exposed to the application of complex engineering problem such as the utilization of Computational Fluid Dynamics (CFD) to enhance their problem solving skills and competency.

CO1 : Analyse forces applied by fluids at rest.

CO2 : Analyse mass, Bernoulli and energy equations associated with fluids in motion.

CO3 : Analyse minor and major losses, pressure drop and pumping power requirement of laminar and turbulent flow in pipes.

CO4 : Analyse dimensional homogeneity of equations, method of repeating variables to obtain non-dimensional parameters and similarity principle for experimental modelling.

CO5 : Develop solution for complex engineering problem to solve flow characteristics in pipes.

CO6 : Produce a comprehensive report to demonstrate implemented project.

BFF2233 Thermodynamics

Credit Hour: 3

Prerequisite: None

Synopsis

This course focuses on the application of the thermodynamics knowledge in various engineering systems. The subject covers the review and analysis of energy, concepts of thermodynamics laws and entropy, heat engines, refrigerators and heat pumps cycles.

CO1 : Analyze thermodynamics fundamental concepts which includes energy, state, temperature, pressure, process and cycle.

CO2 : Analyze the properties of pure, simple compressible substances and ideal gases.

CO3 : Analyze the concept of 1st law of thermodynamics in closed and open systems.

CO4 : Analyze entropy change in 2nd law of

thermodynamics.

CO5 : Design engineering project on thermodynamics.

CO6 : Communicate effectively regarding principles of thermodynamics aspects of engineering design.

BFF2423 Manufacturing Processes

Credit Hour: 3

Prerequisite: BFF1113

Synopsis

This course introduces various challenges and issues in modern manufacturing process and operations, ranging from traditional topics such as casting, forming, machining and joining process.

CO1 : Ability to describe manufacturing process of metal casting, forming and shaping, joining and surface technology

CO2 : Analyse the mechanics and processing parameters of metal casting, forming, joining and surface technology

CO3 : Propose a design of manufacturing process system that can be used in production that can contribute to public health and safety, cultural, societal, environmental and sustainability

CO4 : Recommend an optimized process parameters of a manufacturing process using research methods

BFF2433 Advanced Manufacturing Processes

Credit Hour: 3

Prerequisite: None

Synopsis

This course covers the processing of ceramics, glasses, superconductors, plastics, and composite materials. This course also covers, rapid-prototyping processes and operations, advanced machining processes and equipment, fabrication of microelectronic devices, and fabrication of microelectromechanical devices and systems and nanoscale manufacturing.

CO1 : Comprehend knowledge in advanced manufacturing processes.

CO2 : Analyze engineering problem related with advanced manufacturing processes.

CO3 : Apply investigation in related topic advanced manufacturing processes.

CO4 : Follow ethical during exercises covering advanced manufacturing processes.

CO5 : Perform life long learning in the subject of advanced manufacturing processes.

BFF2513 Manufacturing System

Credit Hour: 3

Prerequisite: None

Synopsis

This course provides in-depth understanding of manufacturing system components, Manufacturing Operations, Models and Metrics useful to evaluate them, Material Transport and storage systems, analysis of Single cell, Cellular Manufacturing and Flexible Manufacturing systems. Deals with the analysis of manual and automated assembly systems.

- CO1 : Understand the concepts of manufacturing systems and Analyse the performance of these systems using different metrics.
- CO2 : Analyse the material handling and storage systems in different manufacturing environments
- CO3 : Quantify the performance of single cells, cellular manufacturing systems, flexible manufacturing systems and assembly lines
- CO4 : Evaluate the suitability of modern manufacturing philosophies to improve the performance of manufacturing systems.

BFF2523 Quality Engineering

Credit Hour: 3

Prerequisite: BUM2413

Synopsis

This course is the application of statistical, mathematical and management methods for improving the quality and reliability of industrial products, processes and systems. Thus, the concept of basic quality tools, fundamental of statistics, control chart for variables and attributes, fundamental of probability and acceptance sampling systems are the key success of this course.

- CO1 : Determine the measures of frequency distributions, central tendency, dispersion and normal curve when the data are systematically gathered
- CO2 : Analyze the variations that occur in the central tendency and mean of a set of observation
- CO3 : Analyze the quantitative data to improve process, develop a new product and establish a statistical control
- CO4 : Discover the application of optimization among society

BFF2612 Computer Aided Engineering Design

Credit Hour: 2

Prerequisite: BFF1602

Synopsis

This course introduces 3D surface solid modelling which emphasized on the drawing, functioning and organizing the model. Further course content included part assembly, animation and basic FEA application. Students experience the practical learning through the CAD software.

- CO1 : Apply the knowledge of geometric modelling concepts used in commercial CAD/CAM software
- CO2 : Construct 3D parts, assembly models and drafting according to the engineering standards
- CO3 : Assess the part models with basic Finite Element Analysis (FEA) simulations
- CO4 : Communicate effectively on the topic of geometric modelling

BFF2801 Electrical/Electronics Lab

Credit Hour: 1

Prerequisite: BFF1353

Synopsis

This course introduces practical electrical circuits. Students should analyse, synthesis and build circuits using passive/active components

- CO1 : Apply electrical fundamental technique to solve circuit using modern tools
- CO2 : Implement fundamental electrical and electronic principle and devices to solve circuit problem
- CO3 : Develop an integration of electrical system for an application in a group

BFF2821 Mechanics Lab

Credit Hour: 1

Prerequisite: BFF1123

Synopsis

This lab introduces principles of engineering and solid mechanics through practical experiments. The covered areas are for principles of statics, dynamic and mechanics of materials.

- CO1 : Analyze engineering mechanics problems for a rigid body at rest and in motion
- CO2 : Demonstrate understanding about mechanical properties of engineering structures.
- CO3 : Demonstrate ethical principles and commitments of professional ethics on lab practices

BFF3103 Vibrations

Credit Hour: 3

Prerequisite: BFF1123

Synopsis

This course introduces the fundamental of vibration, free vibration (Single Degree of Freedom -SDOF System), harmonically excited vibration (SDOF System), general excited vibration (SDOF System), two degree of freedom (TDOF System), and vibration control.

- CO1 : Analyze the single degree of freedom system vibration and harmonically excited vibration
- CO2 : Analyze the two degree of freedom system

vibration and control vibration method

- CO3 : Demonstrate the vibration solution for engineering problem
- CO4 : Apply the modern tools for solving vibration problem

BFF3123 Machine Design

Credit Hour: 3

Prerequisite: None

Synopsis

This course focuses on the fundamentals of component design - free body diagrams, force flow, concepts, failure theories, and fatigue design, with application to fasteners, springs, bearings, gears, shafts, clutches, and brakes. It explains the basics of mechanics, strength of materials, and materials properties on how to apply these fundamentals to specific machine components design.

- CO1 : Analyze the concept of machine design, Design considerations for the machine elements, Load and stress analysis, design of compression members
- CO2 : Analyze the failure of machine components due to static and variable loadings, Design of shafts
- CO3 : Design of power screws and mechanical springs
- CO4 : Design of bearings, gears, clutches and flexible mechanical elements
- CO5 : Design solution for engineering problems related to the course content

BFF3242 Heat Transfer

Credit Hour: 2

Prerequisite:

Synopsis

The course covers the modes of heat transfer (through conduction, convection and radiation) in a model of heat transfer system.

- CO1 : Analyse manufacturing and mechatronics engineering problems as either conduction, convection or radiation problems and model them as a heat transfer system
- CO2 : Apply specific knowledge of thermofluids principles and heat transfer mechanisms (conduction, convection or radiation) to the heat transfer system
- CO3 : Design solutions for engineering problems based on course content
- CO4 : Propose the impact of heat transfer engineering for the environment

BFF3313 Sensor & Instrumentation Systems

Credit Hour: 3

Prerequisite: BFF2801

Synopsis

This course covers instrumentations system including instrument principles, measurement techniques and data analysis for a particular sensor and measurement situation.

- CO1 : Determine general treatment of instruments and their characteristics
- CO2 : Analyse transducer elements, intermediate elements and data acquisition systems (DAQ)
- CO3 : Determine principles of the work and derive mathematical model of sensors for measuring motion and vibration, dimensional metrology, force, torque and power, pressure, temperature, flow and acoustics.
- CO4 : Develop team-oriented project for interfacing data acquisition system with applications.

BFF3403 Elective: Advanced Machining

Credit Hour: 3

Prerequisite: None

Synopsis

This course will introduce the knowledge and technologies in precision machining, technique of making tool and die as well as engineering measurement using industrial standard equipment

- CO1 : Evaluate advanced machining process input parameter toward machining quality and failure surface quality and failure
- CO2 : Conduct machining of a complex product using optimized tool path and machine parameters.
- CO3 : Communicate effectively in presenting project outcomes
- CO4 : Function effectively in a teamwork

BFF3603 Elective: Plastics Product Design

Credit Hour: 3

Prerequisite: None

Synopsis

In this course students will be introduced with plastic product design including plastic materials selection, design for strength, features for assembly and design for injection moulding process.

- CO1 : Apply knowledge in designing engineering plastic product including material selections, general design practice, design for strength and design for assembly
- CO2 : Design an engineering plastic product using CAD software.
- CO3 : Analysed the plastic product using Finite element software and suggest improvement

CO4 : Communicate effectively in presenting the project outcomes

BFF4603 Elective: Mold 1

Credit Hour: 3

Prerequisite: None

Synopsis

In this course student will introduced with the knowledge and technologies in plastic injection mould constructions as well as designing a mould for plastic injection moulding process

CO1 : Identify plastic mould construction and component

CO2: Define the plastic mould types

CO3: Define the plastic mould auxiliary system

CO4: Design the plastic injection mould

BFF4613 Elective: Die 1

Credit Hour: 3

Prerequisite: None

Synopsis

This course enhances student's competencies in various die design applied in the sheet metal stamping industry. Student's project will be emphasized on technical aspects in progressive die design and process planning for die fabrication.

CO1: Analyse various die construction commonly used in sheet metal stamping industries

CO2: Analyse the principal and methodological in progressive die design.

CO3: Design strip layout of a progressive die according to product specification

CO4: Design a progressive die and prepare detail process planning for die fabrication.

BFF4623 Elective: Mold 2

Credit Hour: 3

Prerequisite: None

Synopsis

In this course students will fabricate the components of the mould according to the detail drawing and process planning, assemble the mould components, inject the product as well as analyse the quality of the final plastic product

CO1 : Analyse the advance plastic injection mould design

CO2 : Examine the machining process and plan sequences for the plastic mould fabrication

CO3 : Conduct the machining operation and construct the mould according to the dimension and

specification

CO4 : Communicate effectively in a project work

CO5 : Function effectively in a teamwork

BFF4633 Elective: Die 2

Credit Hour: 3

Prerequisite: None

Synopsis

In this course students will fabricate the components of the die according to the detail drawing and process planning, assemble the die components, conduct stamping trial and analyse the quality of final sheet metal product.

CO1: Develop process planning on die fabrication

CO2: Construct and assemble die components

CO3: Demonstrate stamping trial and troubleshoot the die system

CO4: Evaluate the quality of stamped parts

BFF4503 Elective: Factory Management

Credit Hour: 3

Prerequisite: None

Synopsis

This course is designed to provide students with an understanding of Factory Management (FM) concepts, issues, strategies, management approaches and tools commonly used in factory. The main topics which are covered are Operations and Supply Chain Management, Quality Management, Product Design, Processes and Technology; Capacity and Facilities Design, Human Resources, Supply Chain Management Strategy and Design; Global Supply Chain Procurement and Distribution; Resource Planning and Lean Systems.

CO1 : Apply the concepts, systems and strategies relevant to factory operation management

CO2 : Analyse the problems associated with factory planning and control of the production of goods and services.

CO3 : Act as facilitating manager to deploy task and execution the decision made in management meeting.

BFF3563 Elective: Process Auditing Techniques

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the concept of basic internal auditing program i.e. step by step to be an effective auditor; establish audit program; implement audit execution; analyse audit findings and prepare audit report for Quality Management Systems (QMS);



Environmental Management System (EMS) and relevant management systems.

- CO1 : Apply effective internal audit program for any organisations
- CO2 : Prepare audit report based on analysis of audit findings
- CO3 : Conduct internal audit program in a manufacturing company

BFF4513 Elective: Lean Production System

Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces the role of lean production system in a manufacturing environment. The concept of value adding and waste elimination through implementing lean production system. Using the basic principle of Pull system to promote waste elimination, various Lean tools would be introduced which include value stream mapping, Pull System & Kanban, Heijunka, and Cellular manufacturing.

- CO1 : Analyse principles of lean production to a manufacturing environment by identifying the different type of wasteful activities, value added and non-value added activities
- CO2 : Propose process improvement through implementation of pull system in the process by planning pull mechanism such as Kanban system and heijunka technique
- CO3 : Perform a value stream mapping (VSM) study for a manufacturing process from the incoming material until product delivery and propose a future value stream map to minimize the non-value added activities

BFF4643 Elective: Production Line Management

Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces the basic approach to effectively managing production line from receiving the manufacturing order to producing the required quantity, meeting the quality requirements, delivering on-time and realizing the product with optimal cost.

- CO1: Identify and Analyze the fundamental steps required to be performed to ensure each manufacturing order met the objectives
- CO2: Implement and Analyze the utilization of limited resources – manpower, time, money, space, equipment. – at optimum level.
- CO3: Analyze the production line Productivity and Quality achievement to plan & implement process improvement activities

BFF3583 Elective : Industrial Ergonomics

Credit Hour: 3
Prerequisite: None

Synopsis

- CO1 : Define the philosophy of ergonomics in industry based on human structure, function and behaviour to perform work
- CO2 : Design the good workspace based on best ergonomics practice.
- CO3 : Improve the current workspace considering the environments / surrounding factors
- CO4 : Analyse the human-machine and human components of modern work systems.

BFF4573 Elective: Six Sigma

Credit Hour: 3
Prerequisite: None

Synopsis

In this program, students will be able to use all tools, technics and concepts learned in the Introduction program to solve a problem in a Six Sigma. Students will be doing a Six Sigma project and will experience Six Sigma deployment from Define phase until Control phase.

- CO1: Analyze the collection of quantitative data pertaining to any subject or group when the data systematically gathered and collated.
- CO2: Analyze the quality improvement by using control chart.
- CO3: Analyze the various sampling systems in terms of lot by lot, continuous production, attributes and variables.
- CO4: Develop a mathematical model as the solution for the problem

BFF4663 Elective: Maintainance and Reliability

Credit Hour: 3
Prerequisite: None

Synopsis

- CO1 : Investigate the reliability estimation of a system and the components
- CO2 : Build the likelihood function and adapt its use in the estimating of parameters of the failure time distributions
- CO3 : Perform the preventive and scheduled maintenance as well as warranty policies according to reliability objectives

BFF3523 Production Planning and Control

Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces the concept and techniques used for planning and controlling all aspects of manufacturing. The course covers the topics of ERP, demand management, forecasting techniques, sales and operation planning, MPS, MRP, Capacity requirement planning, production activity control and scheduling techniques

- CO1 : Apply forecasting models to develop forecasts for product demand, profits, sales, material requirements for a competitive advantage
- CO2 : Evaluate and analyze capacity planning, MPS and a resultant MRP for a complete production facility
- CO3 : Analyze production and inventory planning & control systems, and scheduling problems by using appropriate analytical skills and tools for a complete production facility

BFF3622 Computer Aided Manufacturing

Credit Hour: 2

Prerequisite: BFF2612

Synopsis

This course introduces to develop students' degree of competencies in the CAM principle, application, and integration that applied in the modern manufacturing system. Emphasizes will be given on the manual programming fundamentals and the application of various prismatic (2-axis) and surface (3-axis) machining strategies, through the selected computer assisted simulation software interface (CATIA).

- CO1 : Demonstrate the principal, application and integration of CAM system in the manufacturing.
- CO2 : Apply the fundamentals of manual part programming.
- CO3 : Analyze the machining parameters (machining strategy, geometry tools, feeds and speeds) using appropriate CAM software.
- CO4 : Demonstrate actual machining for various mechanical parts on the CNC machine in a teamwork.
- CO5 : Developing a group project as for effective and functional component output

BFF3632 Design of Jigs & Fixtures

Credit Hour: 2

Prerequisite: BFF2612

Synopsis

This course covers the important of jigs and fixture in industrial application. Several type of jigs and fixture are introduced where emphasis given to the function of locating, supporting, clamping and positioning as requirement for all applications before design of efficient and ergonomic jigs and fixture is develop to improve productivity.

- CO1 : Evaluate the importance of jigs and fixture in industrial application for the improvement of production and quality.
- CO2 : Analyze variety of jigs and fixture and its applications considering the engineering factors.
- CO3 : Design jigs and fixture using appropriate tools to improve productivity, efficiency and ergonomics.

BFF3801 Thermal-Fluid Engineering Lab

Credit Hour: 1

Prerequisite: BFF2233

Synopsis

This course introduces the thermodynamics concepts and experimental approaches to verify approximate solutions of thermofluids problems at conceptual design stage. The course covers three major chapters in thermofluid engineering as follows: 1. Experimental measurements and analysis 2. Experimental techniques for engineering thermodynamics 3. Experimental technique for engineering fluid mechanics

- CO1 : Determine the accuracy of themofluids measurement using uncertainty analysis
- CO2 : Analyze the experimental and analytical results for verification of thermofluid principles in a controlled experimental settings
- CO3 : Assess thermodynamic concepts in a varying experimental conditions
- CO4 : Characterize a thermofluid concept by initiating complex engineering problem.

BFF3906 Industrial Training

Credit Hour: 6

Prerequisite: None

Synopsis

Students are required to undergo a minimum 10 weeks practical training in an industry or research under industrial supervision. During this period, students will apply the knowledge and skills that they have learned. The hands-on experience will expose them to the real engineering practice and prepare them to work in the manufacturing or related field in various industries upon graduation.

- CO1 : Suggest solutions to problems for related industry
- CO2 : Obey the rules and etiquettes in industry
- CO3 : Communicate effectively on industry experience
- CO4 : Function effectively as a member to supports the efforts of others
- CO5 : Search information in the broadest context of industrial experience

BFF3573 Product Design and Development

Credit Hour: 3

Prerequisite: None

Synopsis

The course blends the perspective of marketing, design and manufacturing into a single approach to product development. It provides students of all kinds with an appreciation for the realities of industrial practice and for the complex and essential roles played by the various members of product development teams. The method provides a concrete approach to solve a product development problem.

CO1 : Identify customer needs and product specifications by interpreting customer statement and developing needs-metrics matrix

CO2 : Analyse concept generation, concept selection and concept testing to verify the customer needs have been adequately met by the product concept

CO3 : Apply design for assemble and manufacturing (DFMA) to reduce manufacturing time and cost during the system-level and detail-design phases of the process

CO4 : Communicate effectively to propose a product design and development project

BFF4653 Integrated Design Project

Credit Hour: 3

Prerequisite: BFF3573

Synopsis

This course requires the students to design and develop a computer-controlled manufacturing machine as a product. It integrates the knowledge of software programming; manufacturing processes planning and design; mechanical and electronic design. Students are required to design and developed a machine in a group as well as performing individual engineering roles in a multidisciplinary setting. The design and development are for providing a solution for complex engineering problems with consideration of health and safety, economy, productivity, quality, environmental and sustainability

CO1 : Construct product design requirement and produce relevant concept-to-final design specifications

CO2 : Produce concept design sketching, detail drawings with GDT & BOM, circuit drawings and programming flowchart

CO3 : Justify engineering design parameters and properties through engineering design calculation, finite element analysis and circuit analysis

CO4 : Develop detail manufacturing process planning including materials selection, tooling and process parameters

CO5 : Produce the product according to the proposed plan which includes the procurement, manufacturing, programming, assembly and testing

CO6 : Recommend potential improvement of the product design and manufacturing processes to reduce impact on environment and sustainability

CO7 : Exhibit effective engineering communication by producing design book and conduct an oral presentation of the product

CO8 : Display an active contribution as a member and leader of multidisciplinary team

CO9 : Manage the project using project management tools with consideration of financial and man-hour aspect of product development

BFF4533 Manufacturing Automation

Credit Hour: 3

Prerequisite: BFF3313

Synopsis

This course introduces fundamental knowledge and skill of hydraulic and pneumatic system for engineers. Both design and development approach will be used in this course. Student will be exposed with Fundamental of Fluid Power; Pneumatic system; Hydraulic system and Programmable Logic Controller. Laboratory management and 5S implementation is essential for the lab session

CO1 : Analyse Pneumatic and Hydraulic system and its components

CO2 : Develop PLC program for automation system

CO3 : Design hydraulic/pneumatic system for mechatronics applications

BFF4103 Control System Engineering

Credit Hour: 3

Prerequisite: None

Synopsis

This subject will cover the analysis of the system's stability and performance of the control system by using the time domain and frequency domain approaches. Conventional controller such as PID controller will be used to improve the transient and steady state performances in the time domain approach. In the frequency domain approach, the bode plot method will be utilised. The lead, lag and lead-lag compensators are introduced in improving the performance of the control system using the frequency approach.

CO1 : Analyze the transient response, system stability and state response for first and second order systems

CO2 : Design the PD, PI, PID, Lag, Lead and Lag-Lead compensator using root locus technique and frequency response technique.

CO3 : Design a PID control system project
 CO4 : Communicate about the project effectively

CO3 : Develop a solution to ESH problem in a given case study.

BFF4902 FINAL YEAR PROJECT 1

Credit Hour: 2

Prerequisite:

Synopsis

This course focuses on the investigative research oriented approach to engineering studies. Students are expected to develop techniques in literature review, perform individual analysis and judgement and show capability of being assessed independently. The application of project management element as a medium for conducting and integration all expertise areas during the course is highly encouraged. Upon completion of this course student will proceed to Final Year Project 2 (FYP2) to fulfil the overall Final Year Project requirement.

- CO1 : Formulate problem statement
- CO2 : Review literature critically
- CO3 : Propose research methodology
- CO4 : Communicate on research work through report and presentation
- CO5 : Demonstrate ethical principles based on norms of engineering practise
- CO6 : Demonstrate project management principles according to engineering practise
- CO7 : Conduct preliminary investigation based on the proposed research methodology.

BFF4911 Environment Safety & Health

Credit Hour: 1

Prerequisite: None

Synopsis

This course covers the topics on industrial safety and health regulations, accident causation phenomenon, accident investigation, accident analysis, industrial hazard, industrial hygiene and managing safety and health.

- CO1 : Explain the importance of environmental safety and health and OSHA regulations in workplace
- CO2 : Analyse the practices in work places of employment contributing to serious possible damage to life, health and property.

BFF4914 Final Year Project 2

Credit Hour: 4

Prerequisite: BFF4914

Synopsis

This course is a continuation of the research work from FYP1. Student needs to conduct investigation based on the proposed research methodology. Students have to complete the course by submitting the thesis with formal presentation and a written report. Students will be assessed on the ability to work independently.

- CO1 : Demonstrate understanding of fundamental and technical knowledge.
- CO2 : Assess problems on relevant topics and develop its solution.
- CO3 : Ability to engage in independent and life-long learning in the broadest context of literature review.
- CO4 : Design and propose research methodology based on the given title.
- CO5 : Conduct investigation based on the proposed research methodology.
- CO6 : Communicate on project work through report and presentation.
- CO7 : Apply ethical principles and commit responsibility in thesis writing.
- CO8 : Produce and demonstrate project management according to engineering practice.
- CO9 : Suggest recommendations for sustainable development.



**CURRICULUM STRUCTURE FOR
MECHATRONICS PROGRAMME
(BFM)**

BFF1103 Statics

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the concepts of force vector algebra and free-body diagrams to solve problems on equilibrium of forces. The course covers six major chapters in engineering mechanics of statics as follows: 1. equilibrium of forces on a particle, 2. equilibrium of forces on single rigid body, 3. equilibrium of forces on simple trusses, frames and machine structures (multi-rigid bodies), 4. Equilibrium of forces in dry friction, 5. centre of gravity and centroid and 6. moments of inertia.

Course Outcomes

- CO1: Solve problems on equilibrium of forces for particles and rigid bodies using the equation of equilibrium.
- CO2: Analyze problems on equilibrium of forces for trusses, frames and machines.
- CO3: Analyze problems on equilibrium of rigid bodies subjected to dry frictional forces.
- CO4: Determines the center of gravity, centroid and moment of inertia for a body of arbitrary shape.
- CO5: Design solutions for complex engineering problems for a simple structure in equilibrium.

BFF1502 Project Management

Credit Hour: 2

Prerequisite : None

Synopsis

This course embraces a broad basic overview and principles of project management which has become central to operations in manufacturing enterprises throughout five stages of managing project; initialization, planning, execution, control and closing.

Course Outcomes

- CO1: Develop a project charter which describes a preliminary framework of project's goal, scopes and high level deliverables.
- CO2: Develop a project planning using management tools

CO3: Propose task scheduling using an ordered sequence of activities with time allotted

CO4: Evaluate actual performance at any of project duration

BFF1113 Engineering Materials

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the fundamental concepts of engineering materials which includes the structure of materials, mechanical and physical properties of materials, binary phase diagrams, isothermal diagram, heat treatment, applications and current developments of metal, polymer, ceramic, composite and advanced materials. Also, basic understanding on the environmental degradation of engineering materials.

Course Outcomes

- CO1: Identify the atomic bondings and the crystal structures as well as the mechanical and physical properties of engineering materials.
- CO2: Analyse various types of engineering materials based on their microstructures, properties and failure behaviours.
- CO3: Illustrate structure-property correlations of materials based on phase diagram, heat treatment and strengthening mechanism.
- CO4: Recommend a suitable material for engineering applications based on product design requirements.
- CO5: Identify the importance of environmental considerations and sustainability in engineering materials.
- CO6: Communicate effectively regarding materials-related project in oral presentation.

BFF1123 Dynamics

Credit Hour: 3

Prerequisite: BFF1103 Statics

Synopsis

This course covers rigid body kinematics and kinetics of 2D planar motions. At the of the course, the students should be able to analyse the position, velocity and acceleration of a 2D planar mechanism. Furthermore, by applying either the principle of force-acceleration, work-energy, and/or impulse-momentum, the students should be able to solve the kinetics problems of 2D planar motion. This course also requires the students to design a 2D planar mechanism that performs a specific function.

Course Outcomes

- CO1: Analyse the linear velocity and acceleration of a point, or angular velocity and angular acceleration of remaining links including the Coriolis acceleration if applicable.
- CO2: Apply the Newton's Second Law of Motion to determine the acceleration and angular acceleration of a body.
- CO3: Apply the Principle of Work and Energy to determine the velocity and angular velocity of a body.
- CO4: Apply the Principle of Impulse and Momentum to determine the velocity and angular velocity of a body.
- CO5: Design a 2D planar mechanism that performs a specific function and to prepare report that demonstrates the knowledge of velocity and acceleration.

BFF1343 Fundamental of Electrical Engineering

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces DC circuit and AC circuit analyses. It covers the fundamental laws and theorems, circuit techniques, transient analysis, sinusoidal steady-state analysis and three-phase systems.

Course Outcomes (CO)

- CO1: Apply fundamental laws, circuit theorems and method of analysis to solve electrical circuit
- CO2: Analyse transient response and steady-state response of circuit applications
- CO3: Analyse balanced and unbalanced three-phase systems
- CO4: Analyse electrical circuit using simulation software

BFM2831 Fundamental of Electrical Engineering Lab

Credit Hour: 1

Prerequisite: BFF1343 Fundamental of Electrical Engineering

Synopsis

This course introduces practical electrical circuits. Students should analyze, synthesis, and build circuits using passive or active components.

Course Outcomes (CO)

- CO1: Apply electrical fundamental techniques to solve circuit using modern tools.

- CO2: Implement fundamental electrical and electronics principle devices to solve circuit problems.
- CO3: Develop an integration of electrical system of an application in a group.

BFF4911 Environment Safety and Health

Credit Hour: 1

Prerequisite: None

Synopsis

This course covers the topics on industrial safety and health regulations, accident causation phenomenon, accident investigation, accident analysis, industrial hazard, industrial hygiene and managing safety and health.

Course Outcomes

- CO1: Explain the importance of environmental safety and health and OSHA regulations in workplace
- CO2: Analyse the practices in work places of employment contributing to serious possible damage to life, health and property.
- CO3: Develop a solution to ESH problem in a given case study.

BFF1602 Technical Drawing

Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces fundamental knowledge and skill of technical drawing for engineers. Both hand sketching and CAD approach will be used in this course. Student will be exposed with Fundamental of Engineering Graphic Language; Layout and Lettering; Technical Sketching; Geometric Constructions; Basic and Advanced Dimensioning; Orthographic Drawing; Section and Auxiliary Views; Geometric Dimensioning and Tolerance (GD&T); and 2D Parametric Drawing Construction. This course also preparing the student to create and interpret working technical drawing according to ISO standards.

Course Outcomes

- CO1: Apply standard procedures in sketching and technical drawing.
- CO2: Manipulates CAD for 2D drawing based on orthographic projections and section views.
- CO3: Analyze the geometric dimensioning and tolerance (GD&T) to explicitly describe geometry, variation and accuracy in engineering drawing
- CO4: Develop standard drawing package consists of 2D assembly drawing, parts list and details part drawing.



CO5: Show the ability to be an effective team player based on the completion of tasks and involvement in group activities.

BFM2013 Programming or Engineers

Credit Hour: 3 credits

Prerequisite : BHM2003 Computer Programming

Synopsis

This course introduces the parallel/serial interfacing techniques between PC and external circuit built with the components such as LEDs, motors (DC/stepper), thermometer etc. using C/C++ programming language. In addition, the intermediate level of programming techniques such as pointers, dynamic memory allocation, data structures, and graphical user interface are also introduced to fit the purpose. By the end of semester, the students apply the interfacing techniques in a mechatronics-based project.

Course Outcomes

- CO1: Apply concepts of pointers, data structures and logical bitwise.
- CO2: Develop graphical user interface.
- CO3: Construct an integration software with electrical devices/components and mechanical system.
- CO4: Orally present and collaborate effectively in a group on a mechatronics-based project.

BF2612 Computer Aided Engineering Design

Credit Hour: 2

Prerequisite: BFF1602 Technical Drawing

Synopsis

This course introduces 3D surface solid modelling which emphasized on the drawing, functioning and organizing the model. Further course content included part assembly, animation and basic FEA application. Students experience the practical learning through the CAD software.

Course Outcomes

- CO1: Apply the knowledge of geometric modeling concepts used in commercial CAD/CAM software
- CO2: Construct 3D parts, assembly models and drafting according to the engineering standards
- CO3: Assess the part models with basic Finite Element Analysis (FEA) simulations
- CO4: Communicate effectively on the topic of geometric modelling

BFF1801 MACHINING 1

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces the students to the fundamental knowledge and principle of metal removing process. In this course, student will apply the theoretical knowledge to perform the actual material removal operation using appropriate tools and technique according to required dimensions, tolerance, specification and safety regulations.

Course Outcomes

- CO1: Apply the role of safety and regulatory compliance of hand tools and lathe machine
- CO2: Analyse various types of drawings, material removal processes and machining parameters
- CO3: Perform basic material removal processes using hand tools and lathe machine with correct sequence of machining operation

BFF1811 Machining 2

Credit Hour: 1

Prerequisite: None

Synopsis

This course introduces student on safety rules, metrology, milling process and surface grinding and machining process.

Course Outcomes

- CO1: Apply the safety and health procedures during machining
- CO2: Apply skill in part inspection during machining
- CO3: Apply technical skill in milling process
- CO4: Apply technical skill in surface grinding process
- CO5: Practice right standard operation procedure and ethics for machining work

BFF2003 Computer Programming

Credit Hour: 3

Prerequisite : None

Synopsis

This course introduces the basics of C programming language. The contents of this course includes coding input and output, variables, constants, arithmetic operations, mathematical functions, user-defined functions, loops, selection making decision and repetitive construct, array, and also data structure. The programming language used for the course is C/C++ language.

Course Outcomes

- CO1: Solve a mathematical problem using variables, constants, arithmetic operations, mathematic functions and user-defined functions with the correct rules.
- CO2: Organizes the flow of a program that uses decision making, repetition and loop statements without any errors.
- CO3: Write an organized and readable C program code without producing compile and output result errors.
- CO4: Develop a program code that is related to manufacturing applications that follows a design specification.
- CO5: Analyse the handling of arrays in a program to ensure correct calculated output is produced.

BFF2423 Manufacturing Processes

Credit Hour: 3

Prerequisite : BFF1113 Engineering Material

Synopsis

This course introduces various challenges and issues in modern manufacturing process and operations, ranging from traditional topics such as casting, forming, machining and joining process.

Course Outcomes

- CO1: Ability to describe manufacturing process of metal casting, forming and shaping, joining and surface technology
- CO2: Analyse the mechanics and processing parameters of metal casting, forming, joining and surface technology
- CO3: Propose a design of manufacturing process system that can be used in production that can contribute to public health and safety, cultural, societal, environmental and sustainability
- CO4: Recommend an optimized process parameters of a manufacturing process using research methods

BFF3622 Computer Aided Manufacturing

Credit Hour: 2

Prerequisite: BFF2612 Computer Aided Engineering

Design

Synopsis

This course introduces to develop students a degree of competencies in the CAM principle, application, and integration that applied in the modern manufacturing system. Emphasizes will be given on the manual programming fundamentals and the application of various prismatic (2-axis) and surface (3-axis) machining strategies, through the selected computer assisted simulation software interface (CATIA).

Course Outcomes

- CO1: Demonstrate the principal, application and integration of CAM system in the manufacturing.
- CO2: Apply the fundamentals of manual part programming.
- CO3: Analyze the machining parameters (machining strategy, geometry tools, feeds and speeds) using appropriate CAM software.
- CO4: Demonstrate actual machining for various mechanical parts on the CNC machine in a teamwork.
- CO5: Developing a group project as for effective and functional component output

BFF2821 Mechanics Lab

Credit Hour: 1

Prerequisite: BFF1133 Mechanics of Material, BFF1123 Dynamics

Synopsis

This lab introduces principles of engineering and solid mechanics through practical experiments. The covered areas are for principles of statics, dynamic and mechanics of materials.

Course Outcomes

- CO1: Analyze engineering mechanics problems for a rigid body at rest and in motion
- CO2: Demonstrate understanding about mechanical properties of engineering structures.
- CO3: Demonstrate ethical principles and commitments of professional ethics on lab practices

BFF2223 Fluid Mechanics

Credit Hour: 3

Prerequisite : None

Synopsis

This course is a fundamental subject for engineering students which presents unlimited practical applications from daily life to related industrial fields. Students taking this course are expected to have adequate background of calculus, physics and engineering mechanics. Lesson will be covering the fundamental concepts of fluids, fluid properties, problem analysis for fluids at static and in motion, fluid flow in pipeline and dimensional homogeneity concept. Students will be also exposed to the application of complex engineering problem such as the utilization of Computational Fluid Dynamics (CFD) to enhance their problem solving skills and competency.

Course Outcomes

- CO1: Analyze forces applied by fluids at rest.



CO2: Analyze mass, Bernoulli and energy equations associated with fluids in motion.

CO3: Analyze minor and major losses, pressure drop and pumping power requirement of laminar and turbulent flow in pipes.

CO4: Analyze dimensional homogeneity of equations, method of repeating variables to obtain no dimensional parameters and similarity principle for experimental modelling.

CO5: Develop solution for complex engineering problem to solve flow characteristics in pipes.

CO6: Produce a comprehensive report to demonstrate implemented project.

BFF2233 Thermodynamics

Credit Hour: 3

Prerequisite : None

Synopsis

This course focuses on the application of the thermodynamics knowledge in various engineering systems. The subject covers the review and analysis of energy, concepts of thermodynamics laws and entropy, heat engines, refrigerators and heat pumps cycles.

Course Outcomes

CO1: Analyze thermodynamics fundamental concepts which includes energy, state, temperature, pressure, process and cycle.

CO2: Analyze the properties of pure, simple compressible substances and ideal gases.

CO3: Analyze the concept of 1st law of thermodynamics in closed and open systems.

CO4: Analyze entropy change in 2nd law of thermodynamics.

CO5: Design engineering project on thermodynamics.

CO6: Communicate effectively regarding principles of thermodynamics aspects of engineering design.

BFF3242 Heat Transfer

Credit Hour: 2 credits

Prerequisite : BFF2233 Thermodynamics

Synopsis

The course covers the modes of heat transfer (through conduction, convection and radiation) in a model of heat transfer system.

Course Outcomes

CO1: Analyse manufacturing and mechatronics engineering problems as either conduction, convection or radiation problems and model them as a heat transfer system

CO2: Apply specific knowledge of thermofluids principles and heat transfer mechanisms (conduction, convection or radiation) to the heat transfer system

CO3: Design solutions for engineering problems based on course content

CO4: Propose the impact of heat transfer engineering for the environment

BFF1133 Mechanics of Material

Credit Hour: 3 credits

Prerequisite: BFF1102 Statics, BFF1113 Engineering Materials

Synopsis

This course introduces the concept of stress, strain and mechanical properties of materials under axial, torsion, bending, transverse, shear and combined loadings in elastic structural members. Plane stress transformation is also included.

Course Outcome

CO1: Identify the concept of stress, strain and different mechanical properties of materials.

CO2: Analyze the stress and strain in structural members subjected to the axial loads and torsional loads.

CO3: Analyze the stress and strain in structural members subjected to the bending loads and shear loads.

CO4: Analyze the stress and strain in structural members subjected to the combined load and analyse the stress transformation to solve the mechanics of materials problems.

CO5: Design solutions for complex engineering problem related to mechanics of materials

BFF3103 Vibrations

Credit Hour: 3

Prerequisite: BFF1123 Dynamics

Synopsis

This course introduces the fundamental of vibration, free vibration (Single Degree of Freedom -SDOF System), harmonically excited vibration (SDOF System), general excited vibration (SDOF System), two degree of freedom (TDOF System), and vibration control.

Course Outcomes

- CO1: Analyze the single degree of freedom system vibration and harmonically excited vibration
- CO2: Analyze the two degree of freedom system vibration and control vibration method
- CO3: Demonstrate the vibration solution for engineering problem
- CO4: Apply the modern tools for solving vibration problem

force, torque and power, pressure, temperature, flow and acoustics.

- CO4: Develop team-oriented project for interfacing data acquisition system with applications.

BFF3123 Machine Design

Credit Hour: 3

Prerequisite: BFF1133 Mechanics of Material, BFF1123 Dynamics

Synopsis

This course focuses on the fundamentals of component design - free body diagrams, force flow, concepts, failure theories, and fatigue design, with application to fasteners, springs, bearings, gears, shafts, clutches, and brakes. It explains the basics of mechanics, strength of materials, and materials properties on how to apply these fundamentals to specific machine components design.

Course Outcomes

- CO1: Analyze the concept of machine design, Design considerations for the machine elements, Load and stress analysis, design of compression members
- CO2: Analyze the failure of machine components due to static and variable loadings, Design of shafts
- CO3: Design of power screws and mechanical springs
- CO4: Design of bearings, gears, clutches and flexible mechanical elements
- CO5: Design solution for engineering problems related to the course content

BFF3213 Sensor and Instrumentations

Credit Hour: 3

Prerequisite : BFF2801 Electrical & Electronics Lab

Synopsis

This course covers instrumentations system including instrument principles, measurement techniques and data analysis for a particular sensor and measurement situation.

Course Outcomes

- CO1: Determine general treatment of instruments and their characteristics
- CO2: Analyse transducer elements, intermediate elements and data acquisition systems (DAQ)
- CO3: Determine principles of the work and derive mathematical model of sensors for measuring motion and vibration, dimensional metrology,

BFF1922 Engineering Economy

Credit Hour: 2

Prerequisite : None

Synopsis

This course introduces concept of life cycle cost, interest and equivalent. Formula and factors for single and multiple cash flow. Method for investments assessment and alternative comparison and project evaluation using cost worth ratio, inflation and cash flow method.

Course Outcomes

- CO1: Analyze the cost concept, cost structure and estimation
- CO2: Analyze the money-time relationship with/without taxes consideration
- CO3: Justify the best economical alternative in private and public engineering projects

BFF3801 Thermal-Fluid Engineering Lab

Credit Hour: 1

Prerequisite : BFF2233 Thermodynamics, BFF2223 Fluid Mechanics

Synopsis

This course introduces the thermodynamics concepts and experimental approaches to verify approximate solutions of thermofluids problems at conceptual design stage. The course covers three major chapters in thermofluid engineering as follows: 1. Experimental measurements and analysis 2. Experimental techniques for engineering thermodynamics 3. Experimental technique for engineering fluid mechanics.

Course Outcomes

- CO1: Determine the accuracy of thermofluids measurement using uncertainty analysis
- CO2: Analyze the experimental and analytical results for verification of thermofluid principles in controlled experimental settings
- CO3: Assess thermodynamic concepts in a varying experimental conditions
- CO4: Characterize a thermofluid concept by initiating complex engineering problem.

BFF1932 Engineers in Society

Credit Hour: 2

Prerequisite : None

Synopsis

This course introduces the engineering profession, local industries sector, issues in local industries, ethics and public responsibility, engineer and law, and contract law.

Course Outcomes

CO1: Discuss the engineering practices in local manufacturing industries.

CO2: Adheres the practice and laws which govern engineering population for environmental and sustainable development.

CO3: Apply responsibility for ones working ethics and public responsibility in engineering practices.

BFF3906 Industrial Training

Credit Hour: 6

Prerequisite: Third year student and achieved “Kedudukan Baik (KB)” status on current evaluation

Synopsis

Students are required to undergo a minimum 10 weeks practical training in an industry or research area under industrial supervision. During this period, students will apply the knowledge and skills that they have learned. The hands-on experience will expose them to the real engineering practice and prepare them to work in the manufacturing or related field in various industries upon graduation.

Course Outcomes

CO1: Suggest solutions to problems for related industry

CO2: Obey the rules and etiquettes in industry

CO3: Communicate effectively on industry experience

CO4: Function effectively as a member to supports the efforts of others

CO5: Search information in the broadest context of industrial experience

BFF4103 Control System Engineering

Credit Hour: 3

Prerequisite : BFF3103 Vibrations

Synopsis

This subject will cover the analysis of the system's stability and performance of the control system by using the time domain and frequency domain approaches. Conventional controller such as PID controller will be used to improve the transient and steady state performances in the time domain approach. In the frequency domain approach, the bode plot method will be utilized. The lead, lag and led-lag compensators are introduced in improving the performance of the control system using the frequency approach.

Course Outcomes

CO1: Analyze the transient response, system stability and state response for first and second order systems

CO2: Design the PD, PI, PID, Lag, Lead and Lag-Lead compensator using root locus technique and frequency response technique.

CO3: Design a PID control system project

CO4: Communicate about the project effectively

BFM2313 Digital Electronics

Credit Hour: 3

Prerequisite: BFF1343 Fundamental of Electrical Engineering

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: Apply numbering system, digital codes and digital component in digital electronics

CO2: Analyze combinational logic circuits in digital system

CO3: Analyze sequential logic circuits in digital system

CO4: Construct digital schematic using computer aided design tools

BFM2303 Analog Electronics

Credit Hour: 3

Prerequisite: BFF1343 Fundamental of Electrical Engineering

Synopsis

In this course students will learn about discrete electronic circuits; that is, circuits containing discrete resistors, capacitors, diodes and transistors. The analysis of these fundamental circuits provides a key understanding of circuit operation and characteristics. Throughout this course, students will also develop, analyze, and design more complex analog electronic circuits by combining and expanding the basic circuits considered, to form more complex circuits. Lastly, students will learn how to analyze and design discrete circuits, these circuits are usually fabricated as integrated circuits called operational amplifiers.

Course Outcomes (CO)

- CO1: Explain the Principle Operation of Active Device Characteristics (e.g Diode, Bipolar Junction Transistor (BJT), Field Effect Transistor (FET), and Metal Oxide Semiconductor Field Effect
- CO2: Explain and Analyse Various Type of Transistor Circuits (e.g., biasing circuits and small signal model circuits)
- CO3: Explain and Analyse Different Type Operational-Amplifier Circuits
- CO4: Design and Analyze Operational Amplifier Applications

BFM3002 Computer Simulation

Credit Hour: 3

Synopsis

This course introduces simulation software MATLAB (simple operations, matrices and vectors, functions, plot, programming and symbolic calculation) and Simulink (functional principle of Simulink, designing a block diagram, solving differential equation, starting Simulink systems from MATLAB and importing plots to word and power points)

Course Outcomes

- CO1: Solve mathematical equations/operations in
- CO2: Construct functional programs using scripts
- CO3: Design block diagrams using Simulink toolboxes
- CO4: Develop simulation solution/project for dynamic Mechatronics systems in Simulink/MATLAB

BFM3333 Microcontroller System

Credit: 3 credits

Prerequisite: BFF1343 Fundamental of Electrical Engineering

Synopsis

This course is an introduction to microcontroller system and embedded devices. Students are exposed to microcontroller architecture, peripherals, and subsystems. These include processing unit, registers, memory, internal data flow, I/O, timer, PWM, Analog Digital Converter, interrupt, serial communication, Master-Slave configuration.

Course Outcomes

- CO1: Demonstrate microcontroller's internal working and its architecture: Processing Unit, Registers, Memory, and their data flow.
- CO2: Analyze microcontroller peripherals: Digital and Analog I/O, Timer, PWM, ADC
- CO3: Analyze microcontroller subsystem: interrupt, serial communication, Master-Slave.

- CO4: Develop a solution for engineering problems using microcontroller.
- CO5: Communicate effectively in group works, presentations, and reports.

BFM3403 Fluid Drive System

Credit Hour: 3

Prerequisite: BFF1343 Fundamental of Electrical Engineering

Synopsis

This course introduces fundamental knowledge and skill of hydraulic and pneumatic system for engineers. Both design and development approach will be used in this course. Student will be exposed with Fundamental of Fluid Power; Pneumatic system; Hydraulic system and Programmable Logic Controller. Laboratory management and 5S implementation is essential for the lab session.

Course Outcomes

- CO1: Apply Pneumatic and Hydraulic system and its components
- CO2: Analyse PLC program for automation system
- CO3: Design hydraulic/pneumatic system for mechatronics applications
- CO4: Demonstrate the understanding of Engineering principles in managing the project

BFF3573 Product Design and Development

Credit Hour: 3

Synopsis

The course blends the perspective of marketing, design and manufacturing into a single approach for product development. It provides students of all kinds with an appreciation for the realities of industrial practice and for the complex and essential roles played by the various members of product development teams. The method provides a concrete approach to solve a product development problem.

Course Outcomes

- CO1: Identify customer needs and product specifications by interpreting customer statement and developing needs-metrics matrix
- CO2: Analyze concept generation, concept selection and concept testing to verify the customer needs have been adequately met by the product concept
- CO3: Apply design for assemble and manufacturing (DFMA) to reduce manufacturing time and cost during the system-level and detail-design phases of the process
- CO4: Communicate effectively to propose a product design and development project

BFM3303 Electrical Drive System

Credit Hour: 3

Prerequisite: BFF1343 Fundamental of Electrical Engineering

Synopsis

This course begins by introducing the basic electrical drive system components. The modelling and equivalent system of the DC motor and induction motor will be derived. This will lead to the design of the drive system using flux controlled, voltage controlled, controlled rectifier, chopper controlled, scalar control.

Course Outcomes

- CO1: Demonstrate knowledge and principle of motor modelling and equivalent system.
- CO2: Analyse DC motor equations and evaluate DC motor drive system for different operating conditions, regenerative braking conditions, quadrant operations.
- CO3: Analyse induction motor equivalent system and its characteristic, speed control.

BFM4503 Robotics for Engineers

Credit Hour: 3

Synopsis

This course provides an overview of robot mechanisms, kinematics, motion kinematic, dynamics, and planning control. Topics include robotic system overview, rotational matrices, translational matrices, homogeneous and composite matrices, D-H algorithm representation, Lagrange-Euler formulation, and robot planning. At the end of the course, students shall design the robot, together with the complete mathematical modelling to implement the theories that have been learnt.

Course Outcomes

- CO1: Derive the robot kinematics using spatial movement.
- CO2: Develop robot dynamic using Lagrange-Euler formulation and robot trajectory planning
- CO3: Develop the robot's control system using PID Controller
- CO4: Design a robotics system project in simulation and experiment
- CO5: Communicate about the project effectively

BFM4653 Integrated Design Project (IDP)

Credit Hour: 3

Synopsis

This course requires the students to design and develop a computer-controlled manufacturing machine as a product. It integrates the knowledge of software programming; manufacturing processes planning and design; mechanical and electronic design. Students are required to design and developed a machine in a group as well as performing individual engineering roles in a multidisciplinary setting. The design and development are for providing a solution for complex engineering problems with consideration of health and safety, economy, productivity, quality, environmental and sustainability

Course Outcomes

- CO1: Construct product design requirement and produce relevant concept-to-final design specifications
- CO2: Produce concept design sketching, detail drawings with GDT & BOM, circuit drawings and programming flowchart
- CO3: Justify engineering design parameters and properties through engineering design calculation, finite element analysis and circuit analysis
- CO4: Develop detail manufacturing process planning including materials selection, tooling and process parameters
- CO5: Produce the product according to the proposed plan which includes the procurement, manufacturing, programming, assembly and testing
- CO6: Recommend potential improvement of the product design and manufacturing processes to reduce impact on environment and sustainability
- CO7: Exhibit effective engineering communication by producing design book and conduct an oral presentation of the product
- CO8: Display an active contribution as a member and leader of multidisciplinary team
- CO9: Manage the project using project management tools with consideration of financial and man-hour aspect of product development

BFM4902 Final Year Project 1

Credit Hour: 2

Prerequisite : Please refer to PSM handbook (Has passed more than 90 Credit hours)

Synopsis

This course focuses on the investigative research oriented approach for engineering studies. Students are expected to develop techniques in literature review, perform individual analysis and judgement and show capability of being assessed independently. The application of project management element as a medium for conducting and integration all expertise areas during the course is highly encouraged. Upon completion of this course student will proceed to Final Year Project 2 (FYP2) to fulfill the overall Final Year Project requirement.

Course Outcomes

- CO1: Formulate problem statement
- CO2: Review literature critically
- CO3: Propose research methodology
- CO4: Communicate on research work through report and presentation
- CO5: Demonstrate ethical principles based on norms of engineering practice
- CO6: Demonstrate project management principles according to engineering practice
- CO7: Conduct preliminary investigation based on the proposed research methodology.

BFM4914 Final Year Project 2

Credit Hour: 4

Prerequisite : Please refer to PSM handbook (Has passed more than 90 Credit hours)

Synopsis

This course is a continuation of the research work from FYP1. Student needs to conduct investigation based on the proposed research methodology. Students have to complete the course by submitting the thesis with formal presentation and a written report. Students will be assessed on the ability to work independently.

Course Outcomes

- CO1: Demonstrate understanding of fundamental and technical knowledge.
- CO2: Assess problems on relevant topics and develop its solution.
- CO3: Ability to engage in independent and life-long learning in the broadest context of literature review.
- CO4: Design and propose research methodology based on the given title.
- CO5: Conduct investigation based on the proposed research methodology.
- CO6: Communicate on project work through report and presentation.
- CO7: Apply ethical principles and commit responsibility in thesis writing.
- CO8: Produce and demonstrate project management according to engineering practice.
- CO9: Suggest recommendations for sustainable development.

BFM4513 Automation System

Credit Hour: 3

Synopsis

This course introduces the students various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and

stabilization of ships, aircraft and other applications and vehicles with minimal or reduced human intervention. Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices and computers, usually in combination. After completing this course, students should be able to apply the theory of automation in mechatronics systems.

Course Outcomes

- CO1: Demonstrate understanding of specific application and function related to automation
- CO2: Analyse automation of the mechatronics systems in the industrial applications
- CO3: Design an integration of automation devices and computerization of the mechatronics support systems
- CO4: Develop a solution for an automation problem

BFM4513 Autonomous Robotic System

Credit Hour: 3

Synopsis

This course introduces the students to the foundation of autonomous robotic system. The course will start with the introduction of the common robotic system (mobile robot and robotic arm). The core of this course will address the problem of perception, localization, planning and control and robot motion and navigation. The course will be accompanied by a large practical part in which students have the opportunity to implement the fundamental theories that they learnt in lecture. After completing this course, students should be able to apply the theory into the real autonomous systems.

Course Outcomes

- CO1: Demonstrate understanding of the overall robotic system (close loop system, hardware software integration)
- CO2: Analyse the motion kinematic of holonomic and non-holonomic system
- CO3: Analyse path planning Methodology using A* algorithm
- CO4: Develop trajectory tracking control system algorithm for an autonomous system

BFM4543 Robotic Prototype Design

Credit Hour: 3

Synopsis

This course will expose the student to the engineering design of mechanism and control of prototype biomimetic robotic systems, which takes inspiration from nature to solve engineering problems. Students will learn the fundamentals of biomimetic mechanisms such as legged



locomotion, bird flight, swimming, and also biomimetic artificial muscles. For biomimetic control, students will learn about dynamics and control of bipedal walking, aerial flight and biomimetic underwater propulsion. Students are required to design a prototype robotic system, compare their design strengths and weaknesses with their team mates, and then propose the best design for solving a set problem.

Course Outcomes

- CO1: Analyse the solution requirements for a problem
- CO2: Design a biomimetic mechanical system that fulfills a set specification
- CO3: Evaluate the strength and weakness of a design from a cost, weight, durability and practicality standpoint
- CO4: Propose an improvement design after discussion with team members

BFM4603 Control System 2

Credit Hour: 3

Synopsis

This course extends the contents of available Control System subject in Mechatronic Programme. It introduces the state space analysis: (Concepts of State, State variable and State space model) controllability and observability: (BIBO Stability – Determining the stability by -Liapunov's stability criterion), non-linear control: (Non-linear systems properties, common physical non-linearity's, dead zone, relay, saturation)

Course Outcomes

- CO1: Study the basic of State space control method.
- CO2: Analyze the controllability and observability of control system.
- CO3: Analyze and control the nonlinear dynamics system
- CO4: Develop a non-linear control system with state space control method.

BFM4613 Digital Signal Processing

Credit Hour: 3

Synopsis

This course introduces Digital Signal Processing and its applications. Discrete time signals and systems. Z-transform. Modelling and implementation forms of DT systems. Time and Frequency domain analysis of digital processors. Design and analysis of finite impulse response filters (FIR). Analog filter approximations. Design and analysis of infinite impulse response (IIR) filters. Digital filter networks. Digital equalizers. The Digital Fourier Transformation and Fast Fourier Transformation algorithms. DSP algorithms and applications.

Course Outcomes

- CO1: Demonstrate the basic knowledge of DSP systems.
- CO2: Design of DSP system.
- CO3: Analyze DSP system with FIR, IIR, DFT, FFT algorithms
- CO4: Develop DSP applications using computer software.

BFM4623 Computer Network in Mechatronic System

Credit Hour: 3

Synopsis

This course introduces Computer Network in mechatronics system, layers of Transport and dialogue sessions - examples of the presentation layer in applications of mechatronics system - network security and privacy – Text compression - terminal protocol - File Transfer Protocol - the application layer - Distributed Computing-network systems and distributed operating in mechatronics system application.

Course Outcomes

- CO1: Introduce the basics of computer networks.
- CO2: Design a network layers with security and protocol implementation.
- CO3: Develop a complete network system for mechatronics applications.

BFM4633 Database and Information System

Credit Hour: 3

Synopsis

Nowadays, a tremendous amount of data is being generated, gathered and collected throughout multiple sources around us. Big data term was born few years back to describe data sets that are so large or complex that traditional data processing application software is inadequate to deal with them. By having this massive data, many challenges will occur including capture, storage, analysis, data curation, search, sharing, transfer, visualization, querying, updating, and information privacy as well. This course will provide an introduction to big data management and analysis. In addition, the beginner level of database setup and handling as well as parallel computing techniques are also introduced to fit the purpose. By the end of semester, the students apply the knowledge to solve real world big data problems.

Course Outcomes

- CO1: Apply and identify the concepts of architectural components and programming models used for scalable

big data management and analysis as well as how big data is analyzed.

CO2: Properly construct and build cloud to be executed under high performance computing environment.

CO3: Analyze real world big data problems using specific architectural components and programming models.

CO4: Orally present and collaborate effectively in a group on the real world big data problems project.

BFM4713 Industrial Electronics

Credit Hour: 3

Synopsis

This course introduces some industrial Electronics components that hasn't been covered in the previous electronics courses: sample and hold circuit, Digital to Analog Converter, Analog to Digital Converters, Circuit Breaker, Electrical Switches, Relays, Thyristors, Triac, Photo-cells, Voltage and current regulators, flip/ flop etc

Course Outcomes

CO1: Demonstrate the working principle of some industrial electronics parts.

CO2: Integrate the studied components with other electronics components.

CO3: Develop applications using these components.

BFM4723 Digital System in Mechatronics Design

Credit Hour: 3

Synopsis

This course introduces students to the foundation of digital system. The course will start with the introduction of the understanding of control unit (CU) and data path unit(DU) for a control system. The core of this course will address the development concept of controlling mechatronics system. The course will be accompanied by a practical part in which students have the opportunity to implement the fundamental theories that they learnt in lecture. After completing this course, students should be able to apply the theory into the real mechatronics systems.

Course Outcomes

CO1: Demonstrate understanding of the overall digital system (control unit (CU), data path unit (DU), CU-DU integration)

CO2: Design control unit using Finite State Machine

CO3: Design integration of control unit and data path resources using Register Transfer Level (RTL)

CO4: Develop digital system for a mechatronics system using FPGA

BFM4713 Industrial Electronics

Credit Hour: 3

Synopsis

This course introduces some industrial Electronics components that has not been covered in the previous electronics courses: sample and hold circuit, Digital to Analog Converter, Analog to Digital Converters, Circuit Breaker, Electrical Switches, Relays, Thyristors, Triac, Photo-cells, Voltage and current regulators, flip/ flop etc

Course Outcomes

CO1: Demonstrate the working principle of some industrial electronics parts.

CO2: Integrate the studied components with other electronics components.

CO3: Develop applications using these components.

CURRICULUM STRUCTURE FOR MECHATRONICS (UMP-HsKA) PROGRAMME (BHM)

BHM1103 Statics

Credit Hour: 3

Prerequisite: NONE

Synopsis

This course introduces the concepts of force vector algebra and free-body diagrams to solve problems on equilibrium of forces. The course covers six major chapters in engineering mechanics of statics as follows: 1. Equilibrium of forces on a particle, 2. Equilibrium of forces on single rigid body, 3. Equilibrium of forces on simple trusses, frames and machine structures (multi-rigid bodies), 4. Equilibrium of forces in dry friction, 5. Centre of gravity and centroid and 6. Moments of inertia

Course Outcomes

CO 1: Solve problems on equilibrium of forces for particles and rigid bodies using the equation of equilibrium.

CO2: Analyze problems on equilibrium of forces for trusses, frames and machines

CO3: Analyze problems on equilibrium of rigid bodies subjected to dry frictional forces

CO4: Determines the centre of gravity, centroid and moment of inertia for a body of arbitrary shape

CO5: Design solutions for complex engineering problems for a simple structure in equilibrium.

BHM1113 Engineering Materials

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the fundamental concepts of engineering materials which includes the structure of materials, mechanical and physical properties of materials, binary phase diagrams, isothermal diagram, heat treatment, applications and current developments of metal, polymer, ceramic, composite and advanced materials. Also, basic understanding on the environmental degradation of engineering materials.

Course Outcomes

- CO1 : Identify the atomic bonding and the crystal structures as well as the mechanical and physical properties of engineering materials
- CO2 : Analyse various types of engineering materials based on their microstructures, properties and failure behaviours.
- CO3 : Illustrate structure-property correlations of materials based on phase diagram, heat treatment and strengthening mechanism.
- CO4 : Recommend a suitable material for engineering applications based on product design requirements.
- CO5 : Identify the importance of environmental considerations and sustainability in engineering materials.
- CO6 : Communicate effectively regarding materials-related project in oral presentation.

BHM1602 Technical Drawing

Credit Hour: 2

Prerequisite: None

Synopsis

This course introduces fundamental knowledge and skill of technical drawing for engineers. Both hand sketching and CAD approach will be used in this course. Student will be exposed with Fundamental of Engineering Graphic Language; Layout and Lettering; Technical Sketching; Geometric Constructions; Basic and Advanced Dimensioning; Orthographic Drawing; Section and Auxiliary Views; Geometric Dimensioning and Tolerance (GD&T); and 2D Parametric Drawing Construction. This course also preparing the student to create and interpret working technical drawing according to ISO standards.

Course Outcomes

- CO1 : Apply standard procedures in sketching and technical drawing.
- CO2 : Manipulates CAD for 2D drawing based on orthographic projections and section views.
- CO3 : Analyze the geometric dimensioning and tolerance (GD&T) to explicitly describe geometry, variation and accuracy in engineering drawing.
- CO4 : Develop standard drawing package consists of 2D assembly drawing, parts list and details part drawing.
- CO5 : Show the ability to be an effective team player based on the completion of tasks and involvement in group activities.

BHM1801 Machining 1

Credit Hour: 1

Prerequisite: None

Synopsis

This is an introductory course to the fundamental knowledge and principles in material removal processes. In this course, the students apply the fundamentals and principles of material removal processes by selecting and using appropriate hand tools and perform basic turning processes and operations.

Course Outcomes

- CO1 : Demonstrate the role of safety and regulatory compliance of hand tools and lathe machine
- CO2 : Analyse various types of drawings and machining parameters
- CO3 : Perform basic material removal processes using hand tools and lathe machine with correct sequence of machining operations

BHM1123 Mechanics of Materials

Credit Hour: 3

Prerequisite: BHM1103Statics, BHM1113 Engineering Materials

Synopsis

This course covers the concept of stress and strain, stress and strain under axial, torsion, bending, transverse-shear and combined loadings in elastic structural members. This course also covers the plane stress transformation.

Course Outcomes

- CO1 : Apply the concept of stress and strain in mechanics of materials.

CO2 : Apply the stress and strain calculations in structural members subjected to axial loads and torsional loads.

CO3 : Apply the stress and strain calculations in structural members subjected to the bending and shear loads.

CO4 : Analyze the stress and strain in structural members subjected to the combined load and analyze the stress transformation to solve problems in mechanics of materials.

CO5 : Design solution of complex engineering problem related to mechanics of materials.

BHM1313 Electronics Engineering 1

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces circuit theory analysis which includes ohm laws, KCL, KVL, thevenin, mesh, superposition and transient analysis of RC and RL network. The digital logic circuits cover analogue vs digital, number system, logic gates, SOP & POS and K-maps.

Course Outcomes

CO1 : Apply fundamental laws, circuit theorems and method of analysis to solve electrical circuit

CO2 : Analyze transient response and steady state response of circuit applications

CO3 : Solve number systems and logic gates problem in digital system

CO4 : Analyze electrical and digital circuit using simulation software

BHM1612 CAD Modeling

Credit Hour: 1

Prerequisite: BFF1602

Synopsis

This course covers the fundamental of designing the 3D solid and surface model inclusive of drafting according to the industrial standard. Development of assembly model using parametric approach is also covered and also calculation of component displacements, strains, and stresses under internal and external loads using finite element analysis.

Course Outcomes

CO1 : Design 3D parts of solid and surface model and generate its technical drawing according to the manufacturing standards

CO2 : Develop assembly model with animation and generate drawing complete with bill of material.

CO3 : Perform and interpret the results of finite element analysis correctly.

BHM1811 MACHINING 2

Credit Hour: 1

Prerequisite : None

Synopsis

This course introduces student on safety rules, metrology, milling process and surface grinding and machining process.

Course Outcomes

CO1 : Apply the safety and health rules during machining

CO2 : Apply skill in part inspection during machining

CO3 : Apply technical skill in milling process

CO4 : Apply technical skill in surface grinding process

CO5 : Practice right standard operation procedure and ethics in machining work

BHM2103 Dynamics

Credit Hour: 3

Prerequisite: BHM1102

Synopsis

This course introduces two major sections involving a motion of a rigid body; 1. Planar kinematics, and, 2. Planar kinetics. In planar kinematics, principles of rigid body motion in terms of translation and rotation will be discussed. For planar kinetics, principles of rigid body motion utilizing force and acceleration method, work and energy method and impulse and momentum method will be studied.

Course Outcomes

CO1 : Analyze problems on planar kinematics of a rigid body for relative-motion analysis involving velocity and acceleration.

CO2 : Analyze problems involving kinetics of a planar kinetics of a rigid body using force and acceleration method.

CO3 : Solve problems involving kinetics of a planar kinetics of a rigid body using work and energy method.

CO4 : Solve problems involving kinetics of a planar kinetics of a rigid body using impulse and momentum method.

CO5 : Design solutions for complex engineering problems for a simple planar mechanism using kinematics principles.

BHM2003 Computer Programming

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the basics of C programming language. The contents of this course includes coding input and output, variables, constants, arithmetic operations, mathematical functions, user defined functions, loops, selection making decision and repetitive construct, array, and also data structure. The programming language used for the course is C/C++ language.

Course Outcomes

CO1 : Solve a mathematical problem using variables, constants, arithmetic operations, mathematic functions and user-defined functions with the correct rules.

CO2 : Organizes the flow of a program that uses decision making, repetition and loop statements without any errors.

CO3 : Develop a program code that is related to mechatronics applications that follows a design specification.

CO4 : Analyze the handling of arrays in a program to ensure correct calculated output is produced.

CO5 : Write an organized and readable C program code without producing compile and output result errors.

BHM2342 Mechanical and Electrical Components

Credit Hour: 2

Prerequisite: None

Synopsis

This course aims to introduce mechanical/electrical components in a mechatronic system, basic knowledge on costing and basic project management technique. The content of this course is divided into three parts namely, mechanical component (Part A), electrical components (Part B) and basic of costing (Part C). Part A covers mechanical measurement (fits and tolerance), components guides, springs, power transmission components and fasteners. Part B comprises basic of printed circuit board and electrical-drive-system. Whereas, Part C covers basic of costing including cost structure, manufacturing cost and break-even analysis. By learning this course the students will be able to select components based on analyzing design requirement and finally assemble them into a functional mechatronic system.

Course Outcomes

CO1 : Select mechanical components and their specification based on design requirements in a mechatronics systems

CO2 : Select electrical components and their specification based on design requirements in a mechatronics systems

CO3 : Examine a mechatronic system to perform basic costing analysis and recommend possible solution to justify cost and efficiency

CO4 : Manage a mini projects that involve component selection, procurement and assembly of a mechatronic system using appropriate project management tools

BHM2403 Manufacturing Processes

Credit Hour: 3

Synopsis

This course introduces various challenges and issues in modern manufacturing process and operations, ranging from traditional topics such as casting, forming, machining and joining process.

Course Outcomes

CO1 : Identify the manufacturing process of metal casting, forming and shaping, joining and surface technology

CO2 : Analyse the mechanics and processing parameters of metal casting, forming, joining, and surface technology

CO3 : Propose a design manufacturing process system that can be used in the production that can contribute to public, health and safety, cultural society, environmental and sustainability

CO4 : Recommend an optimized process parameters of a manufacturing process using research methods

BHM2203 Thermal-Fluid Engineering 1

Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the thermodynamics concepts and analytical approaches to approximate the solutions of thermofluid problems at conceptual design stage. The course covers six major chapters in thermofluid engineering as follows: 1. Modelling of thermodynamics system 2. Thermodynamics concepts 3. Thermodynamics principles and governing equations 4. Thermodynamic processes and its performances 5. Heat engines and power plant 6. Heat pump and cooling system

Course Outcomes

CO1 : Model the physical situation and properties of a fluid in a thermodynamic device

CO2 : Solve the idealised model of thermodynamics processes and cycles using the energy transport equation

CO3 : Analyze the performances of idealised and actual thermodynamic devices

CO4 : Evaluate conceptual design solutions for complex engineering problems using properties of an idealised thermofluid model individually and in group

BHM2213 Thermal-Fluid Engineering 2

Credit Hour: 3

Prerequisite: BHM2203 Thermal-Fluid Engineering 1

Synopsis

This course introduces the fluid dynamic concepts and analytical approaches to approximate the solutions of thermofluids problems at conceptual design stage. An introduction to mechanical engineering thermodynamics, dealing with the application of the first and second laws of thermodynamics to the thermodynamic performance analysis of typical thermo-mechanical plant components, using condensable vapors or gases as the working fluid. The course includes energy and entropy balance for closed and open systems. Basic fluid mechanics including: kinematics and dynamics of fluid flows; conservation laws applied to fluid flow; Euler, Bernoulli, Navier-Stokes equations; dimensional analysis; differential and integral flow analysis; flow visualization.

Course Outcomes

CO1 : Model the physical situation and properties of a fluid in a thermofluid device

CO2 : Solve the idealised model of fluid flow using the mass and momentum transport

CO3 : Analyze the performances of idealised and actual thermodynamic device

CO4 : Evaluate conceptual design solutions for complex engineering problems using properties of an idealised thermofluid model individually and in group

BHM3303 Sensor and Instrumentations System

Credit Hour: 3

Synopsis

This course covers sensor and instrumentation systems including the fundamental instrument principles, measurement techniques, data analysis, data processing, data conversion, and working principle of sensors, and measurement theory.

Course Outcomes

CO1 : Determine general treatment of instrument and sensors with their characteristic.

CO2 : Analyse transducer elements, intermediate elements and data acquisition systems (DAQ)

CO3 : Determine principles of the work and derive mathematical model of sensors for measuring physical characteristic (e.g. speed, pressure, temperature) by means of modern tool.

CO4 : Develop team-oriented project for interfacing data acquisition system with sensor and instrument application.

BHM3102 Vibrations

Credit Hour: 2

Synopsis

This course introduces the fundamental of vibration, free vibration, harmonically excited vibration and vibration control.

Course Outcomes

CO1 : Analyze the free vibration using equation of motion
CO2 : Analyze the harmonically control excited vibration using equation of motion

CO3 : Propose the solution for engineering problem based on literature review

CO4 : Apply the modern tools for solving vibration problem

BHM4103 Control System Engineering

Credit Hour: 3

Prerequisite: BHM3513

Synopsis

This subject will cover the analysis of the stability and performance of the control system by using the time domain and frequency domain approaches. PID controller will be used to improve the transient and steady state performances in the time domain approach. In the frequency domain approach, the bode plot method will be utilized. The lead, lag and lead-lag compensators are introduced in improving the performance of the control system using the frequency approach.

Course Outcomes

CO1 : Derive the mathematical model system in frequency domain and time domain

CO2 : Analyze the transient response, system stability and state response for first and second order systems

CO3 : Design the PD, PI, PID, Lag, Lead and Lag-Lead compensators using root locus technique and frequency response technique

CO4 : Discuss the systems performance between compensated and uncompensated based on transient and steady-state response

BHM4911 Environment Safety and Health

Credit Hour: 1

Synopsis

This course covers the topics on industrial safety and health regulations, accident causation phenomenon, accident investigation, accident analysis, industrial hazard, industrial hygiene and managing environmental safety and health.

Course Outcomes

- CO1 : Explain the importance of environmental safety and health and OSHA regulations in workplace
- CO2 : Analyse the practices in work places of employment contributing to serious possible damage to life, health and property.
- CO3 : Develop a solution to ESH problem in a given case study.

BHM2323 Electronics Engineering 2

Credit Hour: 3

Prerequisite: BHM1313 Electronics Engineering 1

Synopsis

In this course students will learn about discrete electronic circuits; that is, circuits containing discrete resistors, capacitors, diodes and transistors. The analysis of these fundamental circuits provides a key understanding of circuit operation and characteristics. Throughout this course, students will also develop, analyze, and design more complex analog electronic circuits by combining and expanding the basic circuits considered, to form more complex circuits. Lastly, students will learn how to analyze and design discrete circuits, these circuits are usually fabricated as integrated circuits called operational amplifiers.

Course Outcomes

- CO1 : Explain the Principle Operation of Active Device Characteristics (e.g Diode, Bipolar Junction Transistor (BJT), Field Effect Transistor (FET), and Metal Oxide Semiconductor Field Effect Transistor(MOSFET))
- CO2 : Explain and Analyse Various Type of Transistor Circuits (e.g., biasing circuits and small signal model circuits)
- CO3 : Explain and Analyse Different Type Operational-Amplifier Circuits
- CO4 : Design and Analyze Operational Amplifier Applications

BHM2333 Electronics Engineering 3

Credit Hour: 3

Prerequisite: BHM1313 Electronics Engineering 1, BHM2323 Electronics Engineering 2

Synopsis

This course is designed to introduce the basic principle of digital systems and logic implementation with analysis. Lecture and practical will cover the following: Logic Implementation, data path unit elements, bi-stable memory devices and finite state machines.

Course Outcomes

- CO1 : Applying logic implementation in digital system
- CO2 : Analyzing processing unit, storage and bussing circuits of a digital system
- CO3 : Analyzing control unit of a digital system
- CO4 : Construct digital schematics using computer aided design tools

BHM2013 Programming for Engineers

Credit Hour: 3 credits

Prerequisite: BHM2003 Computer Programming

Synopsis

This course introduces the parallel/serial interfacing techniques between PC and external circuit built with the components such as LEDs, motors (DC/stepper), thermometer etc. using C/C++ programming language. In addition, the intermediate level of programming techniques such as pointers, dynamic memory allocation, data structures, and graphical user interface are also introduced to fit the purpose. By the end of semester, the students apply the interfacing techniques in a mechatronics-based project.

Course Outcomes

- CO1 : Apply concepts of pointers, data structures and logical bitwise.
- CO2 : Develop graphical user interface.
- CO3 : Construct an integration software with electrical devices/components and mechanical system.
- CO4 : Orally present and collaborate effectively in a group on a mechatronics-based project.

BHM3012 Numerical Programming

Credit Hour: 2

Synopsis

This course introduces simulation software MATLAB (Simple operations, matrices and vectors, functions, plot, programming and symbolic calculation) and Simulink

(functional principle of Simulink, designing a block diagram, solving differential equation, starting Simulink systems from MATLAB and importing plots to word and power points)

Course Outcomes

- CO1 : Solve mathematical equations/operations in MATLAB
- CO2 : Construct functional programs in Scripts/m.file
- CO3 : Design blocks diagrams using the Simulink toolboxes
- CO4 : Develop simulation solution/project for dynamic Mechatronics systems in Simulink/MATLAB

BHM3702 Cleanroom Technology

Credit Hour: 2

Synopsis

This course introduces the need of cleanrooms in different fields of application as micro-electronics, micro-optics, micro-mechanics in the semiconductor, pharmaceutical and food industry.

Course Outcomes

- CO1 : Design a cleanroom layout for a micro-mechatronic manufacturing process
- CO2 : Operate, test and monitor cleanroom condition to achieve standard required
- CO3 : Evaluate and eliminate the causes/sources of contamination in the cleanroom

BHM3712 Hybrid Integration

Credit Hour: 2

Synopsis

Basics of Micro-Mechatronics (MEMS and MOEMS) and different technologies for monolithic, hybrid and PCB-Systems fabrication, characteristics and application-oriented selection of ceramic materials for substrates (Al2O3). Different pastes used for the screen printing process. Different surface mounting technologies using unmounted semiconductors.

Course Outcomes

- CO1 : Build fundamental knowledge on technologies in Micro-Mechatronics
- CO2 : Develop a layout for a hybrid-integrated system by minimizing the dimensions (packaging density)
- CO3 : Employ the screen printing process with the best selection of the thixotropic pastes
- CO4 : Perform a correct thermal activating process
- CO5 : Demonstrate the surface mount technologies for bare dies (die-, wire- and flip-chip-bonding)

BHM4942 Preparation of Bachelor Thesis

Credit Hour: 2

Synopsis

This course introduces students to organize their bachelor thesis in terms of contents and time. It is based on the procedure and tool of scientific works. The task of the bachelor thesis becomes appropriate to the designed and related information of editing the Bachelor thesis are developed and structured.

Course Outcomes

- CO1: Planning of the contents and structure of bachelor thesis.
- CO2: Organize and complete the bachelor thesis in structured manner within allocated time.

BHM3722 SMD Technology

Credit Hour: 2

Synopsis

This lecture gives an introduction into the PCB technology and the connections and interconnections of the board. The development and the production of single- and multi-layer PCBs are presented in detail. The mounting technologies are presented for the THD (Trough Hole Mounting Device) and for the SMD (Surface Mounting Device). Special designs such as multi-chip-modules and flip-chips are described as well as the assembly processes and the testing methods and tools. Soldering technologies, such as wave-soldering and reflow-soldering, are explained.

Course Outcomes

- CO1 : Explain the sustainable manufacturing of printed circuit boards and SMT devices
- CO2 : Distinguish the different printed circuit boards ,the respective mounting technologies and general SMD related problems in manufacturing
- CO3 : Role-play the functions of SMD Manufacturing production house with customer driven objectives aligned with companies mission and vision

BHM3922 Internship Preparation

Credit Hour: 2

Synopsis



This course provides the students the skills to prepare their mentality and documentations to apply a placement for their internship semester. The topics that will be covered are such as defining self-target and motivation in engineering profession, task understanding and delegation, priority and time management.

Course Outcomes

- CO1 : Complete excellent documentations to apply an internship placement.
- CO2 : Complete excellent documentations to apply an internship placement.
- CO3 : Complete excellent documentations to apply an internship placement.
- CO4 : Define the professional target for internship as well as after graduation.
- CO5 : Define the professional target for internship as well as after graduation.

BHM3912 Internship

Credit Hour: 12

Synopsis

Students are required to undergo a minimum 6-months practical training in an industry or research area under industrial supervision. During this period, students will apply the knowledge and skills that they have learned. The hands-on experience will expose them to the real engineering practice and prepare them to work in the manufacturing or related field in various industries upon graduation. The students work in current projects of the firm in the design, development, production or distribution process. The projects deal with mechatronics or related fields and allow the practical application of university knowledge.

Course Outcomes

- CO1 : Demonstrate technical skills and knowledge to be applied in the industry
- CO2 : Suggest solutions to problems for related industry
- CO3 : Obey the rules and etiquettes in industry
- CO4 : Communicate effectively on industry experience
- CO5 : Function effectively as a member to supports the efforts of others
- CO6 : Search information in the broadest context of industrial experience

BHM3932 Internship Follow-Up

Credit Hour: 2

Synopsis

This course exposes students to new tendencies in the mechatronics engineering/technologies from the talks by several representatives from the industries. The students will select a speaker after their speech to gather more information about the topics as well as get personal connection for future carrier benefits. In the end the students have to prepare a report and present about the topic.

Course Outcomes

- CO1: Complete a report about new technologies/tendencies in the mechatronics engineering.
- CO2: Complete a report about new technologies/tendencies in the mechatronics engineering.
- CO3: Complete a report about new technologies/tendencies in the mechatronics engineering.
- CO4: Present about new technologies/tendencies in the mechatronics engineering.
- CO5: Present about new technologies/tendencies in the mechatronics engineering.

BHM4921 Engineers and Society

Credit Hour: 1

Synopsis

This course introduces the engineering profession in local industries sector, issues in local industries, ethics and public responsibility and sustainability practices in global economy

Course Outcomes

- CO1 : Explain the importance of engineering practices and its professionalism with stakeholders of businesses
- CO2 : Analyse the sustainability practices in engineering profession and impact to global society
- CO3 : Develop a solution with stakeholders engagement

BHM3602 Quality Inspection

Credit Hour: 2

Synopsis

This course is the application of statistical, mathematical and management methods for improving the quality and reliability of industrial products, processes and systems. Thus, the concept of basic quality tools, fundamental of statistics, control chart for variables and attributes, fundamental of probability and acceptance sampling systems are the key success of this course.

Course Outcomes

- CO1 : Determine the measures of frequency distributions, central tendency, dispersion and normal curve when the data are systematically gathered
- CO2 : Analyze the variations that occur in the central tendency and mean of a set of observations
- CO3 : Analyze the quantitative data to improve process, develop a new product and establish a statistical control

BHM3313 Microcomputer Technology

Credit Hour: 3

Synopsis

This course introduces the microcomputer technology in which the students will learn about the periphery and structure of a microcontroller, assembler for the 8051 controller family, solving problems with assemblers, development of microcomputer hardware and overview on processor architecture.

Course Outcomes

- CO1 : Analyze the periphery and structure of microcontroller
- CO2 : Analyze the assembler for the 8051 controller family

BHM3323 Software Engineering

Credit Hour: 3

Synopsis

This course covers C++ for C programmer, object-oriented analysis and design, Unified Modelling Language and multi-layers software design. Students will design and develop software for a specific mechatronics system.

Course Outcomes

- CO1 : Convert C program into C++ program and develop an object-oriented C/C++ program.
- CO2 : Design software using the UML and multi-layer architecture.
- CO3 : Develop software for the specific mechatronics system.
- CO4 : Communicate effectively on the specific mechatronics system.

BHM3941 Engineering Communication

Credit Hour: 1

Synopsis

This course develops the students to write and present technical reports. They will learn about clear sentence, unified-paragraph and report writing. In addition, the students also prepare and practice oral presentations. This course requires the students to submit substantial technical report and perform effective presentation.

Course Outcomes

- CO1 : Produce technical report with proper language and format.
- CO2 : Present technical information effectively.

BHM3512 Manufacturing Quality

Credit Hour: 2

Synopsis

This course familiarizes students with quality management method, quality control tools and techniques. Students expose to quality improvement process and quality management system in industry. The human factor in quality management and the requirements of ISO 9000 are also covered. Students are required to develop an effective quality management system in group as well performing individual engineering roles.

Course Outcomes

- CO1 : Construct the quality management method in manufacturing industry processes
- CO2 : Solve the quality problems by using statistical analysis tools and techniques for quality improvement.
- CO3 : Create the effective quality management system in a company

BHM4704 Industrial Automation

Credit Hour: 4

Synopsis

This course is continuation of course BHM3732 PLC System. In this course the students have to develop, document, and present industrial automation software for a manufacturing system using PLC

Course Outcomes

CO1 : Understand specific applications and functions related to automation
 CO2 : Program and use the automation device of machine control systems with a PLC
 CO3 : Develop a solution for an industrial automation problem with PLCs

BHM4102 Finite Element Analysis

Credit Hour: 2

Synopsis

This course introduces finite element methods for structural, thermal flow, electrostatic and electromagnetic problem analysis of micro electro-mechanical systems (MEMS)

Course Outcomes

CO1 : Analyze Structural Problem Using finite element methods
 CO2 : Analyze Thermal Flow Using finite element methods
 CO3 : Analyze Electrostatic and electromagnetic problem using finite element methods
 CO4 : Analyze Complex Mechatronics problem using finite element methods

BHM4904 Team Oriented Project Study

Credit: 4 credits

Synopsis

This course trains student to conduct a group work engineering project to develop a product. After the students have analysed the main problem, they independently design and determine the specifications and requirements of the product. The documents are presented in form of a role play in which the participants act as another character, e.g. manager or customer, to discuss and improve the relevant documents. These mid-term presentations emulate industrial project team meetings with a fixed agenda, protocol, leadership, voting procedures, kick-off etc. They are followed by the evaluation phase which includes a value analysis and cost and risk assessment. After the final kick-off meeting of the team session phase, the design and manufacturing process starts. This phase is critically accompanied by more reviews and laboratory presentations. At the end of the semester, the finished product is being publically presented.

Course Outcomes

CO1: Apply the product development process in the form of a team-oriented project work

CO2: Analyze and specify products
 CO3: Provide technical documents of an engineering project
 CO4: Apply technical communication and review skills.

BHM4931 Final Examination

Credit Hour: 1

Prerequisite: None

Synopsis

This course is a project-based course which requires students to demonstrate technical skills and personal attributes at levels which correspond with professional engineering practice. It is preferable for the project to be conducted in related industry. Nonetheless, students can also conduct the project in the university, should there is no available industry project. Each student will be supervised by 1 UMP lecturer, 1 HsKA lecturer and 1 engineering in industry (only applicable for industry project). This course evaluates the student's competency through oral presentation (viva) session.

Course Outcomes

CO1 : Demonstrate understanding on fundamental and theoretical knowledge
 CO2 : Show understanding of the problem at hand and how the proposed solution can solve the problem
 CO3 : Explain the acquired knowledge
 CO4 : Present the executions of the project design
 CO5 : Use appropriate analysis approach to interpret the gathered data into sensible findings
 CO6 : Provide critical discussions from the analysis and conclude the findings
 CO7 : Deliver effective presentation on the project work
 CO8 : Prepare effective slides of the project work

BHM3612 Optoelectronics

Credit Hour: 2

Synopsis

This course introduces basic principles of various optics and optical components, optical fibers, optical emitters and detectors, radiometric and photometric quantities, optoelectronic systems for measuring distance geometry and surface finish.

Course Outcomes

- CO1 : Demonstrate the fundamental principles of optoelectronics and properties of wave nature of light
 CO2 : Differentiate the radiometry and photometry characteristics.
 CO3 : Differentiate the dielectric waveguides, its modes and the optical fiber parameters.
 CO4 : Distinguish the types and the principles of semiconductors used in optical devices including light emitting diode, laser and photodetector as well as other optoelectronic applications.
 CO5 : Enhanced communication skills in project

BHM3623 Product Development and Design

Credit Hour: 3

Synopsis

This course covers the knowledge on product development and design to perform product development activities, process measurement and planning in order to manufacture product which meets the customer requirements at a competitive price. This covers development processes and organizations, product planning, opportunity identification, identifying customer needs and product specifications; concept generation, concept selection, concept testing and product architecture; industrial design, design for environment, design for manufacturing, prototyping and process measurement and planning.

Course Outcomes

- CO1 : Analyse problems in product development and design.
 CO2 : Develop solution related to product development and design
 CO3 : Communicate effectively on issues in product development and design.

BHM4003 Information System

Credit Hour: 3

Synopsis

This course provides the basic information about information technology and the possibility of digital signal modification including Fourier Transformation. Students will undergo laboratory activities for development of an IT-supported system.

Course Outcomes

- CO1 : Describe transmission and processing of information in present-day communications technologies

- CO2 : Determine and explain the principle of signal processing of HDTV material in IPTV
 CO3 : Apply the fundamental and principle of signal processing in practical activities

BHM4914 Bachelor Thesis

Credit Hour: 4

Synopsis

This course focuses on the real professional approach to engineering studies. Students will utilise their engineering knowledge and technical skills from the previous studies to solve an engineering problem.

Course Outcomes

- CO1 : Demonstrate understanding on fundamental and theoretical knowledge related to the project
 CO2 : Show clear understanding of the problem at hand and how the proposed solution can solve the problem
 CO3 : Apply with good explanation of the acquired knowledge
 CO4 : Present the executions of the project design with valid result
 CO5 : Use appropriate analysis approach to interpret the gathered data into sensible findings
 CO6 : Provide critical discussions from the analysis and clearly conclude the findings
 CO7: Suggest recommendations for implementation, further research and commercialization
 CO8 : Communicate effectively on the project work through report and presentation

BHM4402 Electronics in Mechatronics Systems

Credit Hour: 2

Synopsis

This course introduces storage of digital information, transmission of signals, programmable memories such as EEPROM or FPGA, power electronics, control of electrical motors and aspects of EMC and assessing the reliability of electronic devices.

Course Outcomes

- CO1 : Apply different concepts for transmitting and storing digital information
 CO2 : Design electrical circuits for power electronics which can adapt changes
 CO3 : Revise the reliability of electronic devices

FACULTY OF ENGINEERING TECHNOLOGY





FACULTY OF ENGINEERING TECHNOLOGY

INTRODUCTION

Faculty of Engineering Technology was established in 2014. The aim of the establishment is to support local and global economic development through education, research, commercialization and consultation in the field of engineering technology.

All our academic programs are accredited by Malaysian Qualifications Agency (MQA) and recognized by numerous universities locally and internationally. We also offers dual degree programs with renowned universities across the globe to enhance the marketability of our future graduates.

VISION & MISSION

Vision

To become a leading center in engineering technology

Mission

We provide high quality education and competent graduates in the field of engineering technology through creative and innovative cultures

Objectives

1. To offer engineering technology programs that meet the needs of industry and the nation.
2. To produce graduates who are competent and highly skilled who are recognized by the local and international professional bodies.
3. To collaborate with local and international industry to further improve technology and professional services.
4. To lead initiatives in the field of research related to the industry.

PROGRAMMES OFFERED

1. Bachelor of Occupational Safety and Health with Hons. - BPS
2. Bachelor of Engineering Technology (Electrical) with Honours. - BTE
3. Bachelor of Engineering Technology (Manufacturing) with Honours. - BTM
4. Bachelor of Engineering Technology (Energy and Environmental) with Honours. - BTV
5. Bachelor of Engineering Technology (Pharmaceutical) with Honours. - BTP
6. Bachelor of Engineering Technology (Infrastructure Management) with Honours. - BTC
7. Bachelor of Engineering Technology (Computer System) with Hons – BTS
8. Bachelor of Engineering Technology (Power & Machine) with Honours – BTW
9. Bachelor of Engineering Technology (Petroleum) with Honours – BTO



LABORATORY FACILITIES

Teaching and research laboratory facilities of the Faculty of Engineering Technology are designed to meet current teaching & learning, research and industrial requirements. It is also designed to meet current safety guidelines and standards. Laboratories at the faculty comprises of all disciplines in Engineering Technology and Occupational Safety & Health.

Program	Facility	Research/Consultation
Electrical/ Electronics (Computer system)	Electronics Laboratory, Control System Laboratory, Digital Electronics Laboratory, Machine & Drive Laboratory, Communication System Design Laboratory and Computer Programming Laboratory	Optical sensor, Ammonia gas monitoring, Optical fiber based gas sensor, Microelectronics, Nanoelectronics, Embedded systems, Electrical machine and drive, Power system and automation, Machine learning, Pattern recognition and Image processing
Manufacturing	Welding Bay, Machining Workshop, Fluid Technology Laboratory, CNC Laboratory, Material Laboratory, CIM Laboratory, PLC Lab	Friction stir welding characterisation, Finite element investigation of composites, Optimization, Lean manufacturing and Wave soldering process characterisation
Energy & Environmental	Industry Quality Laboratory, Physics Laboratory, Chemistry Laboratory, Environmental Technology Laboratory, Renewable Energy Laboratory, Thermodynamics Laboratory, Green Technology/HVAC Laboratory, Energy Management Laboratory	Fuel Cells and Hydrogen (FCH) energy technologies Sustainable development, transformation and production bioenergy Energy auditing, management and efficiency and Environmental monitoring and management Solar Energy Technologies
Pharmaceutical	Microbiology Laboratory, Product Development Laboratory, Analytical Laboratory, GMP Laboratory, Science Laboratory, Pharmaceutical Development Laboratory, Pharmaceutical Synthesis	Biopharmaceutical Production Biopharmaceutical Technology Biopharmaceutical Management. Formulation design of oral dosage forms, optimization of formulation variables of oral dosage forms, advanced drug delivery systems, semi-solid topical products, design

	Laboratory Line.	and execution preclinical evaluation of formulations
Infrastructure Management	Infra Studio, Design Laboratory, Survey Laboratory, Soil Laboratory, Highway Laboratory, Wastewater Laboratory, Concrete mixing and testing facilities.	Project Management & Construction Safety, Transportation & Highway, Material & Structure, Geotechnical, Slope stabilization & Rock mechanic, Water resources & GIS, Green Technology
Occupational Safety & Health	Toxicology Lab, Ergonomic Lab, Industrial Hygiene Lab, Ventilation & Environmental Engineering Lab, Audiometry & Spirometry Lab, Workplace Ergonomic Simulator, Safety Simulation Lab, Fire & Industrial Safety Lab, Fire Detection & Suppression Simulator	Occupational Safety and Health Risk Management, Behavioral Based Safety Assessment among Workers, Human Factors and Ergonomics Study, Survey on The Cause of Accident at Workplace, Empirical Studies on the Occupant Thermal Comfort Towards Workers, Performances in Ventilated Low Energy Consumption Building.
Mechanical Petroleum	Welding Bay, Machining Workshop, Fluid Technology Laboratory, CNC Laboratory, Material Laboratory, CIM Laboratory, PLC Lab, Petroleum Lab, Drilling Simulator Lab	Friction stir welding characterisation, Finite element investigation of composites, Optimization, Lean manufacturing and Wave soldering process characterisation, Drilling simulator process.



CAREER OPPORTUNITIES

Program	Career Opportunity
Electrical	Electrical Engineering Technologist, Operation/Production, Technical Management and Operations, Product/system Designer, Sales/Procurement, Development and Testing, Systems Engineer, Field Engineer, Quality Control Engineer, Technical management, Government sector, Services industry, Technopreneur/ Marketing/ Management or Self employed
Manufacturing	Quality Assurance, Plant Management, Industrial Technologist, Systems Planning, Process Planning, Computer Integrated Manufacturing designer. Their career as manufacturing engineering technologists can be categorized into three main groups ; Design, Machining and System. These 3 groups offers employment opportunities in variety of industries including automotive, medical, agricultural, furniture, textile, electronics, machinery manufacturing, transportation equipment manufacturing, food processing and chemicals. Others may work for the government, utility companies, mining companies and other facilities in which industrial machinery is used.
Energy & Environmental	Energy system designers, energy system auditors or consultants as well as system developers and operators in industry such as in Energy industry, Environmental Industry, Government sector, Energy and Environmental Trading Sector, Energy and Environmental Controller of Malaysia, Waste Management, Agriculture, Forestry and Utilities Industry.
Pharmaceutical	Validation & quality control engineer / technologist, regulatory affairs executive, manufacturing / product engineer / technologist, quality compliance – Good Manufacturing Practices executives, research & development, facilities technology in pharmaceutical industry. Graduates are expected to join workforces under the following industries: a) Pharmaceutical b) Biopharmaceutical c) Food & beverages d) National Drug Control Agency – National Pharmaceutical Control Bureau e) Any industries that apply the use of cleanroom technology such as semiconductor and cosmetic.
Infrastructure Management	Infrastructure/ building/ facilities/ construction Manager, Construction Technologist in the construction industry through various infrastructure agencies – local and government authorities, councils, ministries, firms and consulting companies,



	Civil and Infrastructure Technologist ,Operation and Maintenance Officer , Project Management and Scheduling, Sales/Procurement, Development and Testing, Field/Site Engineer, Project Engineer and Technical management
Occupational Safety & Health	Health, Safety and Environmental Engineer, Health, Safety and Environment Consultant, Safety and Health Officer, Health, Safety and Environment Coordinator, Safety and Health, Supervisor, Lecturer and Trainer or Occupational Hygienist, Occupational Ergonomics.
Electronics (Computer System)	Computer System Technologist, Computing and Control System Engineer, Instrumentation Engineer, Development and Testing Engineer, Systems Engineer/Technologist, Integration Engineer/Technologist, Technopreneur Employment opportunities may also exist within: a) Government sector b) Services industry c) Operation/Production d) Technical Management and Operations e) Medical technology and devices Marketing
Electrical (Power and Machine)	Electrical (Power Generation/Distribution Engineer/Technologist, Power Plant Engineer/Technologist, Electric Vehicle Engineer/Technologist, Maintenance/Operation/Production, Technical Management and Operations, Product/system Designer, Sales/Procurement, Development and Testing, Systems Engineer, Field Engineer, Quality Control Engineer, Technical management, Government related industry, Services industry, Technopreneur ,Management or Self employed
Mechanical Petroleum	Mechanical Technologist, Mechanical Engineer, Pipeline Integrity Engineer, Offshore Operation Engineer, Embedded Engineer, Reservoir Engineer, Petroleum Engineer, Petroleum Process Engineer, Completion Engineer, Drilling Engineer, Production Engineer.

**FACULTY OF ENGINEERING TECHNOLOGY
CURRICULUM STRUCTURE
BACHELOR OF OCCUPATIONAL SAFETY AND HEALTH WITH HONS.**

YEAR SEMESTER	FIRST		SECOND		THIRD		FOURTH	
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	UHL2412 English for Academic Communications	UHL2422 English for Technical Communications	UHF2041 Foreign Language 2	BTU2123 Quality Management System	UHS2011 Soft-skills 2	UG2202 Technopreneurship	BPS4313 Process Safety & Loss Prevention	BPS4538 Industrial Training
	UHR1012 Islamic and Asia Civilizations	UHF11*1 Foreign Language 1	UHR2012 Islamic Institution	BPS2343 Occupational Epidemiology & Disease	BTU 2113 Research Method	UHL2432 English for Professional Communications	BPS4323 OSH Management System	
	UCP**1 Co-Curriculum 1	UHM2022 Ethnic Relations	UHS1021 Soft-skills 1	BPS2353 Emergency Response & Preparedness	BPS3313 Applied Mechanics for Safety	BPS3453 Accident & Incident Investigation Analysis	BPS4643 Construction Safety	
	BUM2123 Applied Calculus	UCQ2**1 Co-Curriculum 2	BUM2413 Applied Statistics	BPS2363 Ergonomics	BPS3323 Industrial Safety	BPS3353 Human Factor in Safety Engineering		BPS4534 Industrial Training Report
	BPS1313 OSH Fundamentals	BPF1123 Industrial Psychology	BPF2413 Management Information System	BPS2374 Exposure Measurement Techniques & Analysis	BPS 3623 Air Pollution Control Technology	BPS3713 Business Continuity Plan	BPS4514 Final Year Project 2	
	BPS1323 Introduction To Engineering Science	BPS1343 Fire and Building Safety	BPS3323 Industrial Hygiene	BPS 2713 Environmental Management and Green Technology		BPS3512 Final Year Project 1		
	BPS1333 OSHE Legislation	BPS1353 Hazard Recognition & Risk Management	BPS2323 Behavior Based Safety	ELECTIVE				
		BPS1363 Industrial Toxicology	BPS2333 Toxic & Hazardous Waste Management	<ul style="list-style-type: none"> ❖ BPS2623 Solid Waste Management ❖ BPS2633 Marine and Offshore Safety ❖ BPS2643 Road and Transportation Safety ❖ BPS2653 Radiation and Nuclear Safety ❖ BPS2663 Wastewater Treatment Technology 				
TOTAL CREDIT SEMESTER	17	18	19	19/22	13/16	15/18	13/16	12
OVERALL TOTAL CREDIT FOR GRADUATION	129							



**ELECTIVE COURSES FOR
BACHELOR OF OCCUPATIONAL SAFETY AND HEALTH WITH HONS.**

NO.	CODE	COURSE	CREDIT HOUR
1	BPS2633	Marine and Offshore Safety	3
2	BPS2623	Solid Waste Management	3
3	BPS2663	Wastewater Treatment Technology	3
4	BPS2643	Road and Transportation Safety	3
5	BPS2653	Radiation and Nuclear Safety	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			3

PROGRAM LEARNING OUTCOMES (PO)	
PO1	Apply scientific and technological knowledge of safety, health and environment.
PO2	Conduct experiment, analyzing and interpreting data.
PO3	Apply techniques, skills, methods and modern engineering tools necessary for good management and engineering practices.
PO4	Communicate ideas professionally on social, cultural, environmental and global responsibilities as safety, health and environment practitioner.
PO5	Adapt best practices to meet desired safety, health and environment needs within the considerable constraints of economic, social, political and sustainability.
PO6	Perform a life-long learning programme recognized locally and internationally with strong research and development activities.
PO7	Use resources to assess entrepreneur opportunities and growing entrepreneurial ventures
PO8	Function effectively with integrity, strong ethics as an individual concerning on local and global economic, social, political and sustainability issues.
PO9	Acquire leadership, interpersonal and social skills in multidisciplinary team project or task.
PO10-	Apply broad business and real world perspectives in workplace and everyday activities and demonstrate entrepreneurial skills.
PO011	Demonstrate sensitivities and responsibilities towards the community, culture, religion and environment;
PO012	Apply skills and principles of lifelong learning in academic and career development; Utilise ICT and information management system to enhance professionalism in occupational safety and health practice;

**CURRICULUM STRUCTURE
BACHELOR OF ENGINEERING TECHNOLOGY (ELECTRICAL) WITH HONOURS**

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	BTU1113 Physics	UHR1012 Islamic and Asian Civilizations	BTM1114 Basic Manufacturing Processes	BTM2324 Manufacturing Computer Applications	UHS2011 Foreign Language II	BTM3514 Computer Integrated Manufacturing	BTE4743 Power Electronics	BTE4919 Industrial Training
	BTU1112 Physics Laboratory	BTE1313 Instrumentation and Measurements	UHS1111 Mandarin For Beginners	BTE2113 Analog Electronics	BTE2413 Electrical Power System	BTE3264 Microprocessors and Interfacing	BTE41**3 Elective 1	BTE4913 Industrial Training Report
	BTE1122 Electrical Isolation Workshop	BUM1223 Calculus	BTM1614 Computer-Aided Drafting	BTE2112 Analog Electronics Laboratory	BTE2223 Digital Logic Design	BTE3252 Microprocessors and Interfacing Laboratory	BTE4**3 Elective 2	
	BTE2313 Computer Programming	BTE2223 Circuit Analysis I	BUM2113 Applied Mathematics	UQ2**1 Co-curriculum 2	BTE3222 Digital Logic Design Laboratory	BTE3323 Control Systems	BTE4**3 Elective 3	
	BUM1113 Technical Mathematics	BTE2222 Circuit Analysis I Laboratory	UHL2422 English For Technical Communication	UHF2041 Foreign Language 2	BTE3262 Electrical Automation	BTE3322 Control Systems Laboratory	BTE4826 Engineering Technology Senior Design Project II	
	UHL2400 Fundamentals of English Language	UHL2412 English For Academic Communication	BTE2233 Circuit Analysis II	UHL2432 English For Professional Communication	BTE3912 Engineering Ethics	BTE3813 Engineering Technology Senior Design Project I		
	BTE1213 Electrical Fundamentals	UHM2012 Ethics Relation	BTE2232 Circuit Analysis II Laboratory	BTE3143 Electric Machines and Transformers	BTE3233 Communication System Design			
	BTE1212 Electrical Fundamentals Laboratory	UGE2002 Technopreneurship	UHS1011 Soft-skills 1	BTE3142 Electric Machines and Transformers Laboratory	BTE3232 Communication System Design Laboratory			
	UQB1**1 Co-curriculum 1							
TOTAL CREDIT PER SEMESTER	19	19	20	18	18	18	18	12
OVERALL TOTAL CREDIT FOR GRADUATION	142							

COURSES

**LECTIVE COURSES FOR
BACHELOR OF ENGINEERING TECHNOLOGY (ELECTRICAL) WITH HONOURS.**

NO.	CODE	COURSE	CREDIT HOUR
1	BTE4713	Programmable Logic Controller	3
2	BTE4723	Advanced Electronics Circuits	3
3	BTE4733	Sensors Technology	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

PROGRAM EDUCATIONAL OBJECTIVES, PEO	
PEO1	To prepare graduates in electrical engineering technology field with mastery of the needed expertise in industries
PEO2	To prepare graduates in electrical engineering technology field that demonstrated hands-on skills for professional and personal development
PEO3	To prepare graduates in electrical engineering technology field with good management skill and ethically professional

Program Learning Outcomes (PO)	
PO1	Apply knowledge of mathematics, science, engineering fundamentals and engineering technology principles to define and applied engineering technology procedures, processes, systems or methodologies in electrical engineering technology area.
PO2	Solve broadly-defined engineering technology problems systematically to reach substantiated conclusions by using appropriate tools and techniques in electrical engineering technology field.
PO3	Design solutions for broadly-defined electrical 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 engineering technology problems by using data from relevant sources.
PO5	Select and apply appropriate techniques, resources and modern engineering technology 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 technical community and society at large.
PO8	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO9	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO10	Demonstrate an awareness of management, business practices and entrepreneurship.
PO11	Demonstrate an understanding of the impact of technical practices, taking into account the need for sustainable development.
PO12	Recognize the need for professional development and to engage in independent and lifelong learning.



**CURRICULUM STRUCTURE
BACHELOR OF ENGINEERING TECHNOLOGY (ENERGY AND ENVIRONMENTAL) WITH HONOURS.**

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	UHL2400 Fundamentals of English Language	UHL2412 English for Academic Communications	TV3333 Biobased Fuels and Alternative Energy Applications	BTM2124 Machine Production Processes	BTY9113 Wastewater Treatment Technology	BTY3813 Engineering Technology Senior Design Project II	BTY4826 Engineering Technology Senior Design Project II	BTY4919 Industrial Training
	UGE2002 Technopreneurship	UHF1111 Foreign Language I	UHF21*1 Foreign Language II	BTY2223 Environmental Management System	BTY3424 Facilities Management Technology	BTY3433 Engineering Economy	UHS2011 Soft Skills II	BTY4913 Industrial Training Report
	UHS1011 Soft Skills I	UC2*2*1 Co Curriculum II	UHL2432 English for Professional Communication	BTY3413 Industrial Quality Control	BTY3324 Design For Energy Efficiency and Green Materials	BTY3463 Safety & Risk Management	BTE4**3 Elective 1	
	UHR1012 Islamic and Asian Civilization	BTE2313 Computer Programming	BTY2123 Environmental Laws, Policy & Economics	BTY2314 Green Technology	BTY2234 Heating, Ventilating and Air Conditioning Technology	BTY2463 Energy Auditing	BTE4**3 Elective 2	
	UCB1**1 Co Curriculum I	BUM1223 Calculus	BTY2213 Thermodynamics	BTM2234 Fluid Power Technology	BTY2323 Solid and Scheduled Waste Management	BTY3143 Air Pollution Control Technology	BTE4**3 Elective 3	
	BUM1113 Technical Mathematics	BTM3314 Computer Aided Design	UHM2022 Ethnic Relations	UHL2422 English for Technical Communication		BTY3463 Energy Management		
	BTE1113 Electrical Fundamentals	BTY1112 Environmental Technology Lab	BUM2113 Applied Mathematics					
	BTE1112 Electrical Fundamentals Lab	BTY1113 Environmental Technology	BTM1113 Basic Manufacturing Processes					
	BTU1213 Physics							
	BTU1112 Physics Laboratory							
TOTAL CREDIT PER SEMESTER	18	18	19	19	20	19	16	12
OVERALL TOTAL CREDIT FOR GRADUATION	141							

COURSES



**ELECTIVE COURSES FOR
BACHELOR OF ENGINEERING TECHNOLOGY (ENERGY AND ENVIRONMENTAL) WITH
HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BTV4713	Solar Energy System	3
2	BTV4753	Geographic Information Systems	3
3	BTV4743	Environmental Impact Assessment	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

PROGRAM EDUCATIONAL OBJECTIVES, PEO	
PEO1	To produce energy and environmental related engineering technologists with mastery of the needed expertise in industries using the foundation of technology and innovation.
PEO2	To prepare engineering technologists that demonstrate skills of lifelong learning for professional and personal development
PEO3	To prepare engineering technologists with good management skill, good professional ethics and understanding local law in energy and environmental issues
PEO4	To prepare global engineering technologists that work and communicate effectively in multinational and multidisciplinary engineering community.

Programme Learning Outcomes (PO)	
PO1	Apply knowledge of mathematics, science, engineering fundamentals and engineering technology principles to define and applied engineering technology procedures, processes, systems or methodologies in energy and environment area
PO2	Solve broadly-defined engineering technology problems systematically to reach substantiated conclusions by using appropriate tools and techniques in energy and environment area
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 engineering technology problems by using data from relevant sources related to energy and environment area
PO5	Select and apply appropriate techniques, resources and modern engineering technology tools, with an understanding of their limitations in energy and environment related area
PO6:	Function effectively as individuals, and as members or leaders in diverse technical teams.
PO7	Communicate effectively with the technical community and society at large.
PO8	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO9	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO10	Demonstrate an awareness of management, business practices and entrepreneurship in the field of energy and environment
PO11	Demonstrate an understanding of the impact of technical practices, taking into account the need for sustainable development.
PO12	Recognize the need for professional development and to engage in independent and lifelong learning in the field of energy and environment



**CURRICULUM STRUCTURE
BACHELOR OF ENGINEERING TECHNOLOGY (MANUFACTURING) WITH HONOURS**

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	BTU1113 Physics	BTM1113 Basic Manufacturing Process	BTE1113 Electric & Electronics Fundamental	BTM2223 Engineering Dynamics	BTM2314 Computer Aided Design	BTM8813 Engineering Tech. Senior Design Project 1	BTM4826 Engineering Tech. Senior Design Project 2	BTM4819 Industrial Training
	BTU1112 Physics Lab	BTM1112 Basic Manufacturing Process Lab	BTE1112 Electric & Electronics Fundamental Lab	BUM2423 Statistics with Technology	BTM3234 Manufacturing Computer Application	BTM3134 Manufacturing Component Design	BTM4514 Automated Manufacturing System	BTM4813 Industrial Training Report
	BTU1213 Chemistry	BTM1213 Engineering Mechanics	BUM2113 Applied Mathematics	BTM2124 Machine Production Process	UGE2002 Technopreneurship	BTM3353 Programmable Logic Controller	BTM4713 Elective 1	
	BTU1212 Chemistry Lab	BUM1223 Calculus	BTM2424 Strength of Materials	BTM3324 Computer Aided Modeling	BTM2234 Fluid Power Technology	BTM364 Numerical Control System	BTM4723 Elective 2	
	BUM1113 Technical Mathematics	UQ**1 Co-Curriculum 2	BTM2413 Properties of Materials	UHL2432 English for Professional Communication	BTM3343 Computer Integrated Manufacturing	BTM3413 Industrial Quality Control	BTM4733 Elective 3	
	UQB**1 Co-Curriculum 1	UHF2041 Foreign Language 2	UHS2011 Soft-skills 2	BTM2433 Engineering Economy	BTM3342 Computer Integrated Manufacturing Lab	BTM2453 Energy Auditing		
	UHR1012 Islamic and Asia Civilizations	UHL2412 English for Academic Communications	UHL2432 English for Technical Communications					
	UHS1011 Soft-skills 1	UHM2022 Ethnic Relations						
	UHF1111 Foreign Language 1							
TOTAL CREDIT PER SEMESTER	18	17	18	19	19	20	19	12
OVERALL TOTAL CREDIT FOR GRADUATION	142							



**ELECTIVE COURSES FOR
BACHELOR OF ENGINEERING TECHNOLOGY (MANUFACTURING) WITH
HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BTM4773	Work Measurement	3
2	BTM4723	Advanced Manufacturing Process	3
3	BTM1733	Ergonomics	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

PROGRAM EDUCATIONAL OBJECTIVES, PEO	
PEO1	To produce engineering technologists with mastery of the needed expertise in manufacturing industries using the foundation of technology and innovation.
PEO2	To prepare engineering technologists that demonstrate skills of lifelong learning for professional and personal development
PEO3	To prepare engineering technologists with good management skill, good professional ethics and understanding local law in manufacturing issues
PEO4	To prepare global engineering technologists that work and communicate effectively in multinational and multidisciplinary engineering community.

Programme Learning Outcomes (PO)	
PO1	Apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to define and manufacturing engineering technology procedures, processes, systems or methodologies
PO2	Solve broadly-defined engineering technology problems systematically to reach substantiated conclusions by using tools and techniques appropriate to manufacturing engineering technology field.
PO3	Design solutions for broadly-defined manufacturing 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 technology tools, with an understanding of their limitations
PO6:	Function effectively as individuals, and as members or leaders in diverse technical teams.
PO7	Communicate effectively with the engineering community and society at large.
PO8	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO9	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO10	Demonstrate an awareness of management, business practices and entrepreneurship
PO11	Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.
PO12	Recognize the need for professional development and to engage in independent and lifelong learning



**CURRICULUM STRUCTURE
BACHELOR OF ENGINEERING TECHNOLOGY (INFRASTRUCTURE MANAGEMENT) WITH HONOURS.**

YEAR SEMESTER	FIRST		SECOND		THIRD		FOURTH		
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	
COURSES	UHL2400 English For Technical Communication (based on EPT)	UHL2412 English For Academic Communication	UHL2422 English For Technical Communication 2	UHL2432 English For Professional Communication	UHF11*1 Foreign Language Level 1	UHF21*1 Foreign Language Level 2	BET3522 Procurement For Infrastructural Project	BET4899 Industrial Training Attachment	
	UHM2002 Ethnic Relations	UHS1021 Soft Skills 1	UHR1012 Islamic & Asian Civilizations 1	UHS2021 Soft Skills 2	UHS3122 Islamic Institutions	BET4042 Entrepreneurship for Technologists	BET4783 Final Year Project 2	BET4893 Industrial Training Report	
	UQT10*1 Co-Curriculum 1	BUM2413 Applied Statistics	UQT20*1 Co-Curriculum 2	BET1263 Geology and Geomechanics	BET4222 Technologist in Society and Law	BET3683 Final Year Project 1	BET4774 Technology Design Project		
	BUM2123 Applied Calculus	BET2343 Spatial Science Engineering	BUS1303 Applied Physics	BET2344 Infrastructural Planning (Studio 4)	BET3573 Engineering Management	BET3644 Infrastructural Management (Studio 6)	BET4*3 Elective 1 (Forensic Investigation in Infrastructure)		
	BET1114 Infrastructural Exploration (Studio 1)	BET1213 Engineering Practice 1	BET2413 Project Scheduling	BET2422 Financial Management for Decision Making	BET3983 Research Methodology	BET3599 Quality Performance Management	BET4*3 Elective 2 (Advance Material Testing Technology)		
	BET1123 Introduction to Infrastructural Engineering	BET1113 Green Technology for Infrastructure Facilities	BET2334 Infrastructural Project (Studio 3)	BET2373 Construction Engineering	BET2573 Construction Methods	BET1613 Engineering Practice 3	BET4*3 Elective 3 (Introduction to Coastal Infrastructure)		
	BET1142 Introduction to Engineering Surveying	BET1474 Infrastructure Investigation (Studio 2)	BET2492 Construction Safety	BET1413 Engineering Practice 2	BET3634 Infrastructural Design (Studio 5)	BET3513 Conflict and Risk Management			
	BET1263 Introduction to Engineering Problem Solving		BET2483 Problem Solving and Analysis						
	TOTAL CREDIT PER SEMESTER	18	19	20	18	18	19	18	12
	OVERALL TOTAL CREDIT FOR GRADUATION	143							

**ELECTIVE COURSES FOR
BACHELOR OF ENGINEERING TECHNOLOGY (INFRASTRUCTURE
MANAGEMENT) WITH HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BET4**3	Forensic investigation in Infrastructure	3
2	BET4**3	Advance Material Testing Technology	3
3	BET4**3	Introduction to Coastal Infrastructure	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

PROGRAM EDUCATIONAL OBJECTIVES, PEO	
PEO1	To produce a knowledgeable graduate in field of engineering and technology through academic program
PEO2	To produce competent and applicable graduate in latest technology
PEO3	To produce graduate with high value and ethical conducts

Programme Learning 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 by using tools and techniques appropriate to their discipline or area of specialization.
PO3	Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PO4	Plan and conduct experimental investigations of broadly-defined problems using data from relevant sources.
PO5	Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.
PO6:	Function effectively as individuals, and as members or leaders in diverse technical teams.
PO7	Communicate effectively with the engineering community and society at large.
PO8	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO9	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO10	Demonstrate an awareness of management, business practices and entrepreneurship
PO11	Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.
PO12	Recognize the need for professional development and to engage in independent and lifelong learning



**CURRICULUM STRUCTURE
BACHELOR OF ENGINEERING TECHNOLOGY (PHARMACEUTICAL) WITH HONOURS**

YEAR	FIRST			SECOND			THIRD			FOURTH	
	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND	THIRD	FIRST	SECOND
COURSES	BUM2133 Ordinary Differential Equation	UHL2412 English For Academic Communication	BUM2413 Applied Statistics	UHL2432 English For Professional Communication	UHM2022 Ethnic Relations	UHF21*1 Foreign Language 2	BTP4753 Tech Inno For Pharma Engineers	BTP4812 Industrial Training			
	UGB1*1 Co-Curriculum 1	BUM2123 Applied Calculus	UHS1021 Soft Skills 1	UC2*1 Co-Curriculum 2	UHF11*1 Foreign Language 1	BTP4683 System Validation	UGE2002 Technopreneurship				
	UHR1012 Islamic & Asian Civilization	BTP2232 Contamination Control & Clean Room	UHL2422 English For Technical Communication	UHS2021 Soft Skills 2	BTP3243 Process Biotechnology Techniques	BTP4673 Pharma Project 1					
	BTP1113 Organic Chemistry	BTP2323 Fluids Mechanics	BTP2632 GMP & Quality Assurance	BTP1623 Industrial Networks	BTP3163 Process Chem & Pharma Engineering 2	BTP3353 Automation Systems	BTP38*2 Elective 3				
	BTP1213 Biology For Engineers	BTP1613 Introduction To Pharmaceutical Science	BTP1133 Process Chem & Pharma Engineering	BTP1623 Manufacturing & Processing Technology	BTP3732 Facilities Management Systems	BTP3363 Manufacturing Systems Lean Six Sigma	BTP3652 Contemporary Trends in Pharma Industry				
	BTP1712 Computer Programming For Engineers	BTP1523 Electrical Fundamentals	BTP2223 Protein Biochemistry & Biotechnology	BTP1143 Environmental Technology	BTP3643 Regulatory Affairs & Validation for Engineers	BTP38*3 Elective 1	BTP4675 Pharma Project 2				
	BTP1312 Material & Process	BTP2333 Thermodynamic	BTP2533 Electrical Power Systems	BTP2543 Control & Instrumentation	BTP3422 Industrial Statistics For Pharmaceutical Engineers	BTP38*3 Elective 2	BTP3742 Technology Transfer				
	BTP1513 Engineering Science	BTP2412 Numerical Methods & Optimization	BTP2153 Pharmaceutical Formulation Methods	BTP4253 Bio & Pharma Analytical Techniques							
	TOTAL CREDIT PER SEMESTER	19	19	19	19	19	19	19	19	19	12
OVERALL TOTAL CREDIT FOR GRADUATION	145 (MATRICULATION –SCIENCE PHYSICS/ STPM/ DIPLOMA) 145 (MATRICULATION-LIFE SCIENCE)										



**ELECTIVE COURSES FOR
BACHELOR OF ENGINEERING (PHARMACEUTICAL) WITH HONOURS.**

NO.	CODE	COURSE	CREDIT HOUR
1	BTP3813	Advanced Drug Delivery Systems	3
2	BTP3823	Materials Processes & Colloid Science	3
3	BTP3822	Biopharmaceutics	2
4	BTP3812	Pharmacology	2
5	BTP3843	Utilities Requirements For Pharma Industry	3
6	BTP3833	Safety & Health In Pharmaceutical Industry	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

Programme Educational Objectives (PEO)	
PEO1	To produce graduates who excel in their pharmaceutical technologist positions in pharmaceutical industries within the area of drug development, plant operation, safety and environment
PEO2	To produce graduates who apply and develop advanced technology through R&D and who are keen to pursue post graduate studies
PEO3	To produce graduates who display leadership qualities to the companies that employ them
PEO4	To produce graduates who demonstrate strong professional values and responsibilities towards society and environment

Programme Learning Outcomes (PLO)	
PO1	Apply knowledge of mathematics, science, engineering fundamentals and engineering technology principles to define and apply engineering technology procedures, processes, systems or methodologies.
PO2	Communicate effectively with the engineering technology community and society at large.
PO3	Plan and conduct experimental investigations of broadly-defined engineering technology problems by using data from relevant sources.
PO4	Solve broadly-defined engineering technology problems systematically to reach substantiated conclusions by using appropriate tools and techniques.
PO5	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.
PO6	Select and apply appropriate techniques, resources and modern engineering technology tools, with an understanding of their limitations.
PO7	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO8	Function effectively as individuals, and as members or leaders in diverse technical teams.
PO9	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO10	Recognize the need for professional development and to engage in independent and lifelong learning in the field of engineering technology.
PO11	Demonstrate an awareness of management, business practices and entrepreneurship in the field of engineering technology.
PO12	Demonstrate an understanding of the impact of engineering technology practices, taking into account the need for sustainable development.



BACHELOR OF ENGINEERING TECHNOLOGY (COMPUTER SYSTEM) WITH HONOURS
CURRICULUM STRUCTURE

YEAR SEMESTER	FIRST	SECOND	FIRST	SECOND	SECOND	FIRST	SECOND	THIRD	SECOND	FIRST	SECOND	FOURTH	SECOND
	UHF1*1 Foreign Language I	UHR1012 Islamic and Asian Civilizations	UGE2002 Technopreneurship	UHL2412 English For Academic Communication	UHL2432 English and Professional Communication	UHS2011 Soft Skills II	BTS3*3 Signal & Networks	BTS4*4 Robotics	BTU4912 Industrial Training				
	UHL2400 Fundamentals of English Language	UHL2412 English For Academic Communication	UHF2041 Foreign Language II	BTE2113 Analog Electronics	BTE3233 Communication System Design	BTE3233 Communication System Design	BTS3*2 Signal & Networks Laboratory	BTS4*3 Elective I	BTU4912 Industrial Training Report				
	UCB1**1 Co-curriculum I	UHS1011 Soft-skills I	UHL2422 English For Technical Communication	BTE2112 Analog Electronics Laboratory	BTE3232 Communication System Design Laboratory	BTE3232 Communication System Design Laboratory	BTS3*3 Microcontroller & Embedded Systems	BTS4*3 Elective II					
	BUJM113 Technical Mathematics	UHM2012 Ethics Relation	UO2**1 Co-curriculum II	BTE3223 Digital Logic Design	BTE3254 Microprocessors and Interfacing Laboratory	BTE3254 Microprocessors and Interfacing Laboratory	BTS3*2 Microcontroller & Embedded Systems Laboratory	BTS4*3 Elective 3					
	BTU1113 Physics	BUJM223 Calculus	BUM2113 Applied Mathematics	BTE3222 Digital Logic Design Laboratory	BTE3252 Microprocessors and Interfacing Laboratory	BTE3252 Microprocessors and Interfacing Laboratory	BTS3*4 PLC Basics and Applications	BTS426 Engineering Technology Senior Design Project II					
	BTU1112 Physics Laboratory	BTU1313 Computer Programming	BTU2343 Circuit Analysis II	BTS3*3 Computer Architecture	BTS3*3 Numerical & Control Systems	BTS3*3 Numerical & Control Systems	BTS3*4 Engineering Technology Senior Design Project I						
	BTU1323 Electrical Fundamentals	BTU1333 Circuit Analysis I	BTE2342 Circuit Analysis II Laboratory	BTS3*2 Computer Architecture Laboratory	BTS3**2 Numerical & Control Systems Laboratory	BTS3**2 Numerical & Control Systems Laboratory							
	BTU1322 Electrical Fundamentals Laboratory	BTU1332 Circuit Analysis I Laboratory	BTU2414 Computer-Aided Drafting	BTS2*3 Control Theory	BTS2*3 Computer Vision System	BTS2*3 Computer Vision System							
	BTU1313 Instrumentation and Measurements												
TOTAL CREDIT PER SEMESTER	18	18	18	20	20	20	17	19	12				
OVERALL TOTAL CREDIT FOR GRADUATION	142												

COURSES

**ELECTIVE COURSES FOR
BACHELOR OF ELECTRONICS ENGINEERING TECHNOLOGY (COMPUTER SYSTEM) WITH
HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BTS4713	Advanced Microprocessor	3
2	BTS4723	Software Engineering	3
3	BTS4733	Internet Programming	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

Programme Educational Objectives (PEO)	
PEO1	To successfully practice digital electronics, communication systems, signal processing, control systems, system integration, and computer-based systems to serve government agencies, national and international industries.
PEO2	To critically evaluate, design and apply alternate assumptions, approaches, procedures, of electronic and/or computer-based components and systems for applications including signal processing, communications, and control systems.
PEO3	To successfully demonstrate good leadership qualities, teamworking spirit, communication skills, ethical values and social responsibilities to fulfill their duties towards the working culture and community.
PEO4	To engage in lifelong learning and new knowledge development in Engineering Technology (Computer Systems).

Programme Learning Outcomes (PLO)	
PO1	Apply knowledge of mathematics, science, engineering fundamentals and engineering technology principles to define and applied engineering technology procedures, processes, systems or methodologies.
PO2	Solve broadly-defined engineering technology problems systematically to reach substantiated conclusions by using appropriate tools and techniques appropriate to their discipline or area of specialisation.
PO3	Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PO4	Plan and conduct experimental investigations of broadly-defined engineering technology problems by using data from relevant sources.
PO5	Select and apply appropriate techniques, resources and modern engineering technology 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 technical community and society at large.
PO8	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO9	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO10	Demonstrate an awareness of management, business practices and entrepreneurship.
PO11	Demonstrate an understanding of the impact of technical practices, taking into account the need for sustainable development.
PO12	Recognize the need for professional development and to engage in independent and lifelong learning

**CURRICULUM STRUCTURE
BACHELOR OF ENGINEERING TECHNOLOGY (PETROLEUM) WITH HONOURS**

YEAR SEMESTER	FIRST		SECOND		THIRD		FOURTH	
	BTU1113 Physics	BUM1223 Calculus	BUM2113 Applied Mathematics	BTO2133 CNC Machining	BTO3233 Industrial Quality Control	BTO3243 Computer Integrated Manufacturing	BTO4384 Dredging Process	BTO4912 Industrial Training
	BTU1112 Physics Lab	BTU1313 Manufacturing Computer Application	BTU2314 Computer Aided Design	BTO2013 Strength of Materials	BTO3003 Thermodynamics	BTO3253 Offshore Oil Mechanics	BTU4713 Engineering Applications	
	BTU1213 Chemistry	BTU1123 Engineering Mechanics	BTU2323 Computer for Engineers	BTU2033 Engineering Dynamics	BTU3023 Properties of Materials	BTU3264 Offshore Engineering	BTU4723 Well Logging and Pressure Gradient Analysis	
	BTU1212 Chemistry Lab	BTU1212 Electric&Electronics Fundamentals Laboratory	BTU2123 Energy Management	BTU2073 Engineering Economy	BTU3043 Fluid Mechanics	BTU3273 Floating Structures	BTU4828 Reservoirs, Resources and Reserves	
COURSES	BUM1113 Technical Mathematics	UHS1011 Soft Skills I	UHL2422 English for Technical Communication	UGE202 Technopreneurship	BTU32013 Well Drilling and Completion	BTO Subsea Engineering	BTU4912 Final Year Project II	
	BTU1113 Introduction to Petroleum Engineering	UHL2412 English for Academic Communications	UHS2011 Soft Skills II	UHL2432 English for Professional Communication	BTU3324 Geometrical Dimensioning & Tolerancing	BTU3816 Final Year Project I		
	BTU1213 Electric&Electronics Fundamentals	UHF 1111 Foreign Language I	UQB2111 Co-Curriculum II	UHS2022 Ethnic Relations				
		UHF2111 Foreign Language II	UHL2012 Islamic and Asian Civilization					
		UQB1111 Co-Curriculum I						
TOTAL CREDIT PER SEMESTER	19	17	19	18	19	19	19	12
OVERALL TOTAL CREDIT FOR GRADUATION	142							



**ELECTIVE COURSES FOR
BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (PETROLEUM) WITH HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BTO4713	CFD for Engineering Applications	3
2	BTO4723	Well Testing and Pressure Transient Analysis	3
3	BTO4733	Reservoirs, Resources and Reserves	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

PROGRAM EDUCATIONAL OBJECTIVES, PEO	
PEO1	To produce engineering technologists with mastery of the needed expertise in mechanical and petroleum industries using the foundation of technology and innovation.
PEO2	To prepare engineering technologists that demonstrate skills of lifelong learning for professional and personal development
PEO3	To prepare engineering technologists with good management skill, good professional ethics and understanding local law in manufacturing issues
PEO4	To prepare global engineering technologists that work and communicate effectively in multinational and multidisciplinary engineering community.
Programme Learning Outcomes (PO)	
PO1	Apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to define and manufacturing engineering technology procedures, processes, systems or methodologies
PO2	Solve broadly-defined engineering technology problems systematically to reach substantiated conclusions by using tools and techniques appropriate to manufacturing engineering technology field.
PO3	Design solutions for broadly-defined manufacturing 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 technology tools, with an understanding of their limitations
PO6:	Function effectively as individuals, and as members or leaders in diverse technical teams.
PO7	Communicate effectively with the engineering community and society at large.
PO8	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO9	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO10	Demonstrate an awareness of management, business practices and entrepreneurship
PO11	Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.
PO12	Recognize the need for professional development and to engage in independent and lifelong learning



**CURRICULUM STRUCTURE
BACHELOR OF ENGINEERING TECHNOLOGY (POWER & MACHINE) WITH HONOURS**

YEAR	FIRST		SECOND		THIRD		FOURTH	
SEMESTER	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
	BTU1113 Physics	UHR1012 Islamic Asian Civilizations	BTM3234 Manufacturing Computer Applications	BTM1314 Computer-Aided Design	UHS2011 Foreign Language II	BTW3113 Power System Analysis	BTE4713 Programmable Logic Control	BTE4919 Industrial Training
	BTU1112 Physics Laboratory	BTE1313 Instrumentation and Measurements	UHS1011 Soft Skills I	BTW3223 Electrical Installation Design	UCB2**1 Co-curriculum II	BTE2413 Electrical Power System	BTE4**3 Elective 1	BTE4913 Industrial Training Report
	BTE1122 Electrical Installation Workshop	BUM1223 Calculus	BTM2014 Basic Manufacturing Process	BTE3222 Electrical Installation Design Laboratory	BTE3912 Engineering Ethics	BTW3632 Maintenance Technology	BTE4**3 Elective 2	
	BTE2313 Computer Programming	BTE2223 Circuit Analysis I	BUM2113 Applied Mathematics	UCB2**1 Soft Skills II	BTM3074 Computer Integrated Manufacturing	BTE3313 Power System Protection & High Voltage	BTE4**3 Elective 3	
	BUM1113 Technical Mathematics	BTE2222 Circuit Analysis I Laboratory	UHL2422 English For Technical Communication	UHF2041 Foreign Language I	BTW2243 Advanced Electric Machine	BTE3243 Control Systems	BTE4826 Engineering Technology Senior Design Project II	
	UHL2400 Fundamentals of English Language	UHL2412 English For Academic Communication	BTE2233 Circuit Analysis II Laboratory	UHL2432 English For Professional Communication	BTW2242 Advanced Electric Machine Laboratory	BTE3322 Control Systems Laboratory		
	BTE1213 Engineering Fundamentals	UHM2012 Ethics Relation	BTE2232 Circuit Analysis II Laboratory	BTE3143 Electric Machines and Transformers	BTE3262 Electrical Automation	BTE3813 Engineering Technology Senior Design Project I		
	BTE1212 Electrical Fundamentals Laboratory	UCE2002 Technopreneurship	UHS1011 Soft-skills 1	BTE3142 Electric Machines and Transformers Laboratory	BTW3213 Power Electronic Drive Machine			
	UCB1**1 Co-curriculum I				BTW3212 Power Electronic Drive Machine Laboratory			
TOTAL CREDIT PER SEMESTER	19	19	19	18	20	19	18	12
OVERALL TOTAL CREDIT FOR GRADUATION	144							

COURSES



**ELECTIVE COURSES FOR
BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY
(POWER & MACHINE) WITH HONOURS**

NO.	CODE	COURSE	CREDIT HOUR
1	BTE4713	Power System Operation & Control	3
2	BTE4723	Power Quality	3
3	BTE4733	Alternative Energy	3
TOTAL MINIMUM CREDITS OF ELECTIVE COURSES FOR GRADUATION			9

PROGRAM EDUCATIONAL OBJECTIVES, PEO	
PEO1	To prepare graduates in electrical engineering technology field with mastery of the needed expertise in industries
PEO2	To prepare graduates in electrical engineering technology field that demonstrated hands-on skills for professional and personal development
PEO3	To prepare graduates in electrical engineering technology field with good management skill and ethically professional

Program Learning Outcomes (PO)	
PO1	Apply knowledge of mathematics, science, engineering fundamentals and engineering technology principles to define and applied engineering technology procedures, processes, systems or methodologies in electrical engineering technology area.
PO2	Solve broadly-defined engineering technology problems systematically to reach substantiated conclusions by using appropriate tools and techniques in electrical engineering technology field.
PO3	Design solutions for broadly-defined electrical 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 engineering technology problems by using data from relevant sources.
PO5	Select and apply appropriate techniques, resources and modern engineering technology 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 technical community and society at large.
PO8	Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PO9	Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO10	Demonstrate an awareness of management, business practices and entrepreneurship.
PO11	Demonstrate an understanding of the impact of technical practices, taking into account the need for sustainable development.
PO12	Recognize the need for professional development and to engage in independent and lifelong learning.



CURRICULUM STRUCTURE

BACHELOR OF OCCUPATIONAL SAFETY AND HEALTH WITH HONS.

BUM2123
APPLIED CALCULUS
Credit: 3 credits
Prerequisites : None

Course Synopsis

This course introduces Polar Coordinates and Vector, Vector-Valued Functions, Partial Derivatives, and Multiple Integrals. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcomes

CO 1: Analyze and apply appropriate calculus concepts to solve various science and engineering problems.

CO 2: Use appropriate software and tool to solve the graphical and computational problems in calculus.

CO 3: Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.

CO 4: Relate and applied the concepts and methods studied into other courses.

BUM 2413
APPLIED STATISTICS
Credit: 3 credits
Prerequisites : None

Course Synopsis

This course discusses on statistical problem-solving methodology and descriptive statistics; sampling distribution and confidence interval; hypothesis testing; analysis of variance (ANOVA); goodness-of-fit test and contingency tables; regression and correlation including simple and multiple linear regressions. Statistical packages such as Microsoft Excel, SPSS, R Language, S Plus, EViews and Minitab shall be used in this course.

Course Outcomes

CO 1: Explain statistical terminologies and apply statistical concepts in solving problems using conventional method

CO 2: Apply statistical concepts in solving problems using statistical packages.

CO 3: Work together in a group to accomplish the task given.

BPF 1123
INDUSTRIAL PSYCHOLOGY
Credit: 3 credits
Prerequisites : None

Course Synopsis

The Industrial Psychology course introduces students to the principles of behaviors as it exists at the workplace: attitudes of employees and employers, organizational behavior, workplace environment and its effects. It focuses on three parts concerning personnel issues, organizational issues, and work environment issues investigated in industrial/organizational psychology. Specifically, the course explains the major applications of Industrial Psychology; describes the importance relationship of selecting, training, and evaluating employees; discusses the issues facing industrial psychology today and how these issues affect workers, organizations, and society; and illustrates how the principles of Industrial Psychology can be applied to day-to-day experiences as an organizational member, and to help you develop as an effective organizational member or manager.

Course Outcomes

CO 1: Know major applications of Industrial Psychology

CO 2: Describe the importance relationship of selecting, training and evaluating employees

CO 3: Relate the issues affecting workers, organizations, and society

CO 4: Illustrate how the principles of Industrial Psychology can be applied in organization

BPF 2413
MANAGEMENT INFORMATION SYSTEM
Credit: 3 credits
Prerequisites : None

Course Synopsis

This course aims to provide firm understanding on the significance role of information systems in today's organization in particular in managing organizational most valuable assets - its data and information. The discussion sessions shall covers four major topics; Information Systems and its applicability in modern enterprise and organization including its strategic competitive advantage as well as ethical issues involved; Information technology infrastructure and security issues; Information system applicability for digital age; building and managing information systems for organizational use. Hands on activity on the usage of office automation system and designing relational database shall be cover in lab sessions.



Course Outcomes

- CO 1: Describe information systems roles in modern organization and its functions in obtaining organizational competitive advantage
- CO 2: Describe information technology infrastructure and its requirement for digital firm and security threats involved
- CO 3: Discuss various strategies and approaches in system development
- CO 4: Demonstrate the usage of office automation system in performing operational tasks and managing information resources within organization

BTU 2123
QUALITY MANAGEMENT SYSTEM
Credit: 3 credits
Prerequisites : None

Course Synopsis

This course intends to provide an understanding of the fundamental of quality management. The topics covered the introduction to Quality Management, Quality's Guru, Quality Tools and Concepts, Different Quality Approaches, Quality Tools and Statistical Process Control. Students will be exposed to various cases studies on Quality locally and internationally.

Course Outcomes

- CO 1: Define and explain the fundamental concept and definition of total quality management
- CO 2: Identify the basic knowledge on quality management and quality control in production and manufacturing
- CO 3: Demonstrate and evaluate new concept of quality control for production and manufacturing, and quality practices in service sectors which integrate fundamental aspects of quality management

CORE PROGRAM
BPS1313
OSH FUNDAMENTALS
Credit: 3 credits
Prerequisites : None

Course Synopsis

This course introduces the principles and basic concepts of occupational safety and health. Students will be exposed to the history of occupational safety and health (OSH) development, acts and legislations in relation to OSH, the responsibilities and qualification of safety and health practitioner and professional ethics. The human bodies and its psychological functions and its relationship to workplace productivity will also be discussed. Introduction to Occupational Hygiene is also discussed as a foundation for the next subjects. Some common safety and health hazards will be emphasized for better understanding.

Course Outcomes

- CO 1: Apply the occupational safety and health fundamentals theory to identify hazards, risk and exposure at the workplace to improve safety and health performance.
- CO 2: Analyse workplace hazards, risk and exposure that effect workers health and planning for the best solution to improve workplace safety and health management and performance.
- CO3: Discuss occupational safety and health problems/challenges and demonstrate a scientific approach to resolves the issues.
- CO 4: Adhere team working skills for problem solving in completing task.

BPS 1323
INTRODUCTION TO ENGINEERING SCIENCE
Credit: 3 credits
Prerequisites : None

Course Synopsis

This course is designed to introduce students to the engineering and spatial science professions, to provide them with an understanding of the fundamental concepts of engineering science and to develop the basic skills necessary to effectively study in an engineering or spatial science discipline. Students will learn how to apply these skills and knowledge, using an engineering systems approach, to a range of authentic multidisciplinary engineering and spatial science problems. Topics covered include the nature of engineering and spatial science; fundamentals of engineering science and their application; study skills and an exposure to a range of professional skills including technical communications, calculation and presentation tools and information literacy.

Course Outcomes

- CO 1: Understanding fundamental scientific and applied mathematical principles in engineering applications
- CO 2: Apply fundamental knowledge of engineering
- CO 3: Formulate the method to solve introductory engineering problem.

BPS 1333
OSH LEGISLATION
Credit: 3 credits
Prerequisites : None

Course Synopsis

This course provides a foundation for understanding the related law on Occupational Safety and Health (OSH) including act, rules, regulations, orders, guidelines and code of practice in their organization. The focuses of studies are for the students to know about the related law and apply their knowledge as OSH personnel in their organization in order to minimize hazards and accident.

**Course Outcomes**

CO1: Explain occupational safety and health related laws including act, regulations and code of practice to be applied at the workplace.

CO2: Apply related laws on occupational safety and health including act, regulations and orders to solve OSH related problems at the workplace.

CO3: Assist the organization to reduce accident and incident in the workplace by applying the related law.

BPS 1343**FIRE & BUILDING SAFETY****Credit: 3 credits****Prerequisites : None****Course Synopsis**

This subject is aimed to give an understanding on the basic concept of Fire Prevention and Protection especially its application in buildings. The course will cover topics such as Basic Principles of Fire and its category, the Components of Fire Safety, the Active and Passive Fire Safety Systems, the Life Cycles of a Building, Loss Impact and Means of Escape During Emergencies. Upon completion of this course, the students will be able to understand and practise major areas in fire hazard management and apply best practices in fire safety and fire management system as well as preparing for emergency cases. Students will also learn the theory of combustion and causes of fire and the way to fight fire, including the types and correct use of fire extinguishers. Students will experience with Live Fire Training Unit where they will learn how to use fire extinguishers correctly and safely.

Course Outcomes

CO1: Identify the basic principles of fire, fire sources and fuel classifications.

CO2: Distinguish between preventive and protective measures of fire safety in the buildings.

CO3: Analyse the loss impact of fire to individual, organisation, society and the country.

CO4: Organize fire safety management system and establish the fire safety activity within the life cycle of a building.

BPS 1353**HAZARD RECOGNITION & RISK MANAGEMENT****Credit: 3 credits****Prerequisites : BPS1113 Occupational Safety And Health Fundamentals****Course Synopsis**

This course is aimed to give an understanding on the basic steps in recognizing hazards at work place and managing risks to as low as reasonably practicable (ALARP). These include the introduction to type of hazards, hazard identification, risk evaluation, risk

assessment, determining risk control, hierarchy of risk control and risk management principle.

Course Outcomes

CO1: Conduct hazard identification and risk assessment in workplace

CO2: Determine risk control and risk reduction measures based on hierarchy of control.

CO3: Adapt risk management principles in reducing risk level to as low as reasonably practicable (ALARP) and preventing workplace incidents.

BPS 1363**INDUSTRIAL TOXICOLOGY****Credit: 3 credits****Prerequisites : BPS1113 Occupational Safety And Health Fundamentals****Course Synopsis**

This course provides students with a basic understanding and appreciation of the principles of human body system and toxic effects of chemicals on the living organism, regulatory aspect, application of toxicology in industry and the effects of toxic substances on man and the environment. Topics include: disposition and metabolism of toxic substances, types of exposure and response, toxic responses of selected body systems, toxic mechanisms of drugs, industrial chemicals, food additives, pesticides, environmental pollutants, household products, toxicity testing and risk assessment.

Course Outcomes

CO 1: Explain the principles of human body system, dose-response relationship and the concept of threshold dose

CO 2: Explain how toxins enter the body and are transported to different organs and tissues

CO 3: List and discuss several types of toxic chemicals available in the occupational environment

CO 4: Describe organ toxicity and type of response occur which results from industrial chemical exposure

CO 5: Apply the principles of chemical safety management in the workplace

BPS 3323**INDUSTRIAL HYGIENE****Credit: 3 credits****Prerequisites : BPS1113 Occupational Safety And Health Fundamentals****Course synopsis**

This course generally will give an introduction to the field of industrial hygiene, including the chemical, physical and biological agents, which affect the health and safety of employees, the application of control measures for the various agents and study of occupational exposure limit. Upon completion of this

course, the student will have studied the major topic areas within the field of chemical, physical and biological hazards, principle of exposure monitoring, medical surveillance and personal protective equipment.

Course Outcomes

CO 1: Apply basic terms, technical concepts, legal, professional and ethical frameworks integral to the practice of industrial hygiene

CO 2: Conduct industrial hygiene assessment fieldwork using standard methodology, proper equipment and correct analysis

CO 3: Illustrate concept of anticipation, recognition and evaluation in designing hazard control to solve industrial problem

BPS2323

BEHAVIOUR BASED SAFETY

Credit: 3 credits

Prerequisites : NONE

Course Synopsis

Work always involves humans. Humans are complex and their behaviour is the result of interaction between and within internal and external factors. This course will introduce usage of behaviour-based safety as a scientific tool for behaviour change. The course will review the relationship between behaviour, attitudes, culture, and systems and explain how behaviour-based fits into the hierarchy of control. Underlying concepts related to performance management and a powerful tool (ABC analysis) is learned and applied to understanding behaviour and to developing a change plan. Overall, the course provides a clear understanding of how attitudes, cultures, and systems influence or affect behaviour, and focuses on understanding how successful behavioural change efforts really work. Effective leadership and involvement are seen as the cornerstone to success in promoting a positive safety culture. This course also will introduce current thinking on safety leadership and supervision models and strategies relevant to health and safety at work.

Course Outcomes

CO 1: Use the right technique in determining the best intervention strategy in promoting safety culture in a workplace.

CO 2: Analyse the right concepts of behaviour based safety approach in developing a Total Safety Culture in the workplace.

CO 3: Demonstrate their ability to work in group either as a member or leader in completion of project related to behaviour based safety.

BPS2333

TOXIC AND HAZARDOUS WASTE MANAGEMENT

Credit: 3 credits

Prerequisites : BPS1443 Industrial Toxicology

Course Synopsis

This course introduces the student to the physical, chemical and toxic properties of toxic and hazardous wastes which are the basis for their hazard classification, movement and distribution as well as their impacts on human health and the environment. The industries which generate toxic and hazardous waste will be discussed. The management of these wastes which include handling, storage and transportation based on the regulations stipulated in the Environmental Quality Act, 1974 as well as other international regulations will be discussed. Understanding on the treatment and disposal processes will be emphasized including pollution prevention and waste minimization strategies.

Course Outcomes

CO 1: Apply the theories and principle of toxic and hazardous waste management, the impact and the risks towards human health and environment

CO 2: Use the legal requirements on toxic and hazardous waste management in the safety and health fields

CO 3: Communicate risk, hazard and safety factors in toxic and hazardous waste treatments.

BPS2343

OCCUPATIONAL EPIDEMIOLOGY AND DISEASE

Credit: 3 credits

Prerequisites: BPS 1363 Industrial Toxicology, Applied Statistics

Course Synopsis

This course will emphasize on aspects of disease transmission and causation, measuring occurrence of disease, determining the cause of disease and estimating risk. The major types of epidemiologic study (cohort, case referent and cross-sectional) will be described. Threats to validity and issues in interpreting epidemiologic data such as bias, confounding factors, and random error will be discussed. Communicable and non-communicable diseases plus epidemiologic surveillance will be also discussed for preventing and controlling diseases. Students will also be exposed to the latest journals related to environmental and occupational epidemiology.

Course Outcomes

CO1: Demonstrate knowledge of the principle of disease causation, and the epidemiological approach to defining and measuring the occurrence of health-related states in populations.

CO2: Contrast the main types of study design in terms of characteristics, strengths, weaknesses and risk measurements.



CO3: Apply the epidemiology concepts and methods to broad area of environmental and occupational health.

**BPS 2353
EMERGENCY RESPONSE & PREPAREDNESS
Credit: 3 credits
Prerequisites: NONE**

Course Synopsis

This course will provide student with basic understanding of Emergency and Disaster Management based on its cycle. Managing a good emergency response is the most effective way to reduce the impact of a crisis on vulnerable populations. Student also will be exposed to management processes which involve units created to prepare for, respond to and recover from any emergency events. This is important to ensure the business continuity is achieved after facing certain type of disasters by manmade or natural cause. Specific topics on Business Continuity Management (BCM), Hazardous Materials (HAZMAT), Incident Command System (ICS) and *Arahan Nombor 20 Majlis Keselamatan Negara (MKN)* also will be discussed.

Course Outcomes

- CO 1: Apply the knowledge of emergency response preparedness for emergency and Disaster Management plan
- CO 2: Evaluate vulnerability analysis in determining exposure of human, environment and property to various emergency threats
- CO 3: Apply appropriate technical skills in conducting Emergency response and preparedness plan

**BPS 2363
ERGONOMICS
Credit: 3 credits
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals**

Course Synopsis

This course provides a foundation for understanding the key concepts and principles related to ergonomics. The aim of ergonomics in industry is to increase productivity, and decrease accidents and illnesses by obtaining a good fit between the employer and the job. This course also examines the relationships between employer, work equipment and work environment. Case studies are also used to test student current knowledge and understanding of the way complex systems are designed and used.

Course Outcomes

- CO 1: To apply scientific knowledge of ergonomics in order to identify ergonomics related problems.
- CO 2: To analyse and interpret the level ergonomics risk factors that may exists in the place of work.

CO 3: To propose control measure to overcome ergonomics problems.

**BPS 2374
EXPOSURE MEASUREMENT TECHNIQUE AND ANALYSIS
Credit: 3 credits
Prerequisites : BPS 3323 Industrial Hygiene**

Course Synopsis

This course is for advanced in depth study of the approaches to workplace and personnel exposure sampling. Emphasis is on statistical sampling methods, passive monitoring, colorimetric devices, breathing zone, area sampling strategies, monitoring and surveillance techniques. Course work will include laboratory exercises and field work. This course is also designed to assist student in understanding the various instruments that are utilized in industrial hygiene and environmental studies and give them the chance to fully understand the way these instruments are calibrated and applied.

Course Outcomes

- CO 1: Prepare occupational and environmental stressor assessment report cases to comply with relevant legislations
- CO 2: Differentiate appropriate sampling procedure and measuring technique for occupational and environmental stressors
- CO 3: Adapt data collection and analysis through surveys, calibration, sampling, monitoring by using the instantaneous or integrated instruments to assess the risk of occupational and environmental stressors

**BPS2713
ENVIRONMENTAL MANAGEMENT AND GREEN TECHNOLOGY
Credit: 3 credits
Prerequisites : NONE**

Course Synopsis

This course will cover the fundamental of environmental management, the principles and concepts about ecology, ecosystems, weather and human impacts on the environment, and the concept of green technology. The natural renewable and non-renewable resources and its management, current issues related to the environment including economics, global view and ethics will also be discussed. Other issues related to environmental development, trade, green activities and roles that are played by the consumer, community, industry and government towards sustainable development also discovered. The students will be also introduced to the ISO 14000 series of Environmental Management Standards and environmental management tools which minimize and reduces the negative impact of human activities.

Course Outcomes

CO 1: Apply theories and principles of environmental management and sustainable development in solving environmental issues

CO 2: Analyse current environmental problems and able to select international conventions, agreements and local legislations to come out with idea on how to solves the problems

CO 3: Recognize appropriate solution for current environmental issues by integrating environmental management tools and systems, and green technology applications towards sustainable development

BTU2113

RESEARCH METHODOLOGY

Credit: 3 credits

Prerequisites : NONE

Course Synopsis

This course aims to expose students with research methodology and its application in conducting research projects. Topics to be covered include identification of research problem, construct research objective, review the literature and propose appropriate methods. This course also allows students to prepare a proposal for conducting academic research in their field of study.

Course Outcomes

CO 1: Explain several types of research methods in several aspects.

CO 2: Discover appropriate research methods in developing research proposal.

CO 3: Prepare a detail research proposal.

BPS 3313

APPLIED MECHANICS FOR SAFETY

Credit: 3 credits

Prerequisites : NONE

Course Synopsis

This course introduces a foundation in engineering science principles which will provide a systematic approach to problem solving in the field of occupational safety and health (OSH) problems such as accident and incident investigation, ergonomics, industrial safety, construction safety and etc. It goes beyond the core engineering science include all the material science, statics, dynamics, fluid mechanics, thermodynamics and heat transfer that can be included in course at this level. The emphasis on the integration of student's understanding and the application aspects of all engineering science principles, supported with many examples, makes this course a very useful for practicing the OSH.

Course Outcomes

CO 1: Explain a fundamental knowledge of engineering science principles such as theories, laws, equations and models.

CO 2: Develop the equations in engineering science for OSH applications.

CO 3: Analyze the problems in OSH and apply a systematic approach of engineering science for problem solving.

BPS3323

INDUSTRIAL SAFETY

Credit: 3 credits

Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

Course Synopsis

This course designed to give student understanding in industrial safety field and its application in the hazards identification and risk management. Students will be exposed to machinery safety practices including design, safe operation, fencing and guarding. Student also will be introduced to mechanical handling safety which details out the design and safe operation of material handling equipment. Maintenance hazards are discussed in details including hazardous energy control and permit-to-work (PTW) system. Hazards of confined space and pressure vessel are also exposed to student. Basic electrical and radiation safety topics are discussed as part of industrial safety management.

Course Outcomes

CO1: Conduct recognition of physical hazards in workplace.

CO2: Analyze any issue and incident on physical hazards to solve industrial safety problems.

CO3: Adapt industrial safety management best practices in workplace.

BPS 3443

HUMAN FACTORS IN SAFETY ENGINEERING

Credit: 3 credits

Prerequisites :BPS 2363 Ergonomics

Course Synopsis

Human Factors is a science that focuses on how humans interact with the environment in their workplace. Human Factors in Safety Engineering is concerned with ways of designing jobs, machines, operations, and work environments so they are compatible with human capacities and limitations.

Course Outcomes

CO 1: Analyse the principles of human factors in safety engineering to identify workplace problems

CO 2: Evaluate the problems arise in human factors in safety engineering to propose the practicable solutions.

CO 3: Communicate ideas professionally in relation to human factors in safety engineering.

BPS 3453

ACCIDENT AND INCIDENT INVESTIGATION AND ANALYSIS



Credit: 3 credits

Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

Course Synopsis

This subject is aimed to introduce and give an understanding on the methodology for incident investigation and analysis. Topics include data collection, investigation techniques, interviewing techniques, notification and reporting to authority, corrective and preventive actions to prevent recurrences. Root cause analysis techniques commonly used in the industry will be also introduced.

Course Outcomes

CO 1: Conduct incident investigation at workplace.

CO 2: Carry out root cause analysis (RCA) to determine incident causal factors.

CO 3: Initiate incident notification and reporting to authorities based on legislations, track and close out correction and preventive actions.

BPS 3512

Final Year Project 1

Credit: 2 credits

Prerequisites : All the first and second year subjects

Course Synopsis

This course will expose the students on the process of conducting academic research in order to provide the skills and ability in carrying out research project in the area of their study. The covered areas for Final Year Project 1 are: (i) problem background, (ii) problem statement, (iii) research objectives, (iv) research questions, (v) research framework, (vi) literature reviews, and (vii) research methods.

Course Outcomes

CO 1: Identify problems/issues/incidences, research objectives/ questions, appropriate literature and research methods

CO 2: Relate problems/issues/incidences with research objectives, research questions and literatures

CO 3: Prepare research proposal comprising research problem, Ros, RQs, literature review and research methods

BPS 3623

Air Pollution Control Technology

Credit: 3 credits

Prerequisites: None

Course Synopsis

The topics in this course discuss several important aspects of air pollution that include classification and sources of air pollutants, their effects on human, vegetation and material. Sampling methods, pollution

control and air quality management system will be discussed.

Course Outcomes

CO 1: Understand the terminologies, theories and principle of air pollution control technology.

CO 2: Understand the impacts and the risks of air pollution towards human health and environment.

CO 3: Understand the meteorological concept and its application in air pollution studies.

CO 4: Identify the specific air pollutants and its control technology.

CO 5: Apply proper air pollutants sampling methods for air quality monitoring.

BPS3713

BUSINESS CONTINUITY PLAN

Credit: 3 credits

Prerequisites : NONE

Course Synopsis

This course is an extension with details regarding to emergency preparedness and response where it provides a foundation and guide to coordinated organizational emergency recovery during and after a disruptive occurrence. The best practices for planning and maintaining Business Continuity Management (BCM) programs is introduced to students where knowledge of these practices are essential to managers and planners of small companies, large corporations and public agencies in order to keep their organizations running after major disruptive events. The recovery time and recovery point objectives (RTO and RPO) also covered.

Course Outcomes

CO 1: Conduct Business Continuity Management programme and exercise at workplace based on applicable standards.

CO 2: Carry out Risk Analysis and Business Impact Analysis to determine business continuity strategies.

CO 3: Adapt industrial best practices of the Business Continuity Management as part of disaster risk reduction.

BPS4514

Final Year Project II

Credit: 3 credits

Prerequisites: BPS 3512 Final Year Project I

Course Synopsis

This course will expose the students on the process of conducting academic research in order to provide the skills and ability in carrying out research project in the area of their study. The covered areas for Final Year Project II are: (i) development of research instruments for data collection, (ii) carrying out data collection, (iii) analyzing data collected, (iv) interpreting data, (v) writing reports.

Course Outcomes

CO 1: Develop research instruments
 CO 2: Analyze collected data using research instruments that has been developed
 CO 3: Prepare Final Year Project report comprising research problem, Ros, RQs, literature review, research methods, data analysis and conclusions

**BPS 4313
 PROCESS SAFETY AND LOSS PREVENTION**

Credit: 3 credits
Prerequisites: BPS 1353 Hazard Recognition and Risk Management

Course Synopsis

This course presents the principles and methodology for Process Safety Management (PSM) in chemical and process based industries. In particular, it emphasizes on Process Hazard Analysis (PHA). The implementation of PSM also will be explained to students. Loss prevention systems such as relief system, emergency shutdown system, toxic release suppression, explosion prevention and safety instrumented system will also be discussed. Students also will be trained on major hazard management based on major accident case studies.

Course Outcomes

CO 1: Conduct Process Hazard Analysis (PHA) to determine process hazards.
 CO 2: Apply process loss prevention systems to reduce process risks.
 CO 3: Adapt Process Safety Management (PSM) and major hazard management as part of industrial disaster risk reduction.

**BPS4323
 OCCUPATIONAL SAFETY AND HEALTH
 MANAGEMENT SYSTEM**

Credit: 3 credits
Prerequisites :BPS 1313 Occupational Safety And Health Fundamentals

Course Synopsis

This course will expose the candidates to the latest and existing Occupational Safety and Health Management System (OSH-MS), the evolution and the elements in the systems that cater current requirement in OSH. The course also introduces the concepts, relationships and principles of managing the OSH function and the development of training procedures and practices to integrate that function into the organization.

Course Outcomes

CO 1: Apply the PDCA cycle and OSH-MS models based on recognized standards.

CO 2: Analyse all phase in OSHMS ; policy, hazard and risk analysis, compliance of legal and other requirements, objectives and programmes.
 CO 3: Communicate ideas professionally in relation to Occupational Safety and Health Management System.

**BPS 4713
 CONSTRUCTION SAFETY**

Credit: 3 credits
Prerequisites : NONE

Course Synopsis

This course is designed for persons who work in the construction industry. This course will provide all members with greater safety in construction field particularly referred to construction safety awareness. It is also designed to increase their confidence in the action to take in case of any emergencies. The stages of construction and most of the building process within the life cycle of a building will be elaborated. All the relevant document and acts particularly relating to Malaysia scenario are among the important references that will be discussed along with the sequence of building construction. Building materials Students are expected to venture into a general safe working practices at construction site and able to supervise the total environment as a free accident area.

Course Outcomes

CO 1: Identify the hazardous materials, substances and unsafe practices at construction industry.
 CO 2: Assess the level of risk and safety of work places compliance to the national safety regulation.
 CO 3: Outline a proposal to enhance and increases a safer work practices in construction industries.

**BPS 2623
 SOLID WASTE MANAGEMENT**

Credit: 3 credits
Prerequisites : NONE

Course synopsis

This course introduces the students to elements of solid waste management systems, which include generation, on-site handling, collection, transportation, treatment and disposal. Aspects to be discussed include methods of waste classification, categorization and listing, handling of waste at source, collection and transportation of waste, waste treatment technologies including waste minimization and recycling, and final disposal technologies. Current and legal issues on solid waste management both from local and international perspectives will also be discussed.

Course Outcomes

CO 1: Explain elements in solid waste management and characteristics of solid waste

CO 2: Propose suitable technology of managing the solid waste that are available within the national and international practices

CO 3: Demonstrate their ability to work in team either as leader or ordinary member

BPS 2633

MARINE & OFFSHORE SAFETY

Credit: 3 credits

Prerequisites : NONE

Course Synopsis

This course introduces student to Health, Safety and Environment (HSE) principles and practices in marine and offshore operations particularly in oil and gas industry. Marine and offshore safety covers upstream operations which include exploration, drilling, completion, production and transportation. The lifecycle of this industry will be covered from engineering, procurement, construction, hook-up, installation, commissioning, operation, maintenance and decommissioning. Topics include legal requirements, type of hazards, accident cases, safety management and technical aspects. Discussion personnel safety and process safety issues will be emphasized. Safety Analysis tool such as Hazard Identification (HAZID) Analysis and Bow Tie Analysis will be introduced. Applicable international standards and codes such as International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), Safety International Convention for the Safety of Life at Sea (SOLAS), 1974 and International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM) and International Ship and Port Facility Security Code (ISPS) will be exposed to students.

Course Outcomes

CO 1: Explain concept of hazard, risk and safety applied in marine and offshore operations.

CO 2: Analyze marine and offshore hazards using modern tools and data analysis methods.

CO 3: Adapt best practices in implementing safety management systems for marine and offshore industrial sector.

BPS 2643

ROAD & TRANSPORTATION SAFETY

Credit: 3 credits

Prerequisites : NONE

Course Synopsis

This course introduces student to Health, Safety and Environment (HSE) principles and practices in land transportation and aviation sectors. Land transportation sectors cover road and railway while for aviation cover flight and ground airside safety. Topics include regulatory requirements, type of hazards, accident cases, technical aspects and Safety Management System (SMS). The discussion on personnel and

technical safety issues will be emphasized. Safety Analysis tool such as Fault Tree Analysis (FTA) and Failure Mode and Effect (FMEA) Analysis will be introduced. Applicable international standards from such as Federal Railway Administration (FRA), National Transportation Safety Board (NTSB) and International Civil Aviation Organization (ICAO) will be exposed to students.

Course Outcomes

CO 1: Explain concept of hazard, risk and safety applied in land transportation and aviation operations.

CO 2: Analyze land transportations and aviation hazards using modern tools and data analysis methods.

CO 3: Adapt best practices in implementing safety management systems for land transportation and aviation sector.

BPS 2653

RADIATION SAFETY AND NUCLEAR SAFETY

Credit: 3 credits

Prerequisites : NONE

Course Synopsis

This introductory course in the fundamentals of radiation and nuclear safety intended to meet the requirements required of all employees who receive, or might receive, a health care related occupational exposure while working in or near a controlled / restricted area. The course focuses on the need for every employee, both radiological workers and non-radiological workers, to play an active role in maintaining exposures to radiation and radioactive materials within regulatory limits and in compliance with regulatory control such as The International Basic Safety Standards for Protection Against Ionizing Radiation and for Safety of Radiation (BS), IAEA Safety Series no 115 (1996), Atomic Energy Licensing Act 1984 (Act 304). Topics include Fundamentals of Radiation and Radioactivity, Radiation Biology, Radiation Dose Limits and ALARA, Personnel Monitoring and others

Course Outcomes

CO 1: Interpret the fundamental of radiation and nuclear safety in the workplace

CO 2: Classify risks associated with radiation, radioactivity and radiation exposure among workers exposed to radiation.

Co 3: Adapt the best practices to meet desired safety and health for workers exposed to radiation within the considerable of economic, social, political and sustainability.

BPS 2663

WASTEWATER TREATMENT TECHNOLOGY

Credit: 3 credits



Prerequisites : NONE

Course Synopsis

This course gives the students exposure to the physical, biological and chemical processes that are used in the treatment of wastewater. Examples of the use of these processes in the manufacturing sector and agriculture including low waste zero discharged technology will be discussed. The environmental laboratory is introduced to students the important of scientific analysis of the wastewater as part of environmental impact assessment. This is to curb the damaged done to the purity of water and to be able to reduce the level of pollution into the surrounding living space particularly involving the quality of river.

Course Outcomes

- CO1: To apply scientific knowledge of the wastewater treatment technology in order to control level of pollution in the environmental
- CO2: To analyse and interpret the level of pollution that exists within the specify sample of wastewater analytically
- CO3: To communicate the importance of wastewater treatment technology theoretically and analytically with the safety, health and environmental issue

CO 5: Perform assigned task proficiently as required by industrial training supervisor

**BPS 4534
INDUSTRIAL TRAINING REPORT
Credit: 8 credits
Prerequisites: BPS 4538 Industrial Training**

Course Synopsis

During the placement, students are expected to keep a log book, in which they make regular entries describing the work they are undertaking. Then Students need to provide industrial training report to describe their technical and personal development during their placement. The industrial training report need to hand in to the university supervisor for evaluation. Students need to do presentation as well at the end of their placement for assessment.

Course Outcomes

- CO 1: Organize systematically the industrial training knowledge, experience and skill in the preparation of the industrial training report
- CO 2: Demonstrate technical writing skill in preparing the industrial training report
- CO 3: Present the details of industrial training experience to both university and industrial supervisor

**BPS 4538
INDUSTRIAL TRAINING
Credit: 8 credits
Prerequisites : All subjects**

Course Synopsis

This course aims to give chances for the student to practise and apply their knowledge and skills that they gain during their study. During the placement, we expect students to keep a log book, in which they make a regular entries describing the work they are undertaking. Student are supervised by industrial and university supervisors to guide and ensure they can do their work as good as possible and achieve the objective for this course.

Course Outcomes

- CO 1: Adapt working culture and regulation as occupational safety and health practitioner in related industry
- CO 2: Demonstrate skills by applying the theory learned for real problem solving in organization
- CO 3: Support others in organization performing the task given
- CO 4: Express interpersonal skills and professional ethics in organization

COURSE STRUCTURE

BACHELOR OF ENGINEERING TECHNOLOGY (ELECTRICAL) WITH HONOURS

CORE FACULTY

BTU1112

Physics Laboratory

Credit: 2

Prerequisites: None

Synopsis

This laboratory introduces the students with the application of physics concept in engineering devices such as Free Fall, Bernoulli's Law, Hydrostatic Pressure And Electric Field. The concepts of physics introduced related in mechanics or dynamics motion and basic concepts of electrical area. The students will learn how to run the experiment with referring the basic concepts of physics during the lab hours.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application
- CO 2 Demonstrating skills in logical thinking in handling equipment.
- CO 3 Applying basic physics concepts to problem solving
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1113

Physics

Credit: 3

Prerequisites: None

Synopsis

This course introduces a fundamental of physics. It covers unit and measurements, kinematics, forces and Newton's law of motion, statics equilibrium, work, energy and power, fluid mechanics, electric and magnetism

Course Outcome

- CO 1 Understand the basic concepts, theories and principles of physics in engineering application
- CO 2 Solve physics problems such as in kinematics, forces and static equilibrium
- CO 3 Discuss physics quantity such as work, energy and power in a team
- CO 4 Applying basic laws to solve fluid, electrical

and magnetism problems

BUM1113

Technical Mathematics

Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Student are exposed to complex number, functions and graphs, trigonometric functions, analytic geometry, polar coordinates, 3 dimensional spaces and vector. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Apply appropriate mathematics concepts to solve various technological problems.
- CO 2 Use appropriate software and tool to solve the graphical and computational problems in mathematics
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
- CO 4 Relate and applied the concepts and methods studied into other courses.

BUM1223

Calculus

Credit:3

Prerequisites: None

Synopsis

This course discusses Differentiation and applications, techniques of integration and applications, numerical integration and Taylor polynomial, Taylor Series & Maclaurin Series.

Course Outcome

- CO 1 Understand the fundamental concepts of the calculus and connect them with the real world problem.
- CO 2 Solve any related problem involving differentiation and integration.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.
- CO 5 Attain computational facility in differential and integral calculus.

BUM2113

Applied Mathematics

Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses Partial Derivatives, Double Integrals, First Order Differential equations and Second Order differential equations.

Course Outcome

- CO 1 Analyze and apply the knowledge of Multiple Integrations to solve various science and engineering problems.
- CO 2 Analyze and solve various differential equation problems by using the basic principles and methodologies of First Order differential equations and Second Order differential.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.

BTE2313

Computer Programming

Credit: 3

Prerequisites: None

Synopsis

Fundamental principles and concepts of C++ programming, with definitions of data, expressions, control-flow constructions, functions, input and output and preprocessing. Basic problem solving and programming techniques, structured programming ideas, fundamental algorithms and data structures (array).

Course Outcome

- CO 1 Construct computer programs using C++ language
- CO 2 Develop appropriate programming techniques and program control structures
- CO 3 Display the ability to use IDE (Integrated Design Environment) for C++
- CO4 Propose an algorithm for a specific problem by implementing appropriate programming techniques.

CORE PROGRAM

BTE1122

Electrical Installation Workshop

Credit: 2

Prerequisites: None

Synopsis

This course introduces students to the single phase domestic wiring and installation. The students will learn about supply system, rules and regulation, wiring system and electrical protection system. They are also will practice in applying trunking and conduits for electrical wiring as well as doing fitting and installation of electrical system devices. Students need to construct the single phase domestic wiring and installation for lighting, socket outlet, fan and air conditioner. They are also will conduct inspection and testing on their wiring and installation as safety confirmation and fulfil the regulations.

Course Outcome

- CO 1 Interpret rules and regulation for electrical wiring comprising of cable selection and load calculation
- CO 2 Construct single phase electrical installation for domestic wiring using suitable wiring tools and accessories
- CO 3 Perform inspection and testing in electrical wiring and installation.
- CO4 Apply ethical principles and safety in electrical wiring installation

BTE1112

Electrical Fundamentals Laboratory

Credit: 2

Prerequisites: None

Synopsis

This course introduces students to the fundamentals laboratory of DC and AC circuits and basic network laws and theorems. The students will be handling the basic measurement equipment to measure and analyse the parameter of the electrical circuits.

Course Outcome

- CO 1 Construct simple electrical and electronics and simulate the operation of the circuits using circuit simulation software (OrCAD).
- CO 2 Measure parameter of electrical circuits (resistance, voltage, current, etc)
- CO 3 Work ethically and effectively as an individual and in a group

BTE1113

Electrical Fundamentals

Credit:3

Prerequisites: None

Synopsis

This module will introduce students to basic science of electricity, introduction to instrumentation and measurement, work and energy theorem, basic electrical circuits and introduction to magnetism.

Course Outcome

- CO 1 Describe the basic concept of electricity, conductors, insulators, circuit, magnetism and other devices.
- CO 2 Apply basic electrical laws such as Ohm and Kirchoff Law to solve circuit or electrical problems.
- CO 3 Shows the ability to communicate effectively.

BTE1313

Instrumentation & Measurements

Credit:3

Prerequisites: None

Synopsis

This course introduces students to the principles of instrumentation and measurements, determination of error that caused by the meters. The students will be exposed to the architecture and the operation of DC and AC meters, oscilloscope, signal generator, storage instrument and display devices, analysis of DC and AC meters and introduction to signal conditioning.

Course Outcome

- CO 1 Explain the basic concept of Instrumentation & measurement system including the operation, calibration and calculation
- CO 2 Solve problems regarding AC & DC meters, oscilloscope and signal generator
- CO 3 Construct the operation of meters, measuring devices or signal conditioning circuits into trainer board and interpret the experimental results into report.
- CO4 Understand the functional role of individual towards task accomplishment

BTE2222

Circuit Analysis I Laboratory

Credit:2

Prerequisites: BTE1212

Synopsis

This course introduces the basic concepts and engineering methods of DC circuit analysis. It is also introduce the concept of AC circuits. The contents include Ohm's Law, Kirchoff's Law, series and parallel

circuits, Mesh and Nodal analysis, superposition theorem, Thevenin and Norton equivalent of a complex circuit, Measure capacitance, measure capacitor charge and discharge times, RL, RC circuits, phase difference, measure power in a single phase circuit and responses of basic First Order circuits.

Course Outcome

- CO 1 Build various electrical circuits and properly use lab equipment to measure, analyse and troubleshoot the circuits. [PO1]
- CO 2 Solve the DC circuit problems using nodal analysis and mesh analysis, Thevenin and Norton equivalent and evaluate the most efficient methods among them. Also introduce the concept of AC [PO2, PO5]
- CO 3 Write lab reports in proper format to report work clearly and concisely.
- CO 4 Demonstrate the role of individual in team to achieve task completion.

BTE2223

Circuit Analysis I

Credit:3

Prerequisites: BTE1213

Synopsis

This course introduces the engineering methods of DC circuit analysis. The contents include Mesh and Nodal analysis, Source Transformation, and 4 main network Theorems: Superposition, Thevenin, Norton and Maximum Power Transfer theorems. It also includes the basic of DC transients in capacitors and inductors. Introduction to AC fundamentals and impedance concept of RLC circuits are also covered.

Course Outcome

- CO 1 Analyse DC circuit problems using various methods of DC Analysis and Network Theorems
- CO 2 Describe the effects of DC transients on capacitors and inductors, and to relate them with electromagnetism concept
- CO 3 Examine the AC (current and voltage) characteristics, and the concept of impedance in R,L,C circuits
- CO 4 Describe the real industrial practice.

BTM1114

Basic Manufacturing Process

Credit:4

Prerequisites: None

Synopsis

This course intended to introduce to materials, techniques, and equipment of industrial manufacturing. Emphasis on laboratory demonstration and simulation activities such as machining, welding, casting, and forming operations.

Course Outcome

- CO 1 Explain the structure and properties of basic engineering materials and their relationship to manufacturing.
- CO 2 Describe the fundamental equipment and processes employed in common manufacturing operations.
- CO 3 Identify process parameters and how they affect the manufacturing processes.

BTE2232
Circuit Analysis II Laboratory
Credit:2
Prerequisites: BTE2222

Synopsis

This course provides the basic concepts and engineering methods of AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, Filters, Bridges and Balanced 3-phase circuits are also covered.

Course Outcome

- CO 1 Apply and validate circuit analysis theorems in ac circuits. [PO1, P2]
- CO 2 Identify simple first-order filters and determines the resonant frequency and bandwidth for series/ parallel resonant circuits. [PO4, P3]
- CO 3 Identify the functions and applications of transformers and introduce the Non-sinusoidal Waveforms and the 3 phase concept. [PO2, P4]

BTE2233
Circuit Analysis II
Credit:3
Prerequisites: BTE2223

Synopsis

This course provides the basic concepts and engineering methods of AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, Filters,

Bridges and Balanced 3-phase circuits are also covered.

Course Outcome

- CO 1 Determine impedance, voltage, current and other basic values for ac circuits.
- CO 2 Apply circuit analysis theorems in ac circuits.
- CO 3 Identify simple first-order filters and determines the resonant frequency and bandwidth for series/ parallel resonant circuits.
- CO4 Identify the functions and applications of transformers and introduce the Non-sinusoidal Waveforms and the 3 phase concept.

BTM1614
Computer-Aided Drafting
Credit:4
Prerequisites: None

Synopsis

This subject is designed to introduce to the students the principle of computer-aided design. Topics includes Drafting Overview, Drawing Set-up , Basic CAD ,Commands Geometric Construction , Orthographic Projection , Basic Drawing ,Tools, Pictorial Drawings, Sectional Views, Advance CAD Commands, Modifying CAD,Drawings, Dimensioning, Tolerances, Working Drawings, Threads and Fasteners

Course Outcome

- CO 1 Analyze problem in technical drawing and understand drawing
- CO 2 Use basic geometric construction techniques to create objects in CAD
- CO 3 Project a 3 dimensional object in 2 dimensional space with the proper utilization of views in CAD
- CO 4 Read & create dimensioned drawings using conventional techniques in CAD.
- CO 5 Identify and understand the components of working drawings & the standards that apply.

BTM3234
Manufacturing Computer Application
Credit:4
Prerequisites: BUM1113

Synopsis

Overview of computer hardware, software, and processing concepts related to the control of manufacturing tasks. Emphasis on use of integrated

software packages in the solution of a variety of manufacturing problems. Laboratory assignments in automation control, real time data sampling, and creation of user interfaces.

Course Outcome

- CO 1 Apply software development for technology problem solving.
- CO 2 Perform adaptive programming skills for more diverse application environment.

BTE2112

Analog Electronics Laboratory

Credit:2

Prerequisites: None

Synopsis

Diode characteristics, Half wave and full wave rectifiers, Zener characteristics, Zener Voltage regulators, BJT characteristics, CE amplifier, MOSFET characteristics, CS amplifier.

Course Outcome

- CO 1 Measure electronics devices characteristics.
- CO 2 Construct electric circuits. Use lab equipment and Measure Electronics parameters in this circuits.
- CO3 Build and simulate the operation of electric circuit.

BTE2113

Analog Electronics

Credit:3

Prerequisites: None

Synopsis

The P-N Junction Diode, Diode Applications, Bipolar Junction Transistors (BJT), DC Biasing of the BJT Amplifier, Transistor Modelling, Cascade Amplifier, Small-Signal BJT Amplifier, Metal-Oxide-Semiconductor FET (MOSFET), MOSFET Amplifier, Frequency Response of BJT and FET Amplifiers.

Course Outcome

- CO 1 Understanding the electronics devices (Transistors, Op-Amp) theories.
- CO 2 Analysing the electronics circuits.
- CO3 Designing the electronics circuits.

BTE3222

Digital Logic Design Laboratory

Credit:2

Prerequisites: None

Synopsis

Laboratory experiments on digital circuits design and verification, using various digital circuit components. Combinational design techniques as well as sequential design techniques are presented with the use of Karnaugh mapping, state transition diagrams and tables.

Course Outcome

- CO 1 To demonstrate the applications of digital logic simplification techniques
- CO 2 Apply basic gates, flip flops and digital circuit
- CO 3 Construct and analyse logic system, counter, decoder, memory devices and multiplexer.
- CO 4 Demonstrate the report writing skills in technical field
- CO 5 Work in a team and communicate effectively

BTE3223

Digital Logic Design

Credit:3

Prerequisites: None

Synopsis

This course emphasizes on the fundamental of digital electronics. The student is first taught about the number system and logic gates before introducing them to digital IC technology. Then they are exposed to both combinational logic network and combinational logic. In concurrence with this, the fundamental of sequential logic, flip-flop, counter and shift register will be taught. Finally, the memory devices are introduced.

Course Outcome

- CO 1 Apply various techniques for digital logic simplification
- CO 2 Apply basic gates, flip flops and various basic digital circuit
- CO 3 Analyse logic system, counter, decoder, memory devices and multiplexer

BTE3142

Electrical Machines and Transformers Laboratory

Credit:2

Prerequisites: None

Synopsis

This course introduces the fundamental concepts and principles of transformer and various types of electrical machines. It is intended for students to understand fundamental aspects of rotating electrical machines. The first part of the course is a quick review of some electromagnetism fundamental while the following will deal with the transformers and different types of electrical machines.

Course Outcome

- CO 1 Describes the basic principles of selected electrical machines.
- CO 2 Displays the transformer and machines equivalent circuits and the operating conditions for electrical machines under steady state conditions
- CO 3 Construct driver circuit for DC and AC motor
- CO 4 Justify the importance of electrical machines and impacts to the Load.
- CO 5 Measure, Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines.

BTE3143

Electrical Machines and Transformers

Credit:3

Prerequisites: None

Synopsis

This course introduces the fundamental concepts and principles of transformer and various types of electrical machines. It is intended for students to understand fundamental aspects of rotating electrical machines. The first part of the course is a quick review of some electromagnetism fundamental while the following will deal with the transformers and different types of electrical machines.

Course Outcome

- CO 1 Analyze the transformer and machines equivalent circuits and the operating conditions for electrical machines under steady state conditions.
- CO 2 Construct driver circuit for DC and AC motor
- CO 3 Justify the importance of electrical machines and impacts to the environment.
- CO 4 Measure, Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines.

BTE3232

Communication System Design Laboratory

Credit:2

Prerequisites: BTE2232

Synopsis

This course introduces theories in the area of communication systems. Topics covered include the basic elements of communications, signal analysis, amplitude modulation

Course Outcome

- CO 1 Demonstration of various components of electronic communication system.
- CO 2 Demonstrate the understanding of signal generation using available integrated circuits.
- CO 3 Demonstrate the understanding of various type of modulation and demodulation process.
- CO 4 Work in a team effectively as an individual and in a group

BTE3233

Communication System Design

Credit:3

Prerequisites: BTE2233

Synopsis

This course introduces theories in the area of communication systems. Topics covered include the basic elements of communications, signal analysis, type of oscillators, amplitude modulation and angle modulations, as well as single-sideband communication systems.

Course Outcome

- CO 1 Interpret the basic concept and understanding in communication design system.
- CO 2 Analyse and differentiate various type of modulation and demodulation techniques
- CO 3 Measure the parameters for various types of modulation and demodulation
- CO 4 Work in a team effectively as an individual and in a group

BTE3252

Microprocessor and Interfacing Laboratory

Credit:2

Prerequisites: None

Synopsis

This course is an introduction to microprocessors. Students are exposed to the internal architecture of the microprocessor, various instruction sets, and basic hardware design of microprocessor-based.

Course Outcome

- CO 1 Explain the architecture of the microprocessor system and its interface [PO1 P2]
- CO 2 Manipulates the M68000 instruction sets [PO3, P4, CTPS4]
- CO 3 Develop a program in a microprocessor system by using an assembly language [PO3, P5, CTPS5]
- CO 4 Design and build a simple hardware based on the M68000 processor [PO11, P7, CTPS 4]

BTE2413

Electrical Power System

Credit:3

Prerequisites: BTE3142 & BTE3143

Synopsis

This course introduces the fundamental of electrical power system which are the overview of power system, generation, transmission lines, distribution, representation of components, basic power system analysis.

Course Outcome

- CO 1 Compute load factor and load demand [PO1, C4].
- CO 2 Determine the cost of electricity using the basic concept of electricity tariff and energy efficiency [PO1, C4].
- CO 3 Develop the component representation of any balanced three phase power system using per-unit system [PO2, C5].
- CO 4 Measure and calculate the performances of power transmission lines [PO3, P4, CTPS3].
- CO 5 Work in team effectively [PO8, A3, TS3, and LS2].

BTE3254

Microprocessor and Interfacing

Credit:4

Prerequisites: None

Synopsis

This course in an introduction to a microprocessor. Students are exposed to the internal architecture of the microprocessor, various instruction sets, and basic hardware design of microprocessor-based.

Course Outcome

- CO 1 Illustrate the architecture of the microprocessor system and its interface [PO1 C3]
- CO 2 Interpret the M68000 instruction sets [PO1 C8]
- CO 3 Develop a program in a microprocessor system by using an assembly language [PO2 C5]
- CO 4 Design and build a simple hardware based on the M68000 processor [PO11, P7, CTPS 4]

BTE3322

Control System Laboratory

Credit:2

Prerequisites: None

Synopsis

This course introduces students to the control system technology, mathematical models of feedback systems. The students will be exposed to transient and steady-state analysis, root locus, frequency response and analysis design of compensator.

Course Outcome

- CO 1 Explain fundamental concept of control systems. [PO3, P2]
- CO 2 Display mathematical model and transfer function of physical systems. [PO2, P5]
- CO 3 Measure control system performance in terms of transient and steady-state of a linear time invariant systems. [PO3, P5]
- CO 4 Alter a compensator to meet specifications in frequency domain. [PO4, P6]
- CO 5 Utilize Computer aided tools for control system analysis and design. [PO10, A4, LL3]

BTE3323

Control System

Credit:3

Prerequisites: None

Synopsis

This course introduces students to the control system technology, mathematical models of feedback systems. The students will be exposed to transient and steady-state analysis, root locus, frequency response and analysis design of compensator.

Course Outcome

- CO 1 Acquire fundamental concept of control systems.
- CO 2 Derive and manipulate mathematical model and transfer function of physical systems.
- CO 3 Analyze control system performance in terms of transient and steady-state of a linear time invariant systems.
- CO 4 Design a compensator to meet specifications in frequency domain.
- CO 5 Utilize Computer aided tools for control system analysis and design.

BTE3813
Engineering Technology Senior Design I
Credit:3
Prerequisites: None

Synopsis

This course is designed to expose the students to a senior design project. They have to apply all the knowledge that they have learned in the programme to complete the senior design project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the senior design project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcome

- CO 1 Propose background study, problem statement, objective and scopes of the research
- CO 2 Practice positive attitude in research activities
- CO 3 Present the research proposal and cited latest publications on the subject

BTM3514
Computer Integrated Manufacturing
Credit:4
Prerequisites: None

Synopsis

Three basic themes will be stressed throughout the course. First, developing manufacturing strategy involves considering factors beyond the traditional boundaries of the manufacturing function. Such factors include the overall competitive position of the firm, the

nature of market demand, competitor's actions, government regulations, and so on. Second, there is a strong linkage between a firm's competitive strategy and its manufacturing strategy. If this linkage is maintained, operations can become a formidable competitive weapon. If this linkage is neglected, even the best-designed strategies can fail. Finally, the course will consider manufacturing strategy issues in an integrative manner by developing the interrelationship between operations, finance, accounting, and marketing.

Course Outcome

- CO 1 List components of a computerized integrated manufacturing environment.
- CO 2 Explain various automation techniques currently used in industry.
- CO 3 Develop a systematic plan for manufacturing strategy implementation
- CO 4 Develop a systematic plan for manufacturing strategy implementation required for a selected product.
- CO 5 Model enterprise manufacturing and automation strategies that respond to national and global manufacturing demands.

BTE4743
Power Electronics
Credit:3
Prerequisites: BTE2112 & BTE2113

Synopsis

The primary objective of the course is to give students a foundation of knowledge, understanding, analysis and design of power electronics circuits for conversion and control of electrical energy. The course presents concepts, fundamentals analysis tools, practical consideration for design, and a range of power electronics applications. Practical experiments in the laboratory will also be conducted. Students will be exposed to the power converters, PWM switching techniques, DC and induction motor drives.

Course Outcome

- CO 1 Investigate switching characteristics of basic solid state power devices, operating principles, advantages and disadvantages of basic power electronic technologies
- CO 2 Analyse characteristics parameters and evaluate the operation of power electronic converter topologies
- CO 3 Construct power electronic converters to meet functional objectives
- CO 4 Construct electrical drives using electronic converter

BTE4826

Engineering Technology Senior Design Project II

Credit:6

Prerequisites: BTE3813

Synopsis

This subject is the continuation of the subject Engineering Technology Senior Design Project I. In this course, the students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, the students are required to produce a design project report and present it to faculty's evaluation panel.

Course Outcome

- CO 1 Analyze data, discuss and conclude the findings
- CO 2 Manage the research work
- CO 3 Practice positive attitude in research activities
- CO 4 Present the research report and cited latest publications on the subject

BTU4912

Industrial Training

Credit:12

Prerequisites: All Subject

Synopsis

In Industrial Training the students should gain insight into industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo and industrial training for a certain period that has been agreed by the faculty during last semester of the academic year. The performance of each student during the periods of his/her industrial training is evaluated by the faculty staff, and the representatives from employer organization.

Course Outcome

- CO 1 Show and classify in-depth the industrial structure and organization and to understand roles of typical personnel in that particular industry.[PO2,C3]
- CO 2 Manipulate the knowledge learned in the university and to practice them in problem solving direct or indirect application to any design, planning, production or management .[PO3,P5,CTPS3]
- CO 3 Practice the professionalism and work etiquette that comply to good and responsible engineer.[PO6,A5,EM2]

- CO 4 Demonstrate management/leadership skills to lead or manage effectively in a industry environment. [PO8,A3,TS3]
- CO 5 Demonstrate the knowledge and ability to search and retrieve information and materials related to the industrial needs. [PO10,A3,LL2]
- CO 6 Arrange and display data and relevant information with a systematic approach.[PO6,A4,EM3]
- CO 7 Explain and organize the industrial training experience through written communication.[PO7,P5,CS4]

ELECTIVE COURSES

BTE4713

Programmable Logic Controller

Credit:3

Prerequisites: BTE3223 & BTE3222

Synopsis

Basic concepts and skills needed to install, program, and apply programmable electronic controllers in industry. Discrete and analog input/output (I/O) devices and ladder logic will be studied, including basic and intermediate PLC functions. Experiments in operation, programming, and industrial applications with emphasis on discrete I/Os

Course Outcome

- CO 1 Analyze the functions of hardware component of programmable logic controllers and PLC programming
- Co 2 Design proficiency in ladder logic by applying programming skills to implement industrial applications
- CO 3 Varies a program to operate the manufacturing application
- CO 4 Display problems in industrial applications requiring PLCs by troubleshooting hardware and software

BTE4723

Advanced Electronics Circuits

Credit:3

Prerequisites: BTE2112 & BTE2113

Synopsis

Digital to Analog and Analog to Digital Converter Circuits, Class C Amplifier circuit, MOSFET Amplifiers and Switching Circuits, MOSFET DIGITAL SWITCHING circuits, Thyristors circuits and APPLICATIONS, Special-Purpose Op-Amp Circuits, Oscillators circuits, IC Voltage Regulators circuits, and Electronics sensing circuits

Course Outcome

- CO 1 Solve advanced electronics circuit problems
- CO 2 Design the advanced electronics circuits
- CO 3 Build practically advanced electronic circuits
- CO 4 Examine the operation of advanced electronic circuit using software tools (EWB)

BTE4733

Sensor Technology

Credit:3

Prerequisites: BTU1113

Synopsis

This module will introduce students to the structural and functional principles of sensors used for various physical and derived quantities and how to use them to measure these quantities.

Course Outcome

- CO 1 Analyze the principles and operation of how different sensors work
- CO 2 Evaluate different type of sensors and modalities are appropriate for different applications
- CO 3 Conduct various measurements using different types of sensors
- CO 4 Choose potential sensor for environment detection and monitoring

CURRICULUM STRUCTURE

BACHELOR OF ENGINEERING TECHNOLOGY (ENERGY AND ENVIRONMENTAL) WITH HONOURS

CORE FACULTY

BTU1112

Physics Laboratory

Credit:1

Prerequisites: None

Synopsis

This laboratory introduces the students with the application of physics concept in engineering devices such as Free Fall, Bernoulli's Law, Hydrostatic Pressure And Electric Field. The concepts of physics introduced related in mechanics or dynamics motion and basic concepts of electrical area. The students will learn how to run the experiment with referring the basic concepts of physics during the lab hours.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application
- CO 2 Demonstrating skills in logical thinking in handling equipment.
- CO 3 Applying basic physics concepts to problem solving
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1113

Physics

Credit:4

Prerequisites: None

Synopsis

This course introduces a fundamental of physics. It covers unit and measurements, kinematics, forces and Newton's law of motion, statics equilibrium, work, energy and power, fluid mechanics, electric and magnetism.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application
- CO 2 Solve problems in kinematics, forces and static equilibrium
- CO 3 Solve problems in work, energy and power, fluids, electricity & magnetism
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1212
Chemistry Lab
Credit:3

Prerequisites: None

Synopsis

In chemistry laboratory the students are responsible to conduct the basic physical, organic and analytical chemistry experiments such as solubility, miscibility, chemical equilibrium, buffer and pH changes, calorimetry, solvent extraction, gravimetric, UV-VIS spectrometer, FTIR, DSC and gas chromatography. At the end of experiments, the students should be able to inculcate the critical thinking and able to work in safe working condition.

Course Outcome

- CO 1 Apply physical, organic & analytical chemistry theory in laboratory
- CO 2 Apply the basic science and analytical chemistry knowledge in operation of analytical chemistry equipment.
- CO 3 Able to demonstrate and operate each analytical equipment base on the theories applied in analytical chemistry
- CO 4 Able to indicate any minor/major malfunction of equipment, incorrect step/ result & troubleshoot it

BTU1213
Chemistry
Credit:3

Prerequisites: None

Synopsis

Development of the fundamental principles and concepts of chemistry by lecture-demonstration, as well as the development of an appreciation of the nature of chemistry as a science. An historical development of the most important concepts and ideas. Methods and limitations of chemistry, its evolution and discussions of the problems currently being solved and created

Course Outcome

- CO 1 Apply the basic knowledge about physical, inorganic and analytical chemistry.
- CO 2 Relate chemical concept and principles while presenting a broad range of topic in a clear and concise manner.
- CO 3 Develop problem solving and critical thinking skills on general chemistry.

BUM1113
Technical Mathematics
Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Student are exposed to complex number, functions and graphs, trigonometric functions, analytic geometry, polar coordinates, 3 dimensional spaces and vector. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Apply appropriate mathematics concepts to solve various technological problems.
- CO 2 Use appropriate software and tool to solve the graphical and computational problems in mathematics
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in mathematics
- CO 4 Relate and applied the concepts and methods studied into other courses.

BUM2113
Applied Mathematics
Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses Partial Derivatives, Double Integrals, First Order Differential equations and Second Order differential equations.

Course Outcome

- CO 1 Analyze and apply the knowledge of Multiple Integrations to solve various science and engineering problems.
- CO 2 Analyze and solve various differential equation problems by using the basic principles and methodologies of First Order differential equations and Second Order differential.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.

BUM1223

Calculus

Credit:3

Prerequisites: None

Synopsis

This subject discusses Differentiation and applications, techniques of integration and applications, numerical integration and Taylor polynomial, Taylor Series & Maclaurin Series.

Course Outcome

- CO 1 Understand the fundamental concepts of the calculus and connect them with the real world problem
- CO 2 Solve any related problem involving differentiation and integration.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Attain computational facility in differential and integral calculus

CORE PROGRAM

BTE1113

Electric Fundamentals

Credit:3

Prerequisites: None

Synopsis

Fundamentals of DC and AC circuits, network laws and theorems, passive circuit components, semiconductors, electric machines, and digital systems

Course Outcome

- CO 1 Apply electricity fundamentals
- CO 2 Apply electronics fundamentals

BTE1112

Electric Fundamentals Lab

Credit:2

Prerequisites: None

Synopsis

Fundamentals laboratory of DC and AC circuits, network laws and theorems, passive circuit components, semiconductors, electric machines, and digital systems

Course Outcome

- CO 1 Apply electricity fundamentals
- CO 2 Apply electronics fundamentals

BTM2213

Thermodynamics

Credit:3

Prerequisites: BTU1213, BTU1112

Synopsis

This course focuses on the application of the thermodynamics knowledge in various engineering systems. The subject covers the review and analysis of energy, gas power cycles, vapour power cycles, refrigeration cycles, gas mixtures, gas-vapour mixture & air-conditioning and combustion.

Course Outcome

- CO 1 Evaluate the fundamentals of mass balance, 1st law, 2nd law of energy to identify, differentiate and solve engineering problem involving closed, open systems and unsteady-flow processes
- CO 2 Determine and sketch the properties of pure, simple compressible substances and ideal gases
- CO 3 Analyse the concept of heat, work and mass to the typical problems
- CO 4 Analyse the entropy changes problems for pure substances and ideal gas.

BTM3314

Computer-Aided Design

Credit:4

Prerequisites: None

Synopsis

This subject is designed to introduce to the students the principle of computer-aided design. Topics includes Drafting Overview, Drawing Set-up, Basic CAD, Commands Geometric Construction, Orthographic Projection, Basic Drawing, Tools, Pictorial Drawings, Sectional Views, Advance CAD Commands, Modifying CAD, Drawings, Dimensioning, Tolerances, Working Drawings, Threads and Fasteners

Course Outcome

- CO 1 Analyze problem in technical drawing and understand drawing
- CO 2 Use basic geometric construction techniques to create objects in CAD
- CO 3 Project a 3 dimensional object in 2 dimensional space with the proper utilization of views in CAD
- CO 4 Read & create dimensioned drawings using conventional techniques in CAD.
- CO 5 Identify and understand the components of working drawings & the standards that apply.

BTE2313

Computer Programming

Credit: 3

Prerequisites: None

Synopsis

This subject is designed to introduce to the students the principle of computer-aided design. Topics includes Drafting Overview, Drawing Set-up , Basic CAD ,Commands Geometric Construction , Orthographic Projection , Basic Drawing ,Tools, Pictorial Drawings, Sectional Views, Advance CAD Commands, Modifying CAD,Drawings, Dimensioning, Tolerances, Working Drawings, Threads and Fasteners

Course Outcome

- CO 1 Analyze problem in technical drawing and understand drawing
- CO 2 Use basic geometric construction techniques to create objects in CAD
- CO 3 Project a 3 dimensional object in 2 dimensional space with the proper utilization of views in CAD
- CO 4 Read & create dimensioned drawings using conventional techniques in CAD.
- CO 5 Identify and understand the components of working drawings & the standards that apply

BTM1113

Basic Manufacturing Process

Credit:3

Prerequisites: None

Synopsis

This course intended to introduce to materials, techniques, and equipment of industrial manufacturing. Emphasis on laboratory demonstration and simulation activities such as machining, welding, casting, and forming operations.

Course Outcome

- CO 1 Explain the structure and properties of basic engineering materials and their relationship to manufacturing.
- CO 2 Describe the fundamental equipment and processes employed in common manufacturing operations.
- CO 3 Identify process parameters and how they affect the manufacturing processes.

BTM2124

Machine Production Processes

Credit:4

Prerequisites: None

Synopsis

This course intends to provide detailed study of traditional and contemporary methods of metal machining. Laboratory experience includes the fundamentals of machine tool setup and operation, precision measurement techniques, and machine tool safety, care and maintenance.

Course Outcome

- CO 1 Develop basic machine tool processing knowledge, abilities and skills.
- CO 2 Expand machine tool processing knowledge, abilities and skills through experience with traditional process.
- CO 3 Complete assigned projects as directed within safety, planning and specifications consistent with items above
- CO 4 Demonstrate understanding of function and application of processes through examination and discussion and operation.
- CO 5 Provide study and understanding of non-traditional processes in manufacturing.

BTM1113

Environmental Technology

Credit: 3

Prerequisite: None

Synopsis

The study of environmental technology and environmental preventive and mitigation measures in the industries. Case studies and local environmental issues will be analysed to evaluate potentially adverse outcomes of environmental technology in relation to existing legislation (EPA, EQA 1974 & OSHA 1994, FMA 1967) and other existing public policies. The course will also address the human health and economic impact in the private sector.

Course Outcome

- By the end of semester, students should be able to:
- CO1 Outline the concept of environmental technology as well as environmental preventive and mitigation measures.
 - CO2 Integrate concept of environmental technology and environmental preventive and mitigation measures in few case studies and local environmental issues in Malaysia.
 - CO3 Recognize the needs for professional development in environmental and sustainability in the broad scope of industrial sector.

BTV1112

Environmental Technology Laboratory

Credit: 2

Prerequisite: None

Synopsis

This course will focus on environmental testing techniques, common environmental laboratory protocols, data analysis and reporting. Topics will cover the quality of water, wastewater, air, and noise through the use of modern tool equipment. Skills gained will be directly applicable to careers in environmental technology both in data collection and managing field assessments especially for industry. The course will provide an appreciation for the effort involved in environmental samples testing, and an ability to critically evaluate data from a sampling program.

Course Outcome

By the end of semester, students should be able to:

- CO1 Apply environmental related knowledge by performing field and lab scale experiments.
- CO2 Demonstrate the ability to use a variety of modern tools necessary for carrying out environmental monitoring and assessment.
- CO3 Perform environmental monitoring and assessment in a team.

BTV2223

Environmental Management System

Credit:3

Prerequisites: BTV2123

Synopsis

The demand for trained practitioners in environmental management system at the project level and related environmental management fields continues to grow. To meet this demand, this module provides an opportunity for specialist study in the principles of sustainability, international and national policy, approaches to valuing the environment, attitudes to conservation and the role of the public in environmental decision-making. The module emphasizes fieldwork or case studies.

Course Outcome

By the end of semester, students should be able to:

- CO1 Relate the systems and approaches of environmental management system which are being increasingly used in industry- Problem analysis.
- CO2 Monitor and improve environmental performance- Design/ development of solution
- CO3 Adapt and meet the challenge of sustainable development- Environment and sustainability

BTV3233

Solid And Scheduled Waste Management System

Credit: 3 credits

Prerequisites : None

Course synopsis

This course introduces the student to the physical, chemical and toxic properties of solid and Scheduled waste which are the basis for their hazard classification, movement and distribution as well as their impacts on human health and the environment. The industries which generate solid and Scheduled waste will be identified. The management of these wastes which include handling, storage and transportation based on the regulations stipulated in the Environmental Quality Act, 1974 and Solid Waste And Public Cleansing Management 2007, (Act 672). The treatment and disposal processes will be emphasized including pollution prevention and waste minimization strategies.

Course Outcomes

- CO 1: Apply the theories and principle of solid and scheduled waste management, the impact and the risks towards human health and environment
- CO 2: Conduct case studies for best practices solid and Scheduled waste management.
- CO 3: Apply various solid and Scheduled waste treatment technology in the industries

BTV4753

Geographic information System

Credit:3

Prerequisites: None

Synopsis

Study of the fundamental principles of Geographic Information Systems (GIS). Emphasis on the development of these systems, their components and their integration into mainstream geography.

Course Outcome

- CO 1 Describe the concepts, principles, techniques and applications that are fundamental to GIS and that differentiate GIS and geographic science from other information systems, technologies and sciences.
- CO 2 Explain the nature and characteristics of geospatial data, data representations, methods of data input and editing, and data organization/management in GIS.
- CO 3 Apply GIS concepts, principles and techniques to real-world spatial problem solving and mapping applications.

- CO 4 Evaluate different GIS data collection approaches and data sources that require the knowledge of data quality, data fusion, data exchange, metadata management, and other issues such as data pricing, data access policies, privacy, security, and organizational influences.

BTV3463

Safety & Risk Management

Credit: 3 credits

Prerequisites : None

Course Synopsis

This module will introduce students to natural and manmade/technological disaster, source of disaster, hazard management, disaster management plan and relevant agencies in disaster management. The topics include the emergency response plan and procedure, communication, training and abatement as they related to hazardous waste operation, chemical spills, hazardous material recognition, risk assessment, monitoring and personal protective equipment level. The module goal is to enable the student to apply the disaster management plan in the industries/organisations

Course Outcomes

- CO 1 Differentiate type of natural and manmade/technological disaster and the preventive and mitigation measures.
- CO 2 Propose the disaster management plan for the industries/organisations during the natural or manmade/technological disaster occurrence and identify the SOP disaster procedure.
- CO 3 Demonstrate ethical responsibility towards disaster management in the broad scope of industrial sector.

BTV4743

Environmental Impact Assessment

Credit: 3

Prerequisites: None

Synopsis

The demand for trained practitioners in environmental impact assessment at the project level and related environmental impact assessment fields continues to grow. To meet this demand, this module provides an opportunity for specialist study in the principles of sustainability, international and national policy, approaches to valuing the environment, attitudes to conservation and the role of the public in environmental decision-making. The module emphasizes fieldwork or case studies.

Course Outcome

- CO 1 Relate the systems and approaches of environmental impact assessment which are being increasingly used in industry- Problem analysis
- CO 2 Monitor and improve environmental performance- Design/ development of solution
- CO 3 Adapt and meet the challenge of sustainable development- Environment and sustainability

BTV3113

Wastewater Treatment Technology

Credit: 3 credits

Prerequisites : None

Course Synopsis

This course gives the students exposure to the physical, biological and chemical processes that are used in the treatment of wastewater. Examples of the use of these processes in the manufacturing sector and agriculture including low waste zero discharged technology will be discussed. The environmental laboratory is introduced to students the important of scientific analysis of the wastewater as part of environmental impact assessment. This is to curb the damaged done to the purity of water and to be able to reduce the level of pollution into the surrounding living space particularly involving the quality of river.

Course Outcomes

- CO1: To apply scientific knowledge of the wastewater treatment technology in order to control level of pollution in the environmental
- CO2: To analyse and interpret the level of pollution that exists within the specify sample of wastewater analytically
- CO3: To communicate the importance of wastewater treatment technology theoretically and analytically with the safety, health and environmental issue

BTV2123

Environmental Law, Policy & Economics

Credit:3

Prerequisites: None

Synopsis

Overview of how society has responded to environmental problems through law and policy. Examination of the public policy debates that have animated the environmental movement in general, and environmental law in particular, including risk assessment and risk management . Includes an overview of environmental law, including the regulatory process, judicial review, and a brief examination of basic environmental statutes. Introduction to an economic

analysis of environmental problems and proposed market-based solutions

Course Outcome

- CO 1 Describe the ethics and responsibilities as engineer towards environmental law and expose to environmental legislation and regulation practices in Malaysia.
- CO 2 Review problems and its solving involving clean water act and relationship between policy and economics
- CO 3 Analyze the concept involved in management of clean water , air and solid wastes and the enforcement procedures
- CO 4 Understand and presenting the concept of environmental issues

**BTV2314
Green Technology
Credit:4
Prerequisites: BTV3333**

Synopsis

Introduction to environmentally friendly engineering and technological advances and new technologies that utilize green principles and green transportation. Course includes topics in new areas of green manufacturing and materials used today and planned for the future, including the operation and manufacture of solar cells and the production of wind, thermal, and hydroelectric power. Topics will vary depending upon new trends in industry. Several experiments related to green technology were exposed in this subject

Course Outcome

- CO 1 Describe the ethics and responsibilities as engineer towards green environment and expose to environmental legislation and regulation practices in Malaysia.
- CO 2 Describe the principle of green chemistry, review problems and its solving involving green technology applications
- CO 3 Analyze the concept involved in green management, policy, and economics
- CO 4 Demonstrate professionalism behavior in conducting laboratory, ethics and good communication skills

**BTV3413
Industrial Quality Control
Credit:3
Prerequisites: None**

Synopsis

Techniques of establishing and maintaining quality of product including statistical quality control applications.

Course Outcome

- CO 1 Analyze the productivity in an organization by using productivity concept and fundamentals.
- CO 2 Select layout design based on layout design procedure location and basic layout design by taking into account the impact of sustainable environment
- CO 3 Analyze production planning, control and inventory management activities based on given cases.
- CO 4 Evaluate solutions for a given cases based on total quality management systems, quality control concept ISO 17001.

**BTV3424
Facilities Management Technology
Credit:4
Prerequisites: None**

Synopsis

Overview of the technology facility management responsibilities, policies, and practices that are involved with implementing and/or managing technology properties that have sustainable goals connected to it. Identification of competencies needed by the technology facility management function to properly design, operate, and maintain facilities within the scope of responsibilities of technology facilities managers.

Course Outcome

- CO 1 Understand the knowledge on facility management responsibilities, policies and practices.
- CO 2 Implementing managing technology properties and key facilities management issues.
- CO 3 Identify the need fo technology management function including human management factors.
- CO 4 Identify the need and relevency of information system and smart management system.

**BTV3324
Design for Energy Efficiency and Green Materials
Credit:4
Prerequisites: BTV2213**

Synopsis

Overview of energy forms, sources, generation, devices, systems, and materials. Review of the physics of energy transformation and conservation. Energy efficiencies of

components and systems from stationary and transportation sectors. Energy-efficient design in residential, commercial, industrial, and manufacturing systems. Sustainability, environmental impacts, economic and social issues, and global governmental policies. Potential of alternative energy sources. Use of eco-friendly materials to improve efficiency. Topics from an applied perspective of technology practices, management, responsibilities, and policies involved with implementing energy conservation designs.

Course Outcome

- CO 1 Analysing gaps in the energetic behaviour of existing building and developing plans for improvement.
- CO 2 Development of integrative energy efficiency systems.
- CO 3 Develop key skills with the aim to enable students to use Modeling and Simulation in the design and verification of Renewable and Green Energy systems
- CO 4 Advanced knowledge about and training in ICT for energy-efficient building design

BTV3224 Heating, Ventilating and Air Conditioning Technology

Credit:4
Prerequisites: BTV2213

Synopsis

Heat gains and losses, heat-producing equipment, cooling, and refrigeration equipment are studied. System design is presented, including controls and instrumentation for commercial, industrial, and residential systems.

Course Outcome

- CO 1 Recognize and explain the operation of common HVAC&R equipment such as chillers, cooling towers, heat exchangers, etc.
- CO 2 Demonstrate the ability to apply thermal-fluids principles to compute the performance of HVAC&R equipment.
- CO 3 evaluate the performance of refrigeration and air conditioning equipment using the vapor compression cycle.
- CO 4 Evaluate air heating and cooling processes using a psychrometric chart and perform basic heating and cooling load calculations
- CO 5 Apply standard industry practices to the design of HVAC&R system

BTV3333 Biobased Fuels and Alternative Energy Applications

Credit:3
Prerequisites: BTV1112, BTV1113

Synopsis

Overview of bio-fuel sources, production, and applications. Review of conventional energy supplies and uses. The study of liquid and gaseous fuels derived from plant and animal matter, utilizing of biofuels for combustion, stationary power, and transportation. Study of biofuels used in conventional and alternative manners; sustainability, environmental impacts, economic and social issues, and global governmental policies. Topics from an applied perspective of technology practices, management, responsibilities, and policies involved with implementing large-scale consumption of biofuels.

Course Outcome

- CO 1 Describe the fundamentals and main characteristics of biobased energy sources and their differences compared to fossil fuels
- CO 2 Development of integrative energy efficiency systems.
- CO 3 Design biofuel energy systems that meet specific energy demands, are economically feasible and have a minimal impact on the environment
- CO 4 Advanced knowledge about and training in ICT for energy-efficient building design

BTV3433 Engineering Economy

Credit:3
Prerequisites: None

Synopsis

This course introduces concept of life cycle cost, interest and equivalent. Formula and factors for single and multiple cash flow. Method for investment assessment and alternative comparison and project evaluation using cost worth ratio, inflation and cash flow method.

Course Outcome

- CO 1 Analyze the engineering cost concept.
- CO 2 Analyze the return to capital
- CO 3 Analyze the money-time relationship
- CO 4 Analyze the depreciation of the asset
- CO 5 Analyze the cost estimation and project evaluation

BTV3453 Energy Auditing
Credit:3
Prerequisites: BTV3324

Synopsis

This course exposes the students on the methods of auditing energy consumption primarily in commercial

and industrial operations. Students will be introduced to the different types of energy auditing, different types of auditing processes, techniques to determine the energy flow diagram, making energy consumption estimates, including use of energy measurement equipment. Students will also be introduced to the energy efficiency policy and programmes in Malaysia and the prospects of the energy service companies (ESCOs) in the country. The final stage of this course will include a one-day industrial talk and course synthesis.

Course Outcome

- CO 1 Understanding the concept of energy audits to determine the efficiency of energy use; and the rationale why energy auditing is essential in commercial and industrial operations;
- CO 2 Understand the methods of energy auditing, from Walk-Through Audit to Standard Audit and Simulation Audits; techniques to determine energy flow charts, and making energy consumption estimates. Explain also the work involved in the three phases of auditing process - pre-site, on site and post-site.
- CO 3 Explanation, and some demonstration on the various instruments used for energy auditing, including safety considerations. Describe also on national energy efficiency and conservation policy and programmes and the potential of energy auditing as an important energy service industry in the near future;
- CO 4 Status of energy audit companies and the energy managers associations in Malaysia, and requirements for registration and accreditation. Final part of the course includes a one-day industrial talk inviting energy service companies (ESCOs) and energy managers to narrate their energy audit experience in buildings and industries.

BTV3463
Energy Management
Prerequisites: BTV3324

Synopsis

This course is designed to introduce to the students the importance of energy in national and global economic development. The content of this course including the fundamental of electrical system, national energy policies and legislations, introduction and setting up the sustainable energy management system (SEMS) to enable the students to setup the system at real application. The course also includes discussions on energy efficiency and conservation potential and introduction of energy audits.

Course Outcome

- CO 1 Relate global and local energy scenario, fundamental of energy and electrical system, energy policies and legislations, economics, energy efficiency & conservation programs and energy audits.
- CO 2 Acquaint with the principle of Sustainable Energy Management System (SEMS) and able to setup the system at real application.
- CO 3 Engage in independent and lifelong learning, with the broad scope of Energy Management opportunities.

BTV3813
Engineering Technology Senior Design Project I
Credit:3
Prerequisites: BTV3224, BTV3323, BTM2124

Synopsis

This course is designed to expose the students to a senior design project. They have to apply all the knowledge that they have learned in the programme to complete the senior design project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the senior design project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcome

- CO 1 Propose background study, problem statement, objective and scopes of the research
- CO 2 Practice positive attitude in research activities
- CO 3 Present the research proposal and cited latest publications on the subject

BTV3143
Air Pollution Control Technology
Credit:3
Prerequisites: BTV3113

Synopsis

The topics in this course discuss several important aspects of air pollution that include classification and sources of air pollutants, their effects on human, vegetation and material. Sampling methods, pollution control and air quality management system will be discussed.

Course Outcome

- CO 1 Recognize the terminologies, theories and principle of air pollution control technology.

- CO 2 Summarize the impacts and the risks of air pollution towards human health and environment.
- CO 3 Identify the specific air pollutants and its control technology.
- CO 4 Apply proper air pollutants sampling methods for air quality monitoring.

BTV4826

Engineering Technology Senior Design Project II

Credit:6

Prerequisites: BTV3224, BTV3323, BTM2124

Synopsis

This subject is the continuation of the subject Engineering Technology Senior Design Project I. In this course, the students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, the students are required to produce a design project report and present it to faculty's evaluation panel.

Course Outcome

- CO 1 Analyze data, discuss and conclude the findings
- CO 2 Manage the research work
- CO 3 Practice positive attitude in research activities
- CO 4 Present the research report and cited latest publications on the subject

BTV4919

Industrial Training

Credit:9

Prerequisites: All Subject

Synopsis

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo six months of industrial training during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records and submit reports on the training received by him/her. The industrial training report should cover all periods of approved employment. The report document is expected to demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives.

Course Outcome

- CO 1 Work independently in actual working environment with minimal supervision
- CO 2 Develop communication skill with different levels of staff in the organization
- CO 3 Construct technical documents and give oral presentations related to the work completed.
- CO 4 Develop positive attitude during the training programmed such as team working, lifelong learning and able to use the latest technology in industries
- CO 5 Develop an entrepreneurship attitude and management skill during a training

BTV4913

Industrial Training Report

Credit:3

Prerequisites: Industrial Training

Synopsis

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo six months of industrial training during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records and submit reports on the training received by

him/her. The industrial training report should cover all periods of approved employment. The report document is expected to demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives.

Course Outcome

- CO 1 Work independently in actual working environment with minimal supervision
- CO 2 Develop communication skill with different levels of staff in the organization
- CO 3 Construct technical documents and give oral presentations related to the work completed.
- CO 4 Develop positive attitude during the training programmed such as team working, lifelong learning and able to use the latest technology in industries
- CO 5 Develop an entrepreneurship attitude and management skill during a training.

CURRICULUM STRUCTURE

**BACHELOR OF ENGINEERING TECHNOLOGY
(MANUFACTURING) WITH HONOURS**

CORE FACULTY

BTU1112

Physics Laboratory

Credit:2

Prerequisites: None

Synopsis

This laboratory introduces the students with the application of physics concept in engineering devices such as Free Fall, Bernoulli's Law, Hydrostatic Pressure And Electric Field. The concepts of physics introduced related in mechanics or dynamics motion and basic concepts of electrical area. The students will learn how to run the experiment with referring the basic concepts of physics during the lab hours.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application
- CO 2 Demonstrating skills in logical thinking in handling equipment.
- CO 3 Applying basic physics concepts to problem solving
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1113

Physics

Credit:3

Prerequisites: None

Synopsis

This course introduces a fundamental of physics. It covers unit and measurements, kinematics, forces and Newton's law of motion, statics equilibrium, work, energy and power, fluid mechanics, electric and magnetism.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application
- CO 2 Solve problems in kinematics, forces and static equilibrium
- CO 3 Solve problems in work, energy and power, fluids, electricity & magnetism
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1212

Chemistry Lab

Credit:2

Prerequisites: None

Synopsis

In chemistry laboratory the students are responsible to conduct the basic physical, organic and analytical chemistry experimentssuch as solubility, miscibility, chemical equilibrium, buffer and pH changes, calorimetry, solvent extraction, gravimetric, UV-VIS spectrometer, FTIR, DSC and gas chromatography. At the end of experiments, the students should be able to inculcate the critical thinking and able to work in safe working condition.

Course Outcome

- CO 1 Apply physical, organic & analytical chemistry theory in laboratory
- CO 2 Apply the basic science and analytical chemistry knowledge in operation of analytical chemistry equipment.
- CO 3 Able to demonstrate and operate each analytical equipment base on the theories applied in analytical chemistry
- CO 4 Able to indicate any minor/major malfunction of equipment, incorrect step/ result & troubleshoot it

BTU1213

Chemistry

Credit:3

Prerequisites: None

Synopsis

Development of the fundamental principles and concepts of chemistry by lecture-demonstration, as well as the development of an appreciation of the nature of chemistry as a science. An historical development of the most important concepts and ideas. Methods and limitations of chemistry, its evolution and discussions of the problems currently being solved and created

Course Outcome

- CO 1 Apply the basic knowledge about physical, inorganic and analytical chemistry.
- CO 2 Relate chemical concept and principles while presenting a broad range of topic in a clear and concise manner.
- CO 3 Develop problem solving and critical thinking skills on general chemistry.
- CO 4 Communicate effectively in written and oral form through group discussion, tutorial and presentation.
- CO 5 Work in group to complete the assigned tasks in a given time.

BTU1013
Trigonometry and Elementary Function
Credit:3
Prerequisites: None

Synopsis

This course introduces and discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Student are exposed to number system, equations, inequalities and absolute value, polynomials, sequences and series, matrices and system of linear equations, functions and graphs, and trigonometric functions. This course also integrates symbolic tools, graphical concepts, and numerical calculations.

Course Outcome

- CO 1 Define and use the concepts and properties of basic mathematics.
- CO 2 Apply concepts and methods learned to solve any related problem of basic mathematics in various fields.
- CO 3 Relate and apply the concepts and methods studied into other courses.

BTU1031
Calculus I Laboratory
Credit:1
Prerequisites: None

Synopsis

This course introduces the number system, functions, introduction to derivatives, exponential functions, applications of derivatives, limits of functions and continuity. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Analyze and apply appropriate calculus concepts to solve various science and engineering problems using mathematical software.
- CO 2 Use appropriate software to solve the graphical problems in calculus.
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus in math software.
- CO 4 Relate and applied the concepts and methods studied into other courses.

BTU1033
Calculus I
Credit:3
Prerequisites: None

Synopsis

This course introduces the number system, functions, introduction to derivatives, exponential functions, applications of derivatives, limits of functions and continuity. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Analyze and apply appropriate calculus concepts to solve various science and engineering problems.
- CO 2 Use appropriate software to solve the graphical problems in calculus.
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
- CO 4 Relate and applied the concepts and methods studied into other courses.

BTU1041
Calculus II Laboratory
Credit:3
Prerequisites: None

Synopsis

This course introduces the differentiation, integration, techniques of integration, interpolation & approximation, sequences, series, power of series and the Binomial theorem. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Analyze and apply appropriate calculus concepts to solve various science and engineering problems using mathematical software.
- CO 2 Use appropriate software to solve the graphical problems in calculus.
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus in math software.
- CO 4 Relate and applied the concepts and methods studied into other courses.

**BTU1043
Calculus II**

Credit:3
Prerequisites: None

Synopsis

This course introduces the differentiation, integration, techniques of integration, interpolation & approximation, sequences, series, power of series and the Binomial theorem. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Analyze and apply appropriate calculus concepts to solve various science and engineering problems.
- CO 2 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
- CO 3 Use appropriate software to solve the graphical problems in calculus.
- CO 4 Relate and applied the concepts and methods studied into other courses.

CORE PROGRAM

**BTM1114
Basic Manufacturing Process**

Credit:4
Prerequisites: None

Synopsis

This course intended to introduce to materials, techniques, and equipment of industrial manufacturing. Emphasis on laboratory demonstration and simulation activities such as machining, welding, casting, and forming operations.

Course Outcome

- CO 1 Explain the structure and properties of basic engineering materials and their relationship to manufacturing.
- CO 2 Describe the fundamental equipment and processes employed in common manufacturing operations.
- CO 3 Identify process parameters and how they affect the manufacturing processes.

**BTM1614
Computer-Aided Drafting**

Credit:4
Prerequisites:None

Synopsis

This subject is designed to introduce to the students the principle of computer-aided design. Topics includes Drafting Overview, Drawing Set-up , Basic CAD ,Commands Geometric Construction , Orthographic

Projection , Basic Drawing ,Tools, Pictorial Drawings, Sectional Views, Advance CAD Commands, Modifying CAD, Drawings, Dimensioning, Tolerances, Working Drawings, Threads and Fasteners

Course Outcome

- CO 1 Analyze problem in technical drawing and understand drawing
- CO 2 Use basic geometric construction techniques to create objects in CAD
- CO 3 Project a 3 dimensional object in 2 dimensional space with the proper utilization of views in CAD
- CO 4 Read & create dimensioned drawings using conventional techniques in CAD.
- CO 5 Identify and understand the components of working drawings & the standards that apply.

**BTM1124
Machine Production Processes**

Credit:4
Prerequisites: None

Synopsis

This course intends to provide detailed study of traditional and contemporary methods of metal machining. Laboratory experience includes the fundamentals of machine tool setup and operation, precision measurement techniques, and machine tool safety, care and maintenance.

Course Outcome

- CO 1 Develop basic machine tool processing knowledge, abilities and skills.
- CO 2 Expand machine tool processing knowledge, abilities and skills through experience with traditional process.
- CO 3 Complete assigned projects as directed within safety, planning and specifications consistent with items above.
- CO 4 Demonstrate understanding of function and application of processes through examination and discussion and operation.
- CO 5 Provide study and understanding of nontraditional processes in manufacturing.

**BTE1112
Electrical Fundamentals Laboratory**

Credit: 2
Prerequisites: None

Synopsis

This course introduces students to the fundamentals laboratory of DC and AC circuits and basic network laws and theorems. The students will be handling the basic measurement equipment to measure and analyse the parameter of the electrical circuits.

Course Outcome

- CO 1 Construct simple electrical and electronics and simulate the operation of the circuits using circuit simulation software (OrCAD).
- CO 2 Measure parameter of electrical circuits (resistance, voltage, current, etc)
- CO 3 Work ethically and effectively as an individual and in a group

BTE1113

Electrical Fundamentals

Credit:3

Prerequisites: None

Synopsis

This module will introduce students to basic science of electricity, introduction to instrumentation and measurement, work and energy theorem, basic electrical circuits and introduction to magnetism.

Course Outcome

- CO 1 Describe the basic concept of electricity, conductors, insulators, circuit, magnetism and other devices.
- CO 2 Apply basic electrical laws such as Ohm and Kirchhoff Law to solve circuit or electrical problems.
- CO 3 Shows the ability to communicate effectively.

BTM1313

Statics

Credit:3

Prerequisites: BTM2424 Strength of Materials

Synopsis

This course introduces force vector algebra, equilibrium of forces on particle, equilibrium of forces on single rigid body and force analysis on simple frames and machine structures (multi-rigid bodies) and problems involving dry friction.

Course Outcome

- CO 1 Perform force vector algebra – resultant of forces, cross product, dot product and mixed triple product of forces
- CO 2 Solve equilibrium of forces on particle problems
- CO 3 Solve equilibrium of forces on single rigid body problems
- CO 4 Solve equilibrium of forces on simple frame and machine structure problems.
- CO 5 Solve problems involving dry friction.

BTM2223

Engineering Dynamics

Credit:3

Prerequisites: None

Synopsis

This course intended to introduce the basic principles including friction and motion of a point in both one and two dimensions, as well as rigid body motion.

Course Outcome

- CO 1 Ability to understand and apply properties of friction.
- CO 2 Ability to determine velocity and acceleration of a given particle in one and two dimensions.
- CO 3 Ability to determine rectilinear and curvilinear motion.
- CO 4 Ability to determine angular and linear velocity and acceleration.
- CO 5 Ability to apply acceleration and velocity concepts to rigid body motion.

BTM3234

Manufacturing Computer Application

Credit:4

Prerequisites: BUM1113

Synopsis

Overview of computer hardware, software, and processing concepts related to the control of manufacturing tasks. Emphasis on use of integrated software packages in the solution of a variety of manufacturing problems. Laboratory assignments in automation control, real time data sampling, and creation of user interfaces.

Course Outcome

- CO 1 Apply software development for technology problem solving.
- CO 2 Perform adaptive programming skills for more diverse application environment.

BTU2413

Applied Statistics

Credit:3

Prerequisites:None

Synopsis

Students are exposed to statistics including statistical problem-solving methodology and descriptive statistic, probability distributions commonly used in practice, sampling distribution and confidence interval, hypothesis testing, analysis of variance (ANOVA), goodness of fit test and contingency tables and regression and

correlation including simple and multiple linear regressions. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Analyze data using statistical theory and methodology, and recommend a conclusion or suggestion based on the analyzed data.
- CO 2 Perform statistical data analysis by using appropriate software tools.
- CO 3 Apply statistical concepts and methods learned to solve any related problems in various scientific disciplines.
- CO 4 Relate and apply the techniques and methods studied into other courses

BTM3912

Engineering Ethics

Credit:2

Prerequisites: None

Synopsis

This subject gives an overview of engineering, the profession and its requirement in Malaysia scenario. Topics that will be included ethics, management and contribution of engineering also generic skills and study skills. Moreover, this subject can enhance students knowledge about obligation of engineers/technologists to the clients, professionals and society, ethical codes, safety codes.

Course Outcome

- CO 1 Explain Engineering ethics, management and contribution.
- CO 2 Analyze and comprehend the indispensable ethics, professionalism, responsibility, skills of teamwork and leadership
- CO 3 Justify systematic approach to the ethical issue in the industry and engineering field

BTV3433

Engineering Economy

Credit:3

Prerequisites: None

Synopsis

This course introduces concept of life cycle cost, interest and equivalent. Formula and factors for single and multiple cash flow. Method for investment assessment and alternative comparison and project evaluation using cost worth ratio, inflation and cash flow method.

Course Outcome

- CO 1 Analyze the engineering cost concept.
- CO 2 Analyze the return to capital
- CO 3 Analyze the money-time relationship

- CO 4 Analyze the depreciation of the asset
- CO 5 Analyze the cost estimation and project evaluation

BTM2243

Fluid Power Technology

Credit:4

Prerequisites: None

Synopsis

This subject is designed to introduce to the students the principle of fluid mechanic. Topics includes stress and strain rate descriptions, fluid statics, use of differential and finite control volume analysis with continuity, momentum, and energy equations, Bernoulli and Euler equations, vorticity, potential flow, incompressible viscous flow using Navier-Stokes equations, dimensional analysis, pipe flow, boundary layers, separation, introduction to turbulence.

Course Outcome

- CO 1 Understand of fluid mechanics fundamentals, including concepts of mass and momentum conservation.
- CO 2 Apply the Bernoulli equation to solve problems in fluid mechanics.
- CO 3 Apply control volume analysis to problems in fluid mechanics.
- CO 4 Use potential flow theory to solve problems in fluid mechanics.
- CO 5 Perform dimensional analysis for problems in fluid mechanics

BTM1413

Properties of Materials

Prerequisites: None

Synopsis

This course intends to provide comprehensive introduction to the different classes of industrial materials, their structure, properties and industrial uses. The purpose of this course is to introduce the student to a wide range of engineering materials, which are important to industry. Such knowledge will be useful to make an intelligent selection of materials for a variety of commercial applications based on an understanding of properties, test methods and processes.

Course Outcome

- CO 1 Knowledge of fundamental structure of materials.

- CO 2 Understanding of material properties.
- CO 3 Knowledge of material processing by casting and forging.
- CO 4 Solve the stress and strain in structural members subjected combined loads.

BTM2424
Strength of Materials
Credit:4
Prerequisites: None

Synopsis
 This course intends to provide mechanics of deformable bodies with emphasis on principles of stress and strain, shear and bending moment, torsion, buckling, failure criteria and design concepts.

- Course Outcome**
- CO 1 Determine axial and bending stress and strain as well as torsional stress and strain and Hooke's law.
 - CO 2 Determine material properties and principal stresses both theoretically and experimentally
 - CO 3 Utilize mathematics and physics properties in solving complex stress / strain problems
 - CO 4 Utilize stress and strain information in designing tasks.

BTM2233
Thermofluids
Credit:3
Prerequisites: None

Synopsis
 This course is designed to give the student the ability to analyze many practical problems in which fluid is the working medium. Basics of Thermodynamics and heat transfer in its three different modes; conduction, convection and radiation, are also introduced. This is to enable the student to analyze simple thermal systems and cycles.

- Course Outcome**
- CO 1 Apply fluid and thermal fundamental concepts and equations to analyse problems.
 - CO 2 Construct experiment to understand the fundamental concept.
 - CO 3 Demonstrate life-long learning skills during discussion or completing assignment.

BTV3413
Industrial Quality Control
Credit:3
Prerequisites: PRQ: MATH 155 with a C or better, STAT 208 or STAT 301, or consent of department

Synopsis
 Techniques of establishing and maintaining quality of product including statistical quality control applications.

- Course Outcome**
- CO 1 Analyze the productivity in an organization by using productivity concept and fundamentals.
 - CO 2 Select layout design based on layout design procedure location and basic layout design by taking into account the impact of sustainable environment
 - CO 3 Analyze production planning, control and inventory management activities based on given cases.
 - CO 4 Evaluate solutions for a given cases based on total quality management systems, quality control concept ISO 17001.

BTM4743
Advanced Manufacturing Process
Credit:3
Prerequisites:BTM1114 Basic Manufacturing Processes

Synopsis
 This course is designed to provide students with an introduction to industrial manufacturing systems by having them engage in selected activities essential for modern manufacturing. Manufacturing systems, tools, and processes are studied as they are applied to producing products. Laboratory experiences cover manufacturing systems emphasizing tooling design, automated manufacturing, and control systems. Includes laboratory activities

- Course Outcome**
- CO 1 Discuss the importance and characteristics of manufacturing technology
 - CO 2 Conduct scholarly research that thoroughly presents and critically analyzes a manufacturing system or topic
 - CO 3 Apply sound principles of manufacturing engineering to solve problems related to manufacturing
 - CO 4 Develop programming to control a variety of automated manufacturing equipment
 - CO 5 Fabricate products using advanced manufacturing and design equipment

BTM3134

Manufacturing Component Design

Credit:3

Prerequisites: BTM2623 Computer Aided Modelling

Synopsis

Design of motion components for the manufacturing industry. Includes CAD techniques to study solid modeling and manufacturing components such as gears, cams, and linkages, and their application.

Course Outcome

- CO 1 Design parts using solid modeling and identify downstream applications.
- CO 2 Apply parametric solid modeling techniques in component design
- CO 3 Perform design skills in the usage of Solid Works software
- CO 4 Able to determine position, acceleration and velocity for a 4-bar mechanism
- CO 4 Able to analyze a compound and epicyclic gear trains and design and analyze cams

BTM3353

Programmable Logic Controllers

Credit:3

Prerequisites: None

Synopsis

This subject is designed to introduce to the students the principle of programmable logic controllers. This subject emphasize basic concepts and skills needed to program and apply programmable electronic controllers in industry. Man Machine Interface (MMI) and Supervisory Data Acquisition (SCADA) systems will be examined. Experiments in operation, programming, and industrial applications.

Course Outcome

- CO 1 Identify and define functions of hardware component of programmable logic controllers.
- CO 2 Distinguish between different types and architectures of PLC's and their applications.
- CO 3 Demonstrate proficiency in ladder logic by applying programming skills to implement industrial applications.
- CO 4 Identify problems in industrial applications requiring PLC's by troubleshooting hardware and software.

BTM3334

CNC Machining

Prerequisites: BTM1124 Machine Production Processes; BTM2623 Computer Aided Modelling

Synopsis

This subject is designed to introduce to the students numerical control systems. Topics includes Principle of CNC part programming, tooling and work-holding devices, machine tool position and motion control systems, automatic tool changers and machining centres, kinematics and mechanics of milling operations, part programming using CAD/CAM systems.

Course Outcome

- CO 1 Write fundamental manual G-code programs, for various machining applications, including spindle speeds, and feed rates.
- CO 2 Program absolute and incremental tool positions for machining canned cycle operations, linear and circular interpolation, looping and subroutine.
- CO 3 Use a PC to prepare, edit and print a machine readable part program and use a CNC machine to verify and machine a basic part.
- CO 4 Use 2D CAM software to create job operation files, 2D shape profiles, generate machine code, verify tool path using computer simulation, and machine basic parts on a CNC machine using computer generated code.

BTM3813

Engineering Technology Senior Design Project I

Credit:3

Prerequisites: None

Synopsis

This course is designed to expose the students to a senior design project. They have to apply all the knowledge that they have learned in the programme to complete the senior design project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the senior design project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcome

- CO 1 Propose background study, problem statement, objective and scopes of the research
- CO 2 Practice positive attitude in research activities
- CO 3 Present the research proposal and cited latest publications on the subject

BTM3514

Computer Integrated Manufacturing

Credit:4

Prerequisites: None

Synopsis

Three basic themes will be stressed throughout the course. First, developing manufacturing strategy involves considering factors beyond the traditional boundaries of the manufacturing function. Such factors include the overall competitive position of the firm, the nature of market demand, competitor's actions, government regulations, and so on. Second, there is a strong linkage between a firm's competitive strategy and its manufacturing strategy. If this linkage is maintained, operations can become a formidable competitive weapon. If this linkage is neglected, even the best-designed strategies can fail. Finally, the course will consider manufacturing strategy issues in an integrative manner by developing the interrelationship between operations, finance, accounting, and marketing.

Course Outcome

- CO 1 List components of a computerized integrated manufacturing environment.
- CO 2 Explain various automation techniques currently used in industry.
- CO 3 Develop a systematic plan for manufacturing strategy implementation
- CO 4 Develop a systematic plan for manufacturing strategy implementation required for a selected product.
- CO 5 Model enterprise manufacturing and automation strategies that respond to national and global manufacturing demands.

BTM4826

Engineering Technology Senior Design Project II

Credit:6

Prerequisites: None

Synopsis

This subject is the continuation of the subject Engineering Technology Senior Design Project I. In this course, the students are required to conduct the research, collect and analyze data, discuss the findings

and form the conclusions. At the end of the semester, the students are required to produce a design project report and present it to faculty's evaluation panel.

Course Outcome

- CO 1 Analyze data, discuss and conclude the findings
- CO 2 Manage the research work
- CO 3 Practice positive attitude in research activities
- CO 4 Present the research report cited latest publications on the subject

BTM4919

Industrial Training

Credit:9

Prerequisites: None

Synopsis

In Industrial Training the students should gain insight into industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo and industrial training for a certain period that has been agreed by the faculty during last semester of the academic year. The performance of each student during the periods of his/her industrial training is evaluated by the faculty staff, and the representatives from employer organization.

Course Outcome

- CO 1 Show and classify in-depth the industrial structure and organization and to understand roles of typical personnel in that particular industry.[PO2,C3]
- CO 2 Manipulate the knowledge learned in the university and to practice them in problem solving direct or indirect application to any design, planning, production or management [PO3,P5,CTPS3]
- CO 3 Practice the professionalism and work etiquette that comply to good and responsible engineer. [PO6,A5,EM2]
- CO 4 Demonstrate management/ leadership skills to lead or manage effectively in a industry environment. [PO8,A3,TS3]
- CO 5 Demonstrate the knowledge and ability to search and retrieve information and materials related to the industrial needs .[PO10,A3,LL2]

ELECTIVE COURSES**COURSE STRUCTURE****BACHELOR OF ENGINEERING TECHNOLOGY
(INFRASTRUCTURE MANAGEMENT) WITH
HONOURS****CORE FACULTY**

BUM2123
Applied Calculus
Credit: 3
Prerequisites: None

Synopsis

This course introduces Polar Coordinates and Vector, Vector-Valued Functions, Partial Derivatives, and Multiple Integrals. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Analyze and apply appropriate calculus concepts to solve various science and engineering problems.
- CO 2 Use appropriate software and tool to solve the graphical and computational problems in calculus.
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
- CO 4 Relate and applied the concepts and methods studied into other courses.

BUM2413
Applied Statistics
Credit: 3
Prerequisites: None

Synopsis

This course discusses on statistical problem-solving methodology and descriptive statistics; sampling distribution and confidence interval; hypothesis testing; analysis of variance (ANOVA); goodness-of-fit test and contingency tables; regression and correlation including simple and multiple linear regressions. Statistical packages such as Microsoft Excel, SPSS, R Language, S Plus, EViews and Minitab shall be used in this course.

Course Outcome

- CO 1 Analyze data using statistical theory and methodology, draw a conclusion and give a suggestion based on the data analysed.
- CO 2 Perform statistical data analysis using available statistical packages including



scientific calculator.

- CO 3 Apply statistical concepts and methods to solve related problems in various disciplines.
- CO 4 Formulate statistical model from a given data set.

BET1113
Green Technology for Infrastructure Facilities
Credit: 3
Prerequisites: None

Synopsis

This course will expose to the students the concept and application of green technology for construction especially in the area of infrastructural facilities. The subject topics encompasses introduction to the green technology, elements of green construction, economic analysis on green construction, green project requirement and application of green technology in infrastructure facilities such as road and highway, drainage, sewerage system, water reticulation and utilities.

Course Outcome

- CO 1 Identify and describe the definition and the principle of green technology in construction especially for infrastructural facilities.
- CO 2 Describe the engineering problems and solve the problem by applying the element of green technology
- CO 3 Manage project or function as a resourceful individual while conducting a group project of infrastructural facilities

BUS1303
Applied Physics
Credit: 3
Prerequisites: None

Synopsis

This course is intended to expose the central ideas and principles of physics to students requiring a general background in physics. It covers unit and measurements, kinematics, forces and Newton’s law of motion, statics equilibrium, work, energy and power, fluid mechanics, electricity and magnetism.

Course Outcome

- CO 1 Apply basic Physics concepts and theories learned to solve problems covered in the syllabus in terms of physical principles and concepts.

- CO 2 Explain solution of any related problems using the right principles and laws.
- CO 3 Study and report the solutions of a given physical problem covered in the syllabus by a group activity

BET3583
Research Methodology
Credit: 3
Prerequisites: None

Synopsis

The course provides students with the ability to evaluate research literatures in order to determine the current state of knowledge. In addition, the course will instruct students in the principles of research to enable them to conduct research and prepare an original project in their professional area of interest.

Course Outcome

- CO 1 Propose and justify an appropriate research plan for particular research problem
- CO 2 Choose and apply appropriate methodology for particular research problem
- CO 3 Evaluate the outcome of a research project in terms of useable knowledge
- CO4 Apply techniques for writing clear and well expressed technical papers and reports
- CO5 Judge the logical consistency of written material

BET4042
Entrepreneurship for Technologists
Credit: 2
Prerequisites: None

Synopsis

This subject is designed to provide students with the knowledge, skills, and abilities necessary to plan, finance, develop and operate a new business venture. Through the analysis of case studies on entrepreneurial ventures and writing their own business plan screening guide, students learn how to assess the attributes of entrepreneurs, determine the attractiveness of new venture opportunities, and gather the resources necessary to convert a viable opportunity into an entrepreneurial venture.

Course Outcome

- CO 1 Explain the concept of entrepreneurship, its historical development and the role of entrepreneurship in economic development
- CO 2 Analyse a new or growing venture from the perspective of an investor, a family-business successor, or an owner-manager
- CO 3 Produce and present a business plan for a new or growing venture
- CO4 Identify the important issues related to legal aspects of entrepreneurship

CORE PROGRAM

BET1114
Infrastructure Exploration (Studio 1)
Credit: 4
Prerequisites: None

Synopsis

This course will expose students to the fundamental elements of a good engineering approach to problem solving with strong reference to basic sciences and math skills as well as testing and evaluation ideas by building prototypes (it could be a product, a technique, a structure, a project, a method, paperwork or many other things depending on the problem). The learning approach of these subjects is a design driven curriculum with emphasis placed on skills such as team based design, communication skills (graphical, oral and written) and computer aided design tools.

Course Outcome

- CO 1 Identify different types of drawings and reproduce drawings manually and by using AutoCAD.
- CO 2 Apply basic skills in mathematics, sciences and engineering drawing including 2D solid modelling using CAD
- CO 3 Examine the process involved in infrastructure design projects
- CO 4 Collaborate on team based projects, solve inter team problems and develop communications skills

BET1123
Introduction to Infrastructure Engineering
Credit: 3
Prerequisites: None

Synopsis

The course covers on introduction to civil engineering, planning for civil engineering project, structural and infrastructural design, project BQ and cost estimation, project report and engineering drawing, IT as value added in project development and implementation.

Course Outcome

- CO 1 Using available examples, sketches, phrases and pictures to demonstrate understanding about civil engineering
- CO2 Applying planning principles to generate ideas for civil engineering projects
- CO3 Executing conceptual design for structural and infrastructural projects
- CO4 Choosing suitable IT tools as to aid design and documented project output

BET1142
Introduction to Engineering Surveying
Credit: 2
Prerequisites: None

Synopsis

This subject will expose to the students the role of survey engineering in their field. The subject topics encompasses introduction to the engineering surveying, surveying equipment, measurement unit, bearing/angle and distance measurement for horizontal control, coordinate system, area & volume calculation, and the final setting out for construction work.

Course Outcome

- CO 1 Identify and describe the definition and the principle of engineering survey including the engineering surveying roles in infrastructural works
- CO2 Describe the procedure to perform horizontal and vertical control based on related provision
- CO3 Understand the range of calculations that can be made with surveying data

BET1253

Introduction to Engineering Problem Solving

Credit: 3

Prerequisites: None

Synopsis

The course covers the principles in engineering problem solving including discuss and understand the following area engineering failure, procedure for analysis, propose practical remedial measures, preliminary technical report, critical comments, research and finding, recommendation for the solution

Course Outcome

- CO 1 Discuss engineering failure for different types of engineering problems
- CO2 Apply different principle in analysis of engineering failure. Summarized and compare the differences between them.
- CO3 Apply various analysis techniques to solve variety of engineering failures.
- CO4 Implement different remedial and rehabilitation techniques. Selection process base on technical as well as economic point of view.
- CO5 Produce a preliminary technical report for the proposed solution.

BET1213

Engineering Practice 1

Credit: 3

Prerequisites: None

Synopsis

This course is the first of a series of Practice courses that are intended to enable students to acquire engineering and professional practice skills. Students will generally work in teams to assist with the building of group synergy such as team working and interactive thinking. The development of other professional practice skills, such as written and oral communication, is also encouraged in the engineering practice courses. In this introductory course, students will undertake practical work primarily in the areas of instrumentation and measurement, as well as the application of different lab equipment related to civil infrastructure. In addition, students will be introduced to the library and computing facilities of the University and are expected to utilize these resources in the compilation of their reports. All students will be introduced to the Workplace Health and Safety Act and will undertake a preliminary workplace health and safety exercise.

Course Outcome

- CO 1 Demonstrate practical skills in handling civil infrastructure lab equipment.
- CO2 Apply basic health and safety principles in workplace setting
- CO3 Preparing technical reports that demonstrates use of library and computing facilities
- CO4 Contribute as part of a team to complete a specific task in a specific time
- CO5 Communicate the material/tasks assigned effectively to public (oral and written)

BET2343

Spatial Science Engineering

Credit: 3

Prerequisites: None

Synopsis

The course covers on introduction to spatial science engineering, google map as free online GIS, spatial investigation using GIS, mygis (Malaysia GIS) portal and arcgis online application.

Course Outcome

- CO 1 Using available examples, sketches, phrases and pictures to demonstrate understanding about spatial science engineering
- CO2 Exploring the application of google map for spatial science engineering tasks
- CO3 Reviewing the application of local GIS for spatial science investigation
- CO4 Choosing suitable IT tools as sustainable tool for conducting spatial science engineering.

BET1474

Infrastructure Investigation (Studio 2)

Credit: 4

Prerequisites: None

Synopsis

The aims of the course are to developed students' professionalism and ethical responsibilities skills, effective communication abilities with other multidisciplinary professions, effective team working skill, awareness about sustainable environment, desires for lifelong learning, utilization of moderns tools and technologies and techno-preneurship skills using technical knowledge that have been learned to date. Although it is PBL in nature, lectures and e-learning

sessions are conducted as to provide general guidance to the groups.

Course Outcome

- CO 1 Manage project or function as a resourceful individual while observing the professional and ethical responsibilities
- CO2 Communicate effectively in-team and with external parties as to share ideas or get feedbacks from the stakeholders
- CO3 Plan and design/undertake projects as a group effort

**BET2413
Project Scheduling
Credit: 3
Prerequisites: None**

Synopsis

This course attempts to explain the importance of scheduling and estimating process in infrastructure project planning. The discussion will focus on approach and strategies in developing viable schedules and cost estimation which influences the success level of projects and organizations. Students will discover a number of sophisticated tools and technique that can be applied in managing time and costs effectively on every type of project. Selected project management tools/software will be introduced during the lab session to grant student with necessary knowledge and skills in dealing with stages of the project life cycle, how to work within organizational and cost constraints, manage resource and project team effectively.

Course Outcome

- CO 1 Understand the importance of scheduling and estimation in ensuring a successful infrastructure project
- CO2 Understand the concepts of project planning and organization, budgeting and control, and project life cycles
- CO3 Apply Precedence Diagram Method (PDM) in determining relationship between tasks
- CO4 Use appropriate techniques for resource estimation for infrastructure project planning
- CO5 Demonstrate the ability of using Project Management software in managing a project.

**BET2334
Infrastructural Project (Studio 3)
Credit: 4
Prerequisites: None**

Synopsis

The course is the continuation of Infrastructural Project (Studio 2) in which students conduct infrastructural design, project BQ and cost estimation, project report and engineering drawing for a selected study area with a selected theme. Although the project is in conducted in group, students are expected to demonstrate individual values in term CTPS, TPS, CS and LS.

Course Outcome

- CO 1 Communicate efectively in a team and with external parties
- CO2 Develop professional and ethical responsibilities
- CO3 Select sustainable practices in the conduct of the project
- CO4 Make appropriate references to the code of practice/guidelines
- CO5 Demonstrate techniques/skills using modern engineering tools

**BET2492
Construction Safety
Credit: 2
Prerequisites: None**

Synopsis

This course is designed for persons who work in the construction industry. This course will provide all members with greater safety in construction field particularly referred to construction safety awareness. It is also designed to increase their confidence in the action to take in case of any emergencies . The stages of construction and most of the building process within the life cycle of a building will be elaborated. All the relevant document and acts particularly relating to Malaysia scenario are among the important references that will be discussed along with the sequence of building construction. Building materials Students are expected to venture into a general safe working practices at construction site and able to supervise the total environment as a free accident area.

Course Outcome

- CO 1 Recognize the local Act and regulations related to construction safety
- CO2 Identify the hazardous materials, substances and unsafe practices at construction industry
- CO3 Assess the level of risk and safety of work places compliance to the national safety regulation
- CO4 Outline a proposal to enhance and increases a safer work practices in construction industries

BET2483

Problem Solving and Analysis

Credit: 3

Prerequisites: None

Synopsis

This course will increase a student's ability to work as part of an engineering team. It presents a range of engineering theory and applications through engineering design concepts that are learnt within the context of solving a real world problem. This course focuses primarily on the use of statistical analysis to analyze data, propose solutions, solve problems and to evaluate possible solutions. In addition the student is required to further develop their computer skills (especially Excel) to analyze statistics, illustrate and present the results of their work.

Course Outcome

- CO 1 Work as part of a multi-disciplinary and multi-cultural team to analyze, research, synthesize and evaluate solutions for defined engineering and surveying problems and systems
- CO2 Contribute as part of a team working on defined engineering and surveying problems to develop engineering design solutions, value the views of other members and facilitate decision making in team situations to solve an engineering problem or complete a project
- CO3 Undertake a program of self-directed independent learning to acquire the necessary learning within an allocated sub-discipline area to contribute to the team's solution of the set problem and should be communicated to other team members by means of mentoring during regular team meetings
- CO4 Demonstrate the ability to apply appropriate Engineering, Mathematical and Statistical

principles and techniques on an individual basis; to explain phenomena encountered in the set range of problems, utilizing the knowledge base gained from individual self-learning journey

- CO5 Communicate findings in an appropriate technical format

BET1263

Geology and Geomechanics

Credit: 3

Prerequisites: None

Synopsis

This course provides an elementary introduction and the basic mechanics necessary for Geology and Geomechanics. The course aims to provide understanding the strength of rock and soil, exploring the stability of slopes, type of suitable shallow foundation and compressibility of soil. Those understanding from the nature of rock and soils as engineering materials that applies to engineering Practice.

Course Outcome

- CO 1 Apply the knowledge of rock and soil characteristics in for geomechanic analysis and soil stabilization.
- CO2 Acknowledge the geological background and the formation of soil.
- CO3 Produce related diagram for slope stability analysis by using various methods.
- CO4 Able to determine the principle of settlement under structures
- CO5 Apply the strength parameters appropriate to a range of stability problems, and able to differentiate between total and effective stress approaches.

BET2344

Infrastructure Planning (Studio 4)

Credit: 4

Prerequisites: None

Synopsis

This course attempts to explain the fundamental aspects of management and planning skills necessary to plan and maintain infrastructure. Major aspects that are covered throughout the course includes major infrastructure in context, master planning, infrastructure project performance, prioritization of projects and services, environmental and social impacts as well as uncertainty and risks. Case studies and hands-on projects are introduced to students to further enhanced

their knowledge in planning and managing infrastructure projects.

Course Outcome

- CO 1 Understand the steps in planning infrastructure projects
- CO2 Understand the needs of environmental, social, legal and institutional aspects in infrastructure planning
- CO3 Differentiate different types of privatization elements and professional construction services in infrastructure projects
- CO4 Apply the concept of infrastructure planning in project-based cases and scenarios
- CO5 Demonstrate the ability of using Project Management software in managing a project.

BET2422

Financial Management for Decision Making

Credit: 2

Prerequisites: None

Synopsis

The application of financial management for decision making for project evaluation. Coverage includes decisions on cost estimate, revenue generation and feasibility study.

Course Outcome

- CO 1 Apply basic economic analysis in estimating cost estimate
- CO2 Analyse revenue generation of project based on market study
- CO3 Evaluate project feasibility and viability
- CO4 Produce a a sustainable procedure for making decision

BET2373

Construction Engineering

Credit: 3

Prerequisites: None

Synopsis

The construction sector is a major part of the civil infrastructure and building industries. Construction projects range in size from the small (such as the construction of a swimming pool or a subdivision) to the very large (such as the construction of a hydroelectric power scheme or a freeway). However, all projects share the common factors of utilizing workers, machines and

materials, and of requiring organization and control. The graduate must, therefore, be familiar with the range of construction equipment and techniques in common use, and must be able to plan and direct construction works. The course covers the areas of construction techniques, construction management and concrete technology.

Course Outcome

- CO 1 Examine the basic characteristics and use of equipment commonly used in civil infrastructure and building construction
- CO2 Examine commonly used construction techniques of the engineering construction industry
- CO3 Analyse and apply commonly used planning and control techniques used in civil infrastructure and building construction
- CO4 Evaluate the properties of, and analyse the interaction between, the principal component materials used in the production of concrete
- CO5 Formulate concrete mix design and plans quality control procedures for production and placement of concrete

BET1413

Engineering Practice 2

Credit:3

Prerequisites: None

Synopsis

This course includes practice modules covering aspects of Geology and Geomechanics. Practice requirements for each module include laboratory work in a team environment, field excursions and the preparation of individual reports on these practice activities. The geological field excursion provides the student with in-situ activity. Identification the significant of engineering properties on soil and rock was main focus in this course. Students will be required to carry out soil tests according to Malaysian Standards to gauge various engineering properties in geomechanics.

Course Outcome

- CO 1 Identify the civil engineering significance of common geological structures and discuss the implication of weathering and landform development
- CO2 Identify a range of minerals and rocks and applying their properties to resolve civil engineering examples and problems
- CO3 Measure basic civil engineering properties of soils using standard testing procedures

- CO4 Analyse and present experimental data to a suitable engineering standard.
- CO5 Understand and analyse the concept of permeability, flow nets, consolidation of soil and settlement of Structure

BET3573
Engineering Management
Credit: 3
Prerequisites: None

Synopsis

This course provides the basic requirement and best practices of management in engineering organizations, namely at Government Agencies, Consultancy Firms and Construction Companies. It covers technical knowledge with basic business and management techniques. The practical modules produce engineers that meet management responsibilities, formulate meaningful business ideas and take into account on the requirement in leadership role as to face challenges in a competitive environment.

Course Outcome

- CO 1 Identify formal structure requirement for engineering operation activities
- CO2 Discuss various management methods available of engineering related agencies and companies
- CO3 Practice the functions of a management team
- CO4 Analyse the way an engineering organization functions

BET4222
Technologist in Society and Law
Credit: 2
Prerequisites: None

Synopsis

This course combines Seminar and Introduction to Law courses in an integrated course that will be delivered by experienced faculty members and guest lecturers. It will cover topics such as ET career, ET code of ethics, accreditation of ET programmes, ET professional bodies, route to professional technologist, industry expectation of the ET graduates, women in ET, globalization of the ET profession, future roles and challenges of ET in society.

Course Outcome

- CO 1 Be aware about career development in ET and care for the code of ethics
- CO2 Be acknowledged about the required training and registration by be able to identify the relevant professional bodies and illustrate path of the route to Professional
- CO3 Comply to industry expectation by be able to describe opportunities and challenges and show concern of the globalization of ET profession
- CO4 Show continual desire or concern of future roles and challenges of ET by demonstrating and explain issues and give example of modern tools in ET practices

BET2573
Construction Methods
Credit: 3
Prerequisites: None

Synopsis

This course covers the preliminary works and site establishment activities associated with commencing a construction job. It also deals with foundations and soil stabilization techniques, the production and use of common construction materials and discusses some elements associated with the construction of major infrastructure facilities.

Course Outcome

- CO 1 Determine the infrastructure requirements for a construction job and apply a knowledge of the job establishment process
- CO2 Explain and apply the basic methods of foundation construction and soil stabilization
- CO3 Differentiate the main elements involved in timber, steel and concrete structures
- CO4 Select and justify appropriate protective treatments for different structures and explain the various treatment processes involved
- CO5 Evaluate and differentiate between the commonly used methods and techniques for the construction of selected major infrastructure facilities.

BET3634

Infrastructural Design (Studio 5)

Credit: 4

Prerequisites: None

Synopsis

This course attempts to explain the fundamental aspects of design skills necessary to construct the infrastructure. Major aspects that are covered throughout the course includes design one or two major infrastructure in context, preliminary design, project report and engineering drawing, environmental and social impacts as well as uncertainty and risks. Case studies and hands-on projects are introduced to students to further enhanced their knowledge in designing and constructing infrastructure projects.

Course Outcome

- CO 1 Understand the steps in designing infrastructure projects
- CO2 Understand the needs of environmental, social, legal and institutional aspects in infrastructure designing
- CO3 Differentiate different types of infrastructure and typical design in infrastructure projects
- CO4 Apply the design of infrastructure in project-based cases and scenarios
- CO5 Demonstrate the ability of using computer program software in designing a project.

BET3683

Final Year Project 1

Credit: 3

Prerequisites: None

Synopsis

This course is designed to expose the students to a senior design project. They have to apply all the knowledge that they have learned in the programme to complete the senior design project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the senior design project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcome

- CO 1 Propose background study, problem statement, objective and scopes of the research
- CO2 Practice positive attitude and ethics in research activities
- CO3 Present the research proposal and cited latest publications on the subject

BET3644

Infrastructure Management (Studio 6)

Credit: 4

Prerequisites: None

Synopsis

The course is the continuation of Infrastructural Project (Studio 5) in which students conduct infrastructural design, project BQ and cost estimation, project report and engineering drawing for a selected town with a selected theme. Although the project is in conducted in group, students are expected to demonstrate individual values in term CTPS, TPS, CS and LS.

Course Outcome

- CO 1 Communicate effectively in a team and with external parties
- CO2 Develop professional and ethical responsibilities
- CO3 Select sustainable practices in the conduct of the project
- CO4 Make appropriate references to the code of practice/guidelines
- CO5 Demonstrate techniques/skills using modern engineering tools

BET3593

Quality Performance Management

Credit: 3

Prerequisites: None

Synopsis

This course mainly covers several topics related to quality and performance management, namely different systems used for assessing quality of infrastructure projects, methods of assessing overall construction project performance as well as different techniques applied in establishing and maintaining quality of infrastructure projects. Case studies and project-based tasks are introduced to understand the application of quality and performance in infrastructure projects.

Course Outcome

- CO 1 Understand the fundamental concept of quality and performance in infrastructure projects
- CO2 Identify different types of quality management systems suitable for infrastructure projects
- CO3 Analyze production planning, control and inventory management activities based on given cases.
- CO4 Evaluate solutions for a given cases based on total quality management systems, quality control concept ISO 17001.

**BET1613
Engineering Practice 3
Credit: 3
Prerequisites: None**

Synopsis

This course will involve the student in an investigation of the range of materials commonly used in civil engineering. The characterization of materials and the need for material parameters for design will be considered. The student will test a range of materials in the laboratory to establish material properties. Presentation and interpretation of test results will also form an important part of the course.

Course Outcome

- CO 1 Demonstrate characteristics of materials commonly used in engineering are important in civil engineering design and construction
- CO2 Describe how key characteristics of civil engineering materials are quantified
- CO3 Plan the test regime used to ascertain design parameters for civil engineering materials
- CO4 Organize a testing procedure and sequence to obtain parameters for civil engineering design purpose
- CO5 Analyse test data and present the data and its analysis for use by other engineering personnel

**BET3513
Conflict and Risk Management
Credit: 3
Prerequisites: None**

Synopsis

This course is designated to expose to students various managerial skills and good practices in managing conflict infrastructure projects. Students are also introduced to the risk management aspect in a project.

Course Outcome

- CO 1 Identify good practices in managing conflicts among team members
- CO2 Describe steps in effective risk management in infrastructure projects
- CO3 Understand risks associated with infrastructure project lifecycle
- CO4 Apply concepts of effective risk management through case studies

**BET3522
Procurement for Infrastructural Project
Credit: 2
Prerequisites: None**

Synopsis

Front end engineering design, detailed engineering, asset improvement, procurement and construction management, EPCM and PMC services for customer sector based on HVE (High Value Engineering) and low-cost but high quality professional services that meet international standards.

Course Outcome

- CO 1 Differentiate between procurement and value added
- CO2 Propose procedure on how to conduct design review
- CO3 Organise value management value
- CO4 Conclude procurement as a binding report

**BET4783
Final Year Project 2
Credit: 3
Prerequisites: None**

Synopsis

This subject is the continuation of the subject Engineering Technology Senior Design Project I. In this

course, the students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, the students are required to produce a design project report and present it to faculty's evaluation panel.

Course Outcome

- CO 1 Analyze data, discuss and conclude the findings
- CO2 Manage the research work
- CO3 Practice positive attitude and ethics in research activities
- CO4 Present the research report and cited latest publications on the subject

BET4774

Technology Design Project

Credit: 4

Prerequisites: None

Synopsis

In this course, the widest implications of a service, product or process are considered at the project design stage, including not only the technical interactions of the various sub-systems, but also the financial ethical, sociological, and socio-economic implications. This course leads the students the understanding of the philosophy and methodology of the design process in the context of the system which embraced sociological, economic, technical and ergonomic aspects. The technology design project is the capstone project course in the four year bachelor of engineering technology (infrastructure management).

Course Outcome

- CO 1 Conceptualize problems and develop strategic solutions from open-ended scenarios
- CO2 Identify, review, and evaluate multi-disciplinary design projects that require the system design approach
- CO3 Rationalize, plan, develop, optimize, and communicate a system design in the wider engineering environment of statutes, ecology, common law, ergonomics, social acceptability, marketing, and economics, etc

CO4 Transfer and apply appropriate use of computer technology to the design project

CO5 Cooperate as effective members of teams working and communicate the multi-disciplinary project results in a professional manner with formal report structure, an executive summary and a formal conveyance letter.

CURRICULUM STRUCTURE

BACHELOR OF ENGINEERING TECHNOLOGY (PHARMACEUTICAL) WITH HONOURS

BTP1113 Organic Chemistry; Credit Hour: 3

Prerequisite : None

Synopsis

This module aims to give students a strong foundation in the fundamental principles and theories used to interpret the different properties of organic functional groups. The laboratory course aims to provide students with a practical understanding of the techniques to perform chemical synthesis of organic compounds and identification of their functional groups.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the concepts of organic bonding, organic acids & bases, optical activity and effect of different functional groups in organic synthesis
- CO2: Analyze organic reaction mechanisms, kinetics, buffer strengths, problems & limitations
- CO3: Organize synthesis of organic compounds and identification of their functional groups
- CO4: Organize teamwork to solve problems related to organic compounds

BTP 1213 Biology for Engineers; Credit Hour: 3

Prerequisite: None

Synopsis

This course aims to provide the students with knowledge of the structure of prokaryotic and eukaryotic cells and biomolecules they are made from. The basic principle of microbiology, including organisms, growth and their industrial application.

Course Outcome

By the end of semester, students should be able to:

- CO1: Compare the basic structures of prokaryotic and eukaryotic cells, the key components and their functions.
- CO2: Explain the application of the cell and its operation in industrial biotechnology
- CO3: Explain the basis for disinfection and sterilization processes and their applications in bio/pharmaceutical manufacturing.
- CO4: Perform and report results of simple laboratory techniques related to aseptic technique, microbial isolation and identification, and simple microscopy technique.

BTP1712 Computer Programming for Engineers; Credit Hour: 2

Prerequisite: None

Synopsis

Fundamental principles and concepts of C++ programming, with definitions of data, expressions, control-flow constructions, functions, input and output (I/O stream) and preprocessing. Basic problem solving and programming techniques, structured programming ideas, fundamental algorithms and data structures (array).

Course Outcome

By the end of semester, students should be able to:

- CO1: Construct computer programs using C++ language
- CO2: Develop appropriate programming techniques and program control structures
- CO3: Demonstrate the ability to transform the problem to design and from design to an operational program using IDE for C++

BTP 1312 Materials & Processes; Credit Hour: 2

Prerequisite: None

Synopsis

This course provides the student with fundamental knowledge in materials and processes of pharmaceutical industry. It will provide students with an overview of the relationship between the structure and properties of materials and their influences on manufacturing processes. It will provide the student with the knowledge required to implement both manufacturing process selection through the analysis of design requirements.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the elementary relationships between

structure, properties and performance of materials that are essential to understand the role of materials in the design of engineering systems

CO2: Discuss the fundamental structure, processing and properties of pharmaceutical materials

CO3: Demonstrate the effects of different tests on materials

BTP 1513 Engineering Science;

Credit Hour: 3

Prerequisite: None

Synopsis

This subject is an introduction to the basic principles of physics and it explores concepts in the areas of mechanics, properties of matter, heat, waves, sound, light and atomic physics which are relevant for engineering students.

Course Outcome

By the end of semester, students should be able to:

CO1: Identify and describe fundamentals in engineering sciences

CO2: Apply the concept of engineering sciences to overcome engineering problems

CO3: Conduct experiments and interpret the results

BTP 2232 Contamination Control and Clean Room;

Credit Hour: 2

Prerequisite: None

Synopsis

This module aims to provide the student with in-depth knowledge to understand and work clean room environment with clear concepts in contamination control

Course Outcome

By the end of semester, students should be able to:

CO1: Introduction and basic concepts of clean room and contamination control

CO2: Principles, problems and equipment related to clean room and contamination control

CO3: Ability to present as individuals in matters related to contamination control and cleanroom concepts

CO4: Defend with presentation in matters related to contamination control and cleanroom concepts

BTP 2323 Fluid Mechanics; Credit Hour: 3

Prerequisite: None

Synopsis

This module will introduce students to the principals of fluid mechanics. Students will apply these principles to the solution of engineering problems such as pipe sizing and the selection of system components such as valves and pumps. The module goal is to enable the student to develop the knowledge and analytical skills in solving practical problems of fluid mechanics, through applications to system design and performance studies.

Course Outcome

By the end of semester, students should be able to:

CO1: Describe and/or perform calculations on fluid principles, Bernoulli's equation, continuity equation, fluid properties and various applications.

CO2: Analyse the fluid systems in real pipe line systems and fluid machines.

CO3: Measure, determine, perform and interpret the parameters of fluid experiment as a group

BTP 1613 Introduction to Pharmaceutical Science; Credit Hour: 3

Prerequisite: None

Synopsis

This module aims to provide the student with an understanding of the basic in pharmaceutical dosage form, pharmaceutical packaging, the mode of action and the evaluation of the dosage form

Course Outcome

By the end of semester, students should be able to:

CO1: Differentiate between different classes of pharmaceutical products

CO2: Explain the type of packaging, closure systems labels used in pharmaceutical manufacturing environment

CO4: Demonstrate the evaluation and unit operations of product development involved in the manufacture of a drug formulations

CO5: Commit a good communication skills through presentation and report writing

BTP 1523 Electrical Fundamentals; Credit Hour: 3

Prerequisite: None

Synopsis

Familiarise students with the principles of energy storage and transport in electric and magnetic circuits. The course will provide the knowledge and skills required to safely build electric circuits and to measure and analyse the currents, voltage and power in circuit.

Course Outcome

By the end of semester, students should be able to:

CO1: Describe the basic concept of electricity, conductors, insulators, circuits and magnetism

CO2: Apply circuit analysis theorems in DC and AC circuits by using Ohm and Kirchhoff Laws

CO3: Produce simple electric circuits. Use lab equipment to measure voltage, current and resistance/impedance safely.

CO4: Work in a team and communicate effectively.

BTP 2333 Thermodynamic; Credit Hour: 3

Prerequisite: None

Synopsis

This course intended to provide students with fundamental knowledge of energy, first Law of thermodynamics, enthalpy, entropy, second law of thermodynamics, free energy and equilibrium. Students will also be taught the application of thermodynamics in physical processes which includes solutions of nonelectrolytes and electrolytes, colligative properties, solubility as well as surfaces and interfaces.

Course Outcome

By the end of semester, students should be able to:

CO1: Calculate the change in the energy, enthalpy, entropy using appropriate thermodynamics relations

CO2: Apply the basic concepts of thermodynamics in solutions of nonelectrolytes and electrolytes, colligative properties, solubility, surfaces and interfaces.

CO3: Measure thermodynamics elements and heat transfer of different systems

BTP 2632 Basic Good Manufacturing Practices; Credit Hour: 2

Prerequisite: None

Synopsis

This course aims to provide the students with in-depth understanding of Good Manufacturing Practices with quality assurance in a pharmaceutical manufacturing industry. The course provides an understanding about quality control, quality assurance, validations, complaints, training

and documentation in the pharmaceutical manufacturing industry.

Course Outcome

By the end of semester, students should be able to:

- CO1: Explain the necessity and basics of GMP in pharmaceutical industry
- CO2: Analyze the standard of GMP plant by considering quality control, quality assurance, validation and documentation
- CO3: Demonstrate concern to the impact of Good Manufacturing Practice towards the issues in Pharmaceutical industry
- CO4: Defend ideas with appropriate evidence from Pharmaceutical Inspection Co-operation Scheme (PICS) standards to maintain GMP standards in Pharmaceutical industry

BTP 1133 Pharmaceutical Separation

Technogy; Credit Hour: 3

Prerequisite: None

Synopsis

This course emphasizes on the several mechanisms involved in chemical process. It signifies different applications of liquid- liquid, vapour- liquid and solid-liquid separation process which consists of various unit operations that are commonly used in industry

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply the knowledge of mass balance and mass transfer in separation process
- CO2: Solve problems related to extraction process by applying the formula relevant to specific unit operations
- CO3: Analyze the physical and chemical properties of the active ingredient produced in the lab and make comparison to the literature review
- CO4: Commit as a dynamic team player and gives adequate support to the team

BTP 2223 Protein Biochemistry & Biotechnology;

Credit Hour: 3

Prerequisite: None

Synopsis

This course aims to provide the students with the theoretical and practical fundamentals of the technology in animal and microbial biotechnology. The course focuses on providing understanding of protein biochemistry, protein synthesis mechanism and how the proteins can be genetically modified. These biological systems are then applied to upstream processes of biopharmaceutical production.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe protein based on its type, structure and function and describe the techniques to determine the protein's structure
- CO2: Apply the knowledge of expression & transmission of genetic information in animal and microbial biotechnology
- CO3: Distinguish the types of cloning techniques and bioreactor/fermenter operations according to the type of cells used to produce biopharmaceutical products
- CO4: Perform basic cell culture and fermentation techniques with regard to bioreactor/fermenter operation and analyses the growth parameters and product concentrations
- CO5: Express with documentation in matters related to biotechnology techniques & applications

BTP 2533 Electrical Power System; Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the fundamental concepts and principles of transformer and various types of electrical machines. It is intended for students to understand fundamental aspects of rotating electrical machines. The first part of the course is a quick review of some electromagnetism fundamental while the following will deal with the transformers and different types of electrical machines.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the transformer and machines equivalent circuits and the operating conditions for electrical machines under steady state conditions.
- CO2: Construct driver circuit for DC and AC motor
- CO3: Justify the importance of electrical machines and impacts to the environment.
- CO4: Measure, Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines.

BTP 2412 Numerical Methods & Optimization; Credit Hour: 2

Prerequisite: None

Synopsis

This course focuses on the application of numerical methods in solving engineering technology problems and process optimisation. As the solution of numerical methods often lengthy and time-consuming, the effort used can be reduced by using the computer programming software as as problem solving tools such as MATLAB and Microsoft Excel.

Course Outcome

By the end of semester, students should be able to:

- CO1:Apply numerical methods in solving engineering problem and process optimisation
- CO2:Manipulate computer programming software in solving numerical methods
- CO3:Present the ideas & help team to solve the engineering problems using numerical methods

BTP 2723 Industrial Networks; Credit Hour: 3

Prerequisite: None

Synopsis

This course aims to equip the student with the skills necessary to understand various different network topologies and protocols which will be encountered in the industrial environment. The students are also familiarised with hardware elements of a typical network system such as cabling, nodes, sensors, network devices and interfaces.

Course Outcome

By the end of semester, students should be able to:

- CO1:Demonstrate knowledge and understanding of basic computer networking
- CO2:Construct a simple LAN topologies by applying basic principles of cabling using network simulation
- CO3:Follow basic configuration of network design using real network devices such as switches and routers
- CO4:Execute standard configuration and troubleshooting network using professional technique

BTP 1623 Manufacturing & Processing Technology; Credit Hour: 3

Prerequisite: None

Synopsis

This course is designed to provide the student with an understanding of the equipment unit processes used in pharmaceutical industry and the organization of pharmaceutical manufacturing plant.

Course Outcome

By the end of semester, students should be able to:

- CO1:Analyze major criteria in the manufacturing of pharmaceutical products including drug development, scale-up process and plant organization, management & utilities
- CO2:Analyze the processes involved in drug synthesis, its recovery, formulation and filling
- CO3:Demonstrate the sequence of steps in formulation & filling, product recovery and plant utilities operation.

CO4:Defend theories and prioritize time effectively to meet the needs of organization

BTP 1143 Pharmaceutical Waste Management;

Credit Hour: 3

Prerequisite: None

Synopsis

The course aims to provide students with the basic knowledge of pharmaceuticals in the environment and also presents the fundamental concepts and techniques in waste analysis. This course focuses on the types of pharmaceutical wastes, their sources and life cycle in the environment as well as their effects on human and animal health. Students are also exposed to proper pharmaceutical waste disposal techniques and green and sustainable pharmaceutical practices.

Course Outcome

By the end of semester, students should be able to:

- CO1:Explain different types of pharmaceuticals, pharmaceutical wastes and their point of sources
- CO2: Describe the effects of pharmaceutical wastes on human and animal health
- CO3: Analyze environmental risks of pharmaceuticals
- CO4:Perform basic water and wastewater evaluation and analytical techniques
- CO5:Demonstrate the role of individual within the team in the completion of tasks

BTP 2543 Process Control & Instrumentation; Credit Hour: 3

Prerequisite: None

Synopsis

This course introduces the basic of instrumentation and control, different type of control functions, types of control loops, and continuous vs. discrete control. Introduce to different types of field instrumentation and their principles of operation. Having better understanding in requirements for control rooms and the design of control panels, concepts and implementation of alarm and trip systems as well as requirements for a successful installation, instrument checkout and controller tuning.

Course Outcome

By the end of semester, students should be able to:

- CO1:Describe the key concepts in process control and instrumentation of manufacturing plant
- CO2:Analyze the importance and application of different instrumentations for efficient design of process control loops in manufacturing plants
- CO3:Measure, determine and interpret the parameters

of simple control schemes using instruments and become familiar with the various controllers such as PID controller
 CO4: Design and document process & instrumentation diagrams (PID) and control system definition

BTP 2153 Pharmaceutical Formulation Methods; Credit Hour: 3
Prerequisite: None

Synopsis

This course aims to provide the student with an in-depth knowledge of formulation development, manufacture and process limitations of solid & liquid dosage forms, sustained release products, veterinary products, aerosols and topical products.

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply in detail the formulation aspects of pharmaceutical and veterinary dosage forms.
- CO2: Analyze in detail the instrumentation and manufacturing aspects of pharmaceutical and veterinary dosage forms.
- CO3: Ability to perform formulation development experiments
- CO4: Ability to document and present as individuals in matters related to pharmaceutical formulations: process and limitation

BTP3243 Process Biotechnology Technique; Credit Hour: 3
Prerequisite: None

Synopsis

This course aims to provide the students with the theoretical and practical fundamentals of the technology of the biological product separation. The course focuses on providing understanding of bioseparation processes of four RIPP phases which are recovery, isolation, purification and polishing

Course Outcome

By the end of semester, students should be able to:

- CO1: Apply the principles of each bioseparation technique to solve any related bioseparation problems
- CO2: Analyze the operation and limitations of the protein separation techniques required for lab scale and industrial processing
- CO3: Perform operational and analytical procedures with regard to bioseparation techniques
- CO4: Develop the experimental method proposal and a review of literature through project organization and

time efficiently

BTP3163 Pharmaceutical Manufacturing Process Development; Credit Hour: 3
Prerequisite: BTP 1133 Pharmaceutical Separation Technology

Synopsis

This module aims to provide the student with the theoretical and practical fundamentals of scale up and process development in pharmaceutical manufacturing. The process development starts from Research & Development (R&D) stage to waste disposal control

Course Outcome

By the end of semester, students should be able to:

- CO1: Identify the aspects in R&D process change prior to scale up
- CO2: Outline the elements in process development, evaluation and risk management
- CO3: Demonstrate the application of changes in process variables for scaled up process
- CO4: Exhibit a HAZOP study by applying risk management tools

BTP3732 Facilities Management Systems; Credit Hour: 2
Prerequisite: None

Synopsis

This module introduces students an overview of the Facilities Management in pharmaceutical. This subject introduces the balance of generic management skills core quality of an organization, the value and the risk in processes and to be focused on the facilities operations. These operational skills for the delivery of the facilities services are covered by the management of space, environment, communications and the full range of services that supports business effectiveness in the pharmaceutical industry.

Course Outcome

By the end of semester, students should be able to:

- CO1: Conducting inventory on general building facilities management system
- CO2: Commit to the core values practiced in facilities management
- CO3: Organize the procedures in facilities management to maintain the sustainability of the infrastructures
- CO4: Adapt to the facilities management inventory system

BTP 3643 Regulatory Affairs; Credit Hour: 3
Prerequisite: None

Synopsis

This module aims to provide the student with a detailed understanding of the requirements of the Good manufacturing practice (GMPs), GMP guidelines around the globe, basic concepts of validation, management of validation program, validation in pharmaceuticals specifically and being introduced to the post-marketing issues.

Course Outcome

By the end of semester, students should be able to:

CO1: Describe and interpret the GxP guidelines and the legislation governing the manufacture of pharmaceutical products in Malaysia and ASEAN countries.

CO2: Outline the regulatory, product life cycle including raw material sourcing and validation.

CO3: Express with documentation in the regulatory inspection and the significance of post-marketing issues in pharmaceutical industry.

BTP 3422 Industrial Statistics for Pharmaceutical Engineers; Credit Hour: 2
Prerequisite: None

Synopsis

To provide student with statistical tools (Microsoft EXCEL) for designing experiments, evaluating processes and predicting responses. Exposing students with methods for collecting, analysing, and understanding data, variability, statistical significance, and risks for pharmaceutical industry decisions about processes, products and scientific circumstances. Cover the basic knowledge on statistics and concentrating on specific statistical techniques used in science and industry. Topics include: hypothesis testing and estimation, confidence intervals, single factor experiments, analysis of variance (ANOVA), Taguchi testing, Correlation, Linear regression and multiple regression and Process capability and Statistical process control (SPC)

Course Outcome

By the end of semester, students should be able to:

CO1: Explain fundamental principle of statistics and decision rules of testing a hypothesis

CO2: Carry out statistical analysis by using appropriate statistical theory and methodology

CO3: Analyse data to solve related problems in pharmaceutical discipline using statistical packages; Microsoft Excel

BTP 4253 Bio & Pharma Analytical Techniques; Credit Hour: 3
Prerequisite: None

Synopsis

This module provides the theoretical foundation for analytical techniques used in material characterization, pre-formulation development and Process Analytical Technology (PAT) applications. Apply the handling operation of selected analytical techniques used in pharmaceutical industry. Topics included: Spectroscopy, chromatography, particle analysis, thermal analysis, sensors, electron microscopy, microbiological testing, stability testing and metal and mineral trace analysis

Course Outcome

By the end of semester, students should be able to:

CO1: Explain Process Analytical Techniques (PAT) and the benefits to pharmaceutical industry

CO2: Discuss theory, principles and application of analytical techniques used in material characterisation, pre-formulation development, manufacturing process and storage stability

CO3: Perform standard operation on selected analytical techniques and interpret the results obtained from the experiments

CO4: Express with documentation in matters related to analytical instruments and their applications in pharmaceutical industry

CO5: Adopt the impacts of the environment and sustainability to solve engineering problems

BTP 4663 System Validations; Credit Hour: 3
Prerequisite: None

Synopsis

This module aims to provide students with insights about the processes of validation in pharmaceutical industry. Students will be familiarized with a concept of documented evidence that provides an assurance that a specific process, method or system will consistently produce to the required specification in accordance to accepted standards of Good Manufacturing Practice (GMP). This will provide the students with a good basic to construct validation protocols and implement them appropriately at the workplace.

Course Outcome

By the end of semester, students should be able to:

CO1: Evaluate the existing facilities, systems, equipment and processes in pharmaceutical industry to be validated

CO2: Generate validation plans, protocols and reports

for validation process

CO3: Express with documentation in matters related to system validation in pharmaceutical industry

BTP 4673 Pharma Project I; Credit Hour: 3

Prerequisite: None

Synopsis

This course is designed to expose the students to a final year project known as Pharma Project I. They have to apply all the knowledge that they have learned in the program to complete the project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the Pharma Project I, the students should be able to write a project proposal consisting of objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, project scheduling and costing. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcome

By the end of semester, students should be able to:

CO1: Propose the project proposal on a chosen/given topic in the relevant area

CO2: Defend project proposal in formal oral presentation identifying key outcomes and conclusions

CO3: Function effectively as a member or leader in the diversified technical teams

CO4: Demonstrate a professional ethics and responsibilities towards the project

CO5: Propose financial and costing analysis

CO6: Classify relevant information independently and demonstrate curiosity in exploring new information

BTP 3353 Automation Systems; Credit Hour: 3

Prerequisite: None

Synopsis

This course provides an overview of automation in the industry. The course also includes an introduction to automation equipment such as robots and sensors as well as mechanisms in automation such as Pneumatic and Hydraulic System. The application of automation in the pharmaceuticals manufacturing are introduced. Finally, laboratory experiences with automated technology will be emphasised.

Course Outcome

By the end of semester, students should be able to:

CO1: Understand the production system, the automation principles and related technologies.

CO2: Demonstrate various automation techniques

currently used in industry and list components of an assembly process

CO3: Design and implement an automation project for pharmaceuticals manufacturing

BTP 3363 Lean Manufacturing Systems; Credit Hour: 3

Prerequisite: None

Synopsis

Introduction to modern issues in lean manufacturing systems and practice of lean tools. Topics include overview of lean manufacturing systems, quick changeover, total productive maintenance, pull/just-in-time/kanban, cellular manufacturing, kaizen, wastes identification, productivity measurement, plant layout, and line balance. At the end of the semester the students should be having a basic understanding of the design, operation and control of lean manufacturing systems and be able to use quantitative methods to model, analyze, and optimize such systems.

Course Outcome

By the end of semester, students should be able to:

CO1: Outline the background, philosophy of lean production and identify the seven types of waste in a manufacturing company.

CO2: Assess Lean production tools and techniques in Lean manufacturing system in a production line

CO3: Arrange the evaluation techniques to measure productivity in learn manufacturing activities.

CO4: Organize and control project implementation

BTP 4753 Tech Inno for Pharma Eng; Credit Hour: 3

Prerequisite: None

Synopsis

This course intended to prepare students to design experiments, analyze data, evaluate results and report findings. Student will be exposed to the technique in selecting appropriate research problems and parameters to identify appropriate research topics.

Course Outcome

By the end of semester, students should be able to:

CO1: Analyze the different kind of research design and methodology and apply the appropriate method according to the niche area of research interest

CO2: Develop independent critical thinking for analysing research report/ article

CO3: Generate appropriate research proposal to undertake research project as well as for grant application

CO4: Contribute and complete the given task in timely manner

BTP 4173 Process Control; Credit Hour: 3
Prerequisite: None

Synopsis

This module aims to provide the student with in-depth knowledge to understand the controlling of manufacturing processes ensuring the product quality and compliance as per the regulatory standards

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the fundamentals of process analytical techniques
- CO2: Outline the pharmaceutical industry applications and regulatory environment
- CO3: Perform process control experiments
- CO4: Defend with presentation in matters related to Process control in pharmaceutical industry

BTP 3652 Contemporary Trends in Pharmaceutical Industry; Credit Hour: 2
Prerequisite: None

Synopsis

This module aims to provide the student with in-depth knowledge to understand the pharmaceutical business organization, regulatory parts and recent advanced technological applications.

Course Outcome

By the end of semester, students should be able to:

- CO1: Describe recent regulatory requirements, technical guides and manufacturing technology to pharmaceutical industry
- CO2: Analyze the effectiveness of recent trends to pharmaceutical industry
- CO3: Defend with presentation in matters related to interpretation and applications of new regulatory systems
- CO4: Maintain the code of practice in report writing

BTP 4675 Pharma Project II; Credit Hour: 5
Prerequisite: Pharma Project I

Synopsis

Pharma Project II is the platform in which students will implement their project proposal from Pharma Project I. In this project, students are required to execute series of experiments within the scope of studies based on the outlined objectives in Pharma Project I. Here, students are given opportunity to demonstrate the significant element of self-motivation and creativity in terms of the design and execution of their given/chosen area of study. The successful

completion of a project requires that the student draws fully on his/her knowledge, conceptual and technical skills.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the problem and construct the solution based on the knowledge gained throughout the course of studies
- CO2: Execute project according to the proposed research plan, schedule and estimated cost and solve the problems by using appropriate tools
- CO3: Evaluate and discuss the findings within the scopes and based on the project objectives and write a technical report based on the findings
- CO4: Defend the findings of project in a formal oral presentation identifying key outcomes and conclusions.
- CO5: Function effectively as a member or leader in the diversified technical teams
- CO6: Demonstrate a professional ethics and responsibilities towards the project
- CO7: Manage project financial and costing
- CO8: Classify relevant information independently and demonstrate curiosity in exploring new information

BTP 3742 Technology Transfer; Credit Hour: 2
Prerequisite: None

Synopsis

Students shall obtain an understanding of the requirements and possible problem areas in technology transfer. Know the regulatory and production life cycle including raw material sourcing (assess to their physic-chemical properties) from bench top to large scale pilot plant. Expose to design protocols, documentations and execution of cleaning development, commissioning and validation that are necessary for technology transfer. Topics included: Product Life Cycle, Pilot-Plant Studies, Raw Material Sourcing, Cleaning Validation, Commissioning and Validation.

Course Outcome

By the end of semester, students should be able to:

- CO1: Outline the regulatory and production life cycle including raw material sourcing from bench top to large scale pilot plant.
- CO2: Design protocols, documentations and execution of cleaning development, commissioning and validation.
- CO3: Demonstrate presentation skill and play the role of individual in team to achieve task completion.
- CO4: Defend with documentation in matters related

to cleaning, commissioning or validation process.

BTP 4912 Industrial Training; Credit Hour: 12
Prerequisite: None

Synopsis

In Industrial Training the students should gain insight into industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo industrial training for a certain period that has been agreed by the faculty during last semester of the academic year. The performance of each student during the periods of his/her industrial training is evaluated by the faculty staff, and the representatives from employer organization.

Course Outcome

By the end of semester, students should be able to:

- CO1: Initiate effort to apply acquired technical skill for problem solving in the industry.
- CO2: Function as a professional and ethical trainee in an organization during the industrial training.
- CO3: Demonstrate a professional commitment and responsibilities at workplace.
- CO4: Present the outcomes of industrial training in a formal oral presentation.
- CO5: Conduct an analysis on one main issue discovered during industrial training.

BTP 3812 Pharmacology (Elective I); Credit Hour: 2

Prerequisite: None

Synopsis

This course aims to provide students with a comprehensive knowledge of fundamental Pharmacology; drug absorption, distribution, metabolism and excretion. Expose students with knowledge of mechanism of action and uses of the major classes of clinically important drugs currently used in medical practice. These include drugs affecting the autonomic nervous system; anesthetics and analgesics; drugs to treat the heart and diseases of the cardiovascular system; drugs that affect the immune system; drugs that affect the endocrine system and etc.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the principles of pharmacokinetics that underlie the absorption, distribution, metabolism and elimination of drugs in the body.
- CO2: Evaluate the scientific basis of drug-drug interactions within the body and the undesirable effects.
- CO3: Outline the Pharmacology and the mechanism

of action of the major class of clinically important drugs.

CO4: Express with documentation in matters related to clinical use and mechanism of actions of selected drugs.

BTP 3822 Biopharmaceutics (Elective I); Credit Hour: 2

Prerequisite: None

Synopsis

This course aims to provide the students with in-depth understanding and applying the biopharmaceutics principles absorption, distribution, metabolism, excretion, bioavailability and pharmacokinetics to expand knowledge of drug action and the influence of physiological and chemical function of drug disposition.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the principles of pharmacokinetics that underlie the absorption, distribution, metabolism and elimination of drugs in the body.
- CO2: Evaluate the effects of physiological factors and variability of pharmacokinetics parameters towards drug disposition within body.
- CO3: Outline the biopharmaceutics considerations and impacts of Quality Drug Products to pharmaceutical industry
- CO4: Express ideas related to biopharmaceutics and pharmacokinetics.

BTP 3813 Advanced Drug Delivery Systems (Elective II); Credit Hour: 3

Prerequisite: None

Synopsis

This course aims to provide the student with an in-depth knowledge of both theoretical and practical in formulation development, characterization and pharmacological applications of advanced drug delivery systems.

Course Outcome

By the end of semester, students should be able to:

- CO1: Analyze the concepts of advanced drug delivery and its rationale, use of biodegradable polymers, targeted drug delivery and overview of existing marketed formulations with their pharmacological applications.
- CO2: Design formulation development aspects of diverse pharmaceutical advanced drug delivery systems.
- CO3: Perform formulation development of advanced drug delivery systems

CO4:Defend with documentation in matters related to advanced drug delivery systems: Formulation techniques, characterization & applications

BTP 3823 Material Processes & Colloid Science (Elective II); Credit Hour: 3

Prerequisite: None

Synopsis

This course aims to introduce students the information about surface, interface, surfactants, types and mechanism involved in colloids and rheological properties of the colloidal systems to formulate a stable colloidal dosage forms such as emulsion, suspension, ointment, cream etc.

Course Outcome

By the end of semester, students should be able to:

- CO1:Outline the properties of colloids and technical surfaces
- CO2:Analyze the rheology and formulation of pharmaceutical colloidal dosage forms
- CO3:Design the formulation and evaluation of colloidal systems experiments
- CO4:Demonstrate and defend with presentation related to materials processes and colloidal science

BTP 3833 Safety & Health in Pharmaceutical Industry (Elective III); Credit Hour: 3

Prerequisite: None

Synopsis

This course intended to provide students with fundamental knowledge of safety and health in industry, particularly in pharmaceutical industry, as well as the law and regulation that one industry should comply to in order to ensure a safe workplace environment. Students will also be taught on hazards identification and the assessment of it through proper safety management.

Course Outcome

By the end of semester, students should be able to:

- CO1: Integrate the fundamental of safety & health and its practices to pharmaceutical industry
- CO2: Design health and safety programs to control and minimize occupational hazards using project management principles and processes
- CO3: Demonstrate the ability to use the software to analyze and solve safety & health-related problem
- CO4: Contribute and complete the given task in the given timeframe

BTP 3843 Utilities Requirements for Pharmaceutical Industry (Elective III); Credit Hour: 3

Prerequisite: None

Synopsis

This module aims to provide the student with the theoretical and practical fundamentals of water technology and Heating, Ventilation and Air Conditioning (HVAC) System. The chapters cover pharmaceutical water characteristics and quality. For engineering section, the students will learn about unit operations involved in producing pharmaceutical grade water. This module also covers the theoretical, application and operation of HVAC system.

Course Outcome

By the end of semester, students should be able to:

- CO1:A Analyse the biological and chemical impurities in pharmaceutical water
- CO2: Analyse the main components and their purposes of water treatment and HVAC operations
- CO3: Conceptualize the current status of equipment in pharmaceutical water generation and HVAC system for periodical maintenance
- CO4: Operate the water system in producing purified water and HVAC system maintenance checking in generating high quality air for cleanroom purpose

CURRICULUM STRUCTURE

BACHELOR OF ENGINEERING TECHNOLOGY (COMPUTER SYSTEM) WITH HONOURS

CORE FACULTY

BTU1112

Physics Laboratory

Credit: 2

Prerequisites: None

Synopsis

This laboratory introduces the students with the application of physics concept in engineering devices such as Free Fall, Bernoulli's Law, Hydrostatic Pressure And Electric Field. The concepts of physics introduced related in mechanics or dynamics motion and basic concepts of electrical area. The students will learn how to run the experiment with referring the basic concepts of physics during the lab hours.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application
- CO 2 Demonstrating skills in logical thinking in handling equipment.
- CO 3 Applying basic physics concepts to problem solving
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1113

Physics

Credit: 3

Prerequisites: None

Synopsis

This course introduces a fundamental of physics. It covers unit and measurements, kinematics, forces and Newton's law of motion, statics equilibrium, work, energy and power, fluid mechanics, electric and magnetism

Course Outcome

- CO 1 Understand the basic concepts, theories and principles of physics in engineering application
- CO 2 Solve physics problems such as in kinematics, forces and static equilibrium
- CO 3 Discuss physics quantity such as work, energy and power in a team
- CO 4 Applying basic laws to solve fluid, electrical

and magnetism problems

BUM1113

Technical Mathematics

Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Student are exposed to complex number, functions and graphs, trigonometric functions, analytic geometry, polar coordinates, 3 dimensional spaces and vector. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Apply appropriate mathematics concepts to solve various technological problems.
- CO 2 Use appropriate software and tool to solve the graphical and computational problems in mathematics
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
- CO 4 Relate and applied the concepts and methods studied into other courses.

BUM1223

Calculus

Credit:3

Prerequisites: None

Synopsis

This course discusses Differentiation and applications, techniques of integration and applications, numerical integration and Taylor polynomial, Taylor Series & Maclaurin Series.

Course Outcome

- CO 1 Understand the fundamental concepts of the calculus and connect them with the real world problem.
- CO 2 Solve any related problem involving differentiation and integration.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.
- CO 5 Attain computational facility in differential and integral calculus.

BUM2113

Applied Mathematics

Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses Partial Derivatives, Double Integrals, First Order Differential equations and Second Order differential equations.

Course Outcome

- CO 1 Analyze and apply the knowledge of Multiple Integrations to solve various science and engineering problems.
- CO 2 Analyze and solve various differential equation problems by using the basic principles and methodologies of First Order differential equations and Second Order differential.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.

BTU1313

Computer Programming

Credit: 3

Prerequisites: None

Synopsis

Fundamental principles and concepts of C++ programming, with definitions of data, expressions, control-flow constructions, functions, input and output and preprocessing. Basic problem solving and programming techniques, structured programming ideas, fundamental algorithms and data structures (array).

Course Outcome

- CO 1 Construct computer programs using C++ language
- CO 2 Develop appropriate programming techniques and program control structures
- CO 3 Display the ability to use IDE (Integrated Design Environment) for C++
- CO4 Propose an algorithm for a specific problem by implementing appropriate programming techniques.

BTU1322

Electrical Fundamentals Laboratory

Credit: 2

Prerequisites: None

Synopsis

This course introduces students to the fundamentals laboratory of DC and AC circuits and basic network laws and theorems. The students will be handling the basic measurement equipment to measure and analyse the parameter of the electrical circuits.

Course Outcome

- CO 1 Construct simple electrical and electronics and simulate the operation of the circuits using circuit simulation software (OrCAD).
- CO 2 Measure parameter of electrical circuits (resistance, voltage, current, etc)
- CO 3 Work ethically and effectively as an individual and in a group

BTU1323

Electrical Fundamentals

Credit:3

Prerequisites: None

Synopsis

This module will introduce students to basic science of electricity, introduction to instrumentation and measurement, work and energy theorem, basic electrical circuits and introduction to magnetism.

Course Outcome

- CO 1 Describe the basic concept of electricity, conductors, insulators, circuit, magnetism and other devices.
- CO 2 Apply basic electrical laws such as Ohm and Kirchhoff Law to solve circuit or electrical problems.
- CO 3 Shows the ability to communicate effectively.

BTU1333

Circuit Analysis I Laboratory

Credit:2

Prerequisites: BTE1212

Synopsis

This course introduces the basic concepts and engineering methods of DC circuit analysis. It is also introduce the concept of AC circuits. The contents include Ohm's Law, Kirchhoff's Law, series and parallel circuits, Mesh and Nodal analysis, superposition

theorem, Thevenin and Norton equivalent of a complex circuit, Measure capacitance, measure capacitor charge and discharge times, RL, RC circuits, phase difference, measure power in a single phase circuit and responses of basic First Order circuits.

Course Outcome

- CO 1 Build various electrical circuits and properly use lab equipment to measure, analyse and troubleshoot the circuits. [PO1]
- CO 2 Solve the DC circuit problems using nodal analysis and mesh analysis, Thevenin and Norton equivalent and evaluate the most efficient methods among them. Also introduce the concept of AC [PO2, PO5]
- CO 3 Write lab reports in proper format to report work clearly and concisely.
- CO 4 Demonstrate the role of individual in team to achieve task completion.

BTU1332

Circuit Analysis I

Credit:3

Prerequisites: BTE1213

Synopsis

This course introduces the engineering methods of DC circuit analysis. The contents include Mesh and Nodal analysis, Source Transformation, and 4 main network Theorems: Superposition, Thevenin, Norton and Maximum Power Transfer theorems. It also includes the basic of DC transients in capacitors and inductors. Introduction to AC fundamentals and impedance concept of RLC circuits are also covered.

Course Outcome

- CO 1 Analyse DC circuit problems using various methods of DC Analysis and Network Theorems
- CO 2 Describe the effects of DC transients on capacitors and inductors, and to relate them with electromagnetism concept
- CO 3 Examine the AC (current and voltage) characteristics, and the concept of impedance in R,L,C circuits
- CO 4 Describe the real industrial practice.

BTU2343

Circuit Analysis II Laboratory

Credit:2

Prerequisites: BTE2222

Synopsis

This course provides the basic concepts and engineering methods of AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, Filters, Bridges and Balanced 3-phase circuits are also covered.

Course Outcome

- CO 1 Apply and validate circuit analysis theorems in ac circuits. [PO1, P2]
- CO 2 Identify simple first-order filters and determines the resonant frequency and bandwidth for series/ parallel resonant circuits. [PO4, P3]
- CO 3 Identify the functions and applications of transformers and introduce the Non-sinusoidal Waveforms and the 3 phase concept. [PO2, P4]

BTU2342

Circuit Analysis II

Credit:3

Prerequisites: BTE2223

Synopsis

This course provides the basic concepts and engineering methods of AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, Filters, Bridges and Balanced 3-phase circuits are also covered.

Course Outcome

- CO 1 Determine impedance, voltage, current and other basic values for ac circuits.
- CO 2 Apply circuit analysis theorems in ac circuits.
- CO 3 Identify simple first-order filters and determines the resonant frequency and bandwidth for series/ parallel resonant circuits.
- CO4 Identify the functions and applications of transformers and introduce the Non-sinusoidal Waveforms and the 3 phase concept.

BTE1313

Instrumentation & Measurements

Credit:3

Prerequisites: None

Synopsis

This course introduces students to the principles of instrumentation and measurements, determination of error that caused by the meters. The students will be exposed to the architecture and the operation of DC and AC meters, oscilloscope, signal generator, storage instrument and display devices, analysis of DC and AC meters and introduction to signal conditioning.

Course Outcome

- CO 1 Explain the basic concept of Instrumentation & measurement system including the operation, calibration and calculation
- CO 2 Solve problems regarding AC & DC meters, oscilloscope and signal generator
- CO 3 Construct the operation of meters, measuring devices or signal conditioning circuits into trainer board and interpret the experimental results into report.
- CO4 Understand the functional role of individual towards task accomplishment

BTU2414

Computer-Aided Drafting

Credit:4

Prerequisites: None

Synopsis

This subject is designed to introduce to the students the principle of computer-aided design. Topics includes Drafting Overview, Drawing Set-up , Basic CAD ,Commands Geometric Construction , Orthographic Projection , Basic Drawing ,Tools, Pictorial Drawings, Sectional Views, Advance CAD Commands, Modifying CAD,Drawings, Dimensioning, Tolerances, Working Drawings, Threads and Fasteners

Course Outcome

- CO 1 Analyze problem in technical drawing and understand drawing
- CO 2 Use basic geometric construction techniques to create objects in CAD
- CO 3 Project a 3 dimensional object in 2 dimensional space with the proper utilization of views in CAD
- CO 4 Read & create dimensioned drawings using conventional techniques in CAD.
- CO 5 Identify and understand the components of working drawings & the standards that apply.

CORE PROGRAM

BTE2112

Analog Electronics Laboratory

Credit:2

Prerequisites: None

Synopsis

Diode characteristics, Half wave and full wave rectifiers, Zener characteristics, Zener Voltage regulators, BJT characteristics, CE amplifier, MOSFET characteristics, CS amplifier.

Course Outcome

- CO 1 Measure electronics devices characteristics.
- CO 2 Construct electric circuits. Use lab equipment and Measure Electronics parameters in this circuits.
- CO3 Build and simulate the operation of electric circuit.

BTE2113

Analog Electronics

Credit:3

Prerequisites: None

Synopsis

The P-N Junction Diode, Diode Applications, Bipolar Junction Transistors (BJT), DC Biasing of the BJT Amplifier, Transistor Modelling, Cascade Amplifier, Small-Signal BJT Amplifier, Metal-Oxide-Semiconductor FET (MOSFET), MOSFET Amplifier, Frequency Response of BJT and FET Amplifiers.

Course Outcome

- CO 1 Understanding the electronics devices (Transistors, Op-Amp) theories.
- CO 2 Analysing the electronics circuits.
- CO3 Designing the electronics circuits.

BTE3222

Digital Logic Design Laboratory

Credit:2

Prerequisites: None

Synopsis

Laboratory experiments on digital circuits design and verification, using various digital circuit components. Combinational design techniques as well as sequential design techniques are presented with the use of Karnaugh mapping, state transition diagrams and tables.



Course Outcome

- CO 1 To demonstrate the applications of digital logic simplification techniques
- CO 2 Apply basic gates, flip flops and digital circuit
- CO 3 Construct and analyse logic system, counter, decoder, memory devices and multiplexer.
- CO 4 Demonstrate the report writing skills in technical field
- CO 5 Work in a team and communicate effectively

BTE3223

Digital Logic Design

Credit:3

Prerequisites: None

Synopsis

This course emphasizes on the fundamental of digital electronics. The student is first taught about the number system and logic gates before introducing them to digital IC technology. Then they are exposed to both combinational logic network and combinational logic. In concurrence with this, the fundamental of sequential logic, flip-flop, counter and shift register will be taught. Finally, the memory devices are introduced.

Course Outcome

- CO 1 Apply various techniques for digital logic simplification
- CO 2 Apply basic gates, flip flops and various basic digital circuit
- CO 3 Analyse logic system, counter, decoder, memory devices and multiplexer

BTS32**

Computer Architecture Laboratory

Credit:2

Prerequisites: None

Synopsis

This course introduces the concepts Computer arithmetic and ALU design, Data path and control, Using Hardware Description Language to design and simulate the CPU, Pipelining, Memory hierarchy, caches and virtual memory, Interfacing CPU and peripherals, buses, Multiprocessors, networks of multiprocessors, parallel programming and Performance issues.

Course Outcome

- CO 1 Design and emulate a single cycle or pipelined CPU by given specifications using Hardware Description Language (HDL).
- CO 2 Develop projects on computer architecture elements.

- CO 3 Write reports and make presentations of computer architecture projects.

BTS33**

Computer Architecture

Credit:3

Prerequisites: None

Synopsis

This course introduces the architecture of the computer by studying its various levels: physical level, operating-system level, conventional machine level and higher level. Students are supposed to understand computer arithmetic and ALE design, datapath and control, using Hardware Description Language to design and simulate the CPU, pipelining, memory hierarchy, caches and virtual memory, Interfacing CPU and peripherals, buses, multiprocessors, network of multiprocessors, parallel programming and computer networking is provided.

Course Outcome

- CO 1 Understand the fundamentals of different instruction set architecture and their relationship to the CPU.
- CO 2 Understand the principles and the implementation of computer arithmetic.
- CO 3 Understand the operation of modern CPUs including pipelining, memory systems and buses.
- CO 4 Understand the principles of operation of multiprocessor systems and parallel programming.

BTS23**

Control Theory

Credit:3

Prerequisites: None

Synopsis

This subject introduces the analysis and design of control model that include introduction to control concepts, Laplace transforms, frequency response, and mathematical modeling of dynamic systems and basic principle of controllers.

Course Outcome

- CO 1 Understand the fundamentals of control systems.
- CO 2 Analyze mathematical modelling of dynamic systems.

CO 3 Understand the basic principle of controllers.

BTE3232

Communication System Design Laboratory

Credit:2

Prerequisites: BTE2233

Synopsis

This course introduces theories in the area of communication systems. Topics covered include the basic elements of communications, signal analysis, amplitude modulation

Course Outcome

- CO 1 Demonstration of various components of electronic communication system.
- CO 2 Demonstrate the understanding of signal generation using available integrated circuits.
- CO 3 Demonstrate the understanding of various type of modulation and demodulation process.
- CO 4 Work in a team effectively as an individual and in a group

BTE3233

Communication System Design

Credit:3

Prerequisites: BTE2233

Synopsis

This course introduces theories in the area of communication systems. Topics covered include the basic elements of communications, signal analysis, type of oscillators, amplitude modulation and angle modulations, as well as single-sideband communication systems.

Course Outcome

- CO 1 Interpret the basic concept and understanding in communication design system.
- CO 2 Analyse and differentiate various type of modulation and demodulation techniques
- CO 3 Measure the parameters for various types of modulation and demodulation
- CO 4 Work in a team effectively as an individual and in a group

BTE3252

Microprocessor and Interfacing Laboratory

Credit:2

Prerequisites: BTE2313 & BTE3223

Synopsis

This course in an introduction to microprocessors. Students are exposed to the internal architecture of the microprocessor, various instruction sets, and basic hardware design of microprocessor-based.

Course Outcome

- CO 1 Explain the architecture of the microprocessor system and its interface [PO1 P2]
- CO 2 Manipulates the M68000 instruction sets [PO3, P4, CTPS4]
- CO 3 Develop a program in a microprocessor system by using an assembly language [PO3, P5, CTPS5]
- CO 4 Design and build a simple hardware based on the M68000 processor [PO11, P7, CTPS 4]

BTE3254

Microprocessor and Interfacing

Credit:4

Prerequisites: BTE2313 & BTE3223

Synopsis

This course in an introduction to a microprocessor/microcontroller. Students are exposed to the internal architecture of the microprocessor/microcontroller, various instruction sets, program developing for applications in embedded systems using C language and basic hardware design of embedded systems.basic hardware design of microprocessor-based.

Course Outcome

- CO 1 Illustrate the architecture of the microprocessor/microcontroller system and develop programs for applications in embedded system using assembly language.
- CO 2 Develop programs for applications in embedded systems using "c" language.
- CO 3 Build a project using microcontroller & demonstrate the report writing skills in technical field.
- CO 4 Demonstrate the role of individual in team to achieve task completion.

BTS32**

Numerical & Control Systems Laboratory

Credit:2

Prerequisites: None

Synopsis

This course introduces numerical and control systems. Topics include Principle of CNC part programming, tooling and work-holding devices, machine tool position and motion control systems, automatic tool changers and machining centres, kinematics and mechanics of milling operations, part programming using CAD/CAM systems.

Course Outcome

- CO 1 Write fundamental manual G-code programs, for various machining applications, including spindle speeds, and feed rates.
- CO 2 Program absolute and incremental tool positions for machining canned cycle operations, linear and circular interpolation, looping and subroutine.
- CO 3 Use a PC to prepare, edit and print a machine readable part program and use a CNC machine to verify and machine a basic part.
- CO 4 Use 2D CAM software to create job operation files, 2D shape profiles, generate machine code, verify tool path using computer simulation, and machine basic parts on a CNC machine using computer generated code.
- CO 5 Demonstrate the report writing skills in technical field and work in a team and communicate effectively.

BTE33**

Numerical & Control Systems

Credit:3

Prerequisites: None

Synopsis

This course introduces numerical control systems. Topics includes Principle of CNC part programming, tooling and work-holding devices, machine tool position and motion control systems, automatic tool changers and machining centres, kinematics and mechanics of milling operations, part programming using CAD/CAM systems.

Course Outcome

- CO 1 Write fundamental manual G-code programs, for various machining

- CO 2 Program absolute and incremental tool positions for machining canned cycle operations, linear and circular interpolation, looping and subroutine.
- CO 3 Use a PC to prepare, edit and print a machine readable part program and use a CNC machine to verify and machine a basic part.
- CO 4 Use 2D CAM software to create job operation files, 2D shape profiles, generate machine code, verify tool path using computer simulation, and machine basic parts on a CNC machine using computer generated code.

BTS4253

Computer Vision System

Credit:3

Prerequisites: None

Synopsis

This course introduces students to the principles of Computer Vision which includes image formation and low level image processing, theory and techniques for extracting features from images, measuring shape and location, and recognizing and classifying objects. Students will be exposed to design project using image processing software.

Course Outcome

- CO 1 Explain the concept of computer vision and their applications.
- CO 2 Select and evaluate appropriate technique of image processing to solve engineering application.
- CO 3 Design and develop a vision system application using image processing software.
- CO 4 Manipulate ideas on how the computer vision system works through group presentation.
- CO 5 Work effectively in a team to achieve common goal.

BTS32**

Signal & Networks Laboratory

Credit:2

Prerequisites: None

Synopsis

This course introduces the students to signals transformation machines and its application to electrical circuits. This includes applying Fourier Series, Fourier

Transforms and Laplace Transform. The concept of frequency response is introduced in filter analysis and design with additional two port network techniques.

Course Outcome

- CO 1 Distinguish the different type of signals and its operations.
- CO 2 Apply Fourier and Laplace techniques in solving electronics problems.
- CO 3 Analyze and differentiate several types of passive filters.
- CO 4 Evaluate various signals and systems using engineering software.
- CO 5 Conduct independent readings and research in designing Graphical User Interface (GUI) for any transformation technique.

BTS33**
Signals & Networks
Credit:3
Prerequisites: None

Synopsis

This course introduces the students to various signals transformation techniques and its application to electrical circuits. This includes Fourier Series, Fourier Transforms and Laplace Transform. The concept of frequency response is introduced in filter analysis and design with additional two port network techniques.

Course Outcome

- CO 1 Distinguish the different type of signals and its operations.
- CO 2 Apply Fourier and Laplace techniques in solving electronics problems.
- CO 3 Analyze and differentiate several types of passive filters.

BTS32**
Microcontrollers & Embedded Systems Laboratory
Credit:2
Prerequisites: BTS33 (Computer Architecture)**

Synopsis

This course introduces the application of embedded systems. This includes exposure to the internal architecture of the Microcontrollers using Motorola M68HC11, various instruction sets and basic hardware design of Microcontrollers-based. They will learn how to program the Microcontroller using assembly and C language.

Course Outcome

- CO 1 Illustrate the architecture of the microcontroller.
- CO 2 Interpret the M68HC11 instruction sets.

- CO 3 Develop a firmware using assembly language
- CO 4 Design a basic hardware based on 68HC11 microcontroller.
- CO 5 Work in a team and communicate effectively.

BTS33**
Microcontrollers & Embedded Systems
Credit:3
Prerequisites: BTS33 (Computer Architecture)**

Synopsis

This course is an introduction to Microcontrollers. Students are exposed to the internal architecture of the Microcontrollers, various instruction sets and basic hardware design of Microcontrollers-based. They will learn how to program the Microcontroller using assembly and C language.

Course Outcome

- CO 1 Explain the principles, operation and function of microcontroller system.
- CO 2 Create applications program for specific task.
- CO 3 Develop & test programming for high level language.
- CO 4 Construct interface electronics circuit to control the external devices.

BTS34**
PLC Basics and Applications
Credit:4
Prerequisites: BTS33 (Computer Architecture)**

Synopsis

This course introduces the fundamental of Programmable Logic Controller (PLC) including input and output component, memory address, wiring diagram, troubleshooting and design of ladder diagram. The student will learn on how to design the PLC Programming to control simple manufacturing applications. Students are also exposed to the analog input and output of the PLC card.

Course Outcome

- CO 1 Explain the principle, operation and function of PLC.
- CO 2 Identify PLC hardware and software configuration.
- CO 3 Construct control operation system for specific task using PLC.
- CO 4 Develop a program to operate the manufacturing applications.
- CO 5 Practices right attitude and safety procedures.

BTS3813

Engineering Technology Senior Design I

Credit:3

Prerequisites: None

Synopsis

This course is designed to expose the students to a senior design project. They have to apply all the knowledge that they have learned in the programme to complete the senior design project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the senior design project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcome

- CO 1 Propose background study, problem statement, objective and scopes of the research
- CO 2 Practice positive attitude in research activities
- CO 3 Present the research proposal and cited latest publications on the subject

BTS44**

Robotics

Credit:4

Prerequisites: None

Synopsis

This course introduces an understanding of the principles of operation of automated equipment with particular reference to the industrial robot. This course covers classification and various types of robots and its application, robot kinematics, differential kinematics, robot dynamics, robot path planning and robot sensing.

Course Outcome

- CO 1 Understand robotics and sensing system, its basic components and applications.
- CO 2 Design workcell based on industrial problem.
- CO 3 Analyze robot kinematics and dynamic.
- CO 4 Function effectively as an individual and in a group to complete given task.
- CO 5 Apply techniques and skills of robot manipulation through laboratory work.

BTE4826

Engineering Technology Senior Design Project II

Credit:6

Prerequisites: BTE3813

Synopsis

This subject is the continuation of the subject Engineering Technology Senior Design Project I. In this course, the students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, the students are required to produce a design project report and present it to faculty's evaluation panel.

Course Outcome

- CO 1 Analyze data, discuss and conclude the findings
- CO 2 Manage the research work
- CO 3 Practice positive attitude in research activities
- CO 4 Present the research report and cited latest publications on the subject

BTU4912

Industrial Training

Credit:12

Prerequisites: All Subject

Synopsis

In Industrial Training the students should gain insight into industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo and industrial training for a certain period that has been agreed by the faculty during last semester of the academic year. The performance of each student during the periods of his/her industrial training is evaluated by the faculty staff, and the representatives from employer organization.

Course Outcome

- CO 1 Show and classify in-depth the industrial structure and organization and to understand roles of typical personnel in that particular industry.[PO2,C3]
- CO 2 Manipulate the knowledge learned in the university and to practice them in problem solving direct or indirect application to any design, planning, production or management .[PO3,P5,CTPS3]
- CO 3 Practice the professionalism and work etiquette that comply to good and responsible engineer.[PO6,A5,EM2]
- CO 4 Demonstrate management/leadership skills to lead or manage effectively in a industry environment. [PO8,A3,TS3]

- CO 5 Demonstrate the knowledge and ability to search and retrieve information and materials related to the industrial needs. [PO10,A3,LL2]
- CO 6 Arrange and display data and relevant information with a systematic approach.[PO6,A4,EM3]
- CO 7 Explain and organize the industrial training experience through written communication.[PO7,P5,CS4]

ELECTIVE COURSES

BTS4723
Software Engineering
Credit:3
Prerequisites: None

Synopsis

This course introduces the essential knowledge of software engineering dealing with the theories, methods and tools for professional software development. This course covers the definition, implementation, assessment, measurement, management, change and improvement of the software engineering process.

Course Outcome

- CO 1 Understanding the process of professional software development in software engineering
- CO 2 Analyze the theories and different methods and tools for professional software development
- CO 3 Develop the professional software development using different methods and tools

BTS4713
Advanced Microprocessor
Credit:3
Prerequisites: BTE3254

Synopsis

This course introduces software details of the 68000, exception processing, hardware details of the 68000, memory system design, I/O system design, building a working 68000 system and introduction to the advanced 680X0 series microprocessors.

Course Outcome

- CO 1 Analyze the principles of the 68000 including the details of software and hardware
- CO 2 Analyze the principles of the advanced 680X0 series microprocessors
- CO 3 Design working 68000 and 680X0 system that include memory and I/O systems design

BTS4733
Internet Programming
Credit:3
Prerequisites: None

Synopsis

This course introduces the fundamentals of internet and world wide web including the concept of HTML, XHTML and CSS. The course also covers the creation of Internet based applications using the Java Scripts programming language and provides an in-depth knowledge for the creation of dynamic web application with enhanced features by introducing various programming techniques XML and RSS using Java Scripts.

Course Outcome

- CO 1 Analyze the principles of internet and orld wide web
- CO 2 Construct internet based applications using Java Scripts programming language.
- CO 3 Design web applications with enhanced features using various programming technique.



CURRICULUM STRUCTURE

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (PETROLEUM) WITH HONS.

CORE FACULTY

BTU1112

Physics Laboratory

Credit: 2

Prerequisites: None

Synopsis

This laboratory introduces the students with the application of physics concept in engineering devices such as Free Fall, Bernoulli's Law, Hydrostatic Pressure And Electric Field. The concepts of physics introduced related in mechanics or dynamics motion and basic concepts of electrical area. The students will learn how to run the experiment with referring the basic concepts of physics during the lab hours.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application
- CO 2 Demonstrating skills in logical thinking in handling equipment.
- CO 3 Applying basic physics concepts to problem solving
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1113

Physics

Credit: 3

Prerequisites: None

Synopsis

This course introduces a fundamental of physics. It covers unit and measurements, kinematics, forces and Newton's law of motion, statics equilibrium, work, energy and power, fluid mechanics, electric and magnetism

Course Outcome

- CO 1 Understand the basic concepts, theories and principles of physics in engineering application
- CO 2 Solve physics problems such as in kinematics, forces and static equilibrium
- CO 3 Discuss physics quantity such as work, energy and power in a team

BTU1212

Chemistry Laboratory

Credit: 2

Prerequisites: None

Synopsis

In chemistry laboratory the students are responsible to conduct the basic physical, organic chemistry and analytical instrument experiments such as solubility & miscibility (1), chemical equilibrium (2), buffer and pH changes (3), calorimetry (4), gravimetric (5), Limiting reactant (6), Reaction rate (7), Extraction with solvent (8), UV-VIS spectrometer (9), and Melting Point (10). At the end of experiments, the students should be able to inculcate the critical thinking and able to work in safe working condition.

Course Outcome

- CO1 Apply physical, organic & analytical chemistry theory in laboratory
- CO2 Apply the basic science and analytical chemistry knowledge in operation of analytical chemistry equipment.
- CO3 Able to demonstrate and operate each analytical equipment base on the theories applied in analytical chemistry
- CO4 Able to indicate any minor/major malfunction of equipment, incorrect step/result & troubleshoot it

BTU1213

Chemistry

Credit: 2

Prerequisite: None

Synopsis

Development of the fundamental principles and concepts of chemistry by lecture-demonstration, as well as the development of an appreciation of the nature of chemistry as a science. An historical development of the most important concepts and ideas. Methods and limitations of chemistry, its evolution and discussions of the problems currently being solved and created.

Course Outcome

- CO1 Apply the basic knowledge about physical, inorganic and analytical chemistry.
- CO2 Relate chemical concept and principles while presenting a broad range of topic in a clear and concise manner.
- CO3 Develop problem solving and critical thinking skills on general chemistry.



BUM1113
Technical Mathematics
Credit:3
Prerequisites: None

Synopsis

This course introduces and discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Student are exposed to complex number, functions and graphs, trigonometric functions, analytic geometry, polar coordinates, 3 dimensional spaces and vector. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Apply appropriate mathematics concepts to solve various technological problems.
- CO 2 Use appropriate software and tool to solve the graphical and computational problems in mathematics
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
- CO 4 Relate and applied the concepts and methods studied into other courses.

BUM1223
Calculus
Credit:3
Prerequisites: None

Synopsis

This course discusses Differentiation and applications, techniques of integration and applications, numerical integration and Taylor polynomial, Taylor Series & Maclaurin Series.

Course Outcome

- CO 1 Understand the fundamental concepts of the calculus and connect them with the real world problem.
- CO 2 Solve any related problem involving differentiation and integration.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.
- CO 5 Attain computational facility in differential and integral calculus.

BUM2113
Applied Mathematics
Credit:3
Prerequisites: None

Synopsis

This course introduces and discusses Partial Derivatives, Double Integrals, First Order Differential equations and Second Order differential equations.

Course Outcome

- CO 1 Analyze and apply the knowledge of Multiple Integrations to solve various science and engineering problems.
- CO 2 Analyze and solve various differential equation problems by using the basic principles and methodologies of First Order differential equations and Second Order differential.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.

CORE PROGRAM

BTO1113
Introduction to Mechanical Engineering
Credit: 3
Prerequisites: None

Synopsis

Mechanical Engineering covers the creation, design, and analysis of many types of systems, technologies, and materials. This course will introduce students to the fundamentals of Mechanical Engineering, as well as providing a brief introduction to Materials Science, and showing what role materials play for Mechanical Engineers.

Course Outcome

- CO1 Analyze physical systems or components by applying knowledge of mathematics, basic science and engineering
- CO2 Realize a physical system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- CO3 Communicate effectively and function on multidisciplinary teams.



BTO1123
Engineering Mechanics
Credit: 3
Prerequisites: None

Synopsis

This course introduces the force vector algebra, equilibrium of forces on particle, equilibrium of forces on single rigid body and simple force analysis on simple frames and machine structures (multi-rigid bodies) and problems involving dry friction.

Course Outcome

- CO1 Analyze equilibrium of forces on particle problems
- CO2 Analyze equilibrium of forces on single rigid body problems
- CO3 Measure equilibrium of forces on simple frame structure problems using software and compare the result with that of the hand calculation
- CO4 Explain equilibrium of rigid bodies in order to solve a technical problem in technical language

BTO1313
Manufacturing Computer Applications
Credit: 3
Prerequisites: None

Synopsis

Overview of computer hardware, software, and processing concepts related to the control of manufacturing tasks. Emphasis on use of integrated software packages in the solution of a variety of manufacturing problems. Laboratory assignments in automation control, real time data sampling, and creation of user interfaces.

Course Outcome

- CO1 Identify the concept of Visual Basic
- CO2 Explain the basic function of Visual basic
- CO3 Demonstrate the advanced function of Visual basic
- CO4 Develop manufacturing application software

BTE1212
Electric & Electronics Fundamentals Laboratory
Credit: 2
Prerequisites: None

Synopsis

This course introduces the basic laboratory of DC and AC circuit analysis. The contents include Ohm's Law, Kirchhoff's Law, series and parallel circuits, Mesh and Nodal analysis, superposition theorem, Thevenin and Norton equivalent of a complex circuit. The student will be handling measuring of capacitance, measure capacitor charge and discharge times, RL, RC circuits, phase difference, measure power in various type of circuits.

Course Outcome

- CO1 Construct various electrical circuits and properly use lab equipment to measure, analyse and troubleshoot the circuits.
- CO2 Solve the DC circuit problems using nodal analysis and mesh analysis, Thevenin and Norton equivalent and evaluate the most efficient methods among them. Also introduce the concept of AC
- CO3 Demonstrate the role of individual in team to achieve task completion.

BTE1213
Electric & Electronics Fundamentals
Credit: 3
Prerequisites: None

Synopsis

This course introduces the engineering methods of DC circuit analysis. The contents include Mesh and Nodal analysis, Source Transformation, and 4 main network Theorems: Superposition, Thevenin, Norton and Maximum Power Transfer theorems. It also includes the basic of DC transients in capacitors and inductors, and their relationship with electromagnetism concepts. Introduction to AC fundamentals and impedance concept of RLC circuits are also covered.

Course Outcome

- CO1 Analyse DC circuit problems using various methods of DC Analysis and Network Theorems
- CO2 Describe the effects of DC transients on capacitors and inductors, and to relate them with electromagnetism concept
- CO3 Examine the AC (current and voltage) characteristics, and the concept of impedance in R,L,C circuits
- CO4 Describe the real industrial practice



tolerancing in working drawing

BTO2323

Computer for Engineers

Credit: 3

Prerequisites: None

Synopsis

This subject is an introductory computing course that covers popular applications (such as spreadsheets and numerical computing environments) to solve computational problems, procedural programming (using tools associated with the applications) to solve engineering, business and scientific tasks and some aspects of current and emerging Information Technologies.

Course Outcome

- CO1 Demonstrate ability to write computer programs to solve simple numerical problems using software tools; MATLAB, FORTRAN, Excel
- CO2 Demonstrate ability to interface existing software tools with simple customized code
- CO3 Demonstrate ability to read engineering problem statements, translate them to computing problems, solve them and report results

BTO2314

Computer Aided Design

Credit: 4

Prerequisites: None

Synopsis

This course is a basic and advanced computer aided drafting in two dimensions. CAD tools required to document engineering designs. This subject is designed to introduce to the student the principle of computer-aided design including drafting, drawing, dimensioning, tolerances and commands.

Course Outcome

- CO1 Analyse technical drawing.
- CO2 Apply basic geometric construction technique in creating 2D object and projecting 3D object in 2D space.
- CO3 Perform working drawing with its components and follow the standards that apply.
- CO4 Display geometric dimensioning and

BTO2133

CNC Machining

Credit: 3

Prerequisites: None

Synopsis

A study of the principles, techniques, and applications of computer numerically controlled machine tools. G and M code programming of industrial machines, tooling systems, and an introduction to Computer Aided Manufacturing (CAM) systems will be covered.

Course Outcome

- CO1 Produce fundamental manual G-code programs, for various machining applications, including spindle speeds, and feed rates
- CO2 Operate an absolute and incremental tool positions for machining canned cycle operations, linear and circular interpolation and subprograms.
- CO3 Use a PC to prepare, edit and print a machine readable part program and use a CNC machine to verify and machine a basic part.
- CO4 Produce job operation files, shape profiles, generate machine code, verify tool path using computer simulation CAM software

BTO2013

Strength of Materials

Credit: 3

Prerequisites: None

Synopsis

This course intends to provide mechanics of deformable bodies with emphasis on principles of stress and strain, shear and bending moment, torsion, buckling, failure criteria and design concepts.

Course Outcome

- CO1 Determine axial and bending stress and strain as well as torsional stress and strain and Hookes law.
- CO2 Determine material properties and principal stresses both theoretically and experimentally
- CO3 Utilize mathematics and physics properties in solving complex stress / strain problems
- CO4 Utilize stress and strain information in

designing tasks.

BTO2033
Engineering Dynamics
Credit: 3
Prerequisites: None

Synopsis

This course intended to introduce the basic principles including friction and motion of a point in both one and two dimensions, as well as rigid body motion.

Course Outcome

- CO1 Ability to understand and apply properties of friction.
- CO2 Ability to determine velocity and acceleration of a given particle in one and two dimensions.
- CO3 Ability to determine rectilinear and curvilinear motion.
- CO4 Ability to determine angular and linear velocity and acceleration.
- CO5 Ability to apply acceleration and velocity concepts to rigid body motion.

BTO2073
Engineering Economy
Credit: 3
Prerequisites: None

Synopsis

This course introduces concept of life cycle cost, interest and equivalent. Formula and factors for single and multiple cash flow. Method for investment assessment and alternative comparison and project evaluation using cost worth ratio, inflation and cash flow method.

Course Outcome

- CO1 Recognize basic principles of engineering economy, cost estimation, money-time relationships
- CO2 Apply analytical and numerical methods for evaluation of engineering projects to come up with best alternatives
- CO3 Practice computer to solve problems using Microsoft programs such as Excel etc

BTO3003
Thermodynamics
Credit: 3
Prerequisite: None

Synopsis

This course intended to provide students with fundamental knowledge of energy, first Law of thermodynamics, enthalpy, entropy, second law of thermodynamics, free energy and equilibrium. Students will also be taught the application of thermodynamics in physical processes which includes solutions of nonelectrolytes and electrolytes, colligative properties, solubility as well as surfaces and interfaces.

Course Outcome

- CO1 Calculate the change in the energy, enthalpy, entropy using appropriate thermodynamics relations
- CO2 Apply the basic concepts of thermodynamics in solutions of nonelectrolytes and electrolytes, colligative properties, solubility, surfaces and interfaces.
- CO3 Measure thermodynamics elements and heat transfer of different systems

BTO3043
Fluid Mechanics
Credit: 3
Prerequisites: None

Synopsis

The objective of this course is to introduce the concept and use of fluid mechanics, both static and dynamics fluid. The covered topics are fluid properties, fluid static and dynamics, Bernoulli's equation and applications, momentum equation and its application, analysis of flow in pipeline system and dimensional analysis.

Course Outcome

- CO1 State the Newton's law of viscosity and Explain the mechanics of fluids at rest and in motion by observing the fluid phenomena.
- CO2 Compute force of buoyancy on a partially or fully submerged body and Analyze the stability of a floating body.
- CO3 Examine energy losses in pipe transitions and sketch energy gradient lines.
- CO4 Evaluate pressure drop in pipe flow using Hagen-Poiseuille's equation for laminar flow in a pipe

BTO3213
Well Drilling and Completion



Credit: 3
Prerequisites: None

systems, quality control concept ISO 17001.

Synopsis

This course addresses the technology used to drill wells from a fundamental view point including the basic science concept behind the drilling process. Students will be exposed to the equipment and procedures involved with drilling oil and gas wells. The main focus of the course will be on the practical aspects of each of the technologies, using design examples - successes and failures - to illustrate the key points of the design and the risks/uncertainties. The overall objectives of the course focus on delivering and maintaining well quality.

Course Outcome

- CO1 Understand the basic science concept and identify the key design features which guide the drilling processes
- CO2 Use appropriate analysis tools & techniques for design improvement and performance optimisation of well
- CO3 Assess the measures for design/formation risks and uncertainties and evaluate oil well conditions and reservoir characterization

BTO3233 Industrial Quality Control
Credit: 3
Prerequisites: None

Synopsis

Overview of computer hardware, software, and processing concepts related to the control of manufacturing tasks. Emphasis on use of integrated software packages in the solution of a variety of manufacturing problems. Laboratory assignments in automation control, real time data sampling, and creation of user interfaces.

Course Outcome

- CO1 Analyze the productivity in an organization by using productivity concept and fundamentals effectively
- CO2 Select layout design based on layout design procedure location and basic layout design by taking into account the impact of sustainable environment
- CO3 Analyze production planning, control and inventory management activities based on given cases.
- CO4 Evaluate solutions for a given cases based on total quality management

BTO3023
Properties of Materials
Credit: 3
Prerequisites: None

Synopsis

This course intends to provide the details of engineering materials, their history, structures, properties, applications. This knowledge will be further useful to make intelligent selection of materials for different applications.

Course Outcome

- CO1 Demonstrate basic knowledge, properties and areas of applications of engineering materials.
- CO2 Analyze material properties of structure for different applications.
- CO3 Choose suitable material processing methods.

BTO3224
Geometric Design and Tolerancing
Credit: 4
Prerequisites: BTO2314

Synopsis

Dimensioning techniques using CAD, limits and fits, material condition modifiers, tolerance stacks, and dimensioning standards. Geometric dimensioning and tolerancing.

Course Outcome

- CO1 Apply the principles of geometric tolerancing
- CO2 Apply the tolerancing of cone
- CO3 Apply positional tolerancing
- CO4 Substitute geometric elements
- CO5 Recognize and apply the maximum, envelope and least material requirement.

BTO3253
Offshore Oil Mechanics
Credit: 3
Prerequisites: None

Synopsis

This course introduces the application of principles of soil mechanics. Students will be exposed to the following topics: the origin and nature of soils; soil classification; the effective stress principle; hydraulic

conductivity and seepage; stress-strain-strength behavior of cohesionless and cohesive soils and application to lateral earth stresses; bearing capacity and slope stability; consolidation theory and settlement analysis; and laboratory and field methods for evaluation of soil properties in design practice.

Course Outcome

- CO1 Demonstrate the relationships between physical characteristics and mechanical properties of soils to be applied in field development
- CO2 Demonstrate skills in logical thinking in handling equipment
- CO3 Apply the modeling and analysis techniques used in soil mechanics: (a) Darcy's Law and flow-nets for seepage; (b) consolidation models for load-time-deformation responses of soils; (c) Mohr-Coulomb models for shear strength behavior of soils, to problem solving.

BTO3264

Offshore Engineering

Credit: 4

Prerequisites: None

Synopsis

To provide a basic to intermediate level of treatment of engineering systems that operate in offshore environment. Students will acquire an understanding of the unique and essential character of the offshore fields and the analysis tools to handle the engineering aspects of them.

Course Outcomes

- CO1 Formulate and solve governing equation for an offshore structure under the action of incident waves
- CO2 Assess relative importance of each contributing factor in the design of an offshore system
- CO3 Analyze and design mooring systems for offshore systems
- CO4 Formulate and solve for linear underwater acoustic problems

BTO3273

Floating Structure

Credit: 3

Prerequisites: None

Synopsis

This is an advanced offshore engineering course that introduces the students to the complex fluid-structure problems associated to the design of floating

structures. By combining the knowledge gained in Hydrostatics, Mechanics of Solids and Applied Ocean Wave Mechanics, students will learn the engineering principles that dictate the size and govern the loads and motions experienced by free and moored floating structures.

Course Outcome

- CO1 Appraise the commercial, technical, environmental and social factors that influence the design of floating structures
- CO2 Proficiently use applicable analysis techniques and relevant design codes to determine the optimum configuration and main dimensions of a floating structure taking into considerations the factors in point 1 above
- CO3 Analyse the global performance of floating structures and evaluate the optimum mooring configuration
- CO4 Develop numerical models and scale model tests to evaluate the hydrodynamic characteristic and performance of a floating offshore structure

BTO3243

Subsea Engineering

Credit: 3

Prerequisites: None

Synopsis

This course introduces students to the key elements in designing equipment, tools and infrastructure of offshore settings. Students will be exposed to the unique challenges of deep water operation and will be prepared for the technical and analytical investigation in tackling the challenges since most subsea engineering operations depend on automation and remote procedures to construct and repair components beneath the surface of the water, having to take into consideration the underwater environment; temperature, pressure and corrosion.

Course Outcome

- CO1 Examine the key elements and processes involved in designing equipment, tools and infrastructure with the consideration of underwater challenges
- CO2 Demonstrate skills in logical thinking in handling equipment
- CO3 Apply the fundamentals concept in mathematics, science and engineering in designing subsea infrastructure

BTO3343

Computer Integrated Manufacturing

Credit: 3

Prerequisites: None

Synopsis

This course intends to apply the knowledge of computer integrated manufacturing systems utilized by industry, including automated flow line, material handling system, system control, programmable logic control, robotics, computer-aided manufacturing, computer-aided design/drafting, computer-aided testing/inspection, and computer-aided process planning. At the end of this course the students will have sound knowledge of how each of these areas interact with production and business in a competitive world.

Course Outcome

- CO1 Describe importance of automation in industry and key elements of computer integrated manufacturing system.
- CO2 Analyze manufacturing operations that can combine with various elements of computer integrated manufacturing
- CO3 Adapt manufacturing system and manual labor process prior to create and propose their own customized CIM system

BTO4284

Dredging Proce

Credit: 4

Prerequisites: None

Synopsis

This course intends to apply the knowledge of different dredging applications, equipment selection, dredging processes, hydrographic surveying, soil characteristics and project management. The course is designed for both technical and non-technical management professionals in dredging-related industries.

Course Outcome

- CO1 Gain overview of different dredging processes, dredging equipment & dredging projects
- CO2 Set-up of dredging organisation and project teams Identify the dredging constraints in relation to dredging project and equipment
- CO3 Explain the value of site investigation and surveying

ELECTIVE

BTO4713

CFD for Engineering Applications

Credit: 3

Prerequisites: None

Synopsis

The course will equip the students with the necessary knowledge to use computational techniques to solve problems related to flow mechanics. In particular, students will have hands-on experience in using computational fluid dynamics to solve engineering problems. Governing equations, discretisation schemes, numerical methods, turbulence modelling, mesh quality and independence test, numerical errors, and boundary conditions will be introduced in the course.

Course Outcome

- CO1 Understand and be able to numerically solve the governing equations for fluid flow.
- CO2 Apply finite difference and finite volume methods to fluid flow problems.
- CO3 Able to use ANSYS CFX to an acceptable standard for a graduate engineer

BTO4723

Well Testing & Pressure Transient Analysis

Credit: 3

Prerequisites: None

Synopsis

The course first introduces the purpose of well testing and the basic methodology. The theory and fundamental equations, as well as various understanding analytical solutions are covered before introducing specific analysis techniques for homogeneous oil and gas reservoirs. Non-homogeneous situations and more advanced topics are also covered. Assumptions made in deriving equations and solutions and models used in test interpretation are stressed. Operational aspects are covered in terms of test design and use of specialised testing equipment. The course covers well test objectives and concepts; fluid flow equations and fundamental solutions; classical methods for drawdown and build-up analysis, bounded reservoirs, gas well testing, dual-porosity, hydraulic fractures, interference and pulse testing, test design. Overview of practical methods, some field examples and browsing the commercial software will introduce students into practice of well testing and pressure transient analysis.

Course Outcome



- CO1 Learn various techniques of pressure transient analysis, part of the reservoir engineering discipline.
- CO2 Use real field data and will gain the understanding of how such data is obtained in the field, including accuracy and limitations.
- CO3 Able to do well test design and the modern hardware used in the field.

BTO4733

Reservoirs, Resources and Reserves

Credit: 3

Prerequisites: None

Synopsis

This course comprises 2 components; Reservoir Geology and Resources & Reserves. This course provides participants with a working knowledge of the main techniques (qualitative and quantitative), used by Reservoir (Development and Production) geologists to evaluate subsurface properties of hydrocarbon reservoirs. Geological controls on well log signatures porosity, permeability, relative permeability, and capillarity are discussed. Case histories review conventional methods of determination of net pay and demonstrate some improved techniques using data from core, sidewall core, cuttings, conventional plug measurements (porosity and permeability) in conjunction with capillary pressure data. The course focus will be on conceptual understanding and practical applications using case studies and hands-on exercises. This course also explains strength and weaknesses of various reserves estimating methodologies, including differences between resources and reserves and differences between reserve estimates used for regulatory reporting and those used for business decision making. Exploration and development views are covered, as are deterministic and probabilistic methods, with the aim of gaining a thorough understanding of various reserves levels and their equivalence in both systems, in terms of proved, proved plus probable, and proved plus probably plus possible. Alternative estimation methods, such as volumetrics, material balance and decline curve analysis. An appreciation will be gained of data limitations and uncertainty and how this is reflected in final volumes and hence risk.

Course Outcome

- CO1 Understand with the integration of basic petrographic, wireline and capillary pressure data to evaluate reservoir rock quality, pay vs. non-pay.

- CO2 Differentiate between reservoir fluid contacts (eg Oil / Water contacts) and Free Water Level (FWL).
- CO3 Hands-on experience in using @Risk in dealing with statistics, distributions and probabilistic reserves calculations; some exercises will be conducted in groups, which are subsequently disseminated to the entire class, similar to work situations in the industry.

CURRICULUM STRUCTURE

BACHELOR OF ENGINEERING TECHNOLOGY (POWER & MACHINE) WITH HONOURS

CORE FACULTY

BTU1112

Physics Laboratory

Credit: 2

Prerequisites: None

Synopsis

This laboratory introduces the students with the application of physics concept in engineering devices such as Free Fall, Bernoulli's Law, Hydrostatic Pressure And Electric Field. The concepts of physics introduced related in mechanics or dynamics motion and basic concepts of electrical area. The students will learn how to run the experiment with referring the basic concepts of physics during the lab hours.

Course Outcome

- CO 1 Understanding the basic concepts, theories and principles of physics in engineering application



- CO 2 Demonstrating skills in logical thinking in handling equipment.
- CO 3 Applying basic physics concepts to problem solving
- CO 4 Applying physics knowledge to personal decisions involving physical problems

BTU1113

Physics
Credit: 3

Prerequisites: None

Synopsis

This course introduces a fundamental of physics. It covers unit and measurements, kinematics, forces and Newton's law of motion, statics equilibrium, work, energy and power, fluid mechanics, electric and magnetism

Course Outcome

- CO 1 Understand the basic concepts, theories and principles of physics in engineering application
- CO 2 Solve physics problems such as in kinematics, forces and static equilibrium
- CO 3 Discuss physics quantity such as work, energy and power in a team
- CO 4 Applying basic laws to solve fluid, electrical and magnetism problems

BUM1113

Technical Mathematics
Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Student are exposed to complex number, functions and graphs, trigonometric functions, analytic geometry, polar coordinates, 3 dimensional spaces and vector. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcome

- CO 1 Apply appropriate mathematics concepts to solve various technological problems.
- CO 2 Use appropriate software and tool to solve the graphical and computational problems in mathematics
- CO 3 Analyze and think critically a wide range of problem and solve it using ideas and methods in calculus.
- CO 4 Relate and applied the concepts and methods studied into other courses.

BUM1223

Calculus
Credit:3

Prerequisites: None

Synopsis

This course discusses Differentiation and applications, techniques of integration and applications, numerical integration and Taylor polynomial, Taylor Series & Maclaurin Series.

Course Outcome

- CO 1 Understand the fundamental concepts of the calculus and connect them with the real world problem.
- CO 2 Solve any related problem involving differentiation and integration.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.
- CO 5 Attain computational facility in differential and integral calculus.

BUM2113

Applied Mathematics
Credit:3

Prerequisites: None

Synopsis

This course introduces and discusses Partial Derivatives, Double Integrals, First Order Differential equations and Second Order differential equations.

Course Outcome

- CO 1 Analyze and apply the knowledge of Multiple Integrations to solve various science and engineering problems.
- CO 2 Analyze and solve various differential equation problems by using the basic principles and methodologies of First Order differential equations and Second Order differential.
- CO 3 Apply the concepts and methods studied into other related courses.
- CO 4 Communicate effectively in written and oral form through group discussion.

BTE2313

Computer Programming
Credit: 3

Prerequisites: None



Synopsis

Fundamental principles and concepts of C++ programming, with definitions of data, expressions, control-flow constructions, functions, input and output and preprocessing. Basic problem solving and programming techniques, structured programming ideas, fundamental algorithms and data structures (array).

Course Outcome

- CO 1 Construct computer programs using C++ language
- CO 2 Develop appropriate programming techniques and program control structures
- CO 3 Display the ability to use IDE (Integrated Design Environment) for C++
- CO4 Propose an algorithm for a specific problem by implementing appropriate programming techniques.

CORE PROGRAM

BTE1122

Electrical Installation Workshop

Credit: 2

Prerequisites: None

Synopsis

This course introduces students to the single phase domestic wiring and installation. The students will learn about supply system, rules and regulation, wiring system and electrical protection system. They are also will practice in applying trunking and conduits for electrical wiring as well as doing fitting and installation of electrical system devices. Students need to construct the single phase domestic wiring and installation for lighting, socket outlet, fan and air conditioner. They are also will conduct inspection and testing on their wiring and installation as safety confirmation and fulfil the regulations.

Course Outcome

- CO 1 Interpret rules and regulation for electrical wiring comprising of cable selection and load calculation
- CO 2 Construct single phase electrical installation for domestic wiring using suitable wiring tools and accessories
- CO 3 Perform inspection and testing in electrical wiring and installation.

- CO4 Apply ethical principles and safety in electrical wiring installation

BTE1112

Electrical Fundamentals Laboratory

Credit: 2

Prerequisites: None

Synopsis

This course introduces students to the fundamentals laboratory of DC and AC circuits and basic network laws and theorems. The students will be handling the basic measurement equipment to measure and analyse the parameter of the electrical circuits.

Course Outcome

- CO 1 Construct simple electrical and electronics and simulate the operation of the circuits using circuit simulation software (OrCAD).
- CO 2 Measure parameter of electrical circuits (resistance, voltage, current, etc)
- CO 3 Work ethically and effectively as an individual and in a group

BTE1113

Electrical Fundamentals

Credit:3

Prerequisites: None

Synopsis

This module will introduce students to basic science of electricity, introduction to instrumentation and measurement, work and energy theorem, basic electrical circuits and introduction to magnetism.

Course Outcome

- CO 1 Describe the basic concept of electricity, conductors, insulators, circuit, magnetism and other devices.
- CO 2 Apply basic electrical laws such as Ohm and Kirchoff Law to solve circuit or electrical problems.
- CO 3 Shows the ability to communicate effectively.

BTE1313

Instrumentation & Measurements

Credit:3

Prerequisites: None



Synopsis

This course introduces students to the principles of instrumentation and measurements, determination of error that caused by the meters. The students will be exposed to the architecture and the operation of DC and AC meters, oscilloscope, signal generator, storage instrument and display devices, analysis of DC and AC meters and introduction to signal conditioning.

Course Outcome

- CO 1 Explain the basic concept of Instrumentation & measurement system including the operation, calibration and calculation
- CO 2 Solve problems regarding AC & DC meters, oscilloscope and signal generator
- CO 3 Construct the operation of meters, measuring devices or signal conditioning circuits into trainer board and interpret the experimental results into report.
- CO4 Understand the functional role of individual towards task accomplishment

BTE2222

Circuit Analysis I Laboratory

Credit:2

Prerequisites: BTE1212

Synopsis

This course introduces the basic concepts and engineering methods of DC circuit analysis. It is also introduce the concept of AC circuits. The contents include Ohm's Law, Kirchoff's Law, series and parallel circuits, Mesh and Nodal analysis, superposition theorem, Thevenin and Norton equivalent of a complex circuit, Measure capacitance, measure capacitor charge and discharge times, RL, RC circuits, phase difference, measure power in a single phase circuit and responses of basic First Order circuits.

Course Outcome

- CO 1 Build various electrical circuits and properly use lab equipment to measure, analyse and troubleshoot the circuits. [PO1]

- CO 2 Solve the DC circuit problems using nodal analysis and mesh analysis, Thevenin and Norton equivalent and evaluate the most efficient methods among them. Also introduce the concept of AC [PO2, PO5]
- CO 3 Write lab reports in proper format to report work clearly and concisely.
- CO 4 Demonstrate the role of individual in team to achieve task completion.

BTE2223

Circuit Analysis I

Credit:3

Prerequisites: BTE1213

Synopsis

This course introduces the engineering methods of DC circuit analysis. The contents include Mesh and Nodal analysis, Source Transformation, and 4 main network Theorems: Superposition, Thevenin, Norton and Maximum Power Transfer theorems. It also includes the basic of DC transients in capacitors and inductors. Introduction to AC fundamentals and impedance concept of RLC circuits are also covered.

Course Outcome

- CO 1 Analyse DC circuit problems using various methods of DC Analysis and Network Theorems
- CO 2 Describe the effects of DC transients on capacitors and inductors, and to relate them with electromagnetism concept
- CO 3 Examine the AC (current and voltage) characteristics, and the concept of impedance in R,L,C circuits
- CO 4 Describe the real industrial practice.

BTM1114

Basic Manufacturing Process

Credit:4

Prerequisites: None

Synopsis

This course intended to introduce to materials, techniques, and equipment of industrial manufacturing. Emphasis on laboratory demonstration and simulation activities such as machining, welding, casting, and forming operations.

Course Outcome

- CO 1 Explain the structure and properties of basic engineering materials and their relationship to manufacturing.



- CO 2 Describe the fundamental equipment and processes employed in common manufacturing operations.
- CO 3 Identify process parameters and how they affect the manufacturing processes.

BTE2232
Circuit Analysis II Laboratory
Credit:2
Prerequisites: BTE2222

Synopsis

This course provides the basic concepts and engineering methods of AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, Filters, Bridges and Balanced 3-phase circuits are also covered.

Course Outcome

- CO 1 Apply and validate circuit analysis theorems in ac circuits. [PO1, P2]
- CO 2 Identify simple first-order filters and determines the resonant frequency and bandwidth for series/ parallel resonant circuits. [PO4, P3]
- CO 3 Identify the functions and applications of transformers and introduce the Non-sinusoidal Waveforms and the 3 phase concept. [PO2, P4]

BTE2233
Circuit Analysis II
Credit:3
Prerequisites: BTE2223

Synopsis

This course provides the basic concepts and engineering methods of AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, Filters, Bridges and Balanced 3-phase circuits are also covered.

Course Outcome

- CO 1 Determine impedance, voltage, current and other basic values for ac circuits.

- CO 2 Apply circuit analysis theorems in ac circuits.
- CO 3 Identify simple first-order filters and determines the resonant frequency and bandwidth for series/ parallel resonant circuits.
- CO4 Identify the functions and applications of transformers and introduce the Non-sinusoidal Waveforms and the 3 phase concept.

BTM1314
Computer-Aided Design
Credit:4
Prerequisites: None

Synopsis

This subject is designed to introduce to the students the principle of computer-aided design. Topics includes Drafting Overview, Drawing Set-up , Basic CAD ,Commands Geometric Construction , Orthographic Projection , Basic Drawing ,Tools, Pictorial Drawings, Sectional Views, Advance CAD Commands, Modifying CAD,Drawings, Dimensioning, Tolerances, Working Drawings, Threads and Fasteners

Course Outcome

- CO 1 Analyze problem in technical drawing and understand drawing
- CO 2 Use basic geometric construction techniques to create objects in CAD
- CO 3 Project a 3 dimensional object in 2 dimensional space with the proper utilization of views in CAD
- CO 4 Read & create dimensioned drawings using conventional techniques in CAD.
- CO 5 Identify and understand the components of working drawings & the standards that apply.

BTM3234
Manufacturing Computer Application
Credit:4
Prerequisites: BUM1113

Synopsis

Overview of computer hardware, software, and processing concepts related to the control of manufacturing tasks. Emphasis on use of integrated software packages in the solution of a variety of manufacturing problems. Laboratory assignments in automation control, real time data sampling, and creation of user interfaces.



Course Outcome

- CO 1 Apply software development for technology problem solving.
- CO 2 Perform adaptive programming skills for more diverse application environment.

BTE3142
Electrical Machines and Transformers Laboratory
Credit:2
Prerequisites: None

Synopsis

This course introduces the fundamental concepts and principles of transformer and various types of electrical machines. It is intended for students to understand fundamental aspects of rotating electrical machines. The first part of the course is a quick review of some electromagnetism fundamental while the following will deal with the transformers and different types of electrical machines.

Course Outcome

- CO 1 Describes the basic principles of selected electrical machines.
- CO 2 Displays the transformer and machines equivalent circuits and the operating conditions for electrical machines under steady state conditions
- CO 3 Construct driver circuit for DC and AC motor
- CO 4 Justify the importance of electrical machines and impacts to the Load.
- CO 5 Measure, Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines.

BTE3143
Electrical Machines and Transformers
Credit:3
Prerequisites: None

Synopsis

This course introduces the fundamental concepts and principles of transformer and various types of electrical machines. It is intended for students to understand fundamental aspects of rotating electrical machines. The first part of the course is a quick review of some electromagnetism fundamental while the following will deal with the transformers and different types of electrical machines.

Course Outcome

- CO 1 Analyze the transformer and machines equivalent circuits and the operating conditions for electrical machines under steady state conditions.
- CO 2 Construct driver circuit for DC and AC motor
- CO 3 Justify the importance of electrical machines and impacts to the environment.
- CO 4 Measure, Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines.

BTE3142
Electrical Installation Design Laboratory
Credit:2
Prerequisites: None

Synopsis

This course provides knowledge in electrical installation design especially for commercial buildings. It explores the basic estimation and design procedure based on various codes of practice and standards. Student will be introduced to design a few basic systems in electrical installation such as lighting, protection system, grounding and lightning protection. Students also involve in problem solving and troubleshooting technique when they study on system inspection and testing.

Course Outcome

- CO 1 Describes the different types of electrical installation application available.
- CO 2 Simulate fault and safety investigation through the use of simulators conditions
- CO 3 Design and assemble the different types of professional industrial wiring of electrical installation

BTE3223
Electrical Installation Design
Credit:3
Prerequisites: None

Synopsis

This course provides knowledge in electrical installation design especially for commercial buildings. It explores the basic estimation and design procedure based on various codes of practice and standards. Student will be introduced to design a few basic systems in electrical installation such as lighting, protection system, grounding and lightning protection. Students also involve in problem solving

and troubleshooting technique when they study on system inspection and testing.

Course Outcome

- CO 1 Attribute the lighting layout and power layout using CADD software.
- CO 2 Estimate electrical load for an installation and design single-line diagram for the installation
- CO 3 Explain the protection system used in electrical installation.
- CO 4 Justify the importance of grounding system and lightning protection system.
- CO 5 Measure and determine basic inspection and testing for building electrical installations.

BTE3632

Maintenance Technology

Credit:2

Prerequisites: None

Synopsis

This course introduces students to the vast maintenance strategies and technologies in maintenance practices adoption. The course will cover the skills for implementing an effective maintenance program through workplace environment simulation such as effective work culture, costs appreciation, workplace safety and workplace productivity.

Course Outcome

- CO 1 Classify the types of maintenance strategies and tools utilized in industry.
- CO 2 Solve LCC and inventory cost based on various problems
- CO 3 Explain the important role of safety practices for the environment.
- CO 4 Display maintenance performance using CMMS (Computerized Maintenance Management System) software
- CO 5 Demonstrate appropriate and effective action during plant shutdown.

BTE2413

Electrical Power System

Credit:3

Prerequisites: BTE3142 & BTE3143

Synopsis

This course introduces the fundamental of electrical power system which are the overview of power system, generation, transmission lines,

distribution, representation of components, basic power system analysis.

Course Outcome

- CO 1 Compute load factor and load demand [PO1, C4].
- CO 2 Determine the cost of electricity using the basic concept of electricity tariff and energy efficiency [PO1, C4].
- CO 3 Develop the component representation of any balanced three phase power system using per-unit system [PO2, C5].
- CO 4 Measure and calculate the performances of power transmission lines [PO3, P4, CTPS3].
- CO 5 Work in team effectively [PO8, A3, TS3, and LS2].

BTE3322

Control System Laboratory

Credit:2

Prerequisites: None

Synopsis

This course introduces students to the control system technology, mathematical models of feedback systems. The students will be exposed to transient and steady-state analysis, root locus, frequency response and analysis design of compensator.

Course Outcome

- CO 1 Explain fundamental concept of control systems. [PO3, P2]
- CO 2 Display mathematical model and transfer function of physical systems. [PO2, P5]
- CO 3 Measure control system performance in terms of transient and steady-state of a linear time invariant systems. [PO3, P5]
- CO 4 Alter a compensator to meet specifications in frequency domain. [PO4, P6]
- CO 5 Utilize Computer aided tools for control system analysis and design. [PO10, A4, LL3]

BTE3323

Control System

Credit:3

Prerequisites: None

Synopsis

This course introduces students to the control system technology, mathematical models of feedback systems. The students will be exposed to transient and steady-state analysis, root locus, frequency response and analysis design of compensator.

Course Outcome

- CO 1 Acquire fundamental concept of control systems.
- CO 2 Derive and manipulate mathematical model and transfer function of physical systems.
- CO 3 Analyze control system performance in terms of transient and steady-state of a linear time invariant systems.
- CO 4 Design a compensator to meet specifications in frequency domain.
- CO 5 Utilize Computer aided tools for control system analysis and design.

BTE3813

Engineering Technology Senior Design I

Credit:3

Prerequisites: None

Synopsis

This course is designed to expose the students to a senior design project. They have to apply all the knowledge that they have learned in the programme to complete the senior design project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the senior design project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcome

- CO 1 Propose background study, problem statement, objective and scopes of the research
- CO 2 Practice positive attitude in research activities
- CO 3 Present the research proposal and cited latest publications on the subject

BTM3514

Computer Integrated Manufacturing

Credit:4

Prerequisites: None

Synopsis

Three basic themes will be stressed throughout the course. First, developing manufacturing strategy involves considering factors beyond the traditional boundaries of the manufacturing function. Such

factors include the overall competitive position of the firm, the nature of market demand, competitor's actions, government regulations, and so on. Second, there is a strong linkage between a firm's competitive strategy and its manufacturing strategy. If this linkage is maintained, operations can become a formidable competitive weapon. If this linkage is neglected, even the best-designed strategies can fail. Finally, the course will consider manufacturing strategy issues in an integrative manner by developing the interrelationship between operations, finance, accounting, and marketing.

Course Outcome

- CO 1 List components of a computerized integrated manufacturing environment.
- CO 2 Explain various automation techniques currently used in industry.
- CO 3 Develop a systematic plan for manufacturing strategy implementation
- CO 4 Develop a systematic plan for manufacturing strategy implementation required for a selected product.
- CO 5 Model enterprise manufacturing and automation strategies that respond to national and global manufacturing demands.

BTE4826

Engineering Technology Senior Design Project II

Credit:6

Prerequisites: BTE3813

Synopsis

This subject is the continuation of the subject Engineering Technology Senior Design Project I. In this course, the students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, the students are required to produce a design project report and present it to faculty's evaluation panel.

Course Outcome

- CO 1 Analyze data, discuss and conclude the findings
- CO 2 Manage the research work
- CO 3 Practice positive attitude in research activities
- CO 4 Present the research report and cited latest publications on the subject

BTU4912

Industrial Training

Credit:12



Prerequisites: All Subject

Synopsis

In Industrial Training the students should gain insight into industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo an industrial training for a certain period that has been agreed by the faculty during last semester of the academic year. The performance of each student during the periods of his/her industrial training is evaluated by the faculty staff, and the representatives from employer organization.

Course Outcome

- CO 1 Show and classify in-depth the industrial structure and organization and to understand roles of typical personnel in that particular industry.[PO2,C3]
- CO 2 Manipulate the knowledge learned in the university and to practice them in problem solving direct or indirect application to any design, planning, production or management .[PO3,P5,CTPS3]
- CO 3 Practice the professionalism and work etiquette that comply to good and responsible engineer.[PO6,A5,EM2]
- CO 4 Demonstrate management/leadership skills to lead or manage effectively in a industry environment. [PO8,A3,TS3]
- CO 5 Demonstrate the knowledge and ability to search and retrieve information and materials related to the industrial needs. [PO10,A3,LL2]
- CO 6 Arrange and display data and relevant information with a systematic approach.[PO6,A4,EM3]
- CO 7 Explain and organize the industrial training experience through written communication.[PO7,P5,CS4]

ELECTIVE COURSES

BTE4713

Programmable Logic Controller

Credit:3

Prerequisites:

Synopsis

Basic concepts and skills needed to install, program, and apply programmable electronic controllers in industry. Discrete and analog input/output (I/O) devices and ladder logic will be studied, including basic and intermediate PLC functions. Experiments in operation, programming, and industrial applications with emphasis on discrete I/Os

Course Outcome

- CO 1 Analyze the functions of hardware component of programmable logic controllers and PLC programming
- Co 2 Design proficiency in ladder logic by applying programming skills to implement industrial applications
- CO 3 Varies a program to operate the manufacturing application
- CO 4 Display problems in industrial applications requiring PLCs by troubleshooting hardware and software

BTW47*3

Power System Operation & Control

Credit:3

Prerequisites:

Synopsis

Digital to Analog and Analog to Digital Converter Circuits, Class C Amplifier circuit, MOSFET Amplifiers and Switching Circuits, MOSFET DIGITAL SWITCHING circuits, Thyristors circuits and APPLICATIONS, Special-Purpose Op-Amp Circuits, Oscillators circuits, IC Voltage Regulators circuits, and Electronics sensing circuits

Course Outcome

- CO 1 Solve advanced electronics circuit problems
- CO 2 Design the advanced electronics circuits
- CO 3 Build practically advanced electronic circuits
- CO 4 Examine the operation of advanced electronic circuit using software tools (EWB)

**BTW4723****Power Quality****Credit:3****Prerequisites:****Synopsis**

This module will introduce students to the structural and functional principles of sensors used for various physical and derived quantities and how to use them to measure these quantities.

Course Outcome

- CO 1 Analyze the principles and operation of how different sensors work
- CO 2 Evaluate different type of sensors and modalities are appropriate for different applications
- CO 3 Conduct various measurements using different types of sensors

BTW4733**Alternative Energy****Credit:3****Prerequisites:****Synopsis**

This course introduces students to theories of alternative energies and energy usage in electric power system industry. It goes over energy conversion, usage and storage of renewable energy technologies (wind, solar, wave, fuel cell and biomass). This course focuses on technological development of photovoltaic (PV) systems. It also covers the basic of environmental effect of applying alternative energy technology specifically to global climate change and pollution

Course Outcome

- CO 1 Describe the properties (source, pros, cons) of available alternative energy today
- CO 2 Measure and calculate the best design properties of PV systems
- CO 3 Analyze solar and wind resources and components of PV and wind turbine system
- CO 4 Interpret the various design of renewable systems and generate useful data
- CO 4 Explain the effects of alternative energy to the environm

FACULTY OF INDUSTRIAL MANAGEMENT





FACULTY OF INDUSTRIAL MANAGEMENT

INTRODUCTION

The Faculty of Industrial Management (FIM) is a new entity established in July 2014 through a rebranding process of the Faculty of Technology which was established in 2011 and was formerly known as Faculty of Manufacturing Engineering and Technology Management. Over the years, FIM continues to grow and change but still keep its original goals in mind whilst developing ones to meet the challenges of the globalized environment.

The aim is to support local and global economic development through education, research, commercialization and consultation. The faculty educational objective is to produce highly competent executives, managers and engineering technologist that are equipped with the right competencies, knowledge and professional acumen strategically aligned and carefully positioned according to the current demand in industrial and commercial sectors.

Academic programmes of **Project Management (PM)**, **Industrial Technology Management (ITM)** and **Business Engineering (BE)** which are offered at Faculty of Industrial Management are developed to enhance graduates capabilities to secure jobs in government and private sector employment in their corresponding field of specialization.

All our academic programmes are accredited by Malaysian Qualifications Agency (MQA) and numerous universities locally and internationally for graduates opting to further their studies at higher degree level.

VISION

To nurture future innovative leaders through applying business and technological knowledge.

MISSION

To provide enriching teaching and learning experience through creative convergence of business and technology.

PROGRAMMES OFFERED

- Bachelor of Project Management with Hons.
- Bachelor of Industrial Technology Management with Hons.
- Bachelor of Business Engineering with Honours (Collaboration programme with HsR, Germany)



CAREER OPPORTUNITIES

Bachelor of Project Management with Honours

Graduates from Bachelor of Project Management have a broad career prospect within the private sectors, industries, local authorities, government agencies as well as other professional bodies. Some of the careers you can pursue with a Bachelor of Project Management degree include:

- Construction Project Executive
- Contract Executive
- Procurement Executive
- IT Executive
- Urban Planning Executive
- Risk and Financial Management Executive
- Facility Management Executive
- Product Development Executive
- Quality Management Executive

Bachelor of Industrial Technology Management with Honours

Career prospect for those who graduate from Bachelor Degree in Industrial Technology Management is wide, covers in both manufacturing and services oriented company. Industrial operations are at the heart of most organizations. Opportunities are found in the areas of forecasting, inventory management, the design of production facilities, workforce scheduling, and the location and layout of distribution networks. Some of the careers you can pursue with a Bachelor of Industrial Technology Management degree include:

- Production Executive
- Quality Executive
- Production Planner
- Procurement Officer
- Logistic Executive
- Kaizen Officer
- Business Development Executive
- Industrial Engineer
- Manufacturing Superintendent
- Human Resource Executive
- Sales Executive
- Marketing Executive



Bachelor of Business Engineering with Honours (Collaboration programme with HsR, Germany)

Business Engineering graduates will be equipped with both business engineering knowledge and the skills required in innovating business practices.

- Production Executives / Engineer
- Production Planner / Controller
- Process Engineering Engineer
- Industrial Engineer
- Logistics Executives
- Supply Chain Executives / Officer
- Procurement Officer
- Business Development Executives
- Quality Executives / Engineer
- Project Executives
- Other relevant employment areas

ADDRESS

Faculty of Industrial Management
Universiti Malaysia Pahang
Lebuhraya Tun Razak
26300 Kuantan Pahang.
Tel : 09-5492166
Fax : 09-5492167
Admin : <http://fim.ump.edu.my>

**FACULTY OF INDUSTRIAL MANAGEMENT
CURRICULUM STRUCTURE
Bachelor of Project Management with Hons.**

YEAR	FIRST	SECOND	THIRD	FOURTH
COURSES	BPC1113 Principles of Management	BPM2313 Project Financial Management	BPM3313 Project Control	BPC4114 Final Year Project 2
	BPC1143 Industrial Psychology	BPM2323 Project Estimating & Budgeting	BPC3123 Strategic Management	BPC4112 Industrial Training
	BPC1123 Principles of Economics	BPM2333 Planning & Scheduling	BPC3113 Research Methodology	BPE4613/BPE4713 Elective Course 4
	BPC1133 Principles of Marketing	BPM2343 Integrated Project Management 1	BPM3323 Project Risk Management	BPE4623/BPE4723 Elective Course 5
	BPM1313 Project Management	BPC2113 Quality Management	BPP3333 Stakeholder Management	BPE4633/BPE4733 Elective Course 6
	BPC1153 Business Information System	BPC2123 Organizational Behaviour	BPM3343 Project Portfolio Management	
	BUM1123 Mathematics for Management	BPM2353 Procurement Management	BPC3132 Final Year Project I	
		BPM2363 Integrated Project Management 2	BPE3613/BPE3713 Elective Course 1	
		BUM2413 Statistics for Management	BPE3623/BPE3723 Elective Course 2	
			BPE3633/BPE3733 Elective Course 3	
102	21	27	29	25
18	University Courses : Co-Curriculum I, Co-Curriculum II, Technopreneurship, Islamic & Asian Civilization 1, Ethnic Relations, Foreign Languages Level 1, Foreign Languages Level 2, Fundamentals of English Language, English for Academic Communication, English for Professional Communication, English for Technical Communication, Soft Skills I, Soft Skills II			
120	TOTAL CREDIT FOR GRADUATION			



Elective course to be offer in Bachelor of Project Management with Hons.

Construction Technology

NO.	CODE	COURSE	CREDIT HOUR
1	BPE3613	Construction Management	3
2	BPE3623	Construction Technology	3
3	BPE3633	Construction Drawings & Measurement	3
4	BPE4613	Construction Economics	3
5	BPE4623	Industrial Safety and Health	3
6	BPE4633	Construction and Sustainability Development	3
Total Credit			18

NO.	CODE	COURSE	CREDIT HOUR
1	BPE3713	Construction Management	3
2	BPE3723	Construction Technology	3
3	BPE3733	Construction Drawings & Measurement	3
4	BPE4713	Construction Economics	3
5	BPE4723	Industrial Safety and Health	3
6	BPE4733	Construction and Sustainability Development	3
Total Credit			18

**FACULTY OF INDUSTRIAL MANAGEMENT
CURRICULUM STRUCTURE
Bachelor of Industrial Technology Management with Hons.**

YEAR	FIRST	SECOND	THIRD	FOURTH
	BPC1113 Principles of Management	BPC2113 Quality Management	BPQ3213 Production Planning & Control	BPC4114 Final Year Project 2
	BPC1143 Industrial Psychology	BPQ2113 Financial Management	BPQ3223 Quality control	BPC4112 Industrial Training
	BPC1123 Principles of Economics	BPQ2223 Supply Chain & Logistics Management	BPC3113 Research Methodology	BPE4513/BPE4813 Elective Course 4
	BPC1133 Principles of Marketing	BPC2123 Organizational Behaviour	BPQ3233 Business Law	BPE4523/BPE4823 Elective Course 5
	BPQ1223 Principles of Operation Management	BPQ2233 Project Management	BPC3123 Strategic Management	BPE4533/BPE4833 Elective Course 6
	BPC1153 Business Information System	BPQ2243 Fundamental of Manufacturing	BPQ3243 Production Development & Innovation	
	BPQ1213 Management Accounting	BPQ2253 Management of Technology	BPC3132 Final Year Project 1	
	BUM1123 Mathematics for Management	BUM2413 Statistics for Management	BPE3513/BPE3813 Elective Course 1	
			BPE3523/BPE3823 Elective Course 2	
			BPE3533/BPE3833 Elective Course 3	
102	24	24	29	25
18	University Course : Co-Curriculum I, Co-Curriculum II, Technopreneurship, Islamic & Asian Civilization 1, Ethnic Relations, Foreign Languages Level 1, Foreign Languages Level 2, Fundamentals of English Language, English for Academic Communication, English for Professional Communication, English for Technical Communication, Soft Skills I, Soft Skills II			
120	TOTAL CREDIT FOR GRADUATION			



Elective course to be offer in Bachelor of Industrial Technology Management with Hons.

Operation Manufacturing

NO.	CODE	COURSE	CREDIT HOUR
1	BPE3513	Computer Aided Design	3
2	BPE3523	ERP Systems	3
3	BPE3533	Lean Manufacturing	3
4	BPE4513	Manufacturing Technology	3
5	BPE4523	Computer Modelling & Simulation	3
6	BPE4533	Industrial Control Automation	3
Total Credit			18

Service Management

NO.	CODE	COURSE	CREDIT HOUR
1	BPE3813	Customer Relationship Management	3
2	BPE3823	Service Management	3
3	BPE3833	Knowledge Management	3
4	BPE4813	Service Marketing	3
5	BPE4823	Innovation Management	3
6	BPE4833	Retailing	3
Total Credit			18

**FACULTY OF INDUSTRIAL MANAGEMENT
CURRICULUM STRUCTURE
BACHELOR OF BUSINESS ENGINEERING WITH HOURS (COLLABORATION PROGRAMME WITH HSR, GERMANY)**

YEAR	FIRST				SECOND		THIRD		FOURTH	
	FIRST	SECOND	LONG SEMESTER BREAK	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	
	BP11013 Principles of Management	BP11062 Fundamentals of Project Management	BP12119 Supply Chain Management	BP12013 Quality Management	BP12076 Individual Field Project – Business & Engineering	BP12023 Operations Research	BP12038 Industrial Training	BPE41*9 / BPE43*2 Elective (Business) III	BP12013 Individual Study Project (ISP)	
	BP11022 Business Law	BP11072 Accounting II - Cost Accounting	BP12123 Corporate Finance & Investment	BP12023 Industrial Engineering	BP12092 CSR Project	BPE41*1 / BPE43*3 Elective (Business) I	BP12044 Industrial Training – Report	BPE42*2 / BPE44*2 Elective (Engineering) III	BP12026 Thesis	
	BP11032 Accounting I - Financial Accounting	BP11083 Engineering Mechanics	UHG2002 Deutsche Sprache III	BP12032 Fundamentals of Marketing	BP12103 Cross Module Seminar I	BPE42*3 / BPE44*3 Elective (Engineering) I		BPE41*3 / BPE43*3 Elective (Business) IV	BP12033 Cross Module Seminar II	
	BP11043 Introduction to Computer Science	BP11083 Technical Design / CAD		BP12043 Fundamentals of Electrical Engineering	UGE2002 Technopreneurship	BPE41*1 / BPE43*3 Elective (Business) II		BPE42*3 / BPE44*3 Elective (Engineering) IV		
	BUM1113 Technical Mathematics	BUM1223 Calculus		BP12053 ERP Systems & Business Process Management		BPE42*2 / BPE44*3 Elective (Engineering) II		BPE41*3 / BPE43*3 Elective (Business) V		
	UHG1002 Deutsche Sprache I	UHG1012 Deutsche Sprache II		BUM2023 Statistics with Technology		UPN3012 Intercultural Skills		BPE41*3 / BPE43*3 Elective (Business) VI		
	UHG1012 Islamic and Asian Civilizations 1	UHG2022 Ethnic Relations		UHG2012 Deutsche Sprache IV						
	UHG1021 Soft Skills 1	UHG2021 Soft Skills 2								
	UCB1**1 CO2-I	UC2**1 CO2-II	8							
TOTAL CREDITS PER SEMESTER	19	19	8	19	13	17	12	16	12	
OVERALL TOTAL CREDIT FOR GRADUATION	135									



**Elective course to be offer in
Bachelor of Business Engineering with Honours (Collaboration programme with HsR,
Germany)**

ELECTIVES (SET 1)	CODE	COURSE	CREDIT HOUR
Elective (Business) I, II, IV, V, VI Choose five (15 credits)	BPE4123	Supply Chain Control & Management Control Systems	3
	BPE4133	Advanced Project Management & Control	3
	BPE4143	Lean Management	3
	BPE4153	Simulation Game	3
	BPE4163	Technical Planning Case	3
Elective (Business) III Choose one (2 credits)	BPE4112	Innovation & Technology Management	2
	BPE4122	HR Management	2
	BPE4132	International Business Environment	2
Elective (Engineering) I, II, IV Choose three (9 credits)	BPE4213	Intra-Logistics	3
	BPE4223	Distribution Logistics	3
	BPE4233	International Transport Logistics	3
	BPE4243	Warehouse & Inventory Planning	3
Elective (Engineering) III Choose one (2 credits)	BPE4212	Database Systems	2
	BPE4222	Sustainability/Energy Efficiency	2
	BPE4232	Power Management (Electrical Grids)	2
Total Credit			28

ELECTIVES (Set 2)	CODE	COURSE	CREDIT HOUR
Elective (Business) I, II, IV, V, VI Choose five (15 credits)	BPE4313	Production Accounting & Control	3
	BPE4133	Advanced Project Management & Control	3
	BPE4143	Lean Management	3
	BPE4153	Simulation Game	3
	BPE4163	Technical Planning Case	3
Elective (Business) III Choose one (2 credits)	BPE4112	Innovation & Technology Management	2
	BPE4122	HR Management	2
	BPE4132	International Business Environment	2
Elective (Engineering) I, II, IV Choose three (9 credits)	BPE4413	Production Planning & Methods	3
	BPE4423	Technical Applications & Machines	3
	BPE4433	Materials Science	3
	BPE4443	Product Engineering	3
Elective (Engineering) III Choose one (2 credits)	BPE4453	Electrical Drives	3
	BPE4212	Database Systems	2
	BPE4222	Sustainability/Energy Efficiency	2
BPE4232	Power Management (Electrical Grids)	2	
Total Credit			28

**COURSE STRUCTURE FOR
BACHELOR OF PROJECT MANAGEMENT
WITH HONS.**

CORE FACULTY COURSES

BPC1113

Principles of Management

Credit : 3

Prerequisite: None

Synopsis

This course serves as an introduction to the discipline of management. It is designed to integrate the accepted theories in the area with real world applications to provide students with the basic knowledge and skills needed for managing others. This course begins with a discussion of the current issues in management and then proceeds to cover the traditional functions of management: planning, organizing, leading, and controlling. Contemporary issues and global challenges for future managers will also be discussed to equip students with current trends and best practices in managing a successful organization.

Course Outcomes

- CO 1 Apply the Principles of Management in solving various issues and global challenges
- CO 2 Identify good practices of management functions in managing event
- CO 3 Compare various management styles of contemporary approaches in current setting

BPC1143

Industrial Psychology

Credit : 3

Prerequisite: None

Synopsis

This course provides an overview of different personnel, work environment and organizational

issues to be investigated in industrial psychology. The major application of psychology at work place is covered. The management of human capital and their issues like selection, training, evaluation, relationship at work place and related aspects are focused.

Course Outcomes

- CO 1 Analyze and understand theories of Industrial Psychology and management of human capital.
- CO 2 Demonstrate the issues relating of work behaviour of employees and the human capital management.
- CO 3 Describe human resource skills for effective industrial management.

BPC1123

Principles of Economics

Credit : 3

Prerequisite: None

Synopsis

This course is designed to introduce students to key concepts used in microeconomics and macroeconomics, and to facilitate a basic understanding of economic phenomena. The goals will help students to understand fundamental concepts and tools so that students can use them to analyse various economic issues. This course is primarily concerned with Malaysian economy and will help them understand how economy works.

Course Outcomes

- CO 1 Explain the basic Macro & Micro economic concepts.
- CO 2 Explain the usage of economics concepts for business phenomena.
- CO 3 Demonstrate the usage of the economic models for business management decision making.

BPC1133
Principles of Marketing
Credit : 3
Prerequisite: None

Synopsis

This course serves as an introduction to the discipline of management. It is designed to integrate the accepted theories in the area with real world applications to provide students with the basic knowledge and skills needed for managing others. This course is designed to provide students with an understanding of marketing mix components; explain the environmental factors which influence consumer and organizational decision-making processes; outline a marketing plan; and how marketing works in today's marketing environment.

Course Outcomes

- CO 1 Explain the Principles of Marketing in solving various issues.
- CO 2 Follow a comprehensive marketing plan to real or imaginary products.
- CO 3 Propose persuasive marketing programs

BPC1153
Business Information System
Credit : 3
Prerequisite: None

Synopsis

This course aims to provide firm understanding on the significance and strategic role of information system to the organization particularly in supporting wide range of business functions across the corporate environment. The lecture shall covers theoretical part which cover the foundation of information systems, information technology infrastructure and contemporary issues on information security. Lab session aims to provide students with hands-on and practical experience on the usage of office automation systems, developing

database as well as exploring selected approach in information system development.

Course Outcomes

- CO 1 Explain significance and roles of information systems in achieving organizational competitive advantage.
- CO 2 Apply various strategies and approaches in information system development.
- CO 3 Demonstrate the usage of office automation system in performing operational tasks and managing information resources within organization.

BUM1123
Mathematics for Management
Credit : 3
Prerequisite: None

Synopsis

This course introduces the use of mathematical technique in the field of business administration and management. The topics introduce the inequality, matrices, functions and the key business topics such as simple interest, compound interest, annuity, notes and bank discount, mathematics of buying, markup and markdown.

Course Outcomes

- CO 1 Use the basic principle and methodologies of mathematics to solve the mathematical analysis problems.
- CO 2 Use scientific calculator to solve the exponential and logarithmic functions.
- CO 3 Apply the mathematical concepts and the usage of the mathematical technique in business administration and management.

BPC2113
Quality Management
Credit : 3
Prerequisite: None

Synopsis

The course will provide students with a comprehensive understanding and focuses on quality management principles, performance management and quality improvement alongside relevant tools, techniques, models and frameworks. It is suitable for undergraduates who require to develop knowledge, understanding and business management skills in the fields of quality management and process improvement.

Course Outcomes

- CO 1 Demonstrate a working knowledge of the principles and practice of quality management.
- CO 2 Explain the quality tools and techniques for continuous quality improvement.
- CO 3 Prepare a quality implementation plans for the strategic issues in quality management.

BPC2123
Organizational Behaviour
Credit : 3
Prerequisite: BPC1143 Industrial Psychology

Synopsis

This course provides an analysis of human behaviour at work place. The behaviour of individual, interpersonal, team and organizational levels. The development of interpersonal competencies to allow individuals to effectively work as managers or professionals in the rapidly changing, culturally diverse and technologically integrated global climate facing modern organizations. The topics like personality, attitude, perception, leadership are covered.

Course Outcomes

- CO 1 Classify theories of Organizational Behaviour.
- CO 2 Demonstrate the issues relating of human behaviour at work place and related issues.
- CO 3 Report human behaviour skills for development of organization.

BUM2413
Statistics for Management
Credit : 3
Prerequisite: None

Synopsis

This course discusses on descriptive statistics; graphical summary; common probability distributions; statistical analysis for means; regression and correlation including simple and multiple linear regressions, and goodness of fit test and contingency tables. Statistical packages such as Microsoft Excel, SPSS, R Language, S Plus, EViews and Minitab shall be used in this course.

Course Outcomes

- CO 1 Acquire fundamental principle of statistics.
- CO 2 Perform statistical analysis by using appropriate statistical theory and methodology.
- CO 3 Analyse real life data to solve related problems in various disciplines.

BPC3123
Research Methodology
Credit : 3
Prerequisite: None

Synopsis

This course is designed to introduce students to the research methods that can be applied when conducting research projects. The topics to be

covered include Introduction to research, approaches to research, problem statement, research objective, research question, literature reviews, theoretical framework and hypothesis development, research design, case study research, data collection method, measurement, sampling, data analysis, introduction to Excel/SPSS and writing the research proposal, poster and article.

Course Outcomes

- CO 1 Differentiate between qualitative and quantitative research method.
- CO 2 Construct research proposals by using appropriate research methods.
- CO 3 Propose research methods for problem solving.

**BPC3123
Strategic Management
Credit : 3
Prerequisite: None**

Synopsis

This course exposes students on the aspects of strategic management in business environment. The covered areas for this course are: the nature of strategic management; external and internal assessment; strategic analysis and choice; strategy implementation; and strategic evaluation and control.

Course Outcomes

- CO 1 Analyze the strategic management concepts and techniques.
- CO 2 Demonstrate the strategic management concepts and techniques in business environment.
- CO 3 Initiate strategy choice for implementation.

**BPC3132
Final Year Project I
Credit : 2
Prerequisites: BPC3113 Research Methodology**

Synopsis

This course will expose the students on the process of conducting academic research in order to provide the skills and ability in carrying out research project in the area of their study. The covered areas for Final Year Project 1 are: (i) problem background, (ii) problem statement, (iii) research objectives, (iv) research questions, (v) research framework, (vi) literature reviews, and (vii) research methods.

Course Outcomes

- CO 1 Produce problem statement and research objective in the chosen industrial management field.
- CO 2 Manipulate the reliable sources for exceptional, detail and accurate literature review.
- CO 3 Construct noble research work by producing the feasible flow of methodology.
- CO4 Build effective skills in report writing and oral presentation- through overall report contents and oral presentation session.
- CO5 Demonstrate good attitude to fulfill research requirements.

**BPC4114 (Semester 7/4)
Final Year Project 2
Credit : 4
Prerequisite: BPC3132 Final Year Project I**

Synopsis

This course will expose the students on the process of conducting academic research in order to provide the skills and ability in carrying out research project in the area of their study.

The covered areas for Final Year Project II are: (i) development of research instruments for data collection, (ii) carrying out data collection, (iii) analyzing data collected, (iv) interpreting data, (v) writing reports.

Course Outcomes

- CO 1 Produce validated research instrument.
- CO 2 Organize the research findings based on theoretical knowledge.
- CO 3 Construct the conclusion of the research and recommendation for improvement.
- CO4 Build an effective skill in report writing and oral presentation through overall report contents and oral presentation session.
- CO5 Demonstrate a good attitude to fulfill research requirements.

**BPC4112
Industrial Training
Credit : 12**

Prerequisites: All core faculty and core programme courses from Semester 1 to Semester 7

Synopsis

As part of the Faculty of Industrial Management with an integrated curriculum of the Bachelor of Project Management degree courses, all students are required to undergo industrial training for a minimum period of 24 weeks. Placement of students at various companies will be supervised and coordinated by the Industrial Training Committee set up by the Faculty. Students will be placed at various companies throughout Malaysia. The training at the various companies will expose the students to a real working environment including the companies' organization structures, business operations and technology management. The hands-on experience in the training will reinforce what has been taught at the University. The students are

also required to prepare an industrial training report and do the final presentation describing the tasks they are assigned in their placement.

Course Outcomes

- CO 1 Expose students to the "real" working environment and get acquainted with the organization structure, business operations and technology management.
- CO 2 Build effective communication skills in written and oral presentation.
- CO 3 Build hands-on experience in their related field so that students can relate to and reinforce what has been taught at the University.
- CO 4 Integrate cooperation and collaboration between industry and the university in promoting a knowledgeable society.

CORE PROGRAMME

**BPM1313
Project Management
Credit : 3
Prerequisite: None**

Synopsis

This course provides foundation and knowledge of project management. Students will be exposed to various body of knowledge and institutions related to project management in particular to Project Management Institute (PMI). Throughout semester, students be give the well-round knowledge of theories, project management process and the skills required to manage a project effectively. Last but not least, students also will have opportunity to explore various methods and approaches of project management and project management software.

Course Outcomes

- CO 1 Explain concept of project management process according to selected body of knowledge and

organizational influence towards project management success and project team's roles and organizational influence towards project management success.

- CO 2 Identify best-fit project management software for the organization.
- CO 3 Demonstrate understanding of project life-cycle management according to different industries.

BPM2313
Project Financial Management
Credit : 3
Prerequisite: None

Synopsis

With recent spate of companies experiencing financial difficulties, the issue of sound financial management is now more important than ever. The course is designed to provide a basic understanding of the fundamental concepts and principles that influence investment and financing decisions of the projects at the pre-feasibility stage. It examines relevant issues including financial strategy, debt and equity management, the key drivers of shareholders value, risk and return concept in investment and capital budgeting as vehicles to evaluate investment choice.

Course Outcomes

- CO 1 Explain basic elements of financial management that consist of financing, operating and investing activities.
- CO 2 Demonstrate basic financial calculation for further understanding about financial management analysis.
- CO 3 Discuss the use of basic financial information in decision-making process.

BPM2323
Project Estimating & Budgeting
Credit : 3
Prerequisite: None

Synopsis

This course examines estimating practices and techniques in managing a project cost. The focus includes breaking project costs and quantities into labour, material, plant, direct and indirect cost components. The differences in quantity-related, time-related and fixed cost are explored. Students will learn how to develop a project cost estimate, project budget and project budget baseline. A number of approaches and techniques that can be applied in managing cost effectively will be introduced. The course will also look at more strategic estimating areas such as pricing preliminaries and determining margins for profit and overheads.

Course Outcomes

- CO 1 Explain the fundamental aspects of project cost estimating and budgeting.
- CO 2 Demonstrate the process of estimating in managing costs for a project.
- CO 3 Explain appropriate technique and approach in preparing project cost estimate and budget.

BPM2333
Planning & Scheduling
Credit : 3
Prerequisite: None

Synopsis

This course aims to expose students with knowledge and practical experience in scheduling process during project planning. It focuses on approaches and strategies in developing viable schedules influencing project success. Selected project management tools or software are introduced during the lab sessions to grant students with necessary knowledge and skills in dealing with stages of the project life

cycle, to work within organizational and cost constraints, and to manage resources effectively.

Course Outcomes

- CO 1 Identify the importance of planning and scheduling in ensuring project success.
- CO 2 Display the use of various scheduling tools and techniques.
- CO 3 Demonstrate appropriate techniques for resource estimation and allocation for project planning and scheduling.

**BPM2343
Integrated Project Management 1
Credit : 3
Prerequisite: None**

Synopsis

This course aims to incorporate and integrate courses taught throughout the year of studies. Students are put in groups to complete and solve project tasks. Tasks involved include planning and scheduling from the start until completion date of the project, estimating and budgeting the cost involved, as well as finding reliable sources to finance the project. Throughout the course, students are supervised by the lecturers to guide and ensure they can complete the project as good as possible and achieve the objectives of this course. At the end of the semester, they will be required to submit their recommendation and present their work to a panel of assessors.

Course Outcomes

- CO 1 Develop planning and scheduling of a project.
- CO 2 Apply the principles of estimating and budgeting in a practical scenario.
- CO 3 Demonstrate knowledge and skills to operate as an individual in a team-based environment.

CO4 Perform project tasks in a professional manner.

**BPM2353
Procurement Management
Credit : 3
Prerequisite: None**

Synopsis

This course focuses on essential understanding and knowledge of principles, concepts and techniques for effective project procurement management. The course begins with introductory sections explaining various definitions of contracts and general principles of the contract law. Students will be exposed with various types of procurement systems and contracts. Then the Project Procurement Management Knowledge Area processes are presented: Plan Procurements, Conduct Procurements, Administer Procurements, and Close Procurements. The processes in Project Procurement Management are initiated early in the project with a procurement management plan and are ongoing throughout the life of the project. At the end of this course, students will be equipped with the skills and necessary knowledge in assessing conflicts and remedies for contract breach as well as contractual implications.

Course Outcomes

- CO 1 Demonstrate the fundamental concepts of procurement and law of the contracts.
- CO 2 Explain project procurement process in order to select the best procurement practice.
- CO 3 Identify the various dispute resolution methods in projects.

**BPM2363
Integrated Project Management 2
Credit : 3
Prerequisite: BPM2343 Integrated Project Management 1**

Synopsis

This course aims to incorporate and integrate courses taught throughout the year of studies. Students are put in groups to complete and solve project tasks. Tasks involved include planning and scheduling from the start until completion date of the project, estimating and budgeting the cost involved, as well as finding reliable sources to finance the project. Throughout the course, students are supervised by the lecturers to guide and ensure they can complete the project as good as possible and achieve the objectives of this course. At the end of the semester, they will be required to submit their recommendation and present their work to a panel of assessors.

Course Outcomes

- CO 1 Develop planning and scheduling of a project.
- CO 2 Apply the principles of estimating and budgeting in a practical scenario.
- CO 3 Demonstrate knowledge and skills to operate as an individual in a team-based environment.
- CO4 Perform project tasks in a professional manner.

BPM3313

Project Control

Credit : 3

Prerequisite: None

Synopsis

The purpose of this course is to give an understanding of Project Control and to provide practical guidance to enable the students to perform Project Control in the real world. Project Control is an important component of Project Management, and the success of a project relies on the ability to control the project. Project Control focuses on project scope, schedule and budget, and how to determine when the project is off-course in these areas, and how to get back on track.

Course Outcomes

- CO 1 Demonstrate the way project team members carry out the process of project control.
- CO 2 Display the use of various control tools and techniques..
- CO 3 Explain the close out process for projects.

BPM3323

Project Risk Management

Credit : 3

Prerequisite: None

Synopsis

This course develops student with necessary knowledge and skills in managing risks in becoming a good project manager. In this course, students will be exposed to risk management process used by an organization during the Project Life Cycle. Students will have a firm understanding on the input, output, as well as tools during risk identification, risk analysis, risk response planning and risk control according to PMBOK (5th Edition).

Course Outcomes

- CO 1 Explain key project risks.
- CO 2 Categorize the impacts of risk to a project in order to finalize the best mitigation strategies to be employed.
- CO 3 Explain risk management process.

BPM3333

Stakeholder Management

Credit : 3

Prerequisite: None

Synopsis

This course provides a framework for understanding and managing stakeholders for

achieving successful project outcome. The students will explore the importance of the relationships between project stakeholders as a key to project success. In addition, the course aims to provide knowledge on types of project stakeholders, effective communication techniques for managing expectations and support of stakeholders. At the end of the course, students will know how to craft appropriate communication and management strategies for developing and maintaining successful relationships with stakeholders.

Course Outcomes

- CO 1 Explain the impact of stakeholders on projects success.
- CO 2 Demonstrate appropriate communication skills at various levels involving stakeholders.
- CO 3 Integrate stakeholder's actions to project activities which may affect progress of a project.

BPM3343
Project Portfolio Management
Credit : 3
Prerequisite: None

Synopsis

This course aims to provide a perspective in managing projects within organizations. Students will have the opportunity to obtain firm understanding on project portfolio management by improving resource utilization and planning, and making right decision at the right time. Establishing proper methods in evaluating, selecting and prioritizing organizational resources to the projects are discussed extensively. Appropriate tools and techniques shall be practiced in class to assist students in evaluating project that is aligned with corporate strategies and return on investment goals. At the end, students are able to develop necessary skills in monitoring resource utilization, cost and projects across the portfolio.

Course Outcomes

- CO 1 Explain the importance of Project Portfolio Management in an organisation.
- CO 2 Demonstrate the methods for project selection in an organisation.
- CO 3 Analyze the issues and challenges associated with Project Portfolio Management implementation.

ELECTIVE COURSES

BPE3613
Construction Management (E)
Credit : 3
Prerequisite: None

Synopsis

This course is designed to introduce students with management-oriented practice for construction industry. It focuses on a broad range of inter-related disciplines including residential, commercial and civil construction. Topics include basic concepts of construction management, roles of professional in construction industry, construction labour management, project team coordination, site management, material management, and professional ethics in the construction industry. On top of that, students also will be exposed with various professional bodies in the construction industry.

Course Outcomes

- CO 1 Apply knowledge and understanding of the general practice in construction management.
- CO 2 Distinguish the project team according to their functions and apply the best management practice in construction site.
- CO 3 Identify good ethical practice in construction management.

BPE3623
Construction Technology (E)
Credit : 3
Prerequisite: None

Synopsis

This course focuses on the knowledge of construction technology. The course begins with the construction work organizations and site preparations works. Then, students will be exposed with the design aspects and construction methods for buildings. It includes selected topics on substructure and superstructure works, which give fundamental concepts of the structure of a building. The topics include the construction of frames, walls, floors and roofs. It also covers the construction of stairs, doors and windows including associated glass and glazing, water supply, drainage and external works associated to a building.

Course Outcomes

- CO 1 Distinguish the components related to site organization and temporary works in construction of a building.
- CO 2 Illustrate the design aspects and construction methods for buildings.
- CO 3 Explain the methods of construction sequentially.

BPE3633
Construction Drawings & Measurement (E)
Credit : 3
Prerequisite: None

Synopsis

This course attempts at providing the students with knowledge of and understand the basic concepts of accepted drawing conventions and format together with how to interpret architectural and engineering drawings. Students are also taught on the fundamentals principles for the measurement work items specially focus on building works. It also includes the writing of specification for such

items. The Standard Method of Measurement 2 (SMM2) will be used as guidance for the students in preparing the measurement of quantities and specification for billing.

Course Outcomes

- CO 1 Explain the basic concept of different types of drawing for construction project.
- CO 2 Prepare brief specification on the measured items effectively according to the drawings and SMM2.
- CO 3 Measure the quantities for elements in building work using basic measurement technique according to SMM2.

BPE3713
Introduction to Software Engineering (E)
Credit : 3
Prerequisite: BPE36*3 Elective 1

Synopsis

This course is an introduction to software engineering with an emphasis on the methods, techniques and technology to build and evolve software systems. The emphasis is on software engineering principles, which cover the main activities of building systems (requirements specifications, system architecture and design, system construction, and deployment and maintenance) and the elements that are integral to those activities (evolution, measurement and evaluation, teamwork, and management of project). In addition, this course will also cover the process engineering and project management.

Course Outcomes

- CO 1 Distinguish the important terminology and activities involves related to foundation concepts of software engineering and software development process.

- CO 2 Apply appropriate methods for the design and implementation of software systems.
- CO 3 Explain the use of modules and interfaces to enable separate development, and design patterns.

BPE3723

Introduction to Computer Network & Security (E)

Credit : 3

Prerequisite: BPE36*3 Elective 1

Synopsis

This course introduces the overview of network management systems and the five areas of network management. Student will learn a practical means of designing or evaluating a network management system for a particular networking environment. This course also covers the principles of cyber security, as well as issues and approaches in securing systems and data from threats.

Course Outcomes

- CO 1 Explain the areas, design and evaluation of a network management system for a particular networking environment.
- CO 2 Display theory and principles of information security, types of attacks, cryptography, firewalls, wireless and intrusion detection system.
- CO 3 Identify major security issues and trends in the study of cybercrime and computer related security.

BPE3733

System Analysis and Design (E)

Credit : 3

Prerequisite: BPE36*3 Elective 1

Synopsis

This course explores the concepts and methods of information system analysis and design, with an emphasis on system analysis methods and tools. The course focuses on the issues and management technique involved in analysis, design and implementation of information system.

Course Outcomes

- CO 1 Explain the fundamentals of Information Systems (IS) development life cycle and methodologies.
- CO 2 Apply the appropriate analysis method and design tool in developing an Information System.
- CO 3 Display how project management software packages can be used to assist in representing and managing information system projects.

BPE4613

Construction Economics (E)

Credit : 3

Prerequisite: None

Synopsis

This course enables students to explore the elements of economic theory and its application to the construction and petroleum industries. The topic of this course covers the introduction of micro and macroeconomics together with discussion on the nature of construction market including the concept, definition, profit and marginal analysis, demand and supply. Besides, the focus is on the broad understanding of the project development process and parties involved and consideration of risk and uncertainty in project development. It concludes with an overview of long-term operational costs and environmental impact through the concepts of life-cycle cost planning.

Course Outcomes

- CO 1 Prepare various preliminary estimating and cost analysis methods.

- CO 2 Demonstrate the relationship of construction industry to the nation economy.
- CO 3 Demonstrate project life-cycle cost studies for construction project management.

BPE4623

Industrial Safety and Health (E)

Credit : 3

Prerequisite: None

Synopsis

This course introduces the principles and concepts of health and safety in construction and petroleum industry. Students will be exposed to the history of health and safety development, the policy involved, procedure in promoting health and safety culture, hazard control and monitoring review and audit for safety. Discussions on main legal requirements for construction and petroleum industrial safety will also be discussed.

Course Outcomes

- CO 1 Describe the importance of safety and health in construction and petroleum industry.
- CO 2 Demonstrate appropriate actions to be taken in health and safety issues at workplace.
- CO 3 Study the challenges in implementing health and safety culture in an organization.

BPE4633

Construction and Sustainable Development (E)

Credit : 3

Prerequisite: None

Synopsis

This course is designed to introduce the fundamental concepts of sustainability in construction and development; the environmental, economic and social components. Additionally, this course will develop basic knowledge about the environmental impacts of various phases of a construction project and the consequences of such impacts including the global warming and resource depletion issues. Topics include basic building designs and systems related to sustainability. Students learn about green design topics such as site plans, water and energy efficiency, material and resources usage, environmental quality and renewable energy source. As an outcome of the course, students are able to incorporate green technologies into building projects.

Course Outcomes

- CO 1 Explain the concepts of sustainable construction.
- CO 2 Identify the latest green design and technology for building construction and project management.
- CO 3 Verify the role of project manager according to knowledge areas in sustainable construction.

BPE4713

Integrated Media Application for Business (E)

Credit : 3

Prerequisite: BPE46*3 Elective 1

Synopsis

This course introduces the basic elements or typical components of multimedia including text, graphics, sound, video and animation for education and business. Basic design principles are combined with digital image file formats and compression. The students learn to identify the software in creating digital images and videos, and locating sources of royalty-free stock

photography to enable them to create multimedia presentations. At the end of the course, the students are able to handle a project using different multimedia sources incorporating digital images and demonstrate their ideas through a proposal in a professional manner.

Course Outcomes

- CO 1 Identify the typical components of multimedia.
- CO 2 Design multimedia presentations using text, graphics, sound, video and animation.
- CO 3 Propose a project by applying different multimedia sources.

**BPE4723
Business Analytics (E)**

Credit : 3

Prerequisite: BPE46*3 Elective 1

Synopsis

This course aims to explore business analytics techniques to formulate and solve business problems in supporting managerial decision making. It provides students with the skills required to meet the demands of industry using different tools and techniques of business analytics. The students are equipped with the knowledge and applied skills in data science, big data analytics and business intelligence.

Course Outcomes

- CO 1 Demonstrate the basic knowledge and process of business analytics and its applicability in the context of a project life cycle.
- CO 2 Display the skills to use different business analytics tools and techniques.
- CO 3 Propose a business analytical report to solve practical problems identified in managing project.

**BPE4733
E-Business Strategy and Practice (E)**

Credit: 3

Prerequisite: BPE46*3 Elective 1

Synopsis

This course provides students with the foundations and future development of business when venturing into the new digital economy which is E-Business. It offers complete overview of business models and e-business strategies. The course highlights theory as well as electronic markets practice in dealing with business and social networking between companies. This course examines myriad issues a business must address when venturing into e-business. The course structure is designed to enable students to transform basic companies into e-business enterprises and the digitalisation of core company processes.

Course Outcomes

- CO 1 Describe the concept of e-business.
- CO 2 Point out the main components of E-business.
- CO 3 Integrate business models into E-business with the usage of appropriate and relevant tools.

COURSE STRUCTURE FOR BACHELOR OF INDUSTRIAL TECHNOLOGY MANAGEMENT WITH HONS.

CORE FACULTY

**BUM1123
Mathematics for Management**

Credit : 3

Prerequisites: None

Synopsis

This course introduces the use of mathematical technique in the field of business administration and management. The topics introduce the inequality, matrices, functions and the key business topics such as simple interest,

compound interest, annuity, notes and bank discount, mathematics of buying, markup and markdown.

Course Outcomes

- CO 1 Use the basic principle and methodologies of mathematics to solve the mathematical analysis problems.
- CO 2 Use scientific calculator to solve the exponential and logarithmic functions.
- CO 3 Apply the mathematical concepts and the usage of the mathematical technique in business administration and management.

BPC1113
Principles of Management
Credit : 3
Prerequisites: None

Synopsis

This course serves as an introduction to the discipline of management. It is designed to integrate the accepted theories in the area with real world applications to provide students with the basic knowledge and skills needed for managing others. This course begins with a discussion of the current issues in management and then proceeds to cover the traditional functions of management: planning, organizing, leading, and controlling. Contemporary issues and global challenges for future managers will also be discussed to equip students with current trends and best practices in managing a successful organization.

Course Outcomes

- CO 1 Apply the Principles of Management in solving various issues and global challenges
- CO 2 Identify good practices of management functions in managing event

CO 3 Compare various management styles of contemporary approaches in current setting

BPC1123
Principles of Economics
Credit : 3
Prerequisites: None

Synopsis

This course is designed to introduce students to key concepts used in microeconomics and macroeconomics, and to facilitate a basic understanding of economic phenomena. The goals will help students to understand fundamental concepts and tools so that students can use them to analyse various economic issues. This course is primarily concerned with Malaysian economy and will help them understand how economy works.

Course Outcomes

- CO 1 Explain the basic Macro & Micro economic concepts.
- CO 2 Explain the usage of economics concepts for business phenomena.
- CO 3 Demonstrate the usage of the economic models for business management decision making.

BPC1143
Industrial Psychology
Credit : 3
Prerequisites: None

Synopsis

This course provides an overview of different personnel, work environment and organizational issues to be investigated in industrial psychology. The major application of psychology at work place is covered. The management of human capital and their issues like selection, training, evaluation, relationship at work place and related aspects are focused.

Course Outcomes

- CO 1 Analyze and understand theories of Industrial Psychology and management of human capital.
- CO 2 Demonstrate the issues relating of work behaviour of employees and the human capital management.
- CO 3 Describe human resource skills for effective industrial management.

BPC1153
Business Information System
Credit : 3
Prerequisites: None

Synopsis

This course aims to provide firm understanding on the significance and strategic role of information system to the organization particularly in supporting wide range of business functions across the corporate environment. The lecture shall covers theoretical part which cover the foundation of information systems, information technology infrastructure and contemporary issues on information security. Lab session aims to provide students with hands-on and practical experience on the usage of office automation systems, developing database as well as exploring selected approach in information system development.

Course Outcomes

- CO 1 Explain significance and roles of information systems in achieving organizational competitive advantage.
- CO 2 Apply various strategies and approaches in information system development.
- CO 3 Demonstrate the usage of office automation system in performing operational tasks and managing information resources within organization.

BPC1133
Principles of Marketing
Credit : 3
Prerequisites:None

Synopsis

This course serves as an introduction to the discipline of management. It is designed to integrate the accepted theories in the area with real world applications to provide students with the basic knowledge and skills needed for managing others. This course is designed to provide students with an understanding of marketing mix components; explain the environmental factors which influence consumer and organizational decision-making processes; outline a marketing plan; and how marketing works in today's marketing environment.

Course Outcomes

- CO 1 Explain the Principles of Marketing in solving various issues.
- CO 2 Follow a comprehensive marketing plan to real or imaginary products.
- CO 3 Propose persuasive marketing programs

BUM2413
Statisticis for Management
Credit : 3
Prerequisites: None

Synopsis

This course discusses on descriptive statistics; graphical summary; common probability distributions; statistical analysis for means; regression and correlation including simple and multiple linear regressions, and goodness of fit test and contingency tables. Statistical packages such as Microsoft Excel, SPSS, R Language, S Plus, EViews and Minitab shall be used in this course.

Course Outcomes

- CO 1 Acquire fundamental principle of statistics.

CO 2 Perform statistical analysis by using appropriate statistical theory and methodology.

CO 3 Analyse real life data to solve related problems in various disciplines.

BPC2113

Quality Management

Credit : 3

Prerequisites: None

Synopsis

The course will provide students with a comprehensive understanding and focuses on quality management principles, performance management and quality improvement alongside relevant tools, techniques, models and frameworks. It is suitable for undergraduates who require to develop knowledge, understanding and business management skills in the fields of quality management and process improvement.

Course Outcomes

CO 1 Demonstrate a working knowledge of the principles and practice of quality management.

CO 2 Explain the quality tools and techniques for continuous quality improvement.

CO 3 Prepare a quality implementation plans for the strategic issues in quality management.

BPC2123

Organizational Behaviour

Credit : 3

Prerequisite: BPC1143 Industrial Psychology

Synopsis

This course provides an analysis of human behaviour at work place. The behaviour of individual, interpersonal, team and

organizational levels. The development of interpersonal competencies to allow individuals to effectively work as managers or professionals in the rapidly changing, culturally diverse and technologically integrated global climate facing modern organizations. The topics like personality, attitude, perception, leadership are covered.

Course Outcomes

CO 1 Classify theories of Organizational Behaviour.

CO 2 Demonstrate the issues relating of human behaviour at work place and related issues.

CO 3 Report human behaviour skills for development of organization.

BPC3113

Research Methodology

Credit : 3

Prerequisites: None

Synopsis

This course is designed to introduce students to the research methods that can be applied when conducting research projects. The topics to be covered include Introduction to research, approaches to research, problem statement, research objective, research question, literature reviews, theoretical framework and hypothesis development, research design, case study research, data collection method, measurement, sampling, data analysis, introduction to Excel/SPSS and writing the research proposal, poster and article.

Course Outcomes

CO 1 Differentiate between qualitative and quantitative research method.

CO 2 Construct research proposals by using appropriate research methods.

CO 3 Propose research methods for problem solving.

BPC3123
Strategic Management
Credit : 3
Prerequisites: None

Synopsis

This course exposes students on the aspects of strategic management in business environment. The covered areas for this course are: the nature of strategic management; external and internal assessment; strategic analysis and choice; strategy implementation; and strategic evaluation and control.

Course Outcomes

- CO 1 Analyze the strategic management concepts and techniques.
- CO 2 Demonstrate the strategic management concepts and techniques in business environment.
- CO 3 Initiate strategy choice for implementation.

BPC3132
Final Year Project I
Credit : 2

Prerequisites: BPC3113 Research Methodology

Synopsis

This course will expose the students on the process of conducting academic research in order to provide the skills and ability in carrying out research project in the area of their study. The covered areas for Final Year Project 1 are: (i) problem background, (ii) problem statement, (iii) research objectives, (iv) research questions, (v) research framework, (vi) literature reviews, and (vii) research methods.

Course Outcomes

- CO 1 Produce problem statement and research objective in the chosen industrial management field.
- CO 2 Manipulate the reliable sources for exceptional, detail and accurate literature review.
- CO 3 Construct noble research work by producing the feasible flow of methodology.
- CO4 Build effective skills in report writing and oral presentation- through overall report contents and oral presentation session.
- CO5 Demonstrate good attitude to fulfill research requirements.

BPC4114 (Semester 7/4)
Final Year Project 2

Credit : 4
Prerequisite: BPC3132 Final Year Project I

Synopsis

This course will expose the students on the process of conducting academic research in order to provide the skills and ability in carrying out research project in the area of their study. The covered areas for Final Year Project II are: (i) development of research instruments for data collection, (ii) carrying out data collection, (iii) analysing data collected, (iv) interpreting data, (v) writing reports.

Course Outcomes

- CO 1 Produce validated research instrument.
- CO 2 Organize the research findings based on theoretical knowledge.
- CO 3 Construct the conclusion of the research and recommendation for improvement.

CO4 Build an effective skill in report writing and oral presentation through overall report contents and oral presentation session.

CO5 Demonstrate a good attitude to fulfill research requirements.

**BPC4112
Industrial Training
Credit : 12**

Prerequisites: All core faculty and core programme courses from Semester 1 to Semester 7

Synopsis

As part of the Faculty of Industrial Management with an integrated curriculum of the Bachelor of Project Management degree courses, all students are required to undergo industrial training for a minimum period of 24 weeks. Placement of students at various companies will be supervised and coordinated by the Industrial Training Committee set up by the Faculty. Students will be placed at various companies throughout Malaysia. The training at the various companies will expose the students to a real working environment including the companies' organization structures, business operations and technology management. The hands-on experience in the training will reinforce what has been taught at the University. The students are also required to prepare an industrial training report and do the final presentation describing the tasks they are assigned in their placement.

Course Outcomes

- CO 1 Expose students to the "real" working environment and get acquainted with the organization structure, business operations and technology management.
- CO 2 Build effective communication skills in written and oral presentation.
- CO 3 Build hands-on experience in their related field so that students can relate to and reinforce what has been taught at the University.

CO 4 Integrate cooperation and collaboration between industry and the university in promoting a knowledgeable society.

**CORE PROGRAM
BPQ1213
Management Accounting
Credit : 3
Prerequisites: None**

Synopsis

This course is an introductory course and enables students to understand the basic concepts and terminology of accounting and financial reporting for modern business enterprises. The students will learn to apply accounting information for business activities decision. The course will equip students with understanding and application on context of management accounting, cost identification and behaviour, standard costing, financial planning and control and accounting control systems.

Course Outcomes

- CO 1 Solve accounting problems by applying the accounting method in a business setting
- CO 2 Display cost for business using the principles of costing systems
- CO 3 Explain the business activities base on management accounting principles and concepts

**BPQ1223
Principles of Operation Management
Credit : 3
Prerequisites: None**

Synopsis

The course provides a range of academic knowledge, operations understanding, operational management techniques. It will focus on the main decision areas of operations management and their impact on business functions and the role of the operations manager

and the relationship with productivity improvement.

Course Outcomes

- CO 1 Apply the fundamental concept and the main areas of operation management
- CO 2 Demonstrate operation decisions in solving operational problems
- CO 3 Justify operations management requirements

**BPQ2213
Financial Management
Credit : 3
Prerequisites:None**

Synopsis

This course is an introductory course and enables students to understand the basic concept of finance in an organization. Students will define concepts, characteristics, features and analyzing related financial statements. The course will equip students with understanding and application of finance which cover on financial strategy, debt and equity management, the key drivers of shareholders value, risk and return concept in investment, and capital budgeting as vehicles to evaluate investment choices.

Course Outcomes

- CO 1 Analyze financial management problems by using all concepts in financial management
- CO 2 Calculate and utilize financial formula to a particular area in financial management
- CO 3 Explain the key driven in financial management and its importance in an organization

**BPQ2223
Supply Chain & Logistics Management
Credit : 3
Prerequisites: None**

Synopsis

The course covers supply chain and logistics management in business environment which includes concepts of SCM, logistics, sourcing strategy, supply chain risk, purchasing, distribution, transportation, facilities location, demand forecasting, inventory, pricing strategy and information technology used in industrial system and operation management.

Course Outcomes

- CO 1 Illustrate the roles of supply chain and logistics management in the industry
- CO 2 Explain supply chain and logistics management methods and concepts in solving related industrial operation and system problems
- CO 3 Present operation information and data from various records and database utilized for industrial supply chain and logistics management application

**BPQ2233
Project Management
Credit : 3
Prerequisite: None**

Synopsis

This course provides foundation and knowledge of project management. Students will be exposed to various body of knowledge and institutions related to project management in particular to Project Management Institute (PMI). Through out semester, students be give the well-round knowledge of theories, project management process and the skills required to manage a project effectively. Last but not least, students also will have opportunity to explore

various methods and approaches of project management and project management software.

Course Outcomes

- CO 1 Explain concept of project management process according to selected body of knowledge and organizational influence towards project management success.
- CO 2 Identify best-fit project management software for the organization.
- CO 3 Demonstrate understanding of project life-cycle management according to different industries

**BPQ2243
Fundamental of Manufacturing
Credit : 3
Prerequisites: None**

Synopsis

Manufacturing have become important in the industrial environment to produce products for the services of mankind. The knowledge gained from this course is highly essential as it prepares the students to be familiar with modern concepts of manufacturing technologies. Students will be exposed theoretically to the manufacturing processes, safety measures, fundamental of material properties and measurement, tools and equipments used, and the manufacturing system.

Course Outcomes

- CO 1 Describe the appropriate material required in manufacturing technology
- CO 2 Differentiate the manufacturing technology alternatives based on selected material

CO 3 Identify the appropriate manufacturing technology for modern concepts of manufacturing

**BPQ2253
Management of Technology
Credit : 3
Prerequisites: None**

Synopsis

This subject is intended to give an understanding on the concept of technology management and its application to an organization particularly business firm. The topics to be covered are: Introduction to Management of Technology, Critical Factors and essential issues in Managing Technology, Technology Life Cycles, Technology Forecasting, Technology strategy and planning tools, Technological Innovation, transfer and Technological Competitiveness.

Course Outcomes

- CO 1 Produce the general terms, definitions, principles used in the various topics of management of technology.
- CO 2 Analyze the technical tools or models in formulating technology policies and strategies within and between organizations in the development, operation and marketing of goods and/or services.
- CO 3 Demonstrate decision making techniques in the management of technology to address problems in the range of sectors.

**BPQ3213
Production Planning and Control
Credit : 3
Prerequisites: None**

Synopsis

The subject covers planning and controlling of production in production and operation management; concepts of production planning

techniques, analytical techniques and system designs and concepts of production and process control in industrial management.

Course Outcomes

- CO 1 Analyse industrial production planning and control problems
- CO 2 Apply production planning and control methods for solving industrial operation problems
- CO 3 Respond to production planning and control requirements

BPQ3223

Quality Control

Credit : 3

Prerequisites: BPC2113 Quality Management

Synopsis

The subject is designed to introduce methods for data collection, control chart construction and interpretation, and statistical diagnosis for quality control. The course blends statistical process control (SPC) and principles of statistics for quality control and process improvement purpose. It also covers process capability, acceptance sampling methods and reliability.

Course Outcomes

- CO 1 Apply statistics principles in data analysis for quality control.
- CO 2 Display results of statistical process control, control charts, with the help of minitab software.
- CO 3 Study SPC, control chart, acceptance sampling and reliability technique in solving industrial quality problems for quality control and improvements.

BPQ3233

Business Law

Credit : 3

Prerequisites: None

Synopsis

This subject introduces fundamental legal knowledge in relation to business activities and commercial transactions by focusing on relevant legal theories, principles and aspects and their application within Malaysian legal framework and global business environment. The students will be exposed to the concept of law, legal system and legal liabilities in commercial contracts, commercial crime, tort, consumerism and intellectual property. Upon completing this subject, students will have the understanding on the mechanics of law and its significance to business

Course Outcomes

- CO 1 Explain the substantial and procedural aspects of Malaysian business law
- CO 2 Analyze appropriate legal frameworks for commercial activities and business ventures.
- CO 3 Integrate the application of legal knowledge in commercial decision-making.

BPQ3243

Product Development & Innovation

Credit : 3

Prerequisites: None

Synopsis

The course is intended to give an in-depth understanding of the entire process of new product development, as it should operate within modern production industry which encompassing both the design and development, covering not only of the visual appearance of products but also design for manufacturing, design to meet market needs, design for cost reduction, design for reliability and design for environmental friendliness.

Course Outcomes

- CO 1 Apply technical knowledge in problem solving using appropriate software

and management techniques for new product development

- CO 2 Display new products by utilising appropriate techniques to stimulate creativity and innovation for product design application.
- CO 3 Manage relevant industrial product development information and data from various records, database or publications

ELECTIVE COURSES

BPE3513

Computer Aided Design (E)

Credit : 3

Prerequisites: None

Synopsis

The subject is intended to provide students with introduction and theoretical understanding of computer-aided technologies used in design (CAD). Students are exposed to various problem solving techniques as well as hands-on experience and project-based approach in the aspects of industrial product design and development

Course Outcomes

- CO 1 Demonstrate product design and development and computer-aided design (CAD).
- CO 2 Construct basic design work and product development functions by using selected CAD software
- CO 3 Complete the understanding by solving problems in design and product development using selected CAD software.

BPE3523

ERP Systems (E)

Credit : 3

Prerequisites: None

Synopsis

This course is aimed to teach the students about the basics on modern integrated information systems and how they are deployed in companies. A special emphasis is placed on understanding the connections between business process management and supporting and supporting business processes through integrated information systems.

Course Outcomes

- CO 1 Differentiate the theoretical foundations of modern ERP systems and their application in a company
- CO 2 Construct ERP systems in real-life situations to solve specific process task (eg. Order processing, production planning, invoicing etc.
- CO 3 Demonstrate the connection between business process management and modern ERP systems

BPE3533

Lean Manufacturing (E)

Credit : 3

Prerequisite: None

Synopsis

This course introduces the key concepts in lean manufacturing such as continuous improvement, just-in-time, standardization, kanban and others. Lean focuses on eliminating waste in processes, waste being anything that impedes the flow of product as it is being transformed in the value chain. The course will examine the socio-technical interactions within a modern manufacturing organization and develop skills and processes for implementing changes for achieving agile manufacturing and global competitiveness.

Course Outcomes

- CO 1 Apply lean principles in initiating a continuous improvement program in an organization
- CO 2 Analyze various concepts of lean systems and their applications in the manufacturing and service industry
- CO 3 Demonstrate lean approach by applying lean tools and techniques in solving organization or industry problems

BPE3813
Customer Relationship Management (E)
Credit : 3
Prerequisites: None

Synopsis

This course is designed to introduce students to both CRM fundamentals and the utilization of technology in managing customers. The curriculum will introduce students to CRM concepts and functionality for professionals whose organizations utilize CRM or want to gain an understanding of the role of CRM in service management.

Course Outcomes

- CO 1 Analyse the key concepts, technologies and best practices of CRM in Service industry.
- CO 2 Integrate CRM and technologies practices to enhance the achievement of marketing, sales and service objectives.
- CO 3 Explain the impact of CRM on customer experience, satisfaction and loyalty.

BPE3823
Service Management (E)
Credit : 3
Prerequisites: None

Synopsis

The main aim of this subject is to expose the students to the real service market scenario. It considers the complexity of services that bring together a mesh of organisations, people, technologies, strategies and information to deliver value to the customer. The strategic and competitive focus also provides those students who are interested in entrepreneurial endeavours with the foundation necessary to open their own service business.

Course Outcomes

- CO 1 Analyse fundamental ideas of managing services
- CO 2 Integrate the role of technology, operations, and human behaviour towards a better service management
- CO 3 Point out challenges of managing different types of service operations by learning strategies to overcome it.

BPE3833
Knowledge Management (E)
Credit : 3
Prerequisites: None

Synopsis

Knowledge management as an organizational innovation has reached a state of maturity where we can now discern the principles, practices, and tools that make it unique. It has engendered new concepts and categories for us to make sense of the many important ways that organizations use knowledge to create value. So this course is designed to present a thoughtful, systematic view of knowledge management as a coherent body of management theory and practice. The topics will include: introduction to

knowledge management in theory and practice, the knowledge management cycle, knowledge management models, knowledge capture and codification, knowledge sharing and communities of practice, knowledge application, the role of organizational culture, knowledge management tools, KM strategy and metrics, the KM team, and future challenges for KM.

Course Outcomes

- CO 1 Compare the definitions and perspectives of knowledge and knowledge management.
- CO 2 Manipulate knowledge management tools to suit various organizational contexts in facilitating the business operation.
- CO 3 Prepare framework of implementing knowledge management to address problems in organizations.

BPE4513
Manufacturing Technology (E)
Credit : 3
Prerequisites: None

Synopsis

This subject is intended to introduce manufacturing processes as used by industries to transform raw material to a final product: covering basic principles in metal forming, casting, joining and machining processes. The subject also covers other essential processes such as bulk deformation processes, powder metallurgy and surface treatments. Besides theoretical learning, students are also will be expose to the practical experiences related to basic manufacturing works which are common to the production industries.

Course Outcomes

- CO 1 Analyze the fundamentals of manufacturing technology applicable to industrial production processes
- CO 2 Manipulate the compatibility of manufacturing technology alternative

with product specification for industrial production processes

- CO 3 Demonstrate basic manufacturing work as practiced by production industries

BPE4523
Computer Modelling & Simulation (E)
Credit : 3
Prerequisites: BPE35*3 Elective 1

Synopsis

This course demonstrates how to construct a computer representation of a real world system. A developed simulation model can be use to aid decision making by providing information and predicts how the real-world system behaves under a variety of circumstances. Students will develop both discrete event simulation and system dynamics models with the aid of ARENA and iThink simulation software.

Course Outcomes

- CO 1 Design logical models to represent real world systems
- CO 2 Simulate real world systems using simulation software
- CO 3 Analyze data and output of the simulation model

BPE4533
Industrial Control & Automation (E)
Credit : 3
Prerequisites: BPE35*3 Elective 1

Synopsis

This course will provide the students with basic skills useful in identifying the concepts of automated machines and equipment and describe the terms and phrases associated with industrial automation in manufacturing applications. Topics to be covered include

automation technologies and control, industrial automation instruments and devices, process control system classification and programmable logic control applications.

Course Outcomes

- CO 1 Explain the general function of industrial automation systems
- CO 2 Demonstrate basic Programmable Logic Control (PLC) skills
- CO 3 Differentiate types of process control devices

BPE4813

Service Marketing (E)

Credit : 3

Prerequisites: BPE38*3 Elective 1

Synopsis

This course focuses on the Formulation, Implementation and Evaluation of Service Marketing Execution. From understanding service products, consumers and markets, applying the marketing Principles on services; to managing the customer interface and finally implementing profitable service strategies, this course immerses students into the current issues of services marketing.

Course Outcomes

- CO 1 Distinguish the differences between goods and services marketing.
- CO 2 Identify the various components of the “services marketing mix” (three additional P’s) as well as key issues required in managing service quality.
- CO 3 Analyze various methods of achieving competitive advantages in services marketing practice.

BPE4823

Innovation Management (E)

Credit : 3

Prerequisites: BPE38*3 Elective 1

Synopsis

This course intends to provide an understanding of the innovation management concepts by developing a deeper understanding of the steps involved in the development of new products and services, and the strategies in managing product and service innovation to deliver superior value to customers. Specific course objectives address innovation, services & product management issues starting from product development, innovation management up to product marketing approach.

Course Outcomes

- CO 1 Review various options for the marketing and management of product and service innovation using both theoretical and practical approaches
- CO 2 Plan the implementation of the entire process related to the launch of a selected product or service
- CO 3 Critically appraise the viability of a new product or service launch

BPE4833

Retailing (E)

Credit : 3

Prerequisites: BPE38*3 Elective 1

Synopsis

This course intends to provide an understanding of fundamentals of retailing. The topics covered include introduction of retailing, operation management, developing merchandise plan, financial. Students will be exposed to various case studies on successful domestic and international business

Course Outcomes

- CO 1 Assemble knowledge of contemporary retail management business opportunities
- CO 2 Integrate key contents and structure of retail plan
- CO 3 Develop retailing business plan for small to medium size enterprise which integrates marketing, sale, operation, finance and business management

COURSE STRUCTURE FOR BACHELOR OF BUSINESS ENGINEERING WITH HONOURS (DUAL DEGREE PROGRAMME WITH REUTLINGEN UNIVERSITY, GERMANY)

CORE PROGRAMME

BPN1013
Principles of Management
Credit : 3
Prerequisites : None

Synopsis:
 Principles of management aim to provide students with information and knowledge on theoretical management and applied practiced in managing a successful organization. Students will discuss the major principles of management: Planning, Organizing, Leading and Controlling. Contemporary issues and global challenges for future managers will also be discussed to equipped students with current trends and best practices in managing a successful organization.

- Course Outcomes:**
- CO 1 Explain the basic principles of management
 - CO 2 Identify the best practices in management
 - CO 3 Apply the basic principles of management in solving contemporary issues and global challenges in business management

BPN1022
Business Law
Credit : 2
Prerequisites : None

Synopsis:
 This course aims to introduce students to the subject of business law in Malaysia. Business Law is a combination of several branches of law related to business and trade. This course will discuss contract law, agency law, negotiable instruments, law of sales of goods and hire purchase law. The discussion on the cases will help to produce students who are able to understand the important principles in business law and apply theories to the facts on business situations.

- Course Outcomes:**
- CO 1 Define the theories and basic principles in business law
 - CO 2 Describe the existing legal cases related to business activities
 - CO 3 Apply the theories and relevant case laws to the facts of described situations or problems

BPN1032
ACCOUNTING I:
FINANCIAL ACCOUNTING
Credit : 2
Prerequisites : None

Synopsis:
 To introduce students to the concepts and terminology of accounting and financial reporting for modern business enterprises. They will also learn to use accounting information to make conclusions about business activities and to communicate these conclusions to others, basic accounting concepts, how accounting information reflects basic activities of businesses and organizations and how accounting information is used to make decisions about these entities.

- Course Outcomes:**
- CO 1 Apply the fundamental knowledge of financial framework, concepts, principles, and procedures that govern

how the financial statements are prepared

- CO 2 Acquired the ability to prepare and analyse financial statements, as well as to solve accounting related problems

BPN1043

Introduction to Computer Science

Credit : 3

Prerequisites : None

Synopsis:

Fundamental principles and concepts of C programming, with definitions of data, expressions, control-flow constructions, functions, input and output, preprocessing, command line arguments. Basic problem solving and programming techniques, structured programming ideas, fundamental algorithms and data structures

Course Outcomes:

- CO 1 Understand the computer programming using C++
 CO 2 Develop appropriate basic programming techniques and structures
 CO 3 Design the appropriate algorithms and apply in data structures

BUM1113

Technical Mathematics

Credit : 3

Prerequisites : None

Synopsis:

This course introduces and discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Students are exposed to complex number, functions and graphs, trigonometric functions, analytic geometry, polar coordinates, 3 dimensional spaces and vector. Appropriate software is used by students to implement some of these ideas in practice.

Course Outcomes:

- CO1 Acquire fundamental principle of discrete structure.
 CO2 Analyze mathematical problems using discrete structure knowledge.

- CO3 Provide solution to discrete structure problems arise in computer science and engineering fields.

BPN1062

Fundamentals of Project Management

Credit : 2

Prerequisites : None

Synopsis:

This course provides foundation and conceptual framework of project management. Students will be expose to all body of knowledge in particular with Project Management Institute (PMI). Through out semester, students will have opportunity to discuss various topics; project integration, project initiation, organizational influence to project performance, project manager's role, project management context and project management process groups. Last but not least, students also will have opportunity to explore various methods and approaches of project documentation and project management software.

Course Outcomes:

- CO 1 Describe core concept of all knowledge areas of project management
 CO 2 Understand and analyze project life-cycle
 CO 3 Develop project charter and proper project documentation with project management tools and techniques

BPN1072

Accounting II:

Cost Accounting

Credit : 2

Prerequisites : None

Synopsis:

A study of accounting information as a management decision tool. Topics include production costs, activity-based costing, job costing, budgets, standard costs, and variances. The course focuses on the manufacturing environment, but there is some coverage of merchandising and service sectors.

Course Outcomes:

- CO 1 Ability to apply the concept of the various costing systems
- CO 2 Acquired the ability to analyse accounting information and making economic decisions

BPN1083

Engineering Mechanics

Credit : 3

Prerequisites : None

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.

Course Outcomes:

- CO 1 Apply Newton's Law of motion and SI system of unit
- CO 2 Solve vector operation and resultant system problems
- CO 3 Evaluate the equilibrium of particle and rigid body problem using the equilibrium equation and its free body diagram concept
- CO 4 Calculate the resultant forces, moment with multiple forces in structural problems, centroids and moment of inertia of objects. Analyze the effect of friction of rigid bodies in equilibrium situations

BPN1093

Technical Design / CAD

Credit : 3

Prerequisites : None

Synopsis:

This subject is designed to introduce to the students the principle of computer-aided design. Topics includes Drafting Overview, Drawing Set-up , Basic CAD ,Commands Geometric Construction , Orthographic Projection , Basic Drawing ,Tools, Pictorial Drawings, Sectional Views, Advance CAD Commands, Modifying CAD Drawings, Dimensioning, Tolerances, Working Drawings, Threads and Fasteners

Course Outcomes:

- CO 1 Analyze problem in technical drawing and understand drawing
- CO 2 Use basic geometric construction techniques to create objects in CAD
- CO 3 Project a 3 dimensional object in 2 dimensional space with the proper utilization of views in CAD
- CO 4 Read & create dimensioned drawings using conventional techniques in CAD
- CO 5 Identify and understand the components of working drawings & the standards that apply

BUM1223

Calculus

Credit : 3

Prerequisites : None

Synopsis:

This subject discusses Differentiation and applications, techniques of integration and applications, numerical integration and Taylor polynomial, Taylor Series & Maclaurin Series.

Course Outcomes:

- CO 1 Acquire fundamental principle of differentiation.
- CO 2 Apply appropriate calculus concepts to solve various technological problems.
- CO 3 Use appropriate software and tool to solve the graphical and computational problems in calculus

BPN2013

Quality Management

Credit : 3

Prerequisites : None

Synopsis:

This course intends to provide and understanding of fundamentals of Quality Management. The topics covered include Introduction to Quality Management, Quality's Guru, Quality Tools and Concept, different quality approaches, quality control tools and statistical process controls. Students will be exposed to various case studies on quality concept, locally and internationally.

Course Outcomes:

- CO 1 Define and able to explain the fundamental concept and definition of total quality management as a career of choice
- CO 2 Identify the basic knowledge of quality management and quality control in production and manufacturing
- CO 3 Demonstrate and evaluate new concept of quality control for production and manufacturing, and quality practices in service sector which integrates fundamental aspects of quality management

**BPN203
Industrial Engineering**

**Credit : 3
Prerequisites : None**

Synopsis:

This course introduces Industrial engineering, manufacturing engineering, facilities planning, ergonomic, work study, time study, production planning and control, inventory management, quality management system and productivity.

Course Outcomes:

- CO 1 Explain the application, scope and function of Industrial engineering
- CO 2 Conduct work study and work measurement using different techniques
- CO 3 Apply layout design procedure in selecting optimum location and basic layout design

**BPN2032
Fundamentals of Marketing**

**Credit : 2
Prerequisites : None**

Synopsis:

The purpose of the course is to provide the students with a keen understanding of the marketing function in business firms and of the methods of using this knowledge in developing and implementing successful marketing strategies.

Course Outcomes:

- CO 1 Define marketing and describe the components of marketing process
- CO 2 Understand the marketplace and Consumers
- CO 3 Design a Customer-Driven Marketing Strategy and Marketing Mix

**BPN2043
Fundamentals of Electrical Engineering**

**Credit : 3
Prerequisites : None**

Synopsis:

Fundamentals of DC and AC circuits, network laws and theorems, passive circuit components, semiconductors, electric machines, and digital systems

Course Outcomes:

- CO 1 Apply electricity and electronic fundamentals Cognitive PO1-70%
- CO 2 Conduct electronic experiment and solve electronic circuit problem Psychomotor PO3-5%, PO2-10%
- CO 3 Work effectively in a team to complete a task successfully Affective PO5-15%

**BPN2053
ERP Systems & Business Process Management**

**Credit : 3
Prerequisites : None**

Synopsis:

The aim of the course is to teach the basics about modern integrated information systems and how they are deployed in companies. A special emphasis is placed on understanding the connections between business process management and supporting business processes through integrated information systems. It also addresses the methods and techniques required to analyze, design, implement, automate, and evaluate business processes. Structured along the phases of Business Process Management life cycle, student will learn to identify appropriate technologies support, assess the role of standards, analyze organizational performance

from process perspective, redesign processes, and gauge the organizational impact of process change management activities.

Course Outcomes:

- CO 1 Understand and describe the theoretical foundations of modern ERP systems and their application in a company environment
- CO 2 Understand the connection between business process management and modern ERP systems
- CO 3 Apply ERP systems in real-life situations to solve specific process tasks (e.g. order processing, production planning, invoicing, etc.

BUM2423

Statistics with Technology

Credit : 3

Prerequisites : None

Synopsis:

This course discusses on statistical problem-solving methodology and descriptive statistics; sampling distribution and confidence interval; hypothesis testing; analysis of variance (ANOVA); goodness-of-fit test and contingency tables; regression and correlation including simple and multiple linear regressions. Statistical packages such as Microsoft Excel, SPSS, R Language, S Plus, EViews and Minitab shall be used in this course.

Course Outcomes:

- CO 1 Acquire fundamental principle of statistics
- CO 2 Perform statistical analysis by using appropriate statistical theory and methodology
- CO 3 Analyse real life data to solve related problems in various disciplines

BPN2076

Individual Field Project – Business & Engineering

Credit : 6

Prerequisites : None

Synopsis:

The individual field project offers the possibility to apply theoretical concepts and tools in a practical setting. Under supervision and with guidance of a faculty member the student works on a practical task that is typical for operational activities in production and logistics. This task can be suggested by the student, the faculty mentor or by an outside company and should involve student's at least occasional presence in a company. In any case it must be taken from a discipline covered in the semesters 1 to 4 and must clearly be application-oriented (applying theoretical know-how to real-life business & engineering situation, no theoretical task).

Course Outcomes:

- CO 1 Organize themselves and their work in an efficient manner given a clearly defined practical task
- CO 2 Gain experience in how theoretical know-how can be applied in operational tasks in a business environment
- CO 3 Integrate themselves into an existing organizational setup within a company as far as this is required to solve the assigned task

BPN2092

Corporate Social Responsibility (CSR) Project

Credit : 2

Prerequisites : None

Synopsis:

The Corporate Social Responsibility (CSR) Project familiarizes students with the theoretical concept of CSR and shows its relevance in today's business world. Students not only learn the theoretical foundations of CSR, but also actively apply the concept in a real-life example project that exemplifies the idea of making a positive and sustainable impact to society as a whole and individual stakeholders.

Course Outcomes:

- CO 1 Understand and explain the concept of CSR, its elements and its importance for today's business

CO 2 Show individual behaviour that is in line with the principles of CSR exemplified in a real-life project

BPN2103

Cross-Module Seminar I

Credit : 3

Prerequisites : None

Synopsis:

The Cross Module Seminar I gives students the opportunity to create a comprehensive business plan for the market introduction of a new product line of a fictitious case company. Working in virtual, cross-cultural teams of functional experts, students apply knowledge from various business and engineering disciplines and have to deal with complex, unstructured information. The Module is structured into a series of decision phases (work out proposals) and evaluation phases (reflect proposals and own performance) guided by continuous mentoring and documented both in written documents and in a Web-based journal / project team diary. Performance is assessed both in terms of output (quality of business plan) and in terms of development of personal skills (collaboration, use of technologies, intercultural competencies, etc.). Encompassing a wide variety of disciplines covered in the previous semesters the Cross Module Seminar I is the culmination point of students' first half of studies.

Course Outcomes:

- CO 1 Think, act and collaborate in an interdisciplinary way
- CO 2 Work effectively in a virtual, cross-cultural team environment
- CO 3 Make efficient use of modern information and communication technologies to solve a complex task
- CO 4 Apply knowledge from various disciplines to develop a consistent and convincing business plan

BPN2113

Supply Chain Management

Credit : 3

Prerequisites : None

Synopsis:

The subject is intended to introduce the strategic role of a supply chain from vendor to customer and the methods used to manage these supply chains.

Course Outcomes:

- CO 1 Describe the supply chain goals and managerial actions that improve supply chain performance
- CO 2 Explain strategic framework for supply chain decisions which involves planning, designing and operating processes
- CO 3 Apply technical knowledge in problem solving situation in supply chain management

BPN2123

Corporate Finance & Investment

Credit : 3

Prerequisites : None

Synopsis:

This course also emphasizes the application of financial tools and models that produce better decisions for the firm in short and long term. Asset selection, risk management, inventory management, credit and capital acquisition, and overall value enhancement are covered. Emphasis is put on the quantitative tools and the practices of existing corporations. Students will build both broad financial knowledge and specific understanding of corporate finance. Case studies will address both large and small organizations.

Course Outcomes:

- CO 1 Examine major financial concept applications and its analysis to business environment
- CO 2 Measure and relate investment tools to investment decision making
- CO 3 Appraise capital investment project and compare for project decision making

BPN3023

Operations Research

Credit : 3

Prerequisites : None

Synopsis:

This course introduces students to the application of quantitative methods and techniques for effective decision making in solving business problem. Various tools and theories to solve real-world problems through determining optimal solution subject to the constraints of time, labour, resources and business rules are included. The topics included are: Linear Programming, Multicriteria Decision Making, Non-Linear Programming, Queuing Theory and Simulation.

Course Outcomes:

- CO 1 Describe operation research concepts and techniques
- CO 2 Apply the operation research concepts and techniques in solving business problems
- CO 3 Analyze business problems and formulate operation research model to solve the problems

BPN3038

Industrial Training

Credit : 8

Prerequisites : None

Synopsis:

This course aims to give chances for students to practice and apply their knowledge and skills that they gain during their study. During the placement, we expect students to keep log book, in which they make a regular entries describing the work they are undertaking. Students are supervised by industrial and university supervisors to guide and ensure they can do their work as good as possible and achieve the objective for this course.

Course Outcomes:

- CO 1 Design an appropriate strategy to complete the given task.
- CO 2 Construct possible solution to a given real problem in the industry

- CO 3 Adapt working culture in related industries
- CO 4 Work effectively with others in organization to perform task given
- CO 5 Demonstrate good interpersonal skills and professional ethics in organization

BPN3044

Industrial Training -Report

Credit : 4

Prerequisites : None

Synopsis:

During the placement, we expect students to keep a log book, in which they make a regular entries describing the work they are undertaking. Then, the students need to provide industrial report to describe their technical and personal development during their placement. The industrial training report needs to be submitted to the university supervisor. Students need to do final presentation for assessment.

Course Outcomes:

- CO 1 Organize the Industrial training knowledge, experience and skill in the preparation of the industrial training report
- CO 2 Build effective communication skills in written and oral presentation
- CO 3 Practice the related approach to get relevant information from various sources
- CO 4 Demonstrate good discipline in reporting

BPN4013

Individual Study Project

Credit : 3

Prerequisites : None

Synopsis:

The individual study project focuses the student's attention on one single company or organization. The student can suggest the company and must then analyze it in a holistic manner taking into account at least the following dimensions: innovativeness (of products and processes), strategy, degree of implementation of lean philosophy, commercial position, corporate social responsibility, image / public relations.

The student must combine knowledge from various disciplines and must apply different research techniques in order to prepare a comprehensive, interdisciplinary and critical report on the selected company.

Course Outcomes:

- CO 1 Combine data and information from various sources into a structured analytical description of a company (analytical thinking)
- CO 2 Critically reflect information and put it into relation to other sources in order to develop a personal critical view point on a given company or organization (critical thinking)
- CO 3 Arrive at own suggestions for improving the position of the company analyzed (creative thinking)

BPN4026

Thesis

Credit : 6

Prerequisites : None

Synopsis:

The thesis should show that the student is able to independently work on a problem from the subject areas of the programme using academic methods. It should deal in a self-contained manner with a practical problem based on empirical data and/or theory. The problem should be systematically presented and developed and solutions proposed.

Course Outcomes:

- CO 1 Apply the principles of academic writing and empirical research to a defined topic
- CO 2 Organize him-/herself in an adequate way to achieve the planned output within given time and resource constraints
- CO 3 Critically reflect available theory as well as own achievements when working on a given research question

BPN4033

Cross-Module Seminar II

Credit : 3

Prerequisites : None

Synopsis:

The Cross Module Seminar II combines the topics of the student's Major Specialization classes in a complex, realistic application scenario (logistics/SCM and production, respectively). The application scenario is fictitious, but closely aligned to real-life situations. Students work in small teams and develop a solution that is both technically feasible and commercially viable. They have to prepare a written solution proposal that comprises both technical (drawings and layouts, process flows) and commercial aspects.

Course Outcomes:

- CO 1 Think, act and collaborate in an interdisciplinary way
- CO 2 Apply knowledge from various disciplines to develop a feasible solution proposal in their field of expertise
- CO 3 Develop critical thinking when assessing the suitability of theoretical concepts to practical problems

ELECTIVE COURSES

BPE4123

Supply Chain Control & Management Control Systems

Credit : 3

Prerequisites : None

Synopsis:

The course familiarizes students with the basic concepts and tools of management accounting and focuses on their use within in supply chains. Special emphasis is put on the particular problems of applying these tools and concepts in an inter-organizational setting.

Course Outcomes:

- CO 1 Describe the role of the concept of supply chain control and management control systems
- CO 2 Illustrate strategic framework for supply chain control and management control systems
- CO 3 Use analytical knowledge in problem solving situation of supply chain control

BPE4133

Advanced Project Management & Control

Credit : 3

Prerequisites : None

Synopsis:

This course provides a broader perspective of knowledge, skills, methods, and techniques of modern day project management. The application of advanced project management information system also aims to include the value of automated tool for planning, scheduling and controlling project. On completion of the course, students will have the core knowledge needed in project management and develop problem solving approach in managing triple constraint of time, cost, and quality in array of multidisciplinary industrial projects.

Course Outcomes:

- CO 1 Examine the fundamental theory and advanced concepts used in the current practices of project management.
- CO 2 Analyze standardized tools and techniques involved in effective delivery of projects.
- Co 3 Practice and utilize the project management information system to plan, execute and control broad range of projects.

BPE4143

Lean Management

Credit : 3

Prerequisites : None

Synopsis:

After getting the theoretical background of lean management, the students will apply the learned subject in exercises and business cases. At the end of the course, it is the task of the students to act as consultants and to provide a concept for a holistic supply chain optimization.

Course Outcomes:

- CO 1 Understand the strong interrelationship between the elements within a supply chain network, the Lean Philosophy and the Lean Enterprise Management strategy

- CO 2 Apply a large variety of tools and techniques to create lean value streams within manufacturing and administration
- CO 3 Understand how to manage the process of change towards a lean enterprise and which tools can be used to face resistance against change
- CO 4 Reflect to which extend their personal behavior, the style of communication and the way addressing people is a key factor for the success of a lean project

BPE4163

Technical Planning Case

Credit : 3

Prerequisites : None

Synopsis:

Students use their knowledge to plan a virtual logistics network based on real data in a virtual planning team which is active worldwide. They deal with: developing a logistics strategy, planning factory and warehouses, calculating profitability.

Course Outcomes:

- CO 1 Develop solutions for a complex logistics planning task
- CO 2 Work towards a target in virtual teams
- CO 3 Evaluate the potential and risks of using IT and communications technology of the digital factory
- CO 4 Deal with communications and social conflicts in virtual teams

BPE4153

Simulation Game

Credit : 3

Prerequisites : None

Synopsis:

By taking part in a simulation model students have the opportunity to use teamwork to develop alternative strategies and to test and implement them in the context of a company operating worldwide. The companies are managed by students and have their headquarters in Europe and sell various consumer goods in 4 world markets

Course Outcomes:

- CO 1 Evaluate the activities of a company in a holistic manner
- CO 2 Link together the contents of different disciplines learnt in their studies
- CO 3 Recognise and map out the framework conditions for business success
- CO 4 Deal with situations involving complex decisions

BPE4213

Intra Logistics

Credit : 3

Prerequisites : None

Synopsis:

This course will cover tools and techniques used in the industrial logistics operations. It focuses on logistics system which includes inventory management, transportation and shipping, material management, warehousing, logistics information technology framework, international logistics and logistics system control.

BPE4223

Distribution Logistics

Credit : 3

Prerequisites : None

Synopsis:

The focal point of distribution logistics is the shipment of goods from the manufacturer to the consumer. It comprises all activities related to the provision of finished products and merchandise to a customer. It also involves many different parties along the chain such as distributor, warehouse, retailer etc.

Course Outcomes:

- CO1 Appreciate logistics importance to modern business
- CO2 Explain strategic framework for logistics decisions which involves planning, designing and operating processes
- CO3 Apply technical knowledge in problem solving situation in logistics distribution

BPE4233

International Transport Logistics

Credit : 3

Prerequisites : None

Synopsis:

This course will cover tools and techniques used in the industrial logistics operations. It focuses on logistics system which includes inventory management, transportation and shipping, material management, warehousing, logistics information technology framework, international logistics and logistics system control.

Course Outcomes:

- CO 1 Explain the international logistics strategies and global supply chain
- CO 2 Analyze global freight transportation and management
- CO 3 Solve international logistics problems using appropriate operation management technique

BPE4243

Warehouse & Inventory Planning

Credit : 3

Prerequisites : None

Synopsis:

The subject is intended to introduce the role of warehouse and logistics planning.

Course Outcomes:

- CO 1 Describe the role of warehousing
- Co 2 Explain strategic framework for logistics decisions which involves planning, designing and operating processes.
- CO 3 Apply analytical knowledge in problem solving situation of logistics management

BPE4112

Innovation & Technology Management

Credit : 2

Prerequisites : None

Synopsis:

This subject is intended to give an understanding on the concept of technology management and its application to an

organization particularly business firm. The topics to be covered are : Introduction to Management of Technology, The Role of Technology in the Creation of Wealth, Critical Factors in Managing Technology, Technology Life Cycles, The Process of Technological Innovation, Business Strategy and Technology Strategy, Competitiveness, Technology Planning and Technology Transfer.

Course Outcomes:

- CO 1 Recognise the general principles, terms, definitions, technical tools used in the management of technology
- CO 2 Analyze the role of technology policies, strategies and management within and between organizations in the development, operation and marketing of goods and/or services
- CO 3 Apply decision making techniques in the management of technology to address problems in the range of sectors

BPE4122

HR Management

Credit : 2

Prerequisites : None

Synopsis:

This course provides an overview of many issues related to managing human capital in organisation. Topics are designed to gain an understanding of how individuals in organisation grow and progress in their organisation, and what are the formal dimensions that impinge upon employees and employers, and their relationship to planning, mobility, goal-achievement, motivation and performance.

Course Outcomes:

- CO 1 Understand key principles underlying effective job analysis, recruitment, selection, training & development, appraisal, compensation, incentive rewards and employment law issues
- CO 2 Develop problem-solving skills by applying different approaches relevant to managing human capital
- CO 3 Acquire abilities of analyzing and examining the effects of human resource policies, strategies and management

on employees' and organization's performance in reality

BPE4132

International Business Environment

Credit : 2

Prerequisites : None

Synopsis:

This course aims to expose students to the macro-environment issues that contribute to the formation of international business. Students will develop the ability to evaluate the key issues that will impact the success or failure of an international business venture.

Course Outcomes:

- CO 1 Examine countries differences, economics and politics of international trade and investment and global monetary system arising in the international business environment
- CO 2 Analyse the challenges, opportunities and threats of going global
- CO 3 Produce a feasibility report for entering into a foreign market

BPE4212

Database Systems

Credit : 2

Prerequisites : None

Synopsis:

This course covers fundamentals of database architecture, database management systems, and database systems. Students learns how database management systems can support business processes and are made familiar with the fundamental concepts of data mining / data retrieval. They apply the concepts in a realistic enterprise scenario (capstone project).

Course Outcomes:

- CO 1 Examine user needs and process requirements in order to develop a suitable enterprise data model
- CO 2 Apply modern data query languages
- CO 3 Integrate basic data mining tools for example business scenarios

BPE4222
Sustainability/Energy Efficiency
Credit : 2
Prerequisites : None

Synopsis:

This subject is designed to introduce to the students the importance of energy in peoples' life and in national as well as global economic development. Student will be exposed to the different types of fossil energy supply; supply and consumption trends both at global as well as national level; as well as energy consumption in residential, commercial and industrial sectors. The course also includes discussions on the impacts of energy use on the environment and the growing need for new and renewable energy technologies.

Course Outcomes:

- CO 1 Recognize the importance of energy to human life and to economic development; energy supply and consumption trends; and how escalating energy costs will disrupt national as well as global economy.
- CO 2 Demonstrate the understanding of the national energy mix; energy use in domestic, commercial and industrial sectors; the importance of energy efficiency and conservation programmes; introduction of energy audits.
- CO 3 Relate the impact of escalating energy costs to national and global economy; and impact of energy production-to-consumption chain towards local and global environment
- CO 4 Identify the impact of the current unsustainable use of energy to future world energy scenario; and importance of developing alternative energy technologies to supplement fossil-fuel based technologies.

BPE4232
Power Management (Electrical Grid)
Credit : 2
Prerequisites : None

Synopsis:

This course introduces the emerging concepts, technologies, applications, management and the energy systems related to electrical grid and power transmission. It also covers a Smart Grid system which is more climate and consumer friendly for future sustainable energy usage.

Course Outcomes:

- CO 1 Apply the basic concept of electrical grid
- CO 2 Explain the architecture of smart grid systems and the relations among the stakeholders
- CO 3 Design a future grid system for sustainable energy usage

BPE4313
Production Accounting & Control
Credit : 3
Prerequisites : None

Synopsis:

The Module familiarizes students with the basic concepts and tools of management accounting and focuses on their use at the shop floor level of manufacturing enterprises and the manufacturing environment in general. Special emphasis is put on shop floor performance management and manufacturing cost management.

Course Outcomes:

- CO 1 Critically reflect and apply the main tools of management accounting in simplified real-life settings.
- CO 2 Analyze the particular problems arising when management accounting & control is performed at the shop floor.
- CO 3 Develop a suggestion for a management accounting & control system in a particular manufacturing setting.

BPE4413

Production Planning & Methods

Credit : 3

Prerequisites : None

Synopsis:

The subject covers planning and controlling of production in production and operation management; concepts of JIT, MRP, MRP II, ERP, production system design, analytical techniques and concepts of production and process control in industrial management.

Course Outcomes:

- CO 1 Discover production planning and control approach applied in industry.
- CO 2 Display appropriate production planning and control methods in solving the industrial problems.
- CO 3 Demonstrate relevant industrial production planning information and data from records, database or operation processes.

BPE4423

Technical Application and Machines

Credit : 3

Prerequisites : None

Synopsis:

Introduction to the techniques, and equipments of Industrial manufacturing. Emphasis on technical application such as machining, welding, casting, and forming operations.

Course Outcomes:

- CO 1 Understanding the basic concepts of industrial processes
- CO 2 Introduction to and analysis of common processing techniques
- CO 3 Develop the capability to make scientific decision involving industrial processes

BPE4433

Materials Science

Credit : 3

Prerequisites : None

Synopsis:

The purpose of this course is to provide a general background of the field of material science and engineering. Fundamental topics such as chemical bonding in materials, crystal structure and defects, diffusion and phase diagram will be introduced. Then mechanical properties of materials will be covered and information of types of material and their applications be provided.

Course Outcomes:

- CO 1 Introduce the fundamentals of chemistry of engineered materials
- CO 2 Expand the understanding of the classes of materials
- CO 3 Develop the capability to make scientific decision involving material selection and processing

BPE4443

Product Engineering

Credit : 3

Prerequisites : None

Synopsis:

Maintaining the competitiveness of companies requires going into foreign markets and being differentiated from the competition by something more than simply differences in costs. In this context, being capable of introducing new products into the market at high quality levels, constitutes the best strategy. This course helps the students to understand the strategic and operational aspects that a company has to command in order to have an efficient and effective development process for new products.

Course Outcomes:

- CO 1 Understanding the strategic and operational aspects of the process of product development.
- CO 2 Having knowledge of the most advanced tools and practicing on it.
- CO 3 Attain a balance between theory and practical.

BPE4453

Electrical Drives

Credit : 3

Prerequisites : None

Synopsis:

Electric motors are extensively used in many stages of industrial processes. Since 70% of global electricity generation is consumed by electric motors, it is essential to design efficient electric drives to increase system reliability and to lower operational costs in a plant. Substantial energy savings can be obtained by employing advanced control and semiconductor power converter technologies combined with a suitable selection of electric motor type and rating. This course is intended primarily to provide a fundamental knowledge of modeling, analysis and integration of mechanical and electrical components and to introduce various aspects of design and control techniques in electrical drive applications, such as manufacturing lines, electric transportation, air-conditioning and ventilating, crane and hoist applications, etc. The energy systems related to electrical grid and power transmission. It also covers a Smart Grid system which is more climate and consumer friendly for future sustainable energy usage.

Course Outcomes:

- CO 1 To demonstrate knowledge of classical electric machines
- CO 2 To analyze equivalent circuit representatives for modelling the drive characteristics
- CO 3 To integrate principal methods of control in variable-speed drive systems

ELECTIVE COURSES

Elective (28 Credits)

Elective (Business) I, II, IV, V, VI Choose five (15 credits)

- BPE4123 Supply Chain Control & Management Control Systems
- BPE4133 Advanced Project Management & Control
- BPE4143 Lean Management

- BPE4153 Simulation Game
- BPE4163 Technical Planning Case
- BPE4313 Production Accounting & Control

Elective (Business) III

Choose one (2 credits)

- BPE4112 Innovation & Technology Management
- BPE4122 HR Management
- BPE4132 International Business Environment

Elective (Engineering) I, II, IV

Choose three (9 credits)

- BPE4213 Intra-Logistics
- BPE4223 Distribution Logistics
- BPE4233 International Transport Logistics
- BPE4243 Warehouse & Inventory Planning
- BPE4413 Production Planning & Methods
- BPE4423 Technical Applications & Machines
- BPE4433 Materials Science
- BPE4443 Product Engineering
- BPE4453 Electrical Drives

Elective (Engineering) III

Choose one (2 credits)

- BPE4212 Database Systems
- BPE4222 Sustainability/Energy Efficiency
- BPE4232 Power Management (Electrical Grids)

**CENTRE FOR MODERN
LANGUAGES AND HUMAN
SCIENCES (CMLHS)**





CENTRE FOR MODERN LANGUAGES AND HUMAN SCIENCES (CMLHS)

INTRODUCTION

The Centre for Modern Languages and Human Sciences (CMLHS) was established to complement the development of students' technical and engineering knowledge; as knowledge and skills in engineering alone is insufficient to produce competitive graduates. The centre is consists of four departments, which are the Human Sciences Department, the English Language Department, Foreign Language Department and Soft Skills Department. Apart from providing university core subjects, CMLHS also offers courses to develop students' and staff's competencies such as MUET, IELTS and study skills workshops. CMLHS also provides external trainings to multinational organizations and among our clientele are BASF Petronas, AMM Pekan and Pahang State Secretary Office.

VISION

We aspire to be a centre of excellence in contributing to academic achievements, human development and nation building.

MISSION

To achieve our vision, we conduct outstanding academic programmes, training and research in nurturing lifelong learners who uphold universal values. The expertise of our associates and the use of advanced technology are integral towards realizing our aspiration.

OBJECTIVES

- To develop academic programmes in human sciences which contribute to producing competitive graduates
- To be a Centre of Excellence in research, consultancy and training in the region and in the global arena

ADDRESS

Centre for Modern Languages & Human Sciences
Universiti Malaysia Pahang
26600 Pekan
Pahang
Tel : 09-4246800
Faks :09-4246888
Web : cmlhs@ump.edu.my



COURSES OFFERED

The courses offered by CMLHS include:

- Courses offered by English Language Department
- Courses offered by Human Sciences Department
- Courses offered by Foreign Language Department
- Courses offered by Soft Skills Department
- Elective courses

English Language Courses

Diploma (3 levels) – 2 credit hours

UHL1412 Foundation English
 UHL1422 English for Academic Skills
 UHL1432 English for Occupational Communication

Degree (4 levels) – 2 credit hours

UHL2400 Fundamentals of English Language
 UHL2412 English for Academic Communication
 UHL2422 English for Technical Communication
 UHL2432 English for Professional Communication

Human Sciences Courses

Degree and Diploma – 2 credit hours

UHR1012 Islamic & Asian Civilisations 1
 UHM2022 Ethnic Relations

Soft Skills Courses

Degree and Diploma – 1 credit hour

UHS1021 Soft Skills 1
 UHS2021 Soft Skills 2

Foreign Language Courses

Degree

* Degree students are to select one language only and take two levels of foreign language courses.

Beginners Level – 1 credit hour

UHF1111 Mandarin for Beginners

UHF1121 German for Beginners
 UHF1131 Japanese for Beginners
 UHF1141 Arabic for Beginners
 UHF1151 Spanish for Beginners
 UHF1161 Malay for Beginners
 UHF1271 Turkish 1

Intermediate Level – 1 credit hour

UHF2111 Mandarin for Intermediate
 UHF2121 German for Intermediate
 UHF2131 Japanese for Intermediate
 UHF2141 Arabic for Intermediate
 UHF2151 Spanish for Intermediate
 UHF2161 Malay for Intermediate
 UHF2271 Turkish 2

Elective Courses

UHE3012 Contemporary Leadership in Community
 UHE3022 Critical Thinking Through Literature
 UHE3032 Introduction to Human Behaviour
 UHE3042 Organizational Counseling
 UHE3062 Malaysia: The Impact of Globalization
 UHE3072 Technology for Human Capital Development
 UHE3082 Creative Writing
 UHE3092 English Mechanics
 UHE3122 Islamic Institutions
 UHE3132 Public Speaking
 UHE3142 Project Based Proposal Writing
 UHE3152 Interpersonal Effectiveness
 UHE3162 Family System in Islam
 UHE3172 English for Science and Technology (EST) –UC Davis
 UHE3182 Malaysian Studies
 UHE3192 Fundamental Ibadah in Islam
 UHE3202 Introduction to Halal Studies
 UHE3212 Global Competencies
 UHE3222 Al Quran Memorization 1
 UHE3232 Al Quran Memorization 2

Other courses

UHG1002 Deutsch 1
 UHG1012 Deutsch 2
 UHG2002 Deutsch 3
 UHG2012 Deutsch 4
 UHG1003 German 1
 UHG1013 German 2
 UHG1016 Intensive German 1
 UHG2003 German 3
 UHG2013 German 4
 UHG2016 Intensive German 2

COURSE SYNOPSIS

MODERN LANGUAGES DEPARTMENT

Diploma

Course code : UHL1412

Course: FOUNDATION ENGLISH

Pre-requisite : None

Synopsis

The course focuses on preparing students for Malaysian University English Test (MUET). It covers the four major aspects of language learning which are listening, speaking, reading and writing. To enhance all the four components, students will be taught appropriate skills and strategies in answering MUET practices as well as familiarizing students with past-year questions. Also, they will be exposed to listening for information from different sources, participating in discussions, reading various types of texts and composing essays.

Course outcomes

CO 1 Transfer information from various listening texts using accurate

language and relevant content.

CO 2 Present relevant ideas using accurate language, relevant

content and appropriate discussion strategies.

CO 3 Apply reading skills to comprehend various texts.

CO 4 Write a summary of non-linear texts using accurate language,

relevant content.

CO 5 Demonstrate teamworking skills in group activities.

References

1. Choo, W. Y., Yeoh, W. T., Nyanaprakasan, S., & Yee, S. F. (2017). *Ace ahead MUET (9th ed.)*. Oxford Fajar Sdn. Bhd.
2. Choo, W. Y., Yeoh, W. T., & Yee, S. F. (2016). *MUET writing practice (2nd ed.)*. Oxford Fajar Sdn. Bhd.
3. Harbans Kaur & Jones, F. (2011). *Effective practice MUET. (10th ed.)*. Oxford Fajar Sdn. Bhd.

Course code : UHL1422

Course : ENGLISH FOR ACADEMIC SKILLS

Pre-requisite : UHL1412 Foundation English

Synopsis

This course primarily aims to help students improve communicative performance in academic settings. This is achieved by involving essential language skills including dictionary skills and grammar practices. Students are exposed to the principles of verbal and written communications for academic purposes namely presentation skills and academic writing. They are also introduced to effective listening, note-taking and note making strategies, which are aimed to help them cope with the learning environment. The use of related online materials are incorporated in the subject to include the element of technology in language learning.

Course outcomes

CO 1 Transfer information from general listening and reading texts to

non-linear forms using accurate language.

CO 2 produce appropriate and relevant content in written and spoken

communication.

CO 3 apply appropriate and accurate language in written and spoken

communication.

CO 4 apply reading comprehension strategies to extract information

from reading texts.

CO5 demonstrate appropriate and effective delivery styles in spoken

communication.

References

1. Brooks, M. (2015). *Q:Skills for Success: Listening & Speaking (2nd ed.)*. Oxford.
2. Craven, M. & Sherman, K. D. (2015). *Q:Skills for Success: Listening & Speaking (2nd ed.)*. Oxford
3. Long, E. C. (2009). *Resources for Writers with Readings: from Meyers, A. (2005). Gateaways to Academic Writing*. Longman.
4. Savage, A. & Mayer, P. (2012). *Effective Academic Writing (2nd ed.)*. Oxford.

Course code : UHL1432

Course : ENGLISH FOR OCCUPATIONAL COMMUNICATION

Pre-requisite: UHL1422 English for Academic Skills

Synopsis

This course primarily aims to equip students with the basic principles of communication at the workplace. Students will be exposed to the principles of writing and reading pre-formatted job application documents. Review on practical aspects of oral presentation skills will also be conducted. Students will experience job application process by writing cover letter, resume, recording video resume and attending mock job interview. In addition, students will work on a group project.

Course outcomes

- CO1 Apply appropriate and accurate language in written and/or spoken communication.
- CO2 Use appropriate and accurate content in written and/or spoken communication.
- CO3 Demonstrate effective delivery strategies in spoken communication.

References

1. Dwyer, J. (2015). The Business Communication Handbook. Cengage Learning Australia.
2. George, J. S. (2006). Workplace Communications: The Basics. Pearson Education Inc.
3. Gerson, S. J. & Gerson, S. M. (2006). Workplace communication process and product. Pearson Prentice Hall.
4. Guffey, M. E. & Seefer, C. M. (2007). Business English. Thomson South-Western.
5. Sharma, R. C. & Mohan, K. (2010). Business Correspondence and Report Writing. McGraw Hill Education Pvt. Ltd.
6. Smith-Worthington, S. & Jefferson, S. (2010). Technical Writing for Success South-Western Education.

Degree

Course code : UHL2400
Course : FUNDAMENTALS OF ENGLISH LANGUAGE

Pre-requisite : None

Synopsis

The course is designed to develop skills in using English language effectively. The four language skills; listening, speaking, reading and writing are integrated to strengthen students basic comprehension, vocabulary and grammar skills. This course also emphasizes on improving reading and writing by applying effective strategies which include elements of contextual grammar, active vocabulary building, sentence and paragraph writing. These are

fundamentals in providing essential English language skills that are needed in academic environment.

Course Outcomes

- CO 1 Demonstrate the correct use of grammar form in specific contexts.
- CO 2 Apply reading skills and strategies to comprehend various texts.
- CO 3 Apply different types of sentence patterns, and appropriate grammar forms in writing tasks.
- CO 4 Demonstrate presentation skills and appropriate delivery strategies in groups.
- CO5 Use effective and appropriate content in oral presentation.

References

1. Cole, V. (2012). IELTS introduction: Study skills pack. Macmillan.
2. Collins, P. & Hollo, C. (2010). English grammar: An introduction. Palgrave Macmillan.
3. Firmstern, R. (2008). Grammar Connection 2. Thomson Heinle.
4. Lindeck, J. (2011). Focusing on IELTS: Reading and writing skills. Macmillan Education.
5. Misrah Hamisah Mohammed. (2015). English is easy. Kuala Terengganu: Penerbit UniSZA.
6. Soars, L. & Soars, J. (2015). Academic skills: Reading, writing, and study skills. Oxford University Press.
7. Yule, G. (2008). Oxford practice: Grammar. Oxford University Press.

Course code : UHL2412
Course : ENGLISH FOR ACADEMIC COMMUNICATION

Pre-requisite : UHL 2400 Fundamentals Of English Language

Synopsis

The course aims to equip students with the four language skills (i.e listening, reading, speaking and writing) and study skills for academic success. The course requires students to read various texts of general topics by incorporating essential reading skills. Study skills such as note-taking and notemaking techniques, and active listening skills are also emphasised. Students will be exposed to thesis-support essays and writing styles and organisation appropriate for their level. Additionally, students will be exposed to presentation skills and e-learning platform will also be introduced as part of the course.

Course Outcomes

CO 1 Analyse specific information from various audio visual texts.

CO 2 Apply reading skills to extract and transfer specific information from general texts.

CO 3 Evaluate information to present clear and detailed descriptions on a wide range of subjects.

CO 4 Apply appropriate and accurate language in written and/or spoken discourse.

CO5 Demonstrate effective presentation skills using appropriate non-verbal cues.

References

1. Asiah Kassim et al. (2013). English for Academic Communication UHL2412. CMLHS UMP
2. Dale, P. & Wolf, J.C. (2006). Speech Communication Made Simple. New York: Pearson Longman.
3. Hafizoah Kassim, Noor Raha Mohd Radzuan, Zuraina Ali, Zarina Mohd Ali. (2014). No Plagiarism!. Kuantan: Penerbit UMP.
4. Savage, A. Shafei, M et al. (2012). Effective Academic Writing. Oxford: Oxford University Press.

Course Code : UHL2422

Course : ENGLISH FOR TECHNICAL COMMUNICATION

Pre-requisite : UHL2412 English for Academic Communication

Synopsis

The course is designed for technical communication relevant to academic and professional purposes. It provides opportunities for students to learn and employ language skills and strategies appropriate to written and spoken technical communication for professional audiences. In the course, students are required to listen to, evaluate,organize, present and write technical information.

The contents of this course consist of, but not limited to, technical descriptions, technical processes and procedures feasibility and recommendation reports. Additionally, students have the advantage to collaborate in teams while performing activities assigned to them. Students are encouraged to benefit in language learning when they engage in self-access activities.

Course Outcomes

CO1 Determine salient information from listening tasks related to

technical communication.

CO2 Demonstrate presentation skills using appropriate delivery strategies.

CO3 Transfer salient information from technical reading materials and documents into appropriate format.

CO4 Apply appropriate and accurate language in written and/or spoken discourse.

References

1. Anderson, P. V., & Surman, K. (2007). Technical communication: A reader-centered approach. Toronto: Thompson Canada.
2. Collier, J. H., & Toomey, D. M. (2013). Scientific and technical communication: Theory, practice and policy (Digital Edition). Retrieved from <http://www.collier.sts.vt.edu/stc/>
3. Gurak, L., & Hocks, M. (2009). The technical communication handbook. New York: Pearson Longman.
4. Lannon, J. M. (2006). Technical communication (10th ed.). New York: Pearson Longman.
5. Nation, I. S. P. (2009). Teaching ESL/EFL reading and writing. New York: Routledge.
6. Willis, D., & Willis, J. (2007). Doing task-based teaching. Oxford: Oxford University Press.

Course code : UHL2432

Course : ENGLISH FOR PROFESSIONAL COMMUNICATION

Pre-requisite : UHL2422 English For Technical Communication

Synopsis

The course is designed to develop students spoken and written communication skills effectively. This is vital in helping them to enter the job market and preparing them for workplace. Students will enhance their language skills via learning activities that incorporate communication strategies, interactions and feedback. The learning activities include, but not limited to, carrying out presentations, attending mock-job interviews and conducting meetings.

Course Outcomes

CO 1 Apply appropriate and accurate language in written and / or spoken communication.

CO 2 Deliver relevant information in written and/ or spoken

communication.

CO 3 Demonstrate effective delivery skills in presenting information.

References

1. Barnard, R., & Meehan, A. (2005). *Communicating in Business English*. New York: Oxford University Press.
2. Bovee, C., & Thill, J. (2010). *Business Communication Essentials (4thed.)* NJ: Pearson Education.
3. Corfield, R. (2009). *Preparing the Perfect Job Application: Application Forms and Letters Made Easy (5th ed.)*. London: Kogan Page.
4. Dignen, B. (2003). *Communicating in Business English*. New York: Compass Publishing Inc.
5. Kalpana, S., Noreha, T. , Bhajan Kaur, S.S., & Rajendra, S. (2006). *A practical Guide to Business Meetings*. Shah Alam: Mc Graw Hill.
6. Kolin, P. C. (2012). *Successful Writing at Work (10th ed.)*. Boston: Cengage Learning.
7. Renganathan, S., Abu Bakar, Z. et.al. (2011). *Introducing Professional Communication Skills for Undergraduates*. Shah Alam: Oxford Fajar Sdn Bhd.
8. Taylor, S. (2012). *Model business letters, emails and other business documents (7th ed.)*. UK: Pearson Education Ltd.

HUMAN SCIENCES DEPARTMENT

Degree and Diploma

Course code : UHR1012

Course : ISLAMIC & ASIAN CIVILIZATION 1

Pre-requisite: none

Synopsis

This course is designed to equip students with a deeper understanding about Islamic and Asian civilizations particularly those civilizations which have formed the foundation of Malaysia, i.e. Malay, Indian and Chinese civilizations. The course discusses vast aspects of civilization building; including its civilizations. In addition, some contemporary civilization issues particularly the domination of Western civilization, are also being discussed. In general, the philosophy of the course is to develop students to be individuals who have positive values in multi-racial world nowadays.

Course Outcomes

- CO 1 Identify civilization values in the formation of the Malaysian society value system.
- CO 2 Demonstrate social communication ability in the diversity of cultural landscapes.
- CO 3 Relate civilization elements to current social issues.

References

1. Ahmad Irfan Ikmal Hisham, et.al (2014). *Module for Study of Civilization*. Kuantan, Pahang: Penerbit Universiti Malaysia Pahang.
2. Osman Bakar, et.al. (2009). *Modul Pengajian Tamadun Islam dan Tamadun Asia*. Kuala Lumpur: Penerbit Universiti Malaya & Kementerian Pengajian Tinggi.
3. Asar Abdul Karim. (2008). *Kecemerlangan Tamadun Islam Masa Kini*. Kuantan, Pahang: Penerbit Universiti Malaysia Pahang
4. Azhar Hj. Mad Aros, et.al. (2001). *Tamadun Islam dan Tamadun Asia (TITAS), Kertas 2*. Selangor: Penerbit Fajar Bakti.
5. Munawar Haque, Kabuye Uthman Sulaiman, Bachir Soulihi & Syamsuddin Arif. (2009). *Islam, Knowledge and Civilization*. 1st ed. Kuala Lumpur: International Islamic University Malaysia Press, IIUM.

Course code : UHM2022

Course : ETHNIC RELATIONS

Pre-requisite : none

Synopsis

Kursus ini membincangkan konsep asas, latar belakang dan realiti sosial masa kini hubungan etnik di Malaysia dari perspektif kesepaduan sosial. Tujuan kursus ini ialah memberi kesedaran dan penghayatan dalam mengurus kepelbagaian ke arah penguatkuhan negara bangsa. Pengajaran dan pembelajaran akan dilaksanakan dalam bentuk pembelajaran berasaskan pengalaman melalui aktiviti individu, berpasukan dan semangat kesukarelaan. Di akhir kursus ini, pelajar diharapkan dapat mengamalkan nilai-nilai murni, mempunyai jati diri kebangsaan dan menerima kepelbagaian sosio-budaya etnik-etnik di Malaysia.

Course Outcomes

- CO 1 Membincang isu dan cabaran dalam konteks hubungan etnik di Malaysia.
- CO 2 Menilai kepentingan jati diri kebangsaan dan kesukarelaan ke arah mewujudkan warganegara yang bertanggungjawab.

CO 3 membina hubungan dan interaksi sosial pelbagai etnik.

References

1. Shamsul Amri Baharuddin, Modul Hubungan Etnik, Edisi Kedua, Institut Kajian Etnik, Universiti Kebangsaan Malaysia, Bangi 2012.
2. Abdul Aziz Bari. (2000). Perlembagaan Malaysia: Asas-asas dan Masalah. Kuala Lumpur: Dewan Bahasa & Pustaka
3. Shamsul Amri Baharuddin. (2008). Many ethnicities, many cultures, one nation: The Malaysian experience. UKM Ethnic Studies Papers. Bangi, Selangor: Institut Kajian Etnik (KITA), Universiti Kebangsaan Malaysia
4. Lim Teck Ghee, Alberto Gomes & Azly Rahman (eds). (2009). Multiethnic Malaysia: Past, Present and Future. Selangor and Kuala Lumpur: Strategic Information and Research Development Centre (SIRD) & MiDAS@UCSI University.
5. Jomo, K.S. (1998). Pembangunan Ekonomi dan Kelas Sosial di Semenanjung Malaysia. Kuala Lumpur: Dewan Bahasa & Pustaka.

SOFT SKILLS DEPARTMENT

SOFT SKILLS

Course code : UHS1021

Course : SOFT SKILLS 1

Pre-requisite: none

Synopsis

This course exposes students to Soft Skills which are non-job specific skills that can be used in different occupations. This module aims at creating the sense of awareness and responsibilities as UMP students in nurturing well-rounded personalities. This could be developed through the seven elements which are leadership, teamwork, communication, critical thinking and problem solving, life-long learning entrepreneurship and ethics and moral skills. Students could develop these skills through course work, internship, voluntary jobs and life experiences. Hence, allowing students to enhance their marketability nationally.

Course Outcomes

- CO 1 Identify Soft Skills elements.
- CO 2 Analyse issues related to Soft Skills.
- CO 3 Apply Soft Skills element in selected activities.

References

1. Fatmawati, L., Norrihan, S., Muhammad Nubli, A.W., Mansor, S., Mohd Azam, M.A. (2005). Moulding Soft Skills Modules for KUKTEM. Unpublished Research.
2. Herta A. Murphy and Herbert W. Hildebrandt (1991). Effective Business Communications. Mc Graw Hill
3. Larson, LaFasto. (1989). Teamwork: What Must Go Right, What Can Go Wrong. Sage Publications
4. (2008). Modul Pembangunan Kemahiran Insaniah (Soft Skills) untuk Institusi Pengajian Tinggi Malaysia. Penerbit: UPM: Serdang.
5. (2005). Panduan Program Soft Skills untuk Pelajar. Penerbit KUKTEM: Kuantan
6. (2005). *Panduan Program Soft Skills untuk Pensyarah*. Penerbit KUKTEM: Kuantan
7. Mohd Janib, J. (2001). Etika Professional. Cetakan Pertama, Universiti Teknologi Malaysia, Johor

Course code : UHS2021

Course : SOFT SKILLS 2

Pre-requisite: UHS1021 Soft Skills 1

Synopsis

This course is the extension of Soft Skills 1 (UHS1021). It focuses on the dynamic and integrated approach required by the industry through critical thinking and problem solving, ethic and moral for professional, communications skills and project closure. In the end, students will be more competent, competitive and prepare to venture the workplace challenges.

Course Outcomes

- CO 1 Display the ability to work as a team to deal with challenges.
- CO 2 Demonstrate Soft Skills elements through practical activities.
- CO 3 Analyze Soft Skills issues at workplace.

References

1. Blyth C. (1997). Great Jobs for Art Majors. VGM Career Horizons: Chicago
2. Nelson B. R. (1996). What Color is Your Parachute? Ten speed Press: Berkeley, CA.
3. (2005). Panduan Program Soft Skills untuk Pelajar. Penerbit KUKTEM: Kuantan
4. (2005). Panduan Program Soft Skills untuk Pensyarah. Penerbit KUKTEM: Kuantan
5. (2008). Modul Pembangunan Kemahiran Insaniah (Soft Skills) untuk Institusi Pengajian Tinggi Malaysia. Penerbit: UPM: Serdang.

FOREIGN LANGUAGES DEPARTMENT

Degree (students are to select one language only & enrol in two levels)

Beginners Level

Course code : UHF1111

Course: MANDARIN FOR BEGINNERS

Pre-requisite: none

Synopsis

The course aims to enable students to speak simple Mandarin in their daily life. The students will learn the Chinese Phonetics (Hanyu Pinyin System) and about 150 vocabulary suggested based on Chinese Proficiency Test (Hanyu Shuiping Kaoshi HSK) Level One. Students will be exposed to simple phrases and basic sentence structures. Classroom activities will include listening, speaking, reading and writing. Practices that based on HSK Level One grammar pointed is also introduced. The students will be evaluated based on four language skills-listening, speaking, reading and writing.

Course Outcomes

- CO 1 Distinguish the pronunciation of Chinese syllables, words, phrases and sentences.
- CO 2 Express Chinese sentences according to the given topics.
- CO 3 Identify the usage of Chinese vocabulary, phrases and sentences.
- CO 4 Rephrase phrases and basic sentences in Hanyu Pinyin.

References

1. Chong Ah Kow (2007), Mandarin For Beginners, UMP, Pahang, Malaysia
2. Liu Xun (2004), New Practical Chinese Reader. University of Languages, Beijing, China
3. Ang Lay Hoon & Ooi Bee Lee (2004), Basic Chinese For Everyone. Pelanduk Publication, Kuala Lumpur
4. <http://www.chinese-tools.com>
5. <http://www.zapchinese.com>

Course code : UHF1121

Course : GERMAN FOR BEGINNERS

Pre-requisite : none

Synopsis

This course is designed to give students an exposure to German language and culture as similar in German-

speaking countries. The course covers the basic language skills of listening, reading, speaking and writing. Lessons are composed of individual and group work, role-play and simulation.

Course Outcomes

- CO 1 Produce paragraph of 10-12 sentences with topic sentence.
- CO 2 Responds to simple sentence or simple paragraph.
- CO 3 Extract information from media, audio, dialogue and video clips given.
- CO 4 Responds and paraphrases readings in short essay length Answer.

References

1. Daniela Niebisch, Sylvette Penning-Hiemstra, Franz Specht, Monika Bovermann and Monika Reimann, **Schritte international 1 (Kursbuch + Arbeitsbuch)** (2013), Hueber Verlag, Ismaning, Germany. ISBN 978-3-19-001851-2
2. Yanti Salina Shaari, **Deutsch für Anfänger - German for Beginners** (2012), Penerbit UMP, Kuantan, Pahang. ISBN 978-967-0120-52-2.
3. Monika Reimann, **Grundstufen-Grammatik für Deutsch als Fremdsprache : Erklärungen und Übungen** (2010), Hueber Verlag, Ismaning, Germany. ISBN 978-3-19-161575-8

Course code : UHF1131

Course : JAPANESE FOR BEGINNERS

Pre-requisite: none

Synopsis

As the main aim of this course is basic communicative competence, learning in the classroom will be based on language tasks which students are likely to perform in real life, either in their native country or in Japan. Students will be equipped with basic communicative competence in the aspects of self-development, knowledge acquisition and social interaction.

Course Outcomes

- CO 1 Recognise Japanese syllables and pronounce accordingly.
- CO 2 Communication in simple sentences.
- CO 3 Read selected short texts.
- CO 4 Write simple sentences with words given.

References

1. Mohd Iszuani bin Mohd Hassan, (2008). KihonTeki Na Nihongo 1: UMP
2. Shin Nihongo No Kiso, (1977). Japanese Kana Workbook. The Association For Overseas Technical Scholarship (AOTS)
3. Shin Nihongo Kiso 1, (1990). English Translation, The Association For Overseas Technical Scholarship (AOTS)
4. www.learn-hiragana-katakana.com
5. genkijapan.net

Course code : UHF1141

Course : ARABIC FOR BEGINNERS

Pre-requisite: none

Synopsis

This course focuses on basic Arabic communicative skills. Learning in the classroom will be based on language tasks that students can use in their real life include greeting, introducing oneself, reporting time and etc. Students will be equipped with basic Arabic communicative skills such as speaking and listening and will also learn how to write simple sentences in Arabic.

Course Outcomes

- CO 1 Identify Arabic syllables, words and phrases.
- CO 2 Describe in basic Arabic sentences or phrases.
- CO 3 Read selected short texts.
- CO 4 Construct basic sentences with words given.

References

1. Mardhiyyah Zamani,Rosjuliana Hidayu Rosli,Mohammad Baihaqi bin Hasni. Arabic for Beginners. ,Penerbitan UMP, Kuantan, Pahang, 2012
2. Bahasa Arab untuk Semua, Asar Abdul Karim, Penerbitan UMP, Kuantan, Pahang, 2008

Course code: UHF1151

Course : SPANISH FOR BEGINNERS

Pre-requisite : none

Synopsis

The main aim of this subject is to introduce students to the Spanish language. Students will learn Spanish alphabets and basic sentence structures. They are expected to be able to speak simple Spanish in selected situation and also read and write in Spanish.

Classroom activities will include listening and speaking skill practices, reading and also writing skill are given to enhance the oral skills. Practice on certain basic grammar is also introduced. The students will be evaluated on all four language skills-listening, speaking, reading and writing.

Course Outcomes

- CO 1 Match the Spanish syllables to correct pronunciation.
- CO 2 Communicate in basic sentences.
- CO 3 Read selected shorts texts.
- CO 4 Construct basic sentences with words given.

References

1. Azlina Mohd Ariffin,(2012). Spanish For Beginners :UMP
2. Christopher Kendris,(2009). Spanish Verb : Barron's Educational
3. Gilda Missenberg (2011). Complete Spanish Grammar: Mc Graw Hill Company

Course code : UHF1161

Course : MALAY FOR BEGINNERS

Pre-requisite: none

Synopsis

The main aims of this subject is to introduce international students of the Malay language. Students will learn Malay alphabets and basic sentence structures. To expose students speak simple Malay in selected situation and also read and write in Malay classrooms activities includes listening, speaking, reading and writing. Practice on certain basic grammar are also introduce. The students are evaluated in all four language skills that are listening, speaking, reading and writing.

Course Outcomes

- CO 1 Distinguish the pronunciation of Malay syllable and sentences.
- CO 2 Express Malay sentences according to the given topics.
- CO 3 Identify the usage of Malay vocabulary, phrases and sentences.
- CO 4 Construct basic sentence with words given

References

1. Nor Hashimah Jalaluddin, Mardian Shah Omar,Noor Zilawati Jais. Bahasa Melayu Untuk Penutur Asing Peringkat Asas Buku 1. (2007).DBP,Kuala Lumpur
2. Nor Hashimah Jalaluddin, Mardian Shah Omar,Noor Zilawati Jais. Bahasa Melayu

- Untuk Penutur Asing Peringkat Asas Buku 2. (2007).DBP,Kuala Lumpur.
3. Mahir Jawi Panduan Pembelajaran Jawi. Kelab Bimbingan Rehal

Course code : UHF1271

Course : TURKISH 1

Pre-requisite: none

Synopsis

This course aims to enable students to speak simple Turkish in their daily lives. Classroom activities will include listening and speaking skill practices. Reading and writing activities are also included to enhance the spoken skills, practices on certain basic grammar is also introduced. The students will be evaluated on all the four language skills – listening, speaking, reading and writing. The course also covers to construct basic Turkish phrases and sentences.

Course Outcomes

CO 1 Communicate in basic sentences

CO 2 Read selected short texts.

CO 3 Listen accurately the pronunciation of Turkish syllables, words and phrases.

CO 4 Write simple sentences and short paragraphs in Turkish.

References

1. Tuncay Ozturk & Committee. (2010). *Acilim Turkce Ders Kitabi 1* (Turkish Language Textbook 1). Turkey: Caglayan Publication.
2. Tuncay Ozturk & Committee. (2010). *Acilim Turkce Calisma Kitabi 1* (Turkish Language Workbook 1). Turkey: Caglayan Publication.
3. Pollard, A.C. & Pollard, D. (2010). *Teach Yourself Complete Turkish*. London: Hodder Headlines.
4. Göksel, A. & Kerslake, C. (2010). *Turkish: An Essential Grammar*. London: Routledge.
5. Kurklu, A. (2008). *Turkish Phrasebook*. Australia: Lonely Planet Publication.

6. Öztopçu, K. (2009). *Elementary Turkish. A Complete Course for Beginners*. Turkey: Sanat Kitabevi.
7. Csato, J & Johanson, L. (2007). *The Turkic Languages*. London: Routledge.
8. Lewis V. Thomas. (2012). *Elementary Turkish*. New York: Dover Publication.
9. Yasar Kuzucu. (2014). *The Delights of Learning Turkish: A self-study course book for learners of Turkish*. Germany: Create Space Independent Publishing Platform.
10. Anonymous. (2008). *Turkish Phrase Book and Dictionary*. London: Berlitz Publishing.
11. <http://www.digitaldialects.com/Turkish.htm>
12. <http://www.hello-world.com/languages.php/?language=Turkish/>
13. <https://turkce.yee.org.tr/>
14. <http://www.turkishclass.com/>

Intermediate Level

Course code : UHF2111

Course : MANDARIN FOR INTERMEDIATE

Pre-requisite: UHF1111 Mandarin for Beginners

Synopsis

The course aims to expose students to speak Mandarin in selected situations which include asking for directions, travelling, foods and etc. The students will continue to practice the use of Chinese Phonetics (Hanyu Pinyin System). They will also learn about 300 vocabulary and expected to use of simple Chinese phrases and sentences suggested based on Chinese Proficiency Test (Hanyu Shuiping Kaoshi HSK) Level Two. Classroom activities will focus on language skills practices-listening, speaking, reading and writing. Practices that based on HSK Level Two grammar pointed is also introduced. Students will be evaluated on the four language skills namely listening, speaking, reading and writing.

Course Outcomes

CO 1 Identify the pronunciation of Chinese phrases, sentences and dialogues.

- CO 2 Practice Chinese sentences and dialogue according to syllabus.
- CO 3 Use of Chinese phrases, sentences and dialogue for selected topics.
- CO 4 Construct appropriate sentences for selected topics.

References

1. Chong Ah Kow (2007), *Mandarin For Beginners*, UMP, Pahang, Malaysia
2. Liu Xun (2004), *New Practical Chinese Reader*. University of Languages, Beijing, China
3. Ang Lay Hoon & Ooi Bee Lee (2004), *Basic Chinese For Everyone*. Pelanduk Publication, Kuala Lumpur

Course code : UHF2121

Course : GERMAN FOR INTERMEDIATE

Pre-requisite: UHF1121 German for Beginners

Synopsis

German For Intermediate is a continuation course and intended for students who have successfully completed German For Beginners (UHF1121). This course is designed to reinforce and expand their command over grammatical structures, sharpen reading, writing, speaking, and listening skills, and gain a better understanding of the cultures of the German-speaking world

Course Outcomes

- CO 1 Identify variety basic of conversations information into parts.
- CO 2 Describe spontaneously, precisely in the context of simple, familiar topics and activities.
- CO 3 Recognize most probable information in texts related to everyday situations (e.g. advertisements, brochures or menus).
- CO 4 Build brief isolated phrases and sentences by using guided vocabulary related to particular situations.

References

1. Daniela Niebisch et.2010. Schritte International 1 (Kursbuch + Arbeitsbuch), Hueber Verlag, Germany.
2. Daniela Niebisch et.2010. Schritte international 2 (Kursbuch + Arbeitsbuch), Hueber Verlag, Germany.
3. Monika Reimann.2003. Essential Grammar of German, Max Hueber Verlag, Germany.
4. <http://www.hueber.de/schritte-international/>

5. <http://www.education.vic.gov.au/languagesonline/german/german.htm>
6. <http://www.dict.cc/>

Course code : UHF2131

Course : JAPANESE FOR INTERMEDIATE

Pre-requisite: UHF1131 Japanese for Beginners

Synopsis

The course aims to expose students to speak Japanese in selected situations which include asking for directions, travelling, food and etc. The students will continue to practice the use of Japanese Phonetics. They will also learn additional selected words, common verbs and are expected to be able to write simple sentences. Classroom activities will focus on language skills practices; listening, speaking, reading and writing. Students will be evaluated on the four language skills namely listening, speaking, reading and writing.

Course Outcomes

- CO 1 Identify the pronunciation of Japanese phrases, sentences and dialogues.
- CO 2 Practice Japanese sentences and dialogues according to syllabus.
- CO 3 Use of Japanese phrases, sentences and dialogue for selected topics.
- CO 4 Construct appropriate sentences for selected topics.

References

1. Mohd Iszuani Bin Mohd Hassan, (2011). Yasashi Nihongo 1: UMP
2. Syahrina Binti Ahmad & Mohd Iszuani Bin Mohd Hassan.(2012). Yasashi Nihongo 2: UMP
3. Minna No Nihongo Elementary1-1, (2010). Asian Edition, The Association For Overseas Technical Scholarship (AOTS).
4. Shin Nihongo No Kiso, (2009). Japanese Kana Workbook. The Association for Overseas Technical Scholarship (AOTS).

Course code : UHF2141

Course : ARABIC FOR INTERMEDIATE

Pre-requisite: UHF1141 Arabic for Beginners

Synopsis



The main aim of this subject is to enhance students' knowledge in this language. Students will learn to speak the language in selected situations such as the hospital, at the workplace etc., read short passages, and write simple Arabic Language with correct grammar. Classrooms activities focus on the four main skills; listening, speaking, reading and writing. Practices on certain basic grammar are also introduced. Extensive written exercises give students ample opportunity to put into practice the skills they have learned, enabling them to build up confidence in reading and writing vocalized Arabic text.

Course Outcomes

- CO 1 Identify accurately to the Arabic phrases, sentences and short passages.
- CO 2 Practice Arabic sentences and dialogue according to syllabus.
- CO 3 Determine the usage of Arabic phrases, sentences and dialogue for selected topics.
- CO 4 Produce simple connected text on topics that are familiar or of personal interest.

References

1. Asar Abdul Karim. Bahasa Arab Untuk Semua, Penerbitan UMP, Kuantan, Pahang, 2008
2. Ahmad Muhammad Mutawalli, Prof. Dr. Ali Ahmad Thalib, Prof. Muhammad Khalaf Yusuf. Taisir Nahu dan Sorf, 2008

Course code : UHF2151

Course : SPANISH FOR INTERMEDIATE

Pre-requisite : UHF1151 Spanish for Beginners

Synopsis

Spanish For Intermediate is continuation course for students who have successfully completed Spanish For Beginners (UHF1151). This course is designed to reinforce and expand their command over grammatical structures, improve reading, writing, speaking and listening skills. The students develop intermediate competence in oral and written comprehension and expressions of Spanish language.

Course Outcomes

- CO 1 recognise Spanish syllables and pronounce accordingly.
- CO 2 communicate in simple sentences.
- CO 3 read selected shorts texts.
- CO 4 write short passage with words and phrases given.

References

1. Azlina Mohd Ariffin, (2012) Spanish For Intermediate :UMP
2. Gilda Missenber, (2011). Complete Spansih Grammar : Mc Graw Hill Company
3. Dorothy Richmand, (2009) .Basic Spanish: Mc Graw Hill Company

Course code : UHF2161

Course : MALAY FOR INTERMEDIATE

Pre-requisite : UHF1161 Malay for Beginners

Synopsis

Malay for Intermediate is continuation course and intended for students who have successfully completed Malay for Beginners (UHF1161). This course is designed to reinforce and expand their command over grammatical structures, sharpen reading, writing, speaking and listening skills and gain better understanding of Malay cultures and local wisdom.

Course Outcomes

- CO 1 Identify the pronunciation of Malay phrases, sentences, and dialogues.
- CO 2 Practice Malay sentences and dialogues according to the slybus.
- CO 3 Recognise the information from the selected topics.
- CO 4 Construct appropriate sentences for selected topics.

References

1. Nor Hashimah Jalaluddin, Mardian Shah Omar, Noor Zilawati Jais. Bahasa Melayu Untuk Penutur Asing Peringkat Asas Buku 1. (2007).DBP, Kuala Lumpur
2. Nor Hashimah Jalaluddin, Mardian Shah Omar, Noor Zilawati Jais. Bahasa Melayu Untuk Penutur Asing Peringkat Asas Buku 2. (2007).DBP, Kuala Lumpur

Course code : UHF2271

Course : TURKISH 2

Pre-requisite : UHF1271 Turkish 1

Synopsis

This course covers exercises in more complex vocabulary development, word classes and sentence

construction, development of listening, speaking, reading and writing skills in Turkish Language. In addition, writing short compositions, and development of speech skills in conversation. The course enables the students to communicate effectively in various situations and contexts using interactive tasks and activities related to real life.

Course Outcomes

- CO 1 Accurately use common phrases in Turkish.
- CO 2 Read and understand selected texts.
- CO 3 Develop and ask questions appropriate to a given listening context.
- CO 4 Write and explain short compositions in Turkish.

References

1. Tuncay Ozturk & Committee. (2010). *Acilim Turkce Ders Kitabi 2* (Turkish Language Textbook 2). Turkey: Caglayan Publication.
2. Tuncay Ozturk & Committee. (2010). *Acilim Turkce Calisma Kitabi 2* (Turkish Language Workbook 2). Turkey: Caglayan Publication.
3. Pollard, A.C. & Pollard, D. (2010). *Teach Yourself Complete Turkish*. London: Hodder Headlines.
4. Göksel, A. & Kerslake, C. (2010). *Turkish: An Essential Grammar*. London: Routledge.
5. Kurklu, A. (2008). *Turkish Phrasebook*. Australia: Lonely Planet Publication.
6. Öztıpçu, K. (2009). *Elementary Turkish. A Complete Course for Beginners*. Turkey: Sanat Kitabevi.
7. Csato, J & Johanson, L. (2007). *The Turkic Languages*. London: Routledge.
8. Lewis V. Thomas. (2012). *Elementary Turkish*. New York: Dover Publication.
9. Yasar Kuzucu. (2014). *The Delights of Learning Turkish: A self-study course book for learners of Turkish*. Germany: Create Space Independent Publishing Platform.

10. Anonymous. (2008). *Turkish Phrase Book and Dictionary*. London: Berlitz Publishing.
11. <http://www.digitaldialects.com/Turkish.htm>
12. <http://www.hello-world.com/languages.php/?language=Turkish/>
13. <https://turkce.yee.org.tr/>
14. <http://www.turkishclass.com/>

ELECTIVE COURSES

Course code : UHE3012

Course : CONTEMPORARY LEADERSHIP IN COMMUNITY

Pre-requisite : none

Synopsis

This course explores the basic concept of leadership and ways of being a good leader. It includes the theoretical and practical aspects of leadership as well as issues and matters related to contemporary leadership in community. In general, the philosophy of the course is to equip students with knowledge and skills of good leadership.

Course Outcomes

- CO 1 Explain and demonstrate the Pre-requisite and characteristics of being a leader.
- CO 2 Demonstrate and adopt the values and skills of effective leadership.
- CO 3 Analyse current issues on the conduct of good leadership.

References

1. Dent, F. E. (2003) *The Leadership Pocketbook*. London: Management Pocketbooks Limited
2. Covey, S. (1992). *Principle-Centred Leadership*. New York: Summit Books
3. Hart, M.O. (1978). *The 100: A ranking of the most influential persons in history*. New York: Hart Publishing Company Inc
4. Hisham al Taliib. *Training guide for Islamic workers*. A Simon & Schuster Company. The International Institute of Islamic Thought, USA
5. Yukl, G.A. (2002) *Leadership in Organizations: Fifth Edition*, Upper Saddle River, NJ, Prentice-Hall.



Course code : UHE3022

Course : CRITICALTHINKING THROUGH LITERATURE

Pre-requisite : none

Synopsis

This course aims to use literature as a subject matter that will be explored through the use of various activities which engage students' critical thinking skills. It will introduce representative literary genres: poetry, short story, popular culture, drama, and play. This course is suitable for students who are interested in literature and in developing strong critical thinking skills as it guides students toward a greater understanding and appreciation of literature in connection to their own lives

Course Outcomes

- CO1 Interpret poem critically through oral presentation using relevant content, appropriate language and delivery.
- CO2 Discuss a short story by showing critical understanding using the literary elements.
- CO3 Write an alternative ending to a current movie using appropriate literary device.
- CO4 Produce a short movie by applying literary components and using appropriate language

References

1. Collins, N. D. (1993). Teaching Critical Reading through Literature. Retrieved from <https://www.ericdigests.org/1994/literature.htm>
2. Kenneth, J. B., & Rowan University. (2008). Introduction to Critical Thinking [web page]. Retrieved from <https://www.sas.upenn.edu/~kbanner/jupiter/ic.html>
3. LARAZE, D. (1987). Critical Thinking in College English Studies. Retrieved from <https://www.ericdigests.org/pre-926/critical.htm>

4. MAYS, K. J. (Ed.). (2011). *The Norton Introduction to Literature* (2nd ed.). Cambridge, United Kingdom: Cambridge University Press.
5. MAYS, K. J. (Ed.). (2016). *The Norton Introduction to Literature* (12th ed.). New York City, United States: W.W Norton & Company.
6. UNIVERSITY OF NORTH CAROLINA. (2008). Introduction to Literature. Retrieved from http://catalogue.uncw.edu/preview_course_nopo.p.php?catoid=11&coid=18977
7. YESIL, N. (2004, May). Critical Thinkers in the Lan guage Classroom: Are we Crying for the moon? [research]. Retrieved from <http://dergiler.ankara.edu.tr/dergiler/26/917/11432.pdf>

Course code : UHE3032

Course : INTRODUCTION TO HUMAN BEHAVIOR

Pre-requisite : none

Synopsis

This course is designed to expose students to the basic concepts and major aspects of psychology that related to human behavior. It discusses the part of human being (physical, mental, spiritual and emotion) from various perspectives. It also emphasizes on the application of psychology in diverse human activities. In general, the philosophy of this course is to provide students with correct ways of understanding their behaviour as well as others.

Course Outcomes

- CO 1 To explain the concept related to human behavior in human activities.
- CO 2 To apply the principles of psychology in dealing with the issues related to human behaviour through project.
- CO 3 To analyze issues related to human behaviour.

References

1. Akbar Hussin, et al. (eds). (2008). Horizons of Spiritual Psychology. 1st ed. New Delhi, India, Global Vision Publishing House.
2. Baron, R.A. (1995). Psychology. 3rd ed. USA: Ally & Bacon
3. Lilienfeld, S.O., Lynn, S.J., Namy, L.L., & Woolf, N.J. (2009). Psychology: From Inquiry to Understanding. USA: Pearson Education, Inc.
4. Kaplan, R.M. & Saccuzzo, D.P. (2001). Psychological testing: principles, applications

and issues. 5th Ed. Pacific Grove, California: Wadsworth/Thomson Learning, Inc

5. Noraini M. Noor (Ed.). (2009). Psychology from an Islamic Perspective: A Guide to Teaching and Learning. 1st ed. Kuala Lumpur: International Islamic University Malaysia Press, IIUM.

Course code : UHE3042

Course : ORGANIZATIONAL COUNSELLING

Pre-requisite : none

Synopsis

This course will discuss the theoretical and application of counselling in the work setting. It covers the basic framework of counselling skills, techniques and process of counselling dealing with workplace issues. This course also discusses related personality theories, common problems in the workplace and ways to deal with them. In general, the philosophy of this course is to expose students to the knowledge and basic counselling skills related to workplace in an organization.

Course Outcomes

- CO 1 Identify the concept, principles and issues related to counselling in organization.
- CO 2 Demonstrate the ability to employ basic counselling skills and techniques in helping clients.
- CO 3 Adopt the values and principles of counselling in dealing with self and others.

References

1. Amir Awang. (1987). Teori dan amalan psikoterapi. Pulau Pinang: Penerbitan USM
2. Bahagian Perkhidmatan Psikologi, Jabatan Perkhidmatan Awam Malaysia. (t.t). Kaunseling Organisasi: Satu Pengenalan. Putrajaya: Penerbit Kelab Kebajikan Bahagian Perkhidmatan Psikologi (KEPSI).
3. Carroll, M. (1996). Workplace counselling: a systematic approach to employee care. 1st ed. London, UK: Sage Publications Ltd
4. Corey, Gerald. (2009). Theory and Practice of Counseling and Psychotherapy. 8th ed. USA: Thomson Brooks/Cole
5. Hamdan Abd. Kadir. (2009). Kaunseling di tempat kerja. Edisi 1. Skudai Johor: Penerbit Universiti Teknologi Malaysia

Course code : UHE3062

Course : MALAYSIA: THE IMPACT OF GLOBALIZATION

Pre-requisite : none

Synopsis

This course discusses the influence and impact of globalization on Malaysia and international relations. The influence highlighted will be in the perspective of politics, economics, social and culture. The contemporary issues and challenges related to the globalizational impact in Malaysia and other countries are also discussed. In general, the philosophy of the course is to facilitate borderless thinking among the students about the globalization impact towards human and environmental aspects

Course Outcomes

- CO 1 Identify the concept of globalization in terms of its working definition, key features, and perspectives.
- CO 2 Explain the Malaysia involvement and reactions towards the globalization impact in various aspects of life.
- CO 3 Analyze contemporary issues and challenges of globalization across national and international boundaries.

References

1. Jamaluddin Hj. Ahmad Damanhuri, Zulkurnain Hj. Awang, Sarojini Naidu (ed.,). (2003). Globalisation Meeting Future Challenges, INTAN
2. Karl W. Deutsch, Murugesu Pathmanathan (terj). (1995). Analisis Perhubungan Antarabangsa. Kuala Lumpur: Dewan Bahasa dan Pustaka
3. M. Bakri Musa. (2002). Malaysia In The Era of Globalization. United States of America
4. Norani Othman, Sumit K. Mandal (ed), (2000). Malaysia Menangani Globalisasi (Peserta atau Mangsa). Bangi, Selangor: Penerbit Universiti Kebangsaan Malaysia
5. Zulhilmil Paidi & Asrar Omar. (2003). Hubungan Luar Antarabangsa. Kuala Lumpur: PTS Publications & Distributors Sdn. Bhd

Course code : UHE3072

Course : TECHNOLOGY FOR HUMAN CAPITAL DEVELOPMENT

Pre-requisite: none

Synopsis

This course will enable students to understand the concept and process of human capital development and technology. They will learn on the uses of training needs analysis, information technology and



biofeedback techniques in human development programs. This will also cover several technology in human development such as personality profiling, program design, basic quantitative and qualitative design and data analysis, heart rate variability, skin conductance biofeedback systems, biofeedback script and protocol. The uses of technology and human development theory are integral in providing hands on approach to students in designing and implementing human capital development activities.

Course Outcomes

- CO 1 Recognize the concept and process of human capital development.
- CO 2 Analyze and integrate between technology and human capital development.
- CO 3 Apply the uses of technology in human capital development.

References

1. Muhammad Nubli (2008), Modul Meningkatkan Prestasi Diri, Universiti Malaysia Pahang.
2. Muhammad Nubli (2008), Pembangunan Insan Pendekatan Personaliti Kontemporari, Universiti Malaysia Pahang.
3. Mark S. Schwartz (2005), Biofeedback, Second Edition: A Practitioner's Guide, New York: The Guilford Press.
4. John T. Cacioppo (2007), Handbook of Psychophysiology, Cambridge University Press.
5. Raymond A. Noe (2008) Employee training and development, McGraw-Hill.
6. Bray Tony, The training design manual: the complete practical guide to creating effective and successful training programmes. Kogan Page.

Course code: UHE3082
Code : CREATIVE WRITING
 Pre-requisite: none

Synopsis

This Creative Writing course aims to foster a better understanding of the craft of writing and to instil an appreciation of what goes into producing readable, publishable and engrossing fiction. It encourages the integral first steps towards writing creatively by tapping students' writing potentials to write clearly with imagination. It also exposes students to the beauty of written language and the mechanics of descriptive writing using figurative language and critical thinking skills. Students will explore the creative process through writing, expand and refine vocabulary and

style resources, analyse a piece of writing, reinforce process writing, delve into screenplay writing and make a short film.

Course Outcomes

- CO 1 Compose a weekly journal on your personal blog using accurate language and appropriate content.
- CO 2 Analyse and construct a creative piece of writing based on a picture /situation using accurate language and appropriate content.
- CO 3 Create an original short story using accurate figurative language and appropriate content.
- CO 4 Produce a storyboard with scripts and a short film for public viewing.

References

1. Anderson, L.(2013) Creative Writing: A Workbook with Readings. Routledge.
2. Bond,S.(2015) Your Personal Fiction Writing Coach: 365 Days of Motivation & Tips to Write a Great Book. NeedtoRead Books.
3. Goodman, R.(2009). The Soul of Creative Writing. Transaction Publishers.
4. Thurlow, M. & Thurlow, C.(2005) Making Short Films: The Complete Guide from Script to Screen. Bloomsbury.
5. Turner, C. (2012). The Blog & The Journal _Writing About You. Ruksak Books.

Course code : UHE3092
Course : ENGLISH MECHANICS
 Pre-requisite: none

Synopsis

The course primarily aims to develop a greater understanding towards English mechanics such as grammar components, sentence structure, word formation, coherence and cohesion. Students will be exposed to these components to strengthen their skills in communication. This course is suitable for students who are interested to build confidence in using the language.

Course Outcomes

- CO 1 Demonstrate presentation skills using appropriate delivery styles.
- CO 2 Analyse the use of parts of speech, subject verb agreement,

and tenses at sentence and paragraph level.
CO 3 Distinguish different types of word forms in a sentence.

CO 4 Demonstrate the correct use of logical connectors, coherence and cohesion in a given text.

References

1. Burton-Roberts, N. (2016). *Analysing sentences: an introduction to English syntax*. London: Routledge.
2. Gaudart, H. Hughes, R. & Michael, J. (2007). *Towards Better English Grammar*. Selangor: Oxford Fajar
3. Kolln, M., Gray, L. S., & Salvatore, J. (2011). *Understanding English grammar*. Boston: Pearson.
4. Panda, M. (2006). *Words and their usages: a useful guide to the appropriate use of words and phrases*. Petaling Jaya, Selangor: Unipress Publication.
5. Swan, M. & Walter, C. (2010). *Oxford English Grammar Course*. New York: Oxford University Press.
6. Zemach, D. E. (2011). *Writing sentences: the basics of writing*. Oxford: Macmillan Education.

Course code : UHE3122

Course : ISLAMIC INSTITUTIONS

Prerequisite : none

Synopsis

This course exposes students to the comprehensiveness of Islam through the distinct of institutions. In addition, the course is designed to introduce the main characteristics in Islamic systems which cover universal aspects of management. It covers basic Islamic principles and tools in management such as syura, masalah, hadaf and others which have been applied in particular institutions and organizations. In general, the philosophy of the course is to equip students with necessary and broad knowledge and skills about Islamic management that implemented in various institutions such as education, social, judicial, legislative, political economic, defines, sports, hisbah, religious and food.

Course Outcomes

CO 1 Explain Islamic principles in managing institutions.

CO 2 Evaluate Islamic institutions and its unique philosophical characteristics.

CO 3 Apply Islamic values in managing institutions theoretically.

References

1. Hassan Ahmad (Ed). (2008). *Institusi Institusi Islam*. Kuantan, Pahang: Penerbit UMP.
2. Muhammad Nubli Abdul Wahab.(2008). *Siri Kecemerlangan Pengurusan Organisasi dalam Islam 1*. Kuantan, Pahang: Penerbit UMP.
3. Muhammad Nubli Abdul Wahab. (2009). *Pembangunan Insan: Pendekatan Personaliti Kontemporari*. Kuantan, Pahang: Penerbit UMP.
4. Abdul Ghani Azmi Idris (1997) *Mengenal Qanun Jenayah Islam*. Kuala Lumpur: Pustaka Al Hidayah.
5. Surtahman Kastin Hasan (1990) *Ekonomi Islam*. Bangi, Selangor: Universiti Kebangsaan Malaysia.

Course code : UHE3132

Course : PUBLIC SPEAKING

Pre-requisite : none

Synopsis

The course aims to introduce students to the speech planning process. Students will be exposed to three types of public speaking, namely informative, persuasive and impromptu speeches. Students will learn how to select a topic, gather materials and supporting points, organise the body of the speech, prepare an outline and deliver the speech. Videos on speeches will be used to provide samples on effective delivery skills. Students will also be exposed to the use of relevant technology in preparing and delivering their speeches creatively and effectively.

Course Outcomes

CO 1 Produce a video presentation to introduce themselves by using effective delivery strategies and appropriate language style.

CO 2 Demonstrate understanding of the fundamentals of public speaking.

CO 3 Write original informative and persuasive speech outlines using appropriate language, correct format and relevant content.

CO 4 Present different types of speeches creatively by using effective delivery strategies, appropriate language and relevant content.

References

1. Carnegie, D. (2017). *How to develop self-confidence and influence people by public speaking*. New York: Simon and Schuster.



2. Carnegie, D., & North, W. (2013). *The art of public speaking*. New York: Wyatt North Publishing, LLC.
3. Donovan, J., John, R. S., & Sinek, S. (2014). *How to deliver a TED talk*. London: McGraw.
4. Hill, Fujishin, R. (2016). *The natural speaker*. Boston: Routledge.
5. Sprague, J., Stuart, D., & Bodary, D. (2015). *The Speaker's Handbook*, Spiral bound Version. London: Cengage Learning.

Course code : UHE3142

Course : PROJECT BASED PROPOSAL WRITING

Pre-requisite : none

Synopsis

The course is designed to develop students' ability in writing a project-based proposal with regard to their final year engineering undergraduate research project (URP) or Projek Sarjana Muda (PSM). Students will be introduced to proposal writing in which emphasis is placed on academic writing conventions in writing Introduction, Literature Review and Methodology chapters. Grammar is implicitly embedded into the teaching and learning process. In addition, students will also be exposed to elements of citation techniques and referencing in order to avoid plagiarism.

Course Outcomes

- CO 1 Present the outline of a proposal on an engineering-related project.
- CO 2 Organize references and in-text citations according to correct referencing style.
- CO 3 Write a proposal on a chosen engineering-related topic using appropriate language, correct organization and referencing style.
- CO 4 Demonstrate presentation skills using accurate language, appropriate delivery styles and concise content.

References

1. Curtin University. (2013). APA 6th Referencing. Retrieved from <http://libguides.library.curtin.edu.au/content.php?pid=141214&sid=1335391>
2. Azar, B.S. (1999). *Understanding and Using English Grammar*. (3rd ed.). New York: Longman
3. Reid, J.M. (2000). *The Process of*

- Composition*. (3rd ed.) New York: Longman
- 4. Reinking, J.A., Hart, A.W. & R. von der Osten. (2000). *Strategies for Successful Writing*. New Jersey: Prentice Hall
- 5. Rizvi, M.A. (2005). *Effective Technical Communication*. New Delhi: Tata McGraw-Hill Publishing Company Limited

Course code : UHE3152

Course : INTERPERSONAL EFFECTIVENESS

Pre-requisite : none

Synopsis

This course is appropriate for those who want to improve their ability to interact with others in their personal and professional lives. The course begins with a focus on preliminary topics such as basics of interpersonal communication and relationships and models of interpersonal effectiveness. The second part of the course includes intrapersonal topics on self-awareness, self-disclosure and trust, and self-management. The final part of the course covers topics on perception, diversity, active listening, feedback, communication apprehension and communication styles. The teaching and learning approaches employed in this course includes discussions, self-reflection, group activities, film analysis, presentations, and role playing.

Course Outcomes

- CO 1 Identify the fundamental principles of interpersonal effectiveness.
- CO 2 Write a self-reflection plan between 3-4 pages based on given stimulus questions.
- CO 3 Select and present four key points on one of the interpersonal topics covered from week 9-13.
- CO 4 Prepare and present a 10-minute role play demonstrating at least three interpersonal themes learnt.

References

1. Gamble, Teri Kwal, Gamble, Michael. (2002). *Communication Works* (7th ed.). McGraw-Hill.
2. Beebe, Steven A, Beebe, Susan J. (2007). *Communication –Principles for a Lifetime* (3rd ed.). Pearson Education, Inc.
3. Covey, Stephen R. (2013). *The 7 Habits of Highly Effective People*. Simon and Schuster.



4. DeVito, J. A. (2007). *The interpersonal communication book* (11th ed.). Boston, MA: Allyn & Bacon.
5. Dunn, Daniel M, Goodnight, Lisa J. (2008). *Communication Embracing Difference* (2nd ed.). Pearson Education, Inc.
6. McShane, Steven L, Von Glinow, Mary Ann. (2018). *Organizational Behaviour* (8th ed.). McGraw-Hill.

Course code : UHE3162

Course : FAMILY SYSTEM IN ISLAM

Pre-requisite : none

Synopsis

This course is designed to equip students with a deeper understanding of basic family management in Islam. It covers the concept of marriage in Islam including pre and post marriage management and laws according to Imam Shafie school of thought. However, a comparative mazahib (school of thoughts) discussion will also be covered in certain issues as well as contemporary local laws. The course also discusses contemporary issues that are related to this topic such as gamophobia, rulings on foster child and others.

Course Outcomes

- CO 1 Explain the values of Islamic family system in the task given.
- CO 2 Analyze Islamic family system of marriage.
- CO 3 Evaluate Islamic family system of marriage to overcome related issues.

References

1. Al Jaziri, Abd Rahman. (1990). *Kitab al Fiqh ala Mazahib al Arbaah*. Beirut: Dar al Kutub al Ilmiyyah.
2. Al Qardawi, Yusuf. (2005). *Fatawa Muasirah*. Cetakan ke 5 Al Qahirah: Dar al Qalam.
3. Al-Zuhaili, Wahbah. (1989). *Al-Fiqh al-Islami wa Adillatuh*. Cetakan ke-4. Beirut: Dar al-Fikr.
4. Mustafa Khin, Mustafa al Bugha& Ali al Syarbaji, (terj. ZulkifliMohamad)(2009). *Al Fiqh al Manhaji*. Bandar Baru Bangi, Selangor: Dar al Syakir.
5. Muhammad Ali Qutb, (terj.) (2003). *Mutiara Perkahwinan*. Kuala Lumpur: Pustaka Haji Abdul Majid.
6. Enakmen syariah negeri Pahang.

Course code : UHE3172

Course : ENGLISH FOR SCIENCE AND TECHNOLOGY (EST) –UC DAVIS

Pre-requisite : none

Synopsis

English for Science and Technology (EST) is designed to help international undergraduates and graduate students and professionals become more comfortable using English as a common language in the fields of science and technology. In a highly interactive learning environment—mixing group and individual project work with in-class and out-of-class activities and visits—students improve their overall English language skills (i.e., listening, speaking, reading and writing) as well as the critical thinking, oral presentation, interviewing and research skills needed as international scientists, engineers and technical experts.

Participants visit laboratories and high-tech companies and are introduced to exciting hot topics in research and the latest applications. They increase their awareness of issues and concerns of businesses in emerging technologies.

Course Outcomes

- CO 1 Have improved oral presentation and analytical research skills, and strengthened their pronunciation.
- CO 2 Use logic and critical thinking skills to discuss a variety of scientific and technological topics with peers.
- CO 3 Organize their own ideas, created slides and made effective oral presentations in English.
- CO 4 Become aware of issues and concerns of new businesses in emerging technologies.
- CO 5 Reflect on their experiences through blog-writing.

References

1. UC Davis Extension (2013). *English for Science and Technology (EST)*. Retrieved from http://extension.ucdavis.edu/unit/international_english/science.asp

Course code : UHE3182

Course : MALAYSIAN STUDIES

Pre-requisite : none

Synopsis

This course discusses history and politic, Malaysian Constitution, system and structure of administration, society and national unity, national development and religion and belief in Malaysia. This course aims to produce graduates who have a national identity and a

spirit of patriotism. Teaching and learning will be out in the form of lectures, assignments, test and learning experiences.

Course Outcomes

- CO 1 Describe diversity in society.
- CO 2 Explain the importance of national identity towards strengthening the spirit of patriotism.
- CO 3 Build social relationships and interaction among students.

References

1. Hasnah Hussiin & Mardiana Nordin. (2011). *Malaysian Studies*. Petaling Jaya, Selangor: Oxford Fajar
2. Hasnah Hussiin & Mardiana Nordin. (2007). *Pengajian Malaysia*. Petaling Jaya, Selangor: Oxford Fajar
3. Abdul Aziz Bari. (2000). *Perlembagaan Malaysia: Asas-asas dan Masalah*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
4. Asnarulkhadi Abdul Samah, Ismail Hj. Mohd Rashid, Ma'rof Redzuan & Nazaruddin Hj. Mohd Jali. (2003) *Malaysian Studies Nationhood and Citizenship*. Kuala Lumpur: Prentice-Hall
5. Auger, T. (2007). *Chronicle of Malaysia*. Kuala Lumpur, Malaysia: Editions Didier Millet.
6. Asnarulkhadi Abdul Samah, Ismail Hj. Mohd Rashid, Ma'rof Redzuan & Nazaruddin Hj. Mohd Jali. (2001). *Pengajian Malaysia*. Edisi ke-2. Kuala Lumpur: Prentice-Hall
7. Buyung Adil. (1985). *Perjuangan Orang Melayu Menentang Penjajah*. Kuala Lumpur: Dewan Bahasa & Pustaka
8. Jomo, K.S. (1998). *Pembangunan Ekonomi dan Kelas Sosial di Semenanjung Malaysia*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
9. Jomo, K.S. (1998). *Pembangunan Ekonomi dan Kelas Sosial di Semenanjung Malaysia*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
10. INTAN. (2004). *Malaysia Kita*. Kuala Lumpur: Percetakan Nasional
11. Mahdi Shuid & Mohd. Fauzi Yunus (2003). *Malaysian Studies*. Petaling Jaya, Selangor: Pearson Malaysia Sdn. Bhd.

Course code : UHE 3192
Course : FUNDAMENTAL IBADAH IN ISLAM

Pre-requisite: none

Synopsis

This course is designed to equip students with a deeper understanding on basic principles of Islamic Jurisprudence and its application in fundamental ritual of worship in Islam. It covers the contemporary issue and study according to Shafie school of thought that commonly will be encountered by professionals in their working surrounding. Students will also learn contemporary ijihad (Islamic scholars' opinions) on the current issues of modern lifestyles. In general, the philosophy of the course is to develop students to become more knowledgeable on the basic of Islamic teaching which is very vital in shaping a spiritually strong individual.

Course Outcomes

- CO 1 Explain the basic principles of Islamic Jurisprudence.
- CO 2 Demonstrate correctly the Muslim core ritual in both normal and complex situation.
- CO 3 Analyze selected contemporary issues based on principles and values of Islamic Jurisprudence.

References

1. Kamali, Mohammad Hashim. (2003). *Principles of Islamic Jurisprudence*. Cambridge: The Islamic Text Society.
2. Ramli Awang et al. (2013). *Sains Tamadun Islam*. Skudai: UTM Press
3. Al Qardawi, Yusuf. (2005). *Fatawa Muasirah*. Cetakan ke 5 Al Qahirah: Dar al Qalam
4. Al-Zuhaili, Wahbah. (1989). *Al-Fiqh al-Islami wa Adillatuh*. Cetakan ke-4. Beirut: Dar al-Fikr.
5. Mustafa Khin, Mustafa al Bugha & Ali al Syarbaji, (terj. Zulkifli Mohamad)(2009). *Al Fiqh al Manhaji*. Bandar Baru Bangi, Selangor: Dar al Syakir

Course code : UHE 3202
Course : INTRODUCTION TO HALAL STUDIES
 Pre-requisite: none

Synopsis

This course is designed to equip students with basic understanding of halal and the halal administration particularly in Malaysia. Therefore, the subject covers the study of shariah-based halal principles and requirements pertaining to halal as stipulated in the halal authority guidelines. The course also discusses the current administration of halal especially on the Malaysian Halal Certificate and its enforcement.



Student will also be exposed to an academic project on halal application in the food and non-food industry. In addition, some contemporary issues related to halal regionally and globally will be discussed as well as exposure to halal act and standards. In general, the aim of the course is to develop students to have knowledge on halal and its specific administration.

Course Outcomes

- CO 1 Explain basic concept of halal in Islam.
- CO 2 Analyse halal ruling according to standards.
- CO 3 Apply knowledge of halal values.

References

1. Al-Zuhaili, Wahbah. (1989). *Al-Fiqh al-Islami wa Adillatuh*. Cetakan ke-4. Beirut: Dar al-Fikr.
2. Mustafa Khin, Mustafa al Bugha & Ali al Syarbaji, (terj. Zulkifli Mohamad)(2009). *Al Fiqh al Manhaji*. Bandar Baru Bangi, Selangor: Dar al Syakir.
3. Al Jaziri, Abd Rahman. (1990). *Kitab al Fiqh ala Mazahib al Arbaah*. Beirut: Dar al Kutub al Ilmiyyah

Course code : UHE 3212
Course : GLOBAL COMPETENCIES
 Pre-requisite: none

Synopsis

Global competence refers to the acquisition of in-depth knowledge and understanding of international issues, an appreciation of and ability to learn and work with people from diverse linguistic and cultural world community. This definition contains four basic elements:

- a. International awareness
- b. Appreciation of cultural diversity
- c. Proficiency in foreign languages
- d. Competitive skills

The overall aim of this course is to develop students intercultural awareness and competence in order to enable them to better reflect on their own roles and ability to initiate change in professional situations. It is also to provide the students with a critical understanding of issues relating to cultural identity, cultural difference and cultural diversity. Acquiring intercultural competence is both a cognitive and an affective process and its a long-term process during which the student must understand the relativity of all beliefs, values and behavior practice all over the world. The students should be able to identify and engaging in any topics of local and global significance.

Course Outcomes

- CO 1 Identify the impact of globalizations and the competencies required.
- CO 2 Classifying the competencies that suit and effective for various situations backgrounds.
- CO 3 Applying the competencies in every tasks given.

References

1. Aness Janee Ali. 2000. *The Intercultural Adaptation of Expatriate Spouses and Children An Empirical Study on The Determinants Factors Contributing to The Success of Expatriation*. Gronigen, Holland.
2. Bennett, MJ. 2014. *Basic Concepts of Intercultural Communication: Paradigms, Principles, & Practices*. Intercultural Press
3. _____. 2014. Significantly revised edition of *Basic Concepts of Intercultural Communication: Selected Readings*.
4. _____. 2010. *A Conceptual History of Intercultural Learning in Study Abroad* in Hoffa, B. & S. DePaul (Eds) *A History of US Study Abroad: 1965-Present*.
5. _____. 2009. *Defining, Measuring, and Facilitating Intercultural Learning* in Bennett, MJ (Guest Ed) *Journal of Intercultural Education Volume 20, Supplement 1, January 2009, pages S1-S13*
6. _____. 2004. *Becoming Interculturally Competent in Wurzel, J. (Ed) Towards Multiculturalism: A Reader in Multicultural Education*. Intercultural Resource Corporation.
7. _____. 2009. *Developing Intercultural Sensitivity: An Integrative Approach to Global and Domestic Diversity* in D. Landis, J. Bennett & M. Bennett (Eds), *The Handbook of Intercultural Training*, 3rd Edition. Sage
8. _____. 2003. *Measuring Intercultural Competence: The Intercultural Development Inventory* in R. M. Paige

(Guest Ed) Journal of Intercultural Relations, 27(4), 421-443

9. Downey, G.L. et al., 2006. "The Globally Competent Engineer: Working Effectively with People Who Define Problems Differently," Journal of Engineering Education, Vol. 95, pp. 1-17.
10. Hunter, Bill, George P. White and Galen Godbey. 2006. "What Does it Mean to Be Globally Competent?" Journal of Studies in International Education, Vol. 10, No. 3, 267---285.
11. Hunter, William D. 2004. "Got global competency?" International Educator, Spring 2004, 6---12.
12. _____. 2004. "Knowledge, skills, attitudes, And experiences necessary to become globally competent." Unpublished doctoral dissertation, Lehigh University, Pennsylvania.
13. Jamal Rizal Razali dan Hasnah Hussiin. 2015. Global dan Globalisasi. UMP:Kuantan.
14. Kim, Young Yun. 2005. "Adapting to a New Culture: An Integrative Communication Theory." In Theorizing about Intercultural Communication (ed. William B. Gudykunst. pp. 375-400. Thousand Oaks, CA: Sage.
15. _____. 2006. "From Ethnic to Interethnic: The Case for Identity Adaptation and Transformation." Journal of Language and Social Psychology 25, 3:283-300.
16. _____. 2008. "Toward Intercultural Personhood: Globalization and a Way of Being." Globalization and Diversity [Special Issue]. International Journal of Intercultural Relations 32, 4:359-368.

Course code : UHE 3222

Course : AL-QURAN MEMORIZATION 1

Pre-requisite: none

Synopsis

This course is designed to equip students with a deeper understanding on basic principles of memorizing the Holy Quran. It covers te method of theories how to maintain and strengthen of memorizing as a hafiz. A part of that, students will be given practical training for memorizing from (Al-Baqarah verse 1-169). Students will also be trained in theoretical and practical how to express the accurate makhraj of words according to the tajweed rules. In general, the philosophy of the course is to develop students to become more knowledgeable on the basic of memorizing which is very vital in shaping an individual as a hafiz.

Course Outcomes

- CO 1 Explain the methods and elements in strengthening to memorize the Holy Quran.
- CO 2 Identify the rules of Tajweed (Quranic pronunciation & recitation and articulation points of Arabic letters of the word accurately).
- CO 3 Applying the reading and memorizing of the Holy Quran in a way that retains the corrects meaning and the general rules of phonics.

References

Main references:

1. Al-Quran Al-Karim
2. RDU 1403166. Pembangunan Teknik Intervensi Untuk Meningkatkan Kemahiran Hafazan al-Quran.
3. Huffaz-M (Gold in CITREX and Bronze in ITEX).
4. Rashidi Abbas, Jamal Rizal Razali, Muhammad Nubli Abd Wahab (2016). *Anjakan Minda Huffaz Belia Malaysia*. Kuantan: Universiti Malaysia Pahang.
5. Rashidi Abbas (2016). *Hebatnya Kuasa Hafazan*. Kuantan: Universiti Malaysia Pahang (Manual).
6. Ibrahim Abdul Mun'im Asy-Syaarbani (2014). *Cara Mudah Menghafal Al-Quran*.Kuala Lumpur: Pustaka Al-Shafa.
7. Amjad Qasim, Siti Nur Akma Ahmad (2013). *Menghafal al_Quran dalam Sebulan*. Kuala Lumpur: SynergyMedia.
8. Mohammad Ashraff Ayob Al-Hafiz (2011). *Kaedah Jibril*. Selangor: PTS Darul Furqan Sdn.Bhd.
9. Haji Abdul Qadir Leong (1994). *Tajwid al-Quran*.Pustaka Slam Sdn Bhd: Kuala Lumpur.

Additional references:

1. Imam Al-Nawawi (terj) Ahmad Asri Lubis Abu Samah (2010). *Etika Belajar&Mengajar Al-Quran*. Kuala Lumpur: Yamani Angle.

- AbdurRahman Lubis (2011). *Tips Meghafal Al-Quran Bagi Profesional*. Selangor: Pustaka Al-Ehsan.

Course code : UHE 3232

Course : AL-QURAN MEMORIZATION 2

Pre-requisite: Al-Quran Memorization 1

Synopsis

This course is designed to equip students with a deeper understanding on basic principles of memorizing the Holy Quran. It covers the method of theories how to maintain and strengthen of memorizing as a hafiz. A part of that, students will be given practical training for memorizing from al-Baqarah (verses 170-286). Students will also be trained in theoretical and practical how to express the accurate makhrāj of words according to the tajwid rules. In general, the philosophy of the course is to develop students to become more knowledgeable on the basic of memorizing which is very vital in shaping an individual as a hafiz.

Course Outcomes

- CO1: Identify the methods and elements in strengthening to memorize the al-Quran.
- CO2: Explain the rules of tajwid (Quranic pronunciation & recitation and articulation points of Arabic letters of the words accurately).
- CO3: Applying the reading and memorizing of the Holy Quran in a way that retains the correct meaning and the general rules of phonics.

References

Main references:

- Al-Quran Al-Karim.
- RDU 1403166. *Pembangunan Teknik Intervensi Untuk Meningkatkan Kemahiran Hafazan al-Quran*.
- Huffaz-M (Gold in CITREX and Bronze in ITEX).
- Rashidi Abbas, Jamal Rizal Razali, Muhammad Nubli Abd Wahab (2016). *Anjakan Minda Huffaz Belia Malaysia*. Kuantan: Universiti Malaysia Pahang.
- Rashidi Abbas (2016). *Hebatnya Kuasa Hafazan*. Kuantan: Universiti Malaysia Pahang (Manual).
- Ibrahim Abdul Mun'im Asy-Syaarbani (2014). *Cara Mudah Menghafal Al-Quran*. Kuala Lumpur: Pustaka Al-Shafa.

- Amjad Qasim, Siti Nur Akma Ahmad (2013). *Menghafal al-Quran dalam Sebulan*. Kuala Lumpur: SynergyMedia.
- Mohammad Ashraff Ayob Al-Hafiz (2011). *Kaedah Jibril*. Selangor: PTS Darul Furqan Sdn.Bhd.
- Haji Abdul Qadir Leong (1994). *Tajwid al-Quran*. Pustaka Slam Sdn Bhd: Kuala Lumpur.

Additional references:

- Imam Al-Nawawi (terj) Ahmad Asri Lubis Abu Samah (2010). *Etika Belajar&Mengajar Al-Quran*. Kuala Lumpur: Yamani Angle.
- AbdurRahman Lubis (2011). *Tips Meghafal Al-Quran Bagi Profesional*. Selangor: Pustaka Al-Ehsan.

Other courses

Course code : UHG1002

Course : DEUTSCH 1

Pre-requisite: none

Synopsis

This course enables the students understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. The students can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

Course Outcomes

- CO 1 Visually recognise familiar names, words and very basic phrases on simple notices in the most common everyday situations.
- CO 2 Interact in a simple way, if the interlocutor is speaking slowly and clearly, and is prepared to help. Can ask and answer simple questions.
- CO 3 Auditory recognize simple sentences, familiar words that refer to her/himself, own family or concrete things around, when people speak slowly and clearly.
- CO 4 Write a short simple postcard and fill in a hotel registration form.

References

1. Kalender, Susanne et al.: Schritte Übungsgrammatik, Hueber, München 2010.
2. Dreyer, Schmitt: Lehr-und Übungsbuch der deutschen Grammatik – aktuell, Hueber, München 2009.
3. Gaidosch, Ulrike: Zur Orientierung, Basiswissen Deutschland, 4th Edition, Hueber, München 2010.

Course code : UHG1012

Course : DEUTSCH 2

Pre-requisite : UHG1002 Deutsch 1

Synopsis

This course enables the students to understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). The students can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. They can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.

Course Outcomes

- CO 1 Auditory recognize sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment).
- CO 2 Write a series of simple phrases and sentences about their family, living conditions, educational background, present or most recent job and short, simple formulaic notes and messages, relating to matters in areas of immediate need.
- CO 3 Describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need, produce simple connected text on topics that are familiar or of personal interest.
- CO 4 Find specific, predictable information in simple everyday material such as advertisements, prospectuses, menus, reference lists and timetables.

References

1. Kalender, Susanne et al.: Schritte Übungsgrammatik, Hueber, München 2010.
2. Dreyer, Schmitt: Lehr-und Übungsbuch der deutschen Grammatik – aktuell, Hueber, München 2009.
3. Gaidosch, Ulrike: Zur Orientierung, Basiswissen Deutschland, 4th Edition, Hueber, München 2010.

Course code : UHG2002

Course : DEUTSCH 3

Pre-requisite : UHG1012 Deutsch 2

Synopsis

This course enables the students to understand a wide range of demanding, longer texts, and recognise implicit meaning. They can express themselves fluently and spontaneously without much obvious searching for expressions. The students are able to use language flexibly and effectively for social, academic and professional purposes. Furthermore they will be skillful enough to produce clear, well-structured, detailed text on complex subjects, showing controlled use of organizational patterns, connectors and cohesive devices.

Course Outcomes

- CO 1 Conduct grammatical transformation extensively.
- CO 2 Understand scientific German language spoken at natural place.
- CO 3 Extract key information from a text and paraphrase it grammatically and lexically.
- CO 4 Produce clear detailed text and intimate and clarify a position towards a topic.

References

1. Kalender, Susanne et al.: Schritte Übungsgrammatik, Hueber, München 2010.
2. Dreyer, Schmitt: Lehr-und Übungsbuch der deutschen Grammatik – aktuell, Hueber, München 2009
3. Gaidosch, Ulrike: Zur Orientierung, Basiswissen Deutschland, 4th Edition, Hueber, München 2010

Course code : UHG2012

Course : DEUTSCH 4

Pre-requisite : UHG2002 Deutsch 3

Synopsis

This course enables the students to understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization. They can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. The students can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.

Course Outcomes

- CO 1 Write at length about topical issues, even though complex concepts may be oversimplified, write clear, detailed descriptions on a variety of subjects, a paper giving reasons in support of or against a particular point of view and explaining the advantages and disadvantages of various options, express news, views and feelings in correspondence, and respond to those of the other person, write standard formal letters requesting or communicating relevant information, following a template.
- CO 2 Give clear, detailed descriptions on a wide range of subjects related to the fields of interest, develop a clear argument, linking the ideas logically and expanding and supporting points with appropriate examples, present a topical issue in a critical manner and weigh up the advantages and disadvantages of various options, summarized information and arguments from a number of sources.

References

1. Kalender, Susanne et al.: Schritte Übungsgrammatik, Hueber, München 2010.
2. Dreyer, Schmitt: Lehr-und Übungsbuch der deutschen Grammatik – aktuell, Hueber, München 2009.
3. Gaidosch, Ulrike: Zur Orientierung, Basiswissen Deutschland, 4th Edition, Hueber, München 2010.

Course code : UHG1003

Course : GERMAN 1

Pre-requisite : None

Synopsis

This course enables the students to understand sentences and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. The students

can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

Course Outcomes

- CO 1 Visually recognise familiar names, words and very basic phrases on simple notices in the most common everyday situations.
- CO 2 Interact in a simple way, if the interlocutor is speaking slowly and clearly, and is prepared to help. Can ask and answer simple questions.
- CO 3 Auditory recognize simple sentences, familiar words that refer to her/himself, own family or concrete things around, when people speak slowly and clearly.
- CO 4 Write a short simple postcard and fill in a hotel registration form.

References

1. Evans, Puda, Specht Menschen A1 Kursbuch Hueber ISBN-10: 3191019014.
2. Peters, Pude, Reinmann Menschen A1 Arbeitsbuch Hueber ISBN-10: 3191119019.
3. Reinmann Grundstufen-Grammatik für DaF Hueber ISBN-10: 319161575X.
4. Lemcke, Rohrmann Grammatik Intensiver A1 Langenscheidt ISBN-10: 3126063594.
5. hueber www.hueber.de/menschen/hueber Hueber.
6. Stefanie Dengler, Paul Rusch et. al. Netzwerk A1 Kursbuch Klett 978-3-12-606128-5.
7. Stefanie Dengler, Paul Rusch et. al. Netzwerk A1 Arbeitsbuch Klett 978-3-12-606130-8.

Course code : UHG1013

Course : GERMAN 2

Pre-requisite : UHG1003 German 1

Synopsis

This course enables the students to understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local



geography, employment). The students can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. They can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.

Course Outcomes

- CO 1 Auditory recognize sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment).
- CO 2 Write a series of simple phrases and sentences about their family, living conditions, educational background, present or most recent job and short, simple formulaic notes and messages, relating to matters in areas of immediate need.
- CO 3 Describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need, produce simple connected text on topics that are familiar or of personal interest.
- CO 4 Find specific, predictable information in simple everyday material such as advertisements, prospectuses, menus, reference lists and timetables.

References

1. Dengler, S. et al. Netzwerk A2 Kursbuch Langenscheidt/ Klett ISBN 978-3-12-606998-4.
2. Dengler, S. et al. Netzwerk A2 Arbeitsbuch Langenscheidt/ Klett ISBN 978-3-12-606999-1.
3. Buscha, A., Szita, S. Begegnungen Deutsch als Fremdsprache A2+: Integriertes Kurs- und Arbeitsbuch.

Course code : UHG2003

Course : GERMAN 3

Pre-requisite : UHG1013 German 2

Synopsis

This course enables the students to understand a wide range of demanding, longer texts, and recognized implicit meaning. They can express themselves fluently and spontaneously without much obvious searching for expressions. The students are able to use language flexibly and effectively for social, academic and professional purposes. Furthermore they will be skillful enough to produce clear, well-structured, detailed text on complex subjects, showing controlled use of organizational patterns, connectors and cohesive devices (equal to B2.1 level)

Course Outcomes

- CO 1 Conduct grammatical transformation extensively
- CO 2 Produce clear detailed text and intimate and clarify a position towards a topic pace
- CO 3 Understand scientific German language spoken at natural
- CO 4 Extract key information from a text and paraphrase it grammatically and lexically

References

1. Hueber Verlag www.hueber.de Hueber
2. Klett Verlag www.klett.de Klett
3. Ute Koithan, u. a Aspekte neu B2 Teil 1 Klett ISBN 13: 978-3468474873
4. Schubert Verlag <http://www.schubert-verlag.de/aufgaben>
5. Schubert Verlag <http://www.schubert-verlag.de/aufgaben/index.htm> Schubert

Course code : UHG2013

Course : GERMAN 4

Pre-requisite : UHG2003 German 3

Synopsis

This course enables the students to understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization. They can express with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. The students can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options (B2.1 level)

Course Outcomes

- CO 1 Understand scientific German language spoken at natural pace
- CO 2 Understand the main ideas of complex text on both concrete and abstract topics including technical topic.



CO 3 Present a topical issue in a critical manner and weigh up the advantages and disadvantages of various options, summarized information and arguments from a number of sources

CO 4 Produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various, write at length about topical issues, even though complex concepts may be oversimplified, write clear, detailed descriptions on a variety of subjects

References

1. Ute Koithan, u. a Aspekte neu B2 Teil 2 Klett ISBN-13: 978-3126050289
2. Hueber Verlag www.hueber.de Hueber
3. Klett Verlag www.klett.de Klett
4. Schubert Verlag <http://www.schubert-verlag.de/aufgaben>
5. Schubert Verlag <http://www.schubert-verlag.de/aufgaben/index.htm> Schubert

Course code : UHG1016

Course : INTENSIVE GERMAN 1

Pre-requisite : UHG1003 German 1 & UHG1013 German 2

Synopsis

This course is designed as a platform for the students to enable them to sit for the TELC B1 test. The students will be exposed to the various situation where they have to understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc.. They also need to deal with most situations likely to arise while travelling in an area where the language is spoken. The students will guide to produce simple connected text on topics which are familiar or of personal interest and describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans. At the end of semester, the students should be able to understand,

produce and describe their ideas, hopes, explanations in B1 level of language competencies.

Course Outcomes

- CO 1 Read and understand articles and advertisement of every day newspaper.
- CO 2 Listen und understand radio interviews and shows on every day level.
- CO 3 Writing letters and emails for private and official purpose with up to 150 words.
- CO 4 Discuss personal opinions and planning a task like a trip.

References

1. Aspekte neu B1 plus: Mittelstufe Deutsch. Lehr- und Arbeitsbush mit Audio-CD, Teil 1 (Aspekte neu / Mittelstufe Deutsch)
2. Prüfungstraining DaF: B1 - Zertifikat Deutsch / telc Deutsch B1: Übungsbuch mit CD und CD-ROM Taschenbuch – 1. August 2013
3. Schritte plus Neu 5: Deutsch als Zweitsprache für Alltag und Beruf / Kursbuch + Arbeitsbuch + CD zum Arbeitsbuch Sondereinband – 1. August 2017

Course code : UHG2016

Course : INTENSIVE GERMAN 2

Pre-requisite : UHG2003 German 3 & UHG2013 German 4

Synopsis

At the end of semester, students can comprehend the main ideas of complex text, both on concrete and abstract topics, including basic technical discussion in their field of specialization. They can communicate fluently and spontaneously though that they can interact with native speaker without mayor difficulties. They can produce a detailed, well-structured text on a wide range of topics. They can explain their point of view and give advantages and disadvantages of various objects. This



course is designed as a platform for the students to enable them to sit for the TELC B2 test.

Course Outcomes

CO 1 Read and understand articles, reports and contemporary literature.

CO 2 Listen und understand lengthy statements and reports as well. Most themes and TV programs when the topics are somewhat familiar.

CO 3 Produce detailed text, such as essays, reports and letters, and present arguments effective

CO 4 Relay ideas relatively fluently and spontaneously and actively. Participate in discussions.

References

1. Erkundungen Deutsch als Fremdsprache B2: Integriertes Kurs- und Arbeitsbuch Taschenbuch – 1. Oktober 2008.
2. Mit Erfolg zu telc Deutsch B2: Zertifikat Deutsch Plus. Testbuch + Audio-CD Taschenbuch – 13. September 2010.

STUDENTS AFFAIRS AND ALUMNI DEPARTMENT





STUDENTS AFFAIRS AND ALUMNI DEPARTMENT

INTRODUCTION

Student Affairs and Alumni Department (SAffAD), Universiti Malaysia Pahang (UMP) was established in 2002. SAffAD is responsible for managing the welfare and development of students in supporting the vision, mission, philosophy and core values of the university.

SERVICES OFFERED

WELFARE & STUDENT FINANCE

Students are eligible to apply for scholarship/education loans offered by any agencies such as:

- **Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN)**
- **Jabatan Perkhidmatan Awam (JPA)**
- **Yayasan Pahang**
- **Yayasan Tunku Abdul Rahman**
- **Gamuda Berhad**
- **Yayasan KLK**
- **Other education loan from SUK / State Foundation**

Students are covered under Skim Perlindungan Takaful Berkelompok which seeks to:

- Provides basic protection scheme in the form of compensation in the event of accidents or things that are not desired during the study.
- Alleviate the financial burden on students and their beneficiaries.

It is a 24-hour protection benefits. A claim can be made if admitted for treatment / medical examination, an accident, total permanent disability due to accident, death or claim expenses of hospital bills not covered by UMP Student Health Centre.

Students with financial problems during their studies can apply for financial assistance provided such as:

- Short Term Loan
- Subsistence assistance
- Education fees assistance
- Disabled student assistance



STUDENT COUNSELING SERVICES

- Individual counseling
- Group counseling
- Psychology inventory and career
- Preventive programmes, development, rehabilitation, crisis and intervention

Facilities provided:

- Therapy room
- Reading materials
- Psychological inventory

ACCOMODATION

- Five colleges are provided in the campus. Four colleges at Gambang Campus and one college at Pekan Campus. Both campuses can accommodate up to 8,000 students. It is compulsory for the first year students to stay in the campus.
- Accommodation for second year student and above is assessed through merit and demerit system.
- Active students, students with health problems and students with disabilities are given priority to occupy the residential colleges.
- Air-conditioned rooms are also provided with the appropriate rate.
- Facilities provided at the residential campuses are:
 - Student Park
 - Cafeteria
 - Student Lounges
 - Gymnasium
 - Mini Shops

CO-CURRICULUM CENTRE





CO-CURRICULUM CENTRE

Introduction

Co-curriculum Centre, Universiti Malaysia Pahang was established on January 16, 2009 to create balanced human aspects of academic and soft skills. It also acts as a catalyst in producing students who have a sense of identity, innovative, resilient and has high soft skills through extra-curricular activities. This Centre play significant role in the supply of co-curriculum courses in university, supervision of student bodies and the implementation and expansion of student activities.

Objectives

- Strengthen and enhance co-curricular courses, supervision of student organizations and activities through a systematic planning and management
- Provide encouragement to the graduates to choose programs / clubs / activities based on interests and their capabilities
- To produce graduates who have high self-esteem, knowledge, integrity, creativity and innovation in line with the needs of the University and Industry
- Plan and supervise extra-curricular activities and give recognition through Learning Outcomes (LO) and Soft Skills (KI) and the Merit System in accordance with the soft skills modules from Ministry of Higher Education in order to produce graduates who are holistic

FUNCTIONS

A. Coordinating Co-Curricular Courses

- Offering Co-curricular Courses
- Developing and diversifying the new Co-curriculum Course
- Appoint a qualified coach for each Co-curriculum Courses
- Supervise and manage the implementation of Co-curriculum Courses in terms of logistics and financial



B. Supervise and assist the implementation of club activities / student associations

- Supervise the activities organized or participated in by students
- To assist the implementation of the activities in the financial and logistical aspects
- Provide recognition in the form of merit and a certificate to every student involvement

SYNOPSIS OF CREDITED CO-CURRICULUM COURSES

Student of Universiti Malaysia Pahang must take two credit hours of Co-curriculum Courses. The courses offered are divided into two components. The first component is a Uniformed Body and the second is based on seven Soft Skills elements namely Leadership, Communication, Innovation, Cultural, Volunteerism, Sport, and Community Service.

Diploma students can only choose Briged Siswa for the first component and they do not have to take the second component. While for undergraduate students, who are interested in other Uniformed Bodies courses such as SUKSIS Corps, Army/Airforce/Navy Corps and Siswa APM, they need to follow this course until commissioning. Meanwhile those who choose Briged Siswa and pass, they have to take one more course in the second component for them to graduate.

LIST OF CREDITED CO-CURRICULUM COURSES

Co-Curriculum I

1. Briged Siswa UQB1011
2. Kor Sukarelawan Polis Siswa/i (SUKSIS 1) UQB1021
3. Kor Sukarelawan Polis Siswa/i (SUKSIS 2) UQB2021
4. Kor Sukarelawan Polis Siswa/i (SUKSIS 3) UQB3021
5. Kor Sukarelawan Polis Siswa/i (SUKSIS 4) UQB4021
6. Kor Sukarelawan Polis Siswa/i (SUKSIS 5) UQB5021
7. Kor Sukarelawan Polis Siswa/i (SUKSIS 6) UQB6021
8. Pasukan Siswa APM (Siswa APM 1) UQB1031
9. Pasukan Siswa APM (Siswa APM 2) UQB2031
10. Pasukan Siswa APM (Siswa APM 3) UQB3031
11. Pasukan Siswa APM (Siswa APM 4) UQB4031
12. PALAPES Laut 1 UQB1041
13. PALAPES Laut 2 UQB2041



14. PALAPES Laut 3 UQB3041
15. PALAPES Laut 4 UQB4041
16. PALAPES Laut 5 UQB5041
17. PALAPES Laut 6 UQB6041
18. PALAPES Udara 1 UQB1051
19. PALAPES Udara 2 UQB2051
20. PALAPES Udara 3 UQB3051
21. PALAPES Udara 4 UQB4051
22. PALAPES Udara 5 UQB5051
23. PALAPES Udara 6 UQB6051
24. PALAPES Darat 1 UQB1061
25. PALAPES Darat 2 UQB2061
26. PALAPES Darat 3 UQB3061
27. PALAPES Darat 4 UQB4061

Co-Curriculum II

1. Kompang UQN2011
2. Anyaman UQN2031
3. Kaunselor Siswa UQP2011
4. Iqra' UQP2021
5. Kepimpinan UQP2061
6. Pengurusan Majlis UQP2071
7. Pengurusan Bencana UQP2081
8. Kayak UQS2011
9. Trekking UQS2021
10. Silat Olahraga UQS2031
11. Bola Sepak UQS2041
12. Bola Baling UQS2061
13. Archery UQS2081
14. Fitness UQS2091
15. Mountain Bike UQS2111
16. Futsal UQS2161
17. Debat (Bahasa Melayu) UQP2031
18. Creative Art UQD2021
19. Golf UQS2151



SYNOPSIS OF STUDENT SOCIETIES & ACTIVITIES

Until Desember 2017, there were more than 83 Student Societies that have been established in Universiti Malaysia Pahang. The Societies is divided into 8 Student Development Core such as Leadership, Public Speaking, Innovation, Volunteering, Community Service, Sport& Recreation, Entrepreneurship, and Culture. Each student is free to join the Societies by interests and preferences of the individual.

Student involvement in the club activities / student associations is the process of education or training to develop them as holistic and balanced individuals around six primary attributes: ethics and spirituality, leadership skills, national identity, language proficiency, thinking skills, and knowledge. This agenda in line with the Malaysia Education Blueprint 2015–2025 (Higher Education).

For inquiries:

Dean Student Development

Ts. Dr. Muhamad Bin Mat Noor

Tel: 09-424 6255

Fax: 09-5492535

Email: muhamad@ump.edu.my

Student Activity Unit

Mr. Abd Rahman bin Ahmad

Senior Executive

Tel: 09-549 2343

Fax: 09-549 2535

Email: rahman@ump.edu.my

Student Activity Unit

Mrs. Sufia Binti Juperi

Administrative Assistant

Tel: 09- 549 2568

Faks: 09-549 2535

Email : sufia@ump.edu.my

Co-Curriculum Credit & Uniformed Bodies Unit

Mr. Mohd Nazri Bin Samsudin

Senior Executive

Tel: 09-549 3157

Faks: 09- 549 2535

Email: mohdnazri@ump.edu.my

Co-Curriculum Credit & Uniformed Bodies Unit

Mrs Rozana Binti Sahadan

Senior Administrative Assistant

Tel: 09-549 3158

Faks: 09- 549 2535

Email: rozana@ump.edu.my

Leadership Unit

Mr. Muhamad Faisal Bin Mohd Yasin

Senior Executive

Tel: 09- 549 2343

Faks: 09-549 2535

Email : faisalmy@ump.edu.my

ENTRY REQUIREMENTS



**FACULTY OF ELECTRICAL &
ELECTRONICS ENGINEERING**

DEGREE PROGRAMME



DIPLOMA HOLDER

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	Diploma/Equivalent Minimum Requirements
		<p>General University Requirements</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p>and</p> <p>Possess Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p>and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
1.	B.Eng (Hons.) Electrical Engineering (Electronics) JK02 8 Semester	<p>Fulfills General University Requirement</p> <p>and</p> <p>PROGRAMME REQUIREMENTS</p>
2.	B.Eng (Hons.) Electrical Engineering (Power System) JK21 8 semester	<p>Obtain a relevant Diploma from Public University (UA) with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Private Higher Education Institution (IPTS) / Polytechnic with at least CGPA ≥ 3.00</p> <p>Or</p> <p>Applicants who do not obtained CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years of work experience in related fields can be considered.</p> <p>And</p> <p>Candidates must not be colour blind and physically handicapped which will complicate practical works</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by the faculty.</p>


KPM MATRICULATION/FOUNDATION STUDENT

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	KPM Matriculation/Foundation Studies Minimum Requirements
		<p>GENERAL UNIVERSITY REQUIREMENTS</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p>and</p> <p>Pass KPM Matriculation/UM Science Foundation/UiTM Science Foundation with at least a CGPA of 2.00;</p> <p>and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING		
1.	B.Eng (Hons.) Electrical Engineering (Electronics) JK02 8 Semester	<p>Fulfill General University Requirements</p> <p>and</p> <p>PROGRAMME REQUIREMENTS</p>
2.	B.Eng (Hons.) Electrical Engineering (Power System) JK21 8 semester	<p>Obtain at least Grade C(2.00) in Matriculation/Foundation level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics <p>and</p> <p>Obtain at least Grade C (2.00) in Matriculation/Foundation level in any two(2) of the following subjects;</p> <ul style="list-style-type: none"> • Chemistry / Engineering Chemistry • Physics / Engineering Physics • Biology <p>Candidates without Physics subject in Matriculation/Foundation level need to have at least credit in Physics subject in SPM level.</p> <p>and</p> <p>Candidates must not be colour blind and physically handicapped which will complicate practical works</p> <p>Note: Candidates from Life Science Stream who do not take Physics at Matriculation/Foundation level need to take Basic Physics subject at University.</p>



STPM HOLDER

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	Minimum STPM Qualification
<p>General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu / Bahasa Malaysia July Paper;</p> <p>and</p> <p>Pass Sijil Tinggi Persekolahan Malaysia (STPM) with at least CGPA 2.00 and:</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) for General Studies subject; <p>and</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) in two (2) other subjects. <p>and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
<p>FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING</p>		
1.	B.Eng (Hons.) Electrical Engineering (Electronics) JK02 8 Semester	<p>Fulfill General University Requirement</p> <p>and</p> <p>PROGRAMME REQUIREMENT</p>
2.	B.Eng (Hons.) Electrical Engineering (Power System) JK21 8 semester	<p>Obtain at least Grade C (CGPA 2.00) in STPM level for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; <p>and</p> <p>Obtain at least Grade C (CGPA 2.00) in STPM level for any two (2) of the following subjects ;</p> <ul style="list-style-type: none"> • Chemistry • Physics • Biology <p>Candidates without Physics subjects in STPM level need to have at least credit in Physics subject in SPM level</p> <p>and</p> <p>Candidates must not be colour blind and physically handicapped which will complicate practical works.</p> <p>Note: Candidates who do not take Physics at STPM level need to take Basic Physics subject at University</p>

**FACULTY OF ELECTRICAL &
ELECTRONICS ENGINEERING**

DIPLOMA PROGRAMME



CERTIFICATE HOLDER

No.	Programme and Duration of Study	Code	Minimum Requirement
			<p>GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMME)</p> <ol style="list-style-type: none"> 1. Pass in Sijil Pelajaran Malaysia or equivalent with at least CREDIT (C GRADE) in Bahasa Melayu.
<p>1.</p>	<p>FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING</p> <p>Diploma in Electrical Engineering (Industrial Electronics) (5 Semester + 1 Short Semester)</p>	<p>J2425</p>	<p>PROGRAMME REQUIREMENT</p> <ol style="list-style-type: none"> 1. Fulfill GENERAL UNIVERSITY REQUIREMENT. 2. Pass with Certificate or equivalent in related field from the Institution acknowledged by the University Senate with at least CGPA 3.00 3. Candidates must not be colour blind and physically handicapped which will complicate practical works



SPM HOLDER

No.	Programme and Study Duration	Code	Minimum Requirement
			<p>GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMME)</p> <p>1. Pass in Sijil Pelajaran Malaysia or equivalent with at least FIVE (5) CREDIT (C GRADE) including Bahasa Melayu.</p>
1.	<p>FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING</p> <p>Diploma in Electrical Engineering (Industrial Electronics) (5 Semester + 1 Short Semester)</p>	J2425	<p>PROGRAMME SPECIAL REQUIREMENT</p> <p>1. Fulfill GENERAL UNIVERSITY REQUIREMENT.</p> <p>2. Credit at least (Grade C) in the following subjects :</p> <ul style="list-style-type: none"> •Mathematics, •Additional Mathematics, •Physics/Chemistry. <p>3. Credit at least ONE (1) (Grade C) in the following subjects:-</p> <ul style="list-style-type: none"> •Information Technology •Physics •Chemistry •Invention •Biology •EngineeringTechnology •Mechacnical Engineering •Electrical & Electronics Engineering Studies •Technical Drawing <p>4. Pass at least (Grade E) in English.</p> <p>5. Candidates must not be colour blind and physically handicapped which will complicate practical works</p>

**FACULTY OF COMPUTER
SYSTEMS & SOFTWARE
ENGINEERING**

DEGREE PROGRAMME

DIPLOMA HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/Equivalent Qualification
<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING		
1.	Bachelor of Computer Science (Software Engineering) with Honours JC10 8 semester	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 3.00</p> <p style="text-align: center;">AND</p> <p>At least Credit (Grade C) in SPM Level in the following subject:</p> <ul style="list-style-type: none"> • Additional Mathematics <p>Or</p> <p>Applications not obtained CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates must not be colour blind (only for JC24) and physically handicapped which will complicate practical works</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
2.	Bachelor of Computer Science (Computer Systems & Networking) with Honours JC11 8 semester	
3.	Bachelor of Computer Science (Graphics & Multimedia Technology) with Honours JC24 8 semester	



MATRICULATION/FUNDAMENTAL LEAVERS

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum MOE Matriculation/Fundamental Qualification
<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Pass MOE Matriculation/UM Science Fundamental/UiTM Fundamental with at least CGPA 2.00;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING		
1.	Bachelor of Computer Science (Software Engineering) with Honours JC10 8 semester	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (2.00) in Additional Mathematics at SPM level</p> <p style="text-align: center;">and</p> <p>Candidates should not be colour blind and physically handicapped which will complicate practical works. (Colour Blind condition is only applicable for Program JC24)</p>
2.	Bachelor of Computer Science (Computer Systems & Networking) with Honours JC11 8 semester	
3.	Bachelor of Computer Science (Graphics & Multimedia Technology) with Honours JC24 8 semester	

STPM HOLDER

NO.	(i) (ii) (iii) Study Program Code Study Duration	Minimum STPM Qualification
		<p align="center">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu / Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Pass Sijil Tinggi Persekolahan Malaysia (STPM) with at least CGPA 2.00 and:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) for General Studies subject; <p align="center">and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p align="center">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING		
1.	Bachelor of Computer Science (Software Engineering) with Honours JC10 8 semester	<p align="center">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (2.00) in Additional Mathematics at SPM level</p>
2.	Bachelor of Computer Science (Computer Systems & Networking) with Honours JC11 8 semester	<p align="center">and</p> <p>Candidates should not be colour blind and physically handicapped which will complicate practical works. (Colour Blind condition is only applicable for Program JC24)</p>
3.	Bachelor of Computer Science (Graphics & Multimedia Technology) with Honours JC24 8 semester	

**FACULTY OF COMPUTER
SYSTEMS & SOFTWARE
ENGINEERING**

DIPLOMA PROGRAMME



CERTIFICATE HOLDER

No.	Program and Study Duration	Code	Minimum Requirement
			<p style="text-align: center;">GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAM)</p> <p>1. Pass in Sijil Pelajaran Malaysia or equivalent with at least CREDIT (C GRADE) in Bahasa Melayu. Pass at least (Grade E) in Sejarah.</p>
<p>1.</p>	<p>FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING</p> <p>Diploma in Computer Science (5 Semester + 1 Short Semester)</p>	<p>J2810</p>	<p style="text-align: center;">PROGRAM REQUIREMENTS</p> <p>1. Fulfill GENERAL UNIVERSITY REQUIREMENT.</p> <p>2. Pass with Certificate or equivalent in related field from the Institution acknowledged by the University Senate with at least CGPA 3.00</p> <p>2. At least credit (Grade C) in English.</p> <p>3. Candidates must not be physically handicap which will complicate practical works</p>



SPM HOLDER

No.	Program and Study Duration	Code	Minimum Requirement
			<p align="center">GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAM)</p> <ol style="list-style-type: none"> 1. Pass in Sijil Pelajaran Malaysia or equivalent with at least FIVE (5) CREDIT (C GRADE) including Bahasa Melayu. 2. Pass at least (Grade E) in Sejarah.
1.	<p>FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING</p> <p>Diploma in Computer Science (5 Semester + 1 Short Semester)</p>	<p>J2810</p>	<p align="center">PROGRAM REQUIREMENTS</p> <ol style="list-style-type: none"> 1. Fulfill GENERAL UNIVERSITY REQUIREMENT. 2. At least credit (Grade C) in Mathematics AND English; 3. At least credit (Grade C) in any two (2) subject; 4. At Least pass (Gred E) in Additional Mathematics at SPM Level; 5. Candidates should not be physically handicap which will complicate practical works.

**FACULTY OF CHEMICAL
& NATURAL RESOURCES
ENGINEERING**

DEGREE PROGRAMME

DIPLOMA HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/Equivalent Qualification
		<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
1.	B.Eng (Hons.) Chemical Engineering JK03 8 Semester	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENT</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA \geq 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA \geq 3.00</p> <p>Or</p> <p>Applications not obtain CGPA mentioned above, but with at least CGPA \geq 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
2.	Bachelor Of Chemical Engineering Technology With Honours. JY03 8 Semester	<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">And</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA \geq 2.70</p> <p style="text-align: center;">And</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>



MATRICULATION/FUNDAMENTAL HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum MOE Matriculation/Fundamental Qualification
<p>General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Pass MOE Matriculation/UM Science Fundamental/UiTM Fundamental with at least CGPA 2.70;</p> <p style="text-align: center;">and</p> <p>At least Band 1 in Malaysian University English Test (MUET).</p>		
<p>FACULTY OF CHEMICAL ENGINEERING & NATURAL RESOURCES</p>		
<p>1.</p>	<p>B.Eng (Hons.) Chemical Engineering JK03 8 Semester</p>	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>At least Grade C (2.00) in Matriculation/Fundamental level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics; • Chemistry / Engineering Chemistry; and • Physics / Engineering Physics / Biology. <p>Candidates who obtain conditions in Biology subject in Matriculation/Fundamental level need to have at least credit in Physics subject in SPM level.</p> <p style="text-align: center;">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note:</p> <p>1. Candidates from Life Science Stream who do not take Physics at Matriculation/Fundamental level need to take Basic Physics subject at University.</p>
<p>2.</p>	<p>Bachelor Of Chemical Engineering Technology With Honours. JY03 8 Semester</p>	<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Pass MOE Matriculation/UM Science Fundamental/UiTM Fundamental with at least CGPA 2.50;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>



STPM HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum STPM Qualification
		<p align="center">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Pass Sijil Tinggi Persekolahan Malaysia (STPM) with at least CGPA 2.70 and:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) for General Studies subject; <p align="center">and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p align="center">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF CHEMICAL ENGINEERING & NATURAL RESOURCES		
1.	B.Eng (Hons.) Chemical Engineering JK03 8 Semester	<p align="center">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>At least C Grade (NGMP 2.00) in STPM level for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Chemistry; and • Physics / Biology <p>Candidates who obtain conditions in Biology subject in STPM level need to have at least credit in Physics subject in SPM level.</p> <p align="center">dan</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Candidates from Life Science Stream who do not take Physics at STPM level need to take Basic Physics subject at University.
2.	Bachelor Of Chemical Engineering Technology With Honours. JY03 8 Semester	<p align="center">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Pass Sijil Tinggi Persekolahan Malaysia (STPM) with at least CGPA 2.50 and:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) for General Studies subject; <p align="center">and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p align="center">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>

**FACULTY OF CHEMICAL
& NATURAL RESOURCES
ENGINEERING**

DIPLOMA PROGRAMME



CERTIFICATE HOLDER

No.	Program and Study Duration	Code	Minimum Requirement
			<p style="text-align: center;">GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAM)</p> <p>1. Pass in Sijil Pelajaran Malaysia or equivalent with at least CREDIT (C GRADE) in Bahasa Melayu.</p>
<p>1.</p>	<p>FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING</p> <p>Diploma in Chemical Engineering (Process Plant) (5 Semester + 1 Short Semester)</p>	<p>J2441</p>	<p style="text-align: center;">PROGRAM SPECIAL REQUIREMENT</p> <p>1. Fulfill GENERAL UNIVERSITY REQUIREMENT.</p> <p>2. Pass with Certificate or equivalent in related field from the Institution acknowledged by the University Senate with at least CGPA 3.00</p> <p>3. Candidates are not colour blind and physically handicapped that can impair practical work.</p>



SPM HOLDER

No.	Program and Study Duration	Code	Minimum Requirement
			<p align="center">GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAM)</p> <ol style="list-style-type: none"> 1. Pass in Sijil Pelajaran Malaysia or equivalent with at least FIVE (5) CREDIT (C GRADE) including Bahasa Melayu. 2. Pass at least (Grade E) in Sejarah.
<p>1.</p>	<p>FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING</p> <p>Diploma in Chemical Engineering (Process Plant) (5 Semester + 1 Short Semester)</p>	<p>J2441</p>	<p align="center">PROGRAM SPECIAL REQUIREMENT</p> <ol style="list-style-type: none"> 1. Fulfill GENERAL UNIVERSITY REQUIREMENT. 2. At least credit (C Grade) in the following subjects : <ul style="list-style-type: none"> • Mathematics, • Additional Mathematics, • Physics/Chemistry. 3. At least ONE (1) credit (Grade C) in the following subjects:- <ul style="list-style-type: none"> • Information Technology • Physics • Chemistry • Invention • Biology • EngineeringTechnology • Mechanical Engineering Study • Electric & Electronic Engineering Study • Technical Drawing 4. At least Pass (Grade E) in English 5. Candidates are not colour blind and physically handicapped that can impair practical work.

**FACULTY OF CIVIL
ENGINEERING AND EARTH
RESOURCES**

DEGREE PROGRAMME

DIPLOMA HOLDER

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	Minimum Diploma/Equivalent Qualification
		<p align="center">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p>and</p> <p>Possess Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p>and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES		
1.	B.Eng (Hons.) Civil Engineering JK01 8 semester	<p>Fulfill University General Requirement</p> <p>and</p> <p>PROGRAMME REQUIREMENT</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 3.00</p> <p>Or</p> <p>Applications not obtain CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates must not be physically handicapped which will complicate practical works</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>



KPM MATRICULATION/FOUNDATION STUDENT

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	KPM Matriculation/Foundation Studies Minimum Requirements
<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p>and</p> <p>Pass KPM Matriculation/UM Science Foundation/UiTM Science Foundation Studies with at least a CGPA of 2.00;</p> <p>and</p> <p>Obtain at least Band 2 in Malaysian University English Test (MUET).</p>		
FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES		
1.	B.Eng (Hons.) Civil Engineering JK01 8 semester	<p>Fulfill General University Requirement</p> <p>and</p> <p>PROGRAMME REQUIREMENT</p> <p>Obtain at least Grade C (2.00) in Matriculation/Foundation level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics <p>and</p> <p>Obtain at least Grade C (2.00) in Matriculation/Foundation level in any two(2) of the following subjects;</p> <ul style="list-style-type: none"> • Chemistry / Engineering Chemistry • Physics / Engineering Physics • Biology <p>Candidates without Physics subject in Matriculation/Foundation level need to have at least credit in Physics subject in SPM level.</p> <p>and</p> <p>Candidates should not be physically handicapped which will complicate practical works.</p> <p>Note: Candidates from Life Science Stream who do not take Physics at Matriculation/Foundation level need to take Basic Physics subject at University.</p>



STPM HOLDER

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	Minimum STPM Qualification
		<p>General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu / Bahasa Malaysia July Paper;</p> <p>and</p> <p>Passed Sijil Tinggi Persekolahan Malaysia (STPM) with at least CGPA 2.00 and:</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) for General Studies subject; <p>and</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) in two (2) other subjects. <p>and</p> <p>Obtain at least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES		
1.	B.Eng (Hons.) Civil Engineering JK01 8 semester	<p>Fulfill General University Requirement</p> <p>and</p> <p>PROGRAMME REQUIREMENT</p> <p>Obtain at least Grade C (CGPA 2.00) in STPM level for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; <p>and</p> <p>Obtain at least Grade C (CGPA 2.00) in STPM level for any two (2) of the following subjects ;</p> <ul style="list-style-type: none"> • Chemistry • Physics • Biology <p>Candidates without Physics subject in STPM level need to have at least credit in Physics subject in SPM level.</p> <p>and</p> <p>Candidates should not be physically handicapped which will complicate practical works.</p> <p>Note: Candidates from Life Science Stream who do not take Physics at STPM level need to take Basic Physics subject at University.</p>

**FACULTY OF CIVIL
ENGINEERING AND EARTH
RESOURCES**

DIPLOMA PROGRAMME



CERTIFICATE HOLDER

No.	Programme and Duration of Study	Code	Minimum Requirement
			<p>GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMME)</p> <ol style="list-style-type: none"> 1. Pass in Sijil Pelajaran Malaysia or equivalent with at least CREDIT (GRADE C) in Bahasa Melayu.
1.	<p>FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES</p> <p>Diploma in Civil Engineering (5 Semester + 1 Short Semester)</p>	<p>J2410</p>	<p>PROGRAMME SPECIAL REQUIREMENT</p> <ol style="list-style-type: none"> 1. Fulfill GENERAL UNIVERSITY REQUIREMENT. 2. Pass with Certificate or equivalent in related field from the Institution acknowledged by the University Senate with at least CGPA 3.00 3. Candidates should not be physically handicap which will complicate practical works



SPM HOLDER

No.	Programme and Duration of Study	Code	Minimum Requirement
			<p align="center">GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMME)</p> <ol style="list-style-type: none"> 1. Pass in Sijil Pelajaran Malaysia or equivalent with at least FIVE (5) CREDIT (GRADE C) including Bahasa Melayu 2. Pass at least (Grade E) in Sejarah.
<p>1.</p>	<p>FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES</p> <p>Diploma in Civil Engineering (5 Semester + 1 Short Semester)</p>	<p>J2410</p>	<p align="center">PROGRAMME SPECIAL REQUIREMENT</p> <ol style="list-style-type: none"> 1. Fulfill GENERAL UNIVERSITY REQUIREMENT. 2. At least credit (Grade C) in the following subjects : <ul style="list-style-type: none"> • Mathematics, • Additional Mathematics, • Physics/Chemistry. 3. At least ONE (1) credit (Grade C) in the following subjects:- <ul style="list-style-type: none"> • Information Technology • Physics • Chemistry • Invention • Biology • Engineering Technology • Machine/Mechanical Engineering Study • Civil Engineering Study • Electric & Electronic Engineering Study • Technical Drawing 4. At least Pass (Grade E) in English. 5. Candidates should not be physically handicap which will complicate practical works.

**FACULTY OF MECHANICAL
ENGINEERING**

DEGREE PROGRAMME

DIPLOMA HOLDER

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	Minimum Diploma/Equivalent Qualification
		<p>General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p>and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p>and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF MECHANICAL ENGINEERING		
1.	B.Eng (Hons.) Mechanical Engineering JK08 8 semester	<p>Fulfill General University Requirement</p> <p>and</p>
2.	B.Eng (Hons.) Mechanical Engineering with (Automotive) JK40 8 semester	<p>PROGRAMME REQUIREMENT</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 3.00</p> <p>Or</p> <p>Applications not obtain CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates must not be physically handicapped which will complicate practical works</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>



MATRICULATION/FUNDAMENTAL HOLDER

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	Minimum KPM Matriculation/Fundamental Qualification
		<p>General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and Pass KPM Matriculation/UM Science Fundamental/UiTM Fundamental with at least CGPA 2.00; and At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF MECHANICAL ENGINEERING		
1.	B.Eng (Hons.) Mechanical Engineering JK08 8 semester	<p>Fulfill University General Requirement</p> <p>and</p>
2.	B.Eng (Hons.) Mechanical Engineering with (Automotive) JK40 8 semester	<p>PROGRAMME REQUIREMENT</p> <p>At least Grade C (2.00) in Matriculation/Fundamental level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics <p>and</p> <p>At least Grade C (2.00) in Matriculation/Fundamental level in any two(2) of the following subjects;</p> <ul style="list-style-type: none"> • Chemistry / Engineering Chemistry • Physics / Engineering Physics • Biology <p>Candidates who obtain conditions in Biology subject in Matriculation/Fundamental level need to have at least credit in Physics subject in SPM level.</p> <p>and</p> <p>Candidate should not be physically handicapped which will complicate practical works.</p> <p>Note: Candidates from Life Science Stream who do not take Physics at Matriculation/Fundamental level need to take Basic Physics subject at University.</p>



STPM HOLDER

NO.	(i) Programmeme Name (ii) Code (iii) Duration of Study	Minimum STPM Qualification
<p>General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu / Bahasa Malaysia July Paper;</p> <p>and</p> <p>Pass Sijil Tinggi Persekolahan Malaysia (STPM) with at least CGPA 2.00 and:</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) for General Studies subject; <p>and</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) in two (2) other subjects. <p>and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
<p>FACULTY OF MECHANICAL ENGINEERING</p>		
1.	B.Eng (Hons.) Mechanical Engineering JK08 8 semester	<p>Fulfill General University Requirement</p> <p>and</p>
2.	B.Eng (Hons.) Mechanical Engineering with (Automotive) JK40 8 semester	<p>PROGRAMME REQUIREMENT</p> <p>At least Grade C (CGPA 2.00) in STPM level for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; <p>and</p> <p>At least Grade C (CGPA 2.00) in STPM level for any two (2) of the following subjects ;</p> <ul style="list-style-type: none"> • Chemistry • Physics • Biology <p>Candidates who obtain conditions in Biology subject in STPM level need to have at least credit in Physics subject in SPM level.</p> <p>and</p> <p>Candidates should not be physically handicapped which will complicate practical works.</p> <p>Note: Candidates from Life Science Stream who do not take Physics at STPM level need to take Basic Physics subject at University.</p>

**FACULTY OF MECHANICAL
ENGINEERING**

DIPLOMA PROGRAMME



CERTIFICATE HOLDER

No.	Programme and Duration of Study	Code	Minimum Requirement
			<p align="center">GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAM)</p> <p>1. Pass in Sijil Pelajaran Malaysia or equivalent with at least CREDIT (C GRADE) in Bahasa Melayu.</p>
<p>1.</p>	<p>FACULTY OF MECHANICAL ENGINEERING Diploma in Mechanical Engineering (5 Semester + 1 Short Semester)</p>	<p>J2430</p>	<p align="center">PROGRAM SPECIAL REQUIREMENT</p> <p>1. Fulfill GENERAL UNIVERSITY REQUIREMENT.</p> <p>2. Pass with Certificate or equivalent in related field from the Institution acknowledged by the University Senate with at least CGPA 3.00</p> <p>3. Candidates should not be physically handicapped which will complicate practical works</p>



SPM HOLDER

No.	Programme and Duration of Study	Code	Minimum Requirement
			<p style="text-align: center;">GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAM)</p> <ol style="list-style-type: none"> 1. Pass in Sijil Pelajaran Malaysia or equivalent with at least FIVE (5) CREDIT (C GRADE) including Bahasa Melayu. 2. Pass at least (Grade E) in Sejarah.
1.	<p>FACULTY OF MECHANICAL ENGINEERING</p> <p>Diploma in Mechanical Engineering (5 Semester + 1 Short Semester)</p>	J2430	<p style="text-align: center;">PROGRAMME REQUIREMENT</p> <ol style="list-style-type: none"> 1. Fulfill GENERAL UNIVERSITY REQUIREMENT. 2. At least credit (Grade C) in the following subjects : <ul style="list-style-type: none"> • Mathematics, • Additional Mathematics, • Physics/Chemistry. 3. At least ONE (1) credit (Grade C) in the following subjects:- <ul style="list-style-type: none"> • Information Technology • Physics • Chemistry • Invention • Biology • EngineeringTechnology • Machine/Mechanical Engineering Study • Civil Engineering Study • Electric & Electronic Engineering Study • Technical Drawing 4. At least Pass (GRADE D) in English. 5. Candidates should not be physically handicapped which will complicate practical works.

**FACULTY OF INDUSTRIAL
SCIENCES & TECHNOLOGY**

DEGREE PROGRAMME

DIPLOMA HOLDERS

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/ Equivalent Qualification
<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
FACULTY INDUSTRIAL SCIENCES & TECHNOLOGY		
1.	Bachelor of Applied Science (Hons) Industrial Chemistry JG04 8 Semesters	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 3.00</p> <p>Or</p> <p>Applications not obtain CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates must not be colour blind and physically handicapped which will complicate practical works</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
2.	Bachelor of Applied Science (Hons) Industrial Biotechnology JG44 8 Semesters	
3.	Bachelor of Applied Science (Hons) Materials Technology JG47 8 Semesters	

DIPLOMA HOLDERS - DKM

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/ Equivalent Qualification
		<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY INDUSTRIAL SCIENCES & TECHNOLOGY		
1.	Bachelor of Applied Science (Hons) Industrial Chemistry JG04 8 Semesters	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain a relevant Diploma Kemahiran Malaysia (DKM/DLKM) with at least CGPA ≥ 3.00 or 80%.</p> <p style="text-align: center;">And</p> <p>At least Pass (Grade E) in SPM Level in the following subject:</p> <ul style="list-style-type: none"> • English • Mathematics • Physics / Science <p style="text-align: center;">Or</p> <p>Applications not obtain CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p style="text-align: center;">And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
2.	Bachelor of Applied Science (Hons) Industrial Biotechnology JG44 8 Semesters	
3.	Bachelor of Applied Science (Hons) Materials Technology JG47 8 Semesters	

MATRICULATION/ASASI HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum MOE Matriculation/ Asasi Qualification
<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Pass MOE Matriculation/ UM Asasi Science / Asasi UiTM with at least a CPA of 2.70;</p> <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>		
FACULTY INDUSTRIAL SCIENCES & TECHNOLOGY		
1.	Bachelor of Applied Science (Hons) Industrial Chemistry JG04 8 Semesters	<p style="text-align: center;">Fulfill General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least C Grade (2.00) at Matriculation/ Asasi level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics; • Chemistry / Engineering Chemistry; • Physics / Engineering Physics / Biology; OR Obtain at least a Grade B in Physics / Biology at SPM level <p style="text-align: center;">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>
2.	Bachelor of Applied Science (Hons) Industrial Biotechnology JG44 8 Semesters	<p style="text-align: center;">Fulfill General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least C Grade (2.00) at Matriculation/ Asasi level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics; • Biology; • Physics / Engineering Physics / Chemistry / Engineering Chemistry; OR Obtain at least a Grade B in Chemistry / Physics at SPM level <p style="text-align: center;">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>
3.	Bachelor of Applied Science (Hons) Materials Technology JG47 8 Semesters	<p style="text-align: center;">Fulfill General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least C Grade (2.00) at Matriculation/ Asasi level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics; • Physics / Engineering Physics; • Biology / Chemistry / Engineering Chemistry; OR Obtain at least a Grade B in Physics / Biology / Chemistry at SPM level <p style="text-align: center;">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>



STPM HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum STPM Qualification
		<p align="center">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Pass the Malaysian Higher School Certificate (STPM) with at least a CPA of 2.70 and with at least:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in General Studies; <p align="center">and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p align="center">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>

FACULTY INDUSTRIAL SCIENCES & TECHNOLOGY

1.	Bachelor of Applied Science (Hons) Industrial Chemistry JG04 8 Semesters	<p align="center">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (NGMP 2.00) at STPM level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Chemistry ; and • Physics / Biology; OR Obtain at least a Grade B in Physics / Biology at SPM level;
2.	Bachelor of Applied Science (Hons) Industrial Biotechnology JG44 8 Semesters	<p align="center">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (NGMP 2.00) at STPM level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Biology • Physics / Chemistry; OR Obtain at least a Grade B in Physics / Chemistry at SPM level; and
3.	Bachelor of Applied Science (Hons) Materials Technology JG47 8 Semesters	<p align="center">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (NGMP 2.00) at STPM level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Physics; and • Chemistry / Biology OR OR Obtain at least a Grade B in Chemistry / Biology / Physics at SPM level

Candidates are not colour blind and physically handicapped that can impair practical work for all programme.

**FACULTY OF MANUFACTURING
ENGINEERING**

DEGREE PROGRAMME

DIPLOMA HOLDERS

NO.	(i) Programme Name (ii) Code (iii) Duration of Study	Minimum Diploma/Equivalent Qualification
		<p>General University Requirement</p> <p>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p>and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p>and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY MANUFACTURING ENGINEERING		
1.	B.Eng (Hons.) Manufacturing Engineering JK09 8 Semesters	<p>Fulfill General University Requirement</p> <p>and</p>
2.	B.Eng (Hons.) Mechatronic Engineering JK24 8 Semesters	<p>PROGRAMME REQUIREMENTS</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 3.00</p> <p>Or</p> <p>Applications not obtained CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates must not be colour blind and physically handicapped which will complicate practical works</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>

KPM MATRICULATION/FOUNDATION STUDENT

NO.	(i) (ii) (iii) Programme Name Code Duration of Study	Minimum KPM Matriculation/ Asasi Qualification
<p>General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p>and</p> <p>Pass KPM Matriculation/ UM Asasi Science/ Asasi UiTM with at least a CPA of 2.00;</p> <p>and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>		
<p>FACULTY MANUFACTURING ENGINEERING</p>		
1.	B.Eng (Hons.) Manufacturing Engineering JK09 8 Semesters	<p>Fulfil General University Requirements</p> <p>and</p>
2.	B.Eng (Hons.) Mechatronic Engineering JK24 8 Semesters	<p>PROGRAMME REQUIREMENTS</p> <p>Obtain at least a Grade C (2.00) at Matriculation/ Asasi level in the following subject;</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics <p>and</p> <p>Obtain at least Grade C (2.00) at Matriculation / Asasi level in any of the following two (2) subjects;</p> <ul style="list-style-type: none"> • Chemistry / Engineering Chemistry • Physics / Engineering Physics • Biology <p>Candidates who obtain conditions in Biology at Matriculation/Fundamental level need to have at least credit in Physics at SPM level.</p> <p>and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note: Life Science candidates who did not take Physics at matriculation level / Asasi must take Basic Physics in the University.</p>



STPM HOLDER

NO.	(i) (ii) (iii) Programme Name Code Duration of Study	Minimum STPM Qualification
<p>General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p>and</p> <p>Pass the Malaysian Higher School Certificate (STPM) with at least a CPA of 2.00 and with at least:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in General Studies; <p>and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p>and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>		
<p>FACULTY MANUFACTURING ENGINEERING</p>		
1.	B.Eng (Hons.) Manufacturing Engineering JK09 8 Semesters	<p>Fulfill General University Requirements</p> <p>and</p> <p>PROGRAMME REQUIREMENTS</p>
2.	B.Eng (Hons.) Mechatronic Engineering JK24 8 Semesters	<p>Obtain at least a Grade C (NGMP 2.00) at STPM level in the following subject :</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; <p>and</p> <p>Obtain at least Grade C (NGMP 2.00) at STPM level in any of the following two (2) subjects;</p> <ul style="list-style-type: none"> • Chemistry • Physics • Biology <p>Candidates who obtain conditions in Biology at STPM level should at least credit in Pyhsics at SPM level.</p> <p>and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note: Life Science candidates who did not take Physics at STPM level must take Basic Physics in the University.</p>

**FACULTY OF ENGINEERING
TECHNOLOGY**

**DEGREE PROGRAMME
(ENG TECH)**

DIPLOMA HOLDERS

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/Equivalent Qualification
		<p align="center">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p align="center">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF ENGINEERING TECHNOLOGY		
1.	Bachelor of Engineering Technology (Electrical) with Honours JY30 8 Semesters	<p align="center">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain a relevant Diploma Kemahiran Malaysia (DKM/DLKM) with at least CGPA ≥ 3.00 or 80%.</p> <p align="center">And</p> <p>At least Pass (Grade E) in SPM Level in the following subject:</p> <ul style="list-style-type: none"> • English • Mathematics • Physics / Science <p align="center">Or</p> <p>Applications not obtained CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p align="center">And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
2.	Bachelor of Electrical Engineering Technology (Power & Machine) with Honours JY35 8 Semesters	
3.	Bachelor of Electronics Engineering Technology (Computer System) with Honours JY46	
4.	Bachelor of Engineering Technology (Energy & Environmental) with Honours JY56 8 semesters	
5.	Bachelor of Engineering Technology (Infrastructure Management) with Honours JY60 8 Semesters	
6.	Bachelor of Mechanical Engineering Technology (Petroleum) with Honours JY65 8 semesters	
7.	Bachelor of Manufacturing Engineering Technology (Pharmaceutical) with Honours JY70 8 Semesters	
8.	Bachelor of Engineering Technology (Manufacturing) with Honours JY90 8 Semesters	

DIPLOMA HOLDERS - DVM

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/Equivalent Qualification
		<p align="center">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p align="center">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>
FACULTY OF ENGINEERING TECHNOLOGY		
1.	Bachelor of Engineering Technology (Electrical) with Honours JY30 8 Semesters	<p align="center">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain a relevant Diploma Vokasional Malaysia (DVM) with at least CGPA ≥ 3.00</p> <p align="center">And</p> <p>Obtain at least:</p> <ul style="list-style-type: none"> • Academic CGPA 3.33 • Vocational CGPA 3.67 • Competent All Modul Vocational <p align="center">Or</p> <p>Applications not obtained CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p align="center">And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
2.	Bachelor of Electrical Engineering Technology (Power & Machine) with Honours JY35 8 Semesters	
3.	Bachelor of Electronics Engineering Technology (Computer System) with Honours JY46	
4.	Bachelor of Engineering Technology (Energy & Environmental) with Honours JY56 8 semesters	
5.	Bachelor of Engineering Technology (Infrastructure Management) with Honours JY60 8 Semesters	
6.	Bachelor of Mechanical Engineering Technology (Petroleum) with Honours JY65 8 semesters	
7.	Bachelor of Manufacturing Engineering Technology (Pharmaceutical) with Honours JY70 8 Semesters	
8.	Bachelor of Engineering Technology (Manufacturing) with Honours JY90 8 Semesters	

STPM HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum MOE Matriculation/ Asasi Qualification
		<p align="center">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper; and</p> <p>Pass MOE Matriculation/ UM Asasi Science/ Asasi UiTM with at least a CPA of 2.00; and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>
FACULTY OF ENGINEERING TECHNOLOGY		
1.	Bachelor of Engineering Technology (Electrical) with Honours JY30 8 Semesters	<p align="center">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>At least Grade C (2.00) in Matriculation/Fundamental level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Chemistry / Chemistry / Physics; <p>Candidates who obtain conditions in Biology subject in Matriculation/Fundamental level need to have at least credit in Physics subject in SPM level; and</p> <p>Candidates must not be colour blind and physically handicapped which will complicate practical works</p> <p align="center">Note:</p> <p>Candidates from Life Science Stream who do not take Physics at Matriculation/Fundamental level need to take Basic Physics subject at University.</p>
2.	Bachelor of Electrical Engineering Technology (Power & Machine) with Honours JY35 8 Semesters	
3.	Bachelor of Electronics Engineering Technology (Computer System) with Honours JY46	
4.	Bachelor of Engineering Technology (Energy & Environmental) with Honours JY56 8 semesters	
5.	Bachelor of Engineering Technology (Infrastructure Management) with Honours JY60 8 Semesters	
6.	Bachelor of Mechanical Engineering Technology (Petroleum) with Honours JY65 8 semesters	
7.	Bachelor of Manufacturing Engineering Technology (Pharmaceutical) with Honours JY70 8 Semesters	
8.	Bachelor of Engineering Technology (Manufacturing) with Honours JY90 8 Semesters	
9.	Bachelor of Occupational Safety and Health with Honours JP46 8 semesters	<p align="center">Fulfill General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (2.00) at Matriculation/ Asasi level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Chemistry /Physics /Biology. <p align="center">and</p> <p>Obtain at least credit (Grade C) at SPM level in the following subjects.</p> <ul style="list-style-type: none"> • Physics; and • Chemistry / Biology and <p>Candidates are not colour blind and physically handicapped that can impair practical work. And</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>



STPM HOLDER

NO.	(i) (ii) (iii) Study Program Code Study Duration	Minimum MOE Matriculation/ Asasi Qualification
		<p align="center">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Pass the Malaysian Higher School Certificate (STPM) with at least a CPA of 2.00 and with at least:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in General Studies; <p align="center">and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p align="center">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>

FACULTY OF ENGINEERING TECHNOLOGY

<p align="center">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p>		
1.	Bachelor of Engineering Technology (Electrical) with Honours JY30 8 Semesters	<p>Obtain at least a Grade C (NGMP 2.00) at STPM level in the following subject :</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; and • Chemistry/ Physics / Biology <p>Candidates who obtain conditions in Biology at STPM level should at least credit in Pyhsics at SPM level.</p> <p align="center">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note: Life Science candidates who did not take Physics at STPM level must take Basic Physics in the University.</p>
2.	Bachelor of Electrical Engineering Technology (Power & Machine) with Honours JY35 8 Semesters	
3.	Bachelor of Electronics Engineering Technology (Computer System) with Honours JY46	
4.	Bachelor of Engineering Technology (Energy & Environmental) with Honours JY56 8 semesters	
5.	Bachelor of Engineering Technology (Infrastructure Management) with Honours JY60 8 Semesters	
6.	Bachelor of Mechanical Engineering Technology (Petroleum) with Honours JY65 8 semesters	
7.	Bachelor of Manufacturing Engineering Technology (Pharmaceutical) with Honours JY70 8 Semesters	
8.	Bachelor of Engineering Technology (Manufacturing) with Honours JY90 8 Semesters	

**FACULTY OF ENGINEERING
TECHNOLOGY**

**DEGREE PROGRAMME
(SAFETY)**

DIPLOMA HOLDERS

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/Equivalent Qualification
<p>General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
FACULTY OF ENGINEERING TECHNOLOGY		
1.	Bachelor of Occupational Safety and Health with Honours JP46 8 semesters	<p style="text-align: center;">General University Requirement</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 2.50</p> <p>And</p> <p>Obtain a relevant Diploma from from Intitusi Pengajian Tinggi Swasta (PTS) / Politeknik with at least CGPA ≥ 3.00</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>



STPM HOLDER

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum STPM Qualification
		<p align="center">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Pass the Malaysian Higher School Certificate (STPM) with at least a CPA of 2.00 and with at least:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in General Studies; <p align="center">and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p align="center">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>
FACULTY OF ENGINEERING TECHNOLOGY		
1.	Bachelor of Occupational Safety and Health with Honours JP46 8 semesters	<p align="center">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (2.00) at Matriculation/ Asasi level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Chemistry /Physics /Biology. <p align="center">and</p> <p>Obtain at least credit (Grade C) at SPM level in the following subjects.</p> <ul style="list-style-type: none"> • Physics; and • Chemistry / Biology <p align="center">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>

**FACULTY OF ENGINEERING
TECHNOLOGY**

DEGREE PROGRAMME

DIPLOMA HOLDERS

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/Equivalent Qualification
<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
FACULTY OF ENGINEERING TECHNOLOGY		
1.	Bachelor of Engineering Technology (Electrical) with Honours JY30 8 Semesters	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) / from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Applications not obtain CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
2.	Bachelor of Electrical Engineering Technology (Power & Machine) with Honours JY35 8 Semesters	
3.	Bachelor of Electronics Engineering Technology (Computer System) with Honours JY46	
4.	Bachelor of Engineering Technology (Energy & Environmental) with Honours JY56 8 semesters	
5.	Bachelor of Engineering Technology (Infrastructure Management) with Honours JY60 8 Semesters	
6.	Bachelor of Mechanical Engineering Technology (Petroleum) with Honours JY65 8 semesters	
7.	Bachelor of Manufacturing Engineering Technology (Pharmaceutical) with Honours JY70 8 Semesters	
8.	Bachelor of Engineering Technology (Manufacturing) with Honours JY90 8 Semesters	

**FACULTY OF INDUSTRIAL
MANAGEMENT**

DEGREE PROGRAMME

DIPLOMA HOLDERS

NO.	(i) Study Program (ii) Code (iii) Study Duration	Minimum Diploma/Equivalent Qualification
<p style="text-align: center;">General University Requirement</p> <p>Pass Sijil Pelajaran Malaysia (SPM)/Equivalent with Credit in Bahasa Melayu/Bahasa Malaysia or Credit in Bahasa Melayu/Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Diploma or other qualification equivalently acknowledged by Malaysian Government and approved by University Senate;</p> <p style="text-align: center;">and</p> <p>At least Band 2 in Malaysian University English Test (MUET).</p>		
<p>FACULTY INDUSTRIAL MANAGEMENT</p>		
1.	Bachelor of Project Management with Honours JP45 8 Semesters	<p style="text-align: center;">Fulfill University General Requirement and PROGRAM REQUIREMENTS</p>
2.	Bachelor of Industrial Technology Management with Honours JP47 8 Semesters	<p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 2.50</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 3.00</p> <p>Or</p> <p>Applications not obtain CGPA mentioned above, but with at least CGPA ≥ 2.30 and 2 years work experience in related fields can be consider.</p> <p>And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>
3.	Bachelor Of Business Engineering With Honours (A Collaboration Program of UMP with Reutlingen University, Germany) JP52 8 Semesters	<p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Awam (IPTA) with at least CGPA ≥ 3.00</p> <p>Or</p> <p>Obtain a relevant Diploma from Intitusi Pengajian Tinggi Swasta (IPTS) / Politeknik with at least CGPA ≥ 3.40</p> <p>And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p> <p>Note;</p> <p>Duration of study subjected to the credit exemption approval by faculty.</p>



MATRICULATION/ASASI HOLDER

NO.	(i) (ii) (iii) Study Program Code Study Duration	Minimum MOE Matriculation/ Asasi Qualification
<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Pass MOE Matriculation/ UM Asasi Science/ Asasi UiTM with at least a CPA of 2.00;</p> <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>		
FACULTY INDUSTRIAL MANAGEMENT		
1.	Bachelor of Project Management with Honours JP45 8 Semesters	<p style="text-align: center;">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>At least credit (Grade C) in Mathematics at SPM level;</p> <p style="text-align: center;">And</p>
2.	Bachelor of Industrial Technology Management with Honours JP47 8 Semesters	<p>Pass (Gred E) in English Language at SPM level;</p> <p style="text-align: center;">And</p> <p>Candidates are not physically handicapped that can impair practical work.</p>
3.	Bachelor Of Business Engineering With Honours ((A Collaboration Program of UMP with Reutlingen University, Germany) JP52 8 Semesters	<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Pass MOE Matriculation/ UM Asasi Science/ Asasi UiTM with at least a CPA of 3.00;</p> <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p> <p style="text-align: center;">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least C Grade (2.00) at Matriculation/ Asasi level in the following subjects;</p> <ul style="list-style-type: none"> • Mathematics / Engineering Mathematics • Chemistry / Engineering Chemistry • Physics / Engineering Physics <p style="text-align: center;">And</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>



STAM LEAVERS

NO.	(i) (ii) (iii) Study Program Code Study Duration	Minimum STAM Qualification
<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p style="text-align: center;">and</p> <p>Obtain at least the rank of Jayyid in the Malaysian Higher Religious Certificate (STAM);</p> <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>		
FACULTY OF INDUSTRIAL MANAGEMENT		
1.	Bachelor of Project Management with Honours JP45 8 Semesters	<p style="text-align: center;">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Own the Malaysian Higher Religious Certificate (STAM) with at least the rank of Jayyid.</p>
2.	Bachelor of Industrial Technology Management with Honours JP47 8 Semesters	<p style="text-align: center;">and</p> <p>At least credit (Grade C) in Mathematics at SPM level. And</p> <p>Pass (Gred E) in English Language at SPM level. And</p> <p>Candidates are not physically handicapped that can impair practical work.</p>



STPM HOLDER

NO.	(i) (ii) (iii) Study Program Code Study Duration	Minimum STPM Qualification
<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper.</p> <p style="text-align: center;">and</p> <p>Pass the Malaysian Higher School Certificate (STPM) with at least a CPA of 2.00 and with at least:</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in General Studies; <p style="text-align: center;">and</p> <ul style="list-style-type: none"> • Grade C (NGMP 2.00) in two (2) other subjects. <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>		
FACULTY OF INDUSTRIAL MANAGEMENT		
1.	Bachelor of Project Management with Honours JP45 8 Semesters	<p style="text-align: center;">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>At least credit (GRADE C) in Mathematics at SPM level. And</p>
2.	Bachelor of Industrial Technology Management with Honours JP47 8 Semesters	<p>Pass (GRADE E) in English Language at SPM level. And</p> <p>Candidates are not physically handicapped that can impair practical work.</p>
3.	Bachelor Of Business Engineering With Honours (A Collaboration Program of UMP with Reutlingen University, Germany) JP52 8 Semesters	<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper ;and</p> <p>Pass the Malaysian Higher School Certificate (STPM) with at least a CPA of 3.00 and with at least:</p> <ul style="list-style-type: none"> • C Grade (NGMP 2.00) in General Studies; and • C Grade (NGMP 2.00) in two (2) other subjects; and <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p> <hr/> <p style="text-align: center;">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (NGMP 2.00) at STPM level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Chemistry • Physics <p style="text-align: center;">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>

COLLABORATION PROGRAMMES



A-LEVEL HOLDER

NO.	(i) Program Code (ii) Code (iii) Study Duration	Minimum A-Level Holder Qualification
		<p align="center">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper.</p> <p align="center">and</p> <p>Pass the A-Level examination with at least a level 9</p> <p align="center">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET) or the equivalent.</p>
1.	B.Eng (Hons.) Mechatronic Engineering - (Collaboration Program of UMP with HsKA University, Germany) JK25 9 Semesters	<p align="center">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (3 Marks) in A-Levels in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics • Chemistry • Physics <p align="center">and</p> <p>Candidates are not colour blind and pyhsically handicapped that can impair practical work.</p>
2.	B.Eng (Hons.) Automotive Engineering (Collaboration Program of UMP with HsKA University, Germany) JK71 9 Semesters	
3.	Bachelor Of Business Engineering With Honours (A Collaboration Program of UMP with Reutlingen University, Germany) JP52 8 Semesters	



INTERNATIONAL BACCALAUREATE (IB) HOLDER

NO.	(i) Program (ii) Code (iii) Study Duration	Minimum A-Level Holder Qualification
		<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper.</p> <p style="text-align: center;">and</p> <p>Pass the International Baccalaureate (IB) examination with at least 32 Mark and obtain at least:</p> <ul style="list-style-type: none"> • Grade C (5 Mark) in five (5) subject. <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET) or the equivalent.</p>
1.	B.Eng (Hons.) Mechatronic Engineering - (Collaboration Program of UMP with HsKA University, Germany) JK25 9 Semesters	<p style="text-align: center;">Fulfil General University Requirements and PROGRAM REQUIREMENTS</p> <p>Obtain at least Grade C (3 Marks) at IB Level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics • Chemistry • Physics <p style="text-align: center;">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>
2.	B.Eng (Hons.) Automotive Engineering (Collaboration Program of UMP with HsKA University, Germany) JK71 9 Semesters	
3.	Bachelor Of Business Engineering With Honours ((A Collaboration Program of UMP with Reutlingen University, Germany) JP52 8 Semesters	<p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper.</p> <p style="text-align: center;">and</p> <p>Pass the International Baccalaureate (IB) examination with at least 30 Mark and obtain at least:</p> <ul style="list-style-type: none"> • Grade C (5 Mark) in five (5) subject. <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET) or the equivalent.</p>



MATRICULATION / FOUNDATION STUDENT

NO.	(i) Programme Name (ii) Code (iii) Study Duration	Minimum MOE Matriculation/ Foundation Qualification
		<p align="center">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper;</p> <p align="center">and</p> <p>Pass MOE Matriculation/ UM Foundation Science/ Foundation UiTM with at least a CPA of 3.00;</p> <p align="center">And</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>
1.	B.Eng (Hons.) Mechatronic Engineering - (Collaboration Program of UMP with HsKA University, Germany) JK25 9 Semesters	<p align="center">Fulfil General University Requirements and PROGRAMME REQUIREMENTS</p> <p>Obtain at least Grade C (2.00) at Matriculation/ Foundation level in the following subjects;</p>
2.	B.Eng (Hons.) Automotive Engineering (Collaboration Program of UMP with HsKA University, Germany) JK71 9 Semesters	<ul style="list-style-type: none"> • Mathematics / Engineering Mathematics • Chemistry / Engineering Chemistry • Physics / Engineering Physics <p align="center">and</p>
3.	Bachelor Of Business Engineering With Honours ((A Collaboration Program of UMP with Reutlingen University, Germany) JP52 8 Semesters	<p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>

STPM HOLDERS

NO.	(i) Programme Name (ii) Code (iii) Study Duration	Minimum STPM Qualification
		<p style="text-align: center;">General University Requirements</p> <p>Pass the Malaysian Education Certificate (SPM)/ Equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/ Bahasa Malaysia July Paper.</p> <p style="text-align: center;">and</p> <p>Pass the Malaysian Higher School Certificate (STPM) with at least a CPA of 3.00 and with at least:</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) in General Studies; <p style="text-align: center;">and</p> <ul style="list-style-type: none"> • Grade C (CGPA 2.00) in two (2) other subjects. <p style="text-align: center;">and</p> <p>Obtain at least Band 2 in the Malaysian University English Test (MUET).</p>
1.	B.Eng (Hons.) Mechatronic Engineering - (Collaboration Program of UMP with HsKA University, Germany) JK25 9 Semesters	<p style="text-align: center;">Fulfil General University Requirements and PROGRAMME REQUIREMENTS</p> <p>Obtain at least Grade C (CGPA 2.00) at STPM level in the following subjects :</p> <ul style="list-style-type: none"> • Mathematics T / Further Mathematics T; • Chemistry • Physics <p style="text-align: center;">and</p> <p>Candidates are not colour blind and physically handicapped that can impair practical work.</p>
2.	B.Eng (Hons.) Automotive Engineering - (Collaboration Program of UMP with HsKA University, Germany) JK71 9 Semesters	
3.	Bachelor Of Business Engineering With Honours ((Collaboration Program of UMP with Reutlingen University, Germany) JP52 8 Semesters	

