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MALAYSIA ON YOUR DOORSTEP

Geographically, Malaysia is as diverse as its culture. Malaysia is divided into 13 states and 3 Federal Territories, separated by the South China Sea with 11 states and 2 federal territories (Kuala Lumpur and Putrajaya) in Peninsular Malaysia and two states and 1 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 metres 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 unspoilt lakes. With a population of 1 million, the state, which lies on the East Coast, offers the finest in beaches such as the famous Cherating Beach, Teluk Chempedak and Beserah Beach. There are the renown hill resorts of Cameron Highlands, Genting Highlands and Fraser’s Hill. If you are looking for adventure, why not visit parks such as Kenong Rimba, Endau-Rompin and Taman Negara (National Park).
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 coast of the state facing the blue South China Sea is fast developing into a modern commercial center 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 to the town. Places 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 a fascinating varieties of estuarine plants, birds and fish species.
VISION & MISSION
To be a world-class Technological University.

MISSION
We provide high quality education, research and services in engineering and technology in a culture of creativity and innovation.

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 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.
FOREWORD FROM VICE CHANCELLOR

Greetings

Celebrating 10th year of establishment as the sixteenth Public University in Malaysia, UMP offers a wide range of academic programmes in various engineering, science and technology, technology and management disciplines from diploma to postgraduates for local and international students.

This Undergraduate Prospectus provides you with useful information about UMP's background, admission requirements, structure of our academic programmes, 8 faculties and general information on the services and facilities available in this university.

As a focussed university, developing our niche area namely chemical engineering, industrial biotechnology and automotive engineering is our main priority. At the same time, UMP also ventures on other engineering disciplines such as civil and environmental engineering, electric and electronics engineering and software engineering.

Committed in pursuing our vision to be a world-class Technological University, UMP's academic structures and curriculums aim at enhancing the capabilities of the students in becoming highly competent professionals and global players of the future.

We look forward in welcoming you as a new member of our UMPian community. Join us and you will not only find the educational experience enjoyable and rewarding the best in engineering, science and technology education!

Warmest regards,

PROFESSOR DATO' DR DAING NASIR IBRAHIM

Vice Chancellor
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Warmest regards,

PROFESSOR DATO' DR DAING NASIR IBRAHIM
Vice Chancellor
RESEARCH AND DEVELOPMENT

UMP’s research are centred around specific Niche Areas which are
• Chemical Engineering and Industrial Biotechnology
• Automotive Engineering and Manufacturing

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

**Focus Group**

• Chemical Engineering
• Biotechnology
• Automotive
• Manufacturing

**Expert Groups**

• Process Instrumentation and Control
• Innovative Construction
• Information Technology
• Human Sciences
• Environmental
• Advanced Material

INTERNATIONAL RECOGNITION AND ACHIEVEMENTS

The University has established links with reputable institutions of higher learning in Germany, United States, Indonesia and more on academic collaboration, student as well as staff exchange, and research. 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 emphasises experiential and action learning that is task-oriented and concentrates on problem-solving. UMP focuses on applied research and industrial projects to enrich the teaching and learning processes while promoting the commercialisation 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 a 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 fulfill the needs of industries and contribute to national development.

UMP CAMPUS AT GAMBang, KUANTAN, PAHANG

UMP currently operates at its Gambang campus in the industrial estate in MEC City, Gambang, about 30 km west of the capital city of Kuantan. The University is only 2½ hours away from Kuala Lumpur via the East Coast Expressway. Strategically located in the East Coast Industrial Belt of Peninsular Malaysia which hosts a number of multinational corporations in the chemical, petrochemical, manufacturing, automotive and biotechnology industries, our students have extensive exposure to the latest development in the fields of engineering and technology.

UMP CAMPUS AT PEKAN

UMP’s main campus of 745.6 hectares is under construction in the district of Pekan. The first phase of the campus project started its operations in 2010 with the Faculty of Mechanical Engineering and the Faculty of Electrical and Electronic Engineering. The second phase will see the Faculty of Manufacturing Engineering and Faculty of Technology Management in 2012 and 2014 respectively. There will be two other phases after that. Upon completion, it can accommodate a total of 15,000 students and 2,000 staff.
ACADEMIC FACILITIES AND RESOURCES

UMP’s laboratories have the latest equipment resembling those in industries. A 24-hour internet connection serves students through the wired and wireless networks throughout the campus, making it a conducive teaching and learning environment.

LIBRARY

UMP has two libraries, one at each campus. The library of UMP plays an important role in its service for resource 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 repository.

The Library in Pekan campus started its service since March 2010. UMP’s libraries have a vast collection of books and multimedia for circulation and reference. UMP subscribes to various repository databases such as . Physical facilities include discussion rooms, seminar rooms, multimedia room, computer laboratories and audio visual rooms.

The e-Resource of UMP’s Library provides 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. The e-Resource provides both on-campus and off-campus access to the Library’s electronic Resource.

STUDENT SUPPORT SERVICES

UMP at MEC City 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 staff and students. UMP has set up facilities to ensure that students enjoy the convenience of travel and accommodation when undertaking a program at the university. UMP is equipped with wireless internet accesses, which allow students and staff 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 convenience. The Department of Student Affairs and Alumni administers all matters relating to student welfare on campus. There are numerous student clubs and societies to meet the varied interests and recreational needs of the students.
INTERNATIONAL OFFICE

The International Office serves as a ‘one stop centre’ for all internationalisation activities of the University. IO is committed to provide high quality services to its internal and external clients. The IO will also strive to promote and enrich the academic and cultural experience at University Malaysia Pahang by facilitating the exchange of people and ideas.

ACCOMMODATION

UMP provides ample accommodation for undergraduate and graduate students in five residential college. Available allocation is for 70% students only. Rooms type available are single, twin sharing and quad sharing. Bus service is provided to students who are living at nearby housing estates for commuting to the campuses. An inter-campus bus service is also provided every 15 minutes in the morning and another series in the evening.

There is no allocation for family houses or apartments. However, the Department of Student Affairs and Alumni (JHEPA) can assist in the search for local private houses for rent in the vicinity, within a 25km radius. Rentals for unfurnished 2-4 bedroom houses are usually set between RM500.00 – RM1,000.00 (USD140.00 – USD280.00) per month. Transit houses are available for students with families (spouse and children) while they search for house to rent. The maximum period given for each student family to stay at a Transit house is six months only. Transit house is not part of the students' residential facilities.

FACILITIES

Gymnasium, badminton court, squash court, table tennis, tennis court, basketball, soccer field, volleyball, takraw court. The sports complex building has the biggest capacity in Pahang with twelve 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 staff of UMP. It is situated strategically in the centre of the campus with easy access for all students.
FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING
FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

INTRODUCTION

Faculty of Electrical & Electronics Engineering was established on 16th February, 2002. The main aim of the Faculty is to produce and train highly skilled engineers and technical assistants with diploma and/or degree level. The program offered is a combination of technology and engineering aspect with integration of applied and skilled based knowledge. This faculty is offering courses that focusing on industries in Peninsular Malaysia East Coast Industrial Corridor, mainly in chemical, petrochemical and manufacturing.

The faculty objective is to produce professional and semi-professional in electrical and electronics engineering. It is also aim to develop support specialist in electrical and electronics related to chemical, petrochemicals, manufacturing and process industry requirements.

This faculty will also embark on research and development activities in electrical and electronics engineering to produce expert groups relevant to the industries need especially in East Coast region. It is hoped that it will become the centre of reference for industry. It also hoped that the faculty will functions as a centre that channels innovative research products and expert services in electrical and electronics engineering to the local industries.

Vision

To be a world class faculty for competency-based technical education in Electrical & Electronics Engineering.

Mission

- To provide the highest quality competency-based technical education in electrical & electronics engineering to meet & exceed the needs of stakeholders.
- To continually improve our business through innovation & technology development by providing industrial-based facilities in line with the university focus areas.
- To develop our associates potential through participative & team involvement by providing a conducive environment that encourages creativity & innovativeness towards becoming a learning organisation.
Curriculum Design

For programmes in the faculty, the academic curriculum is designed based upon five top-down criteria:

- faculty vision and mission
- programme educational objectives
- programme outcomes
- course outcomes
- lesson outcomes

Basically, the creation of academic curriculum is initiated with the understanding of faculty vision and mission. From the faculty vision and mission, programme educational objectives are established.

Next, the programme outcomes were streamlined with the programme educational objectives. Once the relationship between the outcomes and objectives were determined, course outcomes and lesson outcomes were created.

As the world is rapidly gearing towards globalization, the creation of borderless countries has resulted greater competition for existing jobs and thus leading to competitive job market. Industries also become more and more technology-intensive and with the introduction of new engineering disciplines. Mastering technical principles is essential for an engineer to be in the forefront of industry because no matter how technology progress, the principles will be essentially to be the same. Therefore, a solid foundation in science and mathematics, and technical competencies are necessary in application, development and innovation of technology.

Future Malaysia engineers shall be trained with the stronger emphasis in the engineering sciences to enable greater flexibility in mastering the various engineering disciplines, particularly emerging ones and to develop their interest in R&D and innovation. In addition, they must be strong in the various skills related to industry such as in communications, team working, management, economics, finance, law, politics and the environment. Engineers must also trained in the humanities including ethics and professionalism and the exposed to future global scenarios and trends.

PROGRAMMES OFFERED

There are a total of four undergraduate programmes offered by the faculty for the 2014/2015 intake session as follows:

- Degree in Electrical Engineering (Electronics) - BEE
- Degree in Electrical Engineering (Power System) - BEP
- Degree in Electrical Engineering (Control & Instrumentation) – BEC
- Degree in Electrical Engineering (Part-time) (Electronics) - BEE

Diploma in Electrical Engineering (Industrial Electronics) - DEE
Diploma in Electrical Engineering (Industrial Electronics) - DEE

Every programme is developed based on market survey of various stakeholders particularly the industry that the programme is eyeing to market the graduates. We can group the stakeholders into three categories as follows:

- Student, alumni and parents
- Employer & industry
- University & faculty advisory board/ panel

Degree in Electrical Engineering (Electronics) - BEE

A bachelor graduate program contains knowledge of electrical and electronic system. It consists of design, construction, production, maintenance, experimentation and control over components and equipments of electrical systems.

Degree in Electrical Engineering (Power System) - BEP

A bachelor graduate program contains strong knowledge of electrical and electronic system. It consists of design, construction, production, maintenance, experimentation and control over components and equipments of electrical systems. To realize this industrialization objective, electrical and electronic engineers must strive for excellence in invention and innovation, managing and administrating electrical and electronic equipments.

Degree in Electrical Engineering (Control & Instrumentation) - BEC

A bachelor graduate program contains strong knowledge of electrical and electronic systems and control engineering. It consists of innovative design solution, construction, production and maintenances, major in control, automation and instrumentation engineering problems throughout experimental via industrial scale laboratories. The focus sub-areas: instrumentations, control and optimization, robotics and automation.

Diploma in Electrical Engineering (Industrial Electronics) - DEE

This is a 3-year programme, specializing in industrial electronics engineering technology. At the end of the study, graduates will be awarded with a diploma, a technical skills certificate, and a soft skills certificate.

Programme Educational Objectives (PEO)

PEO1: Graduates achieve advance standing professionally based on their technical expertise & accomplishment related to engineering practice and research, or in other fields they choose to pursue.

PEO2: Graduates continue to acquire knowledge in technical and non-technical areas in pursuit of life-long learning.
PO3: Graduates demonstrate commitment to the community and the professions, holding responsible positions that contribute to the benefits of the society.

Programme Outcomes (PO)

PO1: Engineering Knowledge - Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problems;

PO2: Problem Analysis - Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;

PO3: Design/Development of Solutions - Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations;

PO4: Investigation - Conduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;

PO5: Modern Tool Usage - Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations;

PO6: The Engineer and Society - Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice;

PO7: Environment and Sustainability - Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development;

PO8: Ethics - Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice;

PO9: Communication - Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;

PO10: Individual and Team Work - Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings;
PO11: **Life Long Learning** - Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change;

PO12: **Project Management and Finance** - Demonstrate knowledge and understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments;

**Career Opportunities**

The demand for professionals in the fields of electrical and electronics is increasing by the year. This is due to the increase in the investments made by foreign investors in Malaysia. Graduates will have the opportunity to work in the fields of industrial power systems, consumer and industrial electronics, manufacturing, and education.

**Laboratories and Facilities**

The engineering laboratories provided by Faculty of Electrical & Electronics Engineering are listed as follows:

- Analog Electronics Laboratory 1 & 2
- Automation & Robotic Laboratory
- Basic Engineering Science Laboratory 1 & 2
- Computer Aided Design Laboratory
- Computer Base Learning Laboratory
- Computer Control System Laboratory
- Computer System & Network Laboratory
- Digital Electronic Laboratory 1 & 2
- Fabrication, PCB, Component Store & General Workshop
- Industrial Electronics Laboratory
- Industrial Instrumentation Laboratory
- Industrial & Domestic Installation Workshop
- Machine Control Laboratory
- Machine & Drivers Laboratory
- Microprocessor & Embedded Controller Laboratory
- Mini Plant Room 1 & 2
- PLC, Pneumatic & Hydraulic Laboratory
- Research Laboratory 1, 2 & 3
- Wiring Bay – Industrial Domestic Installation Workshop
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<tr>
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**Total:** 90 units
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### BACHELOR OF ELECTRICAL ENGINEERING (POWER SYSTEMS) (BEP)

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**Total Unit For Graduation**: 123

## Engineering Electives

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## Foreign Language Level 1 & 2

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For Foreigner Student:

i. UHE3062 Malaysia: The Impact of Globalisation
ii. UHE3012 Contemporary Leadership in Community
iii.
**BACHELOR OF ELECTRICAL ENGINEERING (ELECTRONICS) (BEE)**

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**Total Unit For Graduation**


124
**Engineering Electives**

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**For Foreigner Student:**

i. UHE3062 Malaysia: The Impact of Globalisation

ii. UHE3012 Contemporary Leadership in Community
## BACHELOR OF ELECTRICAL ENGINEERING (CONTROL & INSTRUMENTATION) (BEC)

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### ELECTRICAL ENGINEERING CORE COURSES

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### UNIVERSITY REQUIRED COURSES

- Applied Calculus
- Applied Statistics
- Technical English
- Technical Writing
- Islamic And Asian Civilizations 1, Co-Curriculum I&II
- Ordinary Differential Equations
- Academic Report Writing
- Ethnic Relations
- Soft Skills 1&2
- Foreign Languages Level 1&2
- Technopreneurship
- Numerical Methods
- Project Management
- Basic Physics

**Total Unit For Graduation:** 124
## Engineering Electives

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For Foreigner Student:

- iii. UHE3062 Malaysia: The Impact of Globalisation
- iv. UHE3012 Contemporary Leadership in Community
DEE1123
Circuit Analysis I
Credit Hours: 3
Pre-Requisite : None

Synopsis
This course provides the basic concepts and engineering methods of DC circuit’s analysis and serves as an essential entry point for the wider scope of electrical engineering. The contents include voltage, Ohm's Law, Kirchhoff’s Law, series and parallel circuits, mesh and node analysis, Superposition and Source Transformation Theorems, and Response of First-Order circuits

References

DEE1212
Computer Programming
Credit Hours : 2
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 basic structure of computer programming in C language. Students will also exposed to method for basic hardware/software interfacing and real-life problem solving environment.

References
2. HM Deitel & PJ Deitel, “How to Program.” Prentice Hall

DEE1941
Technical Drawing
Credit Hour: 1
Pre-Requisite: None
Synopsis
This course introduces student to two engineering skill; Electrical Installation I and AutoCAD. The student will learn about domestic wiring and installation, safety measures and also perform the practical of single phase wiring. The student will also learn about 2D design using AutoCAD which will also covers AutoCAD fundamentals, hatching, printing and plotting technique.

References

DEE2123
Circuit Analysis II
Credit Hours : 3
Pre-Requisite: DEE1123

Synopsis
This course introduces the basic knowledge in AC electrical circuit fundamentals which include knowledge of electromagnetism, alternating current and voltage, phasors and complex numbers, sinusoidal and steady state analysis, AC power, rms value, transformer, RLC circuits and also introduction to three-phase systems.

References

DEE2313
Instrumentation & Measurements
Credit Hours: 3
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.

References
DEE3931
Electro Pneumatic
Credit Hour: 1
Pre-Requisite: None

Synopsis
In this course, the students will be exposed to basic of programmable logic control (PLC), specifically Omron PLC, and also learn the basic of pneumatic. In PLC, the student will learn how to practically perform PLC programming by using ladder diagram, identifying input and output devices and also lean how to wire up the PLC hardware. In Pneumatic, the student will learn about cylinders, valves, compressed air system and at the same time will practically use the pneumatic tools and equipment.

References
5. F. Ebel, G.Prede & D.Scholz, “Pneumatic, Basic Level TP101, Textbook”, FESTO Didactic, Germany, 2004

DEE1233
Analog Electronics I
Credit Hours : 3
Pre-Requisite : DEE1123

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.

References
DEE3313
Principles of Control Systems
Credit Hours: 3
Pre-Requisite: None

Synopsis
This Course approaches the students to introduction to control system technology, its applications, system response, stability analysis and compensation. Give exposure to basic design of control system.

References

DEE1223
Digital Electronics
Credit Hours: 3
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.

References

DEE2931
Basic Programmable Logic Controller
Credit Hour: 1
Pre-Requisite: None

Synopsis
This course is an advance level of PLC and pneumatic where student will be exposed to the industrial application of PLC and learn about tools and devices in electro pneumatic. The student will practically perform the PLC programming and practically execute it by using several applications. In electro pneumatic, students will learn to design and use electro pneumatic tools and application.

References
2. F. Ebel, G.Prede & D.Scholz, “Electropneumatics, Basic Level TP201, Textbook”, FESTO Didactic, Germany, 2004
3. F. Ebel, G.Prede & D.Scholz,
“Electropneumatics, Advanced Level TP202, Textbook”, FESTO Didactic, Germany, 2004

DEE2612
Basic Maintenance Technology
Credit Hours: 2
Pre-Requisite: None

Synopsis
This course exposes the students to the required technical / engineering discipline knowledge and skills to diagnosis and correct faults across a wide range of equipment. The course will provide knowledge of different strategic approaches best suited to maintenance and the manufacturing environment and context.

References

DEE3313
Principles of Control Systems
Credit Hours: 3
Pre-Requisite: None

Synopsis
This course introduces students to the basic electrical power systems. Students will be exposed to the basic concept of power system management, the types and functions of protective devices and switchgears. Students will also be introduced to the principles of electrical machines. Students will learn the fundamental aspects of rotating electrical machines such as operational characteristics of electrical apparatus.

References
DEE3213
Microprocessor Fundamentals
Credit Hours: 3
Pre-Requisite: 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 base. Students are also learned in team to complete a course projects to enhance knowledge in developing hardware and software in related to design of microprocessor base.

References
1. Wray, Using Microprocessors & Microcomputers: Motorola family, Prentice Hall
2. Tocci, Microprocessors & Microcomputers: Software & Hardware, Prentice Hall
3. Cahill, Digital & Microprocessor Engineering, Prentice Hall

DEE3233
Analog Electronics II
Credit Hours: 3
Pre-Requisite: DEE1233

Synopsis
Demands from industry on knowledgeable manpower especially who have in-depth knowledge in semiconductors area are increasing rapidly. To fulfill the demand, this course offer wide coverage of knowledge in analog devices. The topics covers CAD using PSpice, basic FET and amplifiers, power amplifiers, frequency response analysis as well as operational amplifiers. Their basic applications and circuit troubleshooting techniques are also discussed in this course in order to meet the industrial demands.

References

DEE2941
Motor Control
Credit Hour: 1
Pre-Requisite: None

Synopsis
This course introduces student to three phase wiring and also motor control circuitry. The student will learn how to practically perform electrical wiring involving three phase supply and also the safety measures required. The student will also learn to design motor control circuitry such as forward reverse and star/delta connection, then practically test the connection by using real control and protection devices.

References


DEE3413
Principles of Communication System
Credit Hours: 3
Pre-Requisite: None

Synopsis
An introduction to communication technology where students are exposed to various fundamental techniques of communication. This includes the introduction to modulation techniques such as amplitude modulation (AM) and frequency modulation (FM). Digital modulation techniques such as pulse modulation, shift keying and line coding are also be discussed.

References
2. Tomasi, Fundamental of Electronic Communications Systems, Prentice Hall
3. Tomasi, Advanced Electronic Communications Systems, Prentice Hall
4. Pearson, Basic Communication Theory, Prentice Hall
5. Roddy, Electronic Communications, Prentice Hall.

DEE3323
Industrial Automations
Credit Hours: 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.

References

DEE3223
Industrial Electronics
Credit Hours: 3
Pre-Requisite: None

Synopsis
This course presents the characteristics of active filters using operational amplifiers, characteristics of the active filter using operational amplifiers, characteristics of thyristors, power supply design, power amplifier design and analysis of Analog to Digital Converter.
(ADC) and Digital to Analog Digital Converter (DAC).

References

DEE3263
Embedded Controller Technology
Credit Hours: 3
Pre-Requisite: None

Synopsis
This course is an introduction to a microcontroller. Students are exposed to the internal architecture of the microcontroller, various instruction sets and basic hardware design of microcontroller-based. For this reason this course introduces the hardware, software, design and interface with various devices.

References
2. Tocci, Microprocessors & Microcomputers: Software & Hardware, Prentice Hall.

DEE3941

Microcontroller Application
Credit Hours: 1
Pre-Requisite: None

Synopsis
This course introduces student to basic autotronics knowledge and PC Interfacing. The student will learn on how to design an automatic controller using the combination of electronic circuit, switches, relay, timer, sensors, ac/dc motor, inverter and PLC. The student will also learn about communication techniques between pc based controller to the hardware via RS232, USB or parallel port. It is intended for student to be familiar with the system design and programming of PC Based Data Acquisition & Control (DA&C) using commercially available DA&C cards. It provides a solid foundation to the students so that they can identify the proper applications of PC Based Data Acquisition & Control in industrial environment.

References
5. Brey, Barry B, “The Intel Microprocessors:
DEE3719
Industrial Training (HW)
Credit Hours: 9
Pre-Requisite: 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 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.

References
1. “Industrial Training Guidelines”, KUKTEM.

DEE3723
Industrial Training Report (HW)
Credit Hours: 3
Pre-Requisite: None

Synopsis
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. The student is required to maintain proper records in his/her log book and submit the reports along with an Industrial Training Report on the training received by him/her.

References
1. “Industrial Training Guidelines”, KUKTEM.

BACHELOR PROGRAMME
COURSE SYNOPSIS

BEE4333
Intelligent Control
Credit Hours: 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.

References
Module”, Universiti Teknologi Malaysia.
Marzuki Khalid, “Artificial Intelligence: Artificial Neural Networks Module”, Universiti Teknologi Malaysia.

**BEE4373 Robotics**
Credit Hours: 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.

**References**

**BEE4523 Industrial Instrumentation**
Credit Hours: 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.

**References**
BEE3233
Electronic System Design
Credit Hours: 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.

References

BEE4253
Computer Vision System
Credit Hours: 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. Students 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.

References

BEE4323
Embedded Controller Technology
Credit Hours: 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.

**References**

5. Driscoll, “Data Acquisition and Process Control with the M68HC11 Microcontroller”, Prentice Hall,
8. Spasov, “Microcontroller Technology: The

68HC11”, Prentice Hall, 5th ed, 2004

**BEE4233**

Data Communications

Credit Hours: 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.

**References**


**BEE4313**

Multimedia Technology & Applications

Credit Hours: 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.

References


BEE4413
Digital Signal Processing
Credit Hours: 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

References


BEE3132
Power Generation & Operation
Credit hours: 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.

References

BEE3143
Power System Analysis
Credit Hours: 3
Pre-Requisite: None

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.

References

BEE4143
Power System Protection & High Voltage
Credit Hours: 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.

References

BEE4163
Alternative Energy
Credit Hours: 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

References

BEE3133
Electrical Power Systems
Credit Hours: 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

References
3. William D. Stevenson, Jr., “Element of Power System

BEE4113
Electrical Installation Design
Credit Hours: 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.

References

BEE4153
Power Quality
Credit Hours: 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

References

CO4: Assess severity of power quality disturbances.

CO5: Work in group environment.

References

BEE4223
Power Electronics and Drive Systems
Credit Hours: 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

References

BEE4343
Process Control
Credit Hours: 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.

**References**


**BEE4313 Industrial Control Technology**

Credit Hours: 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 the 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.

**References**


**BEE4383 Computer Controlled Systems**

Credit Hours: 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.
Course Outcomes

CO1: Identify the principles of controllers
CO2: Apply the mathematical modeling of the discrete-time system in z-domain
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

References

BEE1931
Basic Electronic Applications
Credit Hours: 2
Pre-Requisite: None

Synopsis
Students will learn how to use power supply, function generator, digital multimeter, oscilloscope, analog digital trainer and IC tester. The students will learn on how to design a switching circuit and how to interface between electronics and electrical circuit.

Course Outcomes

CO1: Apply right safety precaution in laboratory and workplace.
CO2: Utilize DC power supply, oscilloscope, function generator, digital multimeter and Analog Digital Trainer.
CO3: Recognize the function of switches, relays and sensor.
CO4: Construct electrical and electronic circuit to meet design requirement.

References
2. Thomas L. Floyd, Electronics fundamentals : circuits, devices and applications, Prentice Hall, 2004

BEE1951
Technical Drawing
Credit Hours: 2
Pre-Requisite: None

Synopsis
This course covers theoretical knowledge and practical-based on doing technical drawing by using mainly AUTOCAD software. The software is focusing on the fundamental level of AUTOCAD skill until the plotting technique. The students will be guided and exposed to draw basic technical drawing, electrical and electronic circuit diagrams as well as the geometrical drawing.

Course Outcomes

CO1: Identify the basic commands and functions in AUTOCAD.
CO2: Use AUTOCAD software as the main tool to draw technical drawing especially in electrical and electronics engineering field.

References

**BEE2931 Basic Programmable Logic Controller**
- **Credit Hours:** 2
- **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 it’s function
- CO2: Implement PLC Hardware configuration.
- CO3: Execute and practice PLC Programming for specific tasks.
- CO4: Practice right attitude and safety procedure.

**References**
3. OMRON "Sysmac CQM1H Series Operation Manual", Revised August 2005

**BEE2951 PLC Applications**
- **Credit Hours:** 2
- **Pre-Requisite:** None

**Synopsis**
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 PLC card.

**Course Outcomes**
- CO1: Configure the Analog Input and Output of PLC Card
- CO2: Demonstrate and discuss the function of discrete and analog card.
- CO3: Identify input and output component of simple manufacturing applications
- CO4: Develop a program to operate the manufacturing applications
- CO5: Practice right attitude and safety procedures

**References**
5. John R Hackworth & Frederick D Hackworth, Jr
BEE3931
PC Interfacing
Credit Hours: 2
Pre-Requisite: None

Synopsis
This subject covers the development of Graphical User Interface (GUI) using programming software and the communication technique between pc based controller to the hardware via DAQ CARD. It is intended for student to be familiar with the system design and programming of PC Based Data Acquisition & Control (DA&C) using commercially available DA&C cards. It provides a solid foundation to the students so that they can identify the proper applications of PC Based Data Acquisition & Control in industrial environment.

Course Outcomes
CO1: Develop Graphical User Interface (GUI) using programming software
CO2: Design a simple program to control specific applications
CO3: Identify hardware specifications to integrate with software
CO4: Develop a program to interface between software and Hardware
CO5: Apply right safety precaution in laboratory and workplace.

References
2. Ramteke, Timothy, “Borland C++ Builder to accompany Introduction to C and C++ for technical students, a skill building approach”,

BEE1941
Electrical Wiring
Credit Hours: 2
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, load calculation, inspection and testing.
CO2: Construct the single phase and three phase electrical wiring correctly.
CO3: Use suitable wiring tools and accessories.
CO4: Demonstrate right attitude and safety implementation.

References
2. “Selection and Erection Guidance Note 1”, IEE Wiring Regulations BS 7671:2001
4. “Inspection And Testing Guidance Note 3”, IEE
Wiring Regulations BS 7671:2001

BEE1961
Motor Control
Credit Hours: 2
Pre-Requisite: None

Synopsis
This course exposes students 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.

References

BEE2941
Basic Electropneumatics
Credit Hours: 2
Pre-Requisite: None

Synopsis
This subject covers about pneumatic and electropneumatics system starting from energy supply, input elements, processing elements, control elements and working elements. The student also will learn how to used electropneumatic tools and design electropneumatic control system using relay, timer, counter and sensors.

Course Outcomes
CO1: Describe pneumatic & electropneumatic system and its components.
CO2: Identify operation of various type of sensors related to pneumatic system.
CO3: Design pneumatic & electropneumatic control system.
CO4: Practice right attitude and safety procedure.

References
2. F. Ebel, G. Prede & D. Scholz, “Pneumatic, Basic Level TP101, Textbook”, FESTO Didactic, Germany, 2004
3. F. Ebel, G. Prede & D. Scholz, “Pneumatics, Advanced Level TP102, Textbook”, FESTO Didactic, Germany, 2004
5. F. Ebel, G. Prede & D. Scholz, “Electropneumatics, Basic Level TP201, Textbook”, FESTO Didactic, Germany, 2004
BEE2961
Industrial Electropneumatic
Credit Hours: 2
Pre-Requisite: None

Synopsis
The students will learn on how to control and integrate the electro pneumatic system using programmable logic controller (PLC). This subject focuses on applying programming for various types of electropneumatics applications.

Course Outcomes
CO1: Understanding of programmable logic controller structure and configurations.
CO2: Understand and apply ladder programming instruction
CO3: Design and apply programmable logic controller in electropneumatics applications.
CO4: Practice right attitude and safety procedure.

References

BEE3941
Microcontroller Applications
Credit Hours: 2
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.

References
BEE1133  
**Circuit Analysis I**  
Credit Hours: 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

**References**  

BEE1143  
**Electric Circuits II**  
Credit Hours: 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.

**References**  

BEE1213  
**Digital Electronics**  
Credit Hours: 3  
Pre-Requisite: 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 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

References

BEE1222
Computer Programming
Credit Hours: 2
Pre-Requisite: None

Synopsis
This course presents the C programming language for electrical & 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 basic structure of computer programming in C language. Students will also be exposed to method for basic hardware/software interfacing.

Course Outcomes
CO1: Explain basic hardware/software interfacing.
CO2: Demonstrate structure programming technique using high level language.
CO3: Use computer programming techniques in solving electrical & electronics engineering problem.
CO4: Work in team and communicate effectively.

BEE1313
Instrumentation & Measurement
Credit Hours: 3
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: 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.

References

BEE2123
Electrical Machines
Credit Hours: 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

References

BEE2143
Signals & Networks
Credit Hours: 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

References
BEE2213
Analog Electronics I
Credit Hours: 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

References

BEE2223
Microprocessor
Credit Hours: 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 68000 microprocessor
CO4: Work in a team and communicate effectively

References

**BEE2233**

**Analog Electronics II**

**Credit Hours:** 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

**References**


**BEE3113**

**Electromagnetic Fields Theory**  
**Credit Hours:** 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.

**References**


BEE3313
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, 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.

References
2. Katsuhiko Ogata, Modern Control Engineering, Prentice Hall.


BEE3413
Principles of Communication Systems
Credit Hours: 3
Pre-Requisite: BEE3313

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 type of modulation and demodulation techniques
CO3: Apply the concepts to practical applications in Telecommunication
CO4: Work in a team and communicate effectively

References
2. B.P.Lathi, “Modern Digital and Analog Communication

BEE4632
Maintenance Technology
Credit hours: 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.
CO7: Demonstrate appropriate and effective action for plant shutdown programme.

References
FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES
INTRODUCTION

The faculty of Civil Engineering & Earth Resources (FKASA) was established in 2002 and had its first intake of student in July 2003. Civil engineering involves the assessment, planning, design, construction, operation and maintenance of physical infrastructures such as roads, buildings, water supply system, airports, port bridges and tunnels. All these infrastructures meant to improve the quality of human life.

FKASA offers academic programs which are relevant to the need of the industry. At present, we run two undergraduate programs i.e. Bachelor of Civil Engineering (BAA) and Diploma in Civil Engineering (DAA)

Objectives of the faculty

The faculty was established with the following objectives:

- To produce and train of graduate engineers in the field of civil engineering.
- To conduct researchs in construction related field relevent to the needs of the industry.
- To become a center of excellence in civil engineering particulary in the East Coast of Peninsular Malaysia.
- To play a role in the East Coast Economic Regional (ECER) development by organising technological exchange and continual training programmes.

Vision of the Faculty

To be a world-class faculty in technological education in civil engineering.

Mission of the Faculty

We strive to provide excellent and innovative academic programmes which are adaptable to stakeholders’ expectation, to produce highly competitive graduates through teaching, learning, research and innovation in line with the vision and mision of the University.

Curriculum Design

The academic curriculum is designed based on the following criteria:

- Faculty vision and mission
- Programme educational objectives (PEOs)
- Programmes Outcomes (POs)
- Course Outcomes (COs)
- Lesson Outcomes (LOs)
The curriculum is designed in line with the vision and mission of the university. Various stakeholders are communicated through various means to give feedbacks and the type of curriculum so that they are relevant to the industry.

Teaching-Learning Methods

Lectures are conducted for most of the offered courses while tutorials are specifically designed for particular courses which require analysis and calculation. A two credit hours course for instance will be delivered by a 1+1 lecture session (50 minutes/session) or a 1+2 comprising 1 lecture session and 1 tutorial session (1 hour and 50 minutes per session). Similarly a three credit hours course will be delivered by a 1+1+1 or 1+2 lecture sessions or a 2+1 comprising 2 continuous lecture sessions (1 hour and 50 minutes) and 1 tutorial session. The lecture sessions are made compulsory for the undergraduates to achieve technical abilities, be alert of contemporary issues and understand the effect of technical solutions on economy, environment and society at global scale. Lectures are conducted in appropriate lecture hall (DK) that can accommodate 60 to 90 students per session and tutorials are conducted in lecture room (BK) that can accommodate up to 40 students. At present, the university has three lecture theatres that have seating capacity up to 250 students.

Laboratory courses are designed to ensure the ability of students to conducting experiments, analyze and interpret data. Laboratory sessions are conducted in groups typically 5 persons per group. Although material and equipment are ready and set by the technical staff, students are required to read the lab manual before coming to lab. At the beginning of every lab session, a short briefing will be given and then students have to conduct the experiment themselves. Although some programs require the lab report to be submitted in group, every group member is assigned specific tasks which is used to measure the CO of individual student.

Computer laboratory for teaching computation skill, programming and language related courses are also provided for 30 to 60 students per 1 hour and 50 minutes session. University courses offered by Centre of Modern Languages and Social Sciences (CMLSS) for instance emphasize on communication skill (oral and writing).

To ensure that the assessment plan and target could be achieved, lectures are encouraged to use variety of teaching methods such as problem based learning, cooperative learning and student centered learning (SCL). The students could gain the required knowledge but are also going out with good character, attitude and skills. As part of the CQI process, lectures performance are assessed regularly every semester by the students to get feedbacks particularly with regard to the effectiveness of the delivery mode used by the academic staff.
The evaluation is of the courses and program consists of a series of coursework and final examination. The course work assessment is conducted through the semester while the final examination is set in final semester. The course work consist of test, assignment, project paper etc.

Emphasis to the Students

The necessity for strong soft skills which comprises of critical thinking, problem solving skills, leadership, positive values, team working, language proficiency and communication skills is highly emphasized for students’ learning. The issue of soft skills acquisition is critical as the future industry leaders in Malaysia are expected to be equipped with both technical and leadership skills in order to be at the top. Realising the importance of soft skills, the faculty requires all students to pass two soft skill courses offered during the second and the third year of study. Soft skills elements such as positive values, leadership, team working, communication and learning capability are evaluated. Students who are incompetent are required to attend soft skills clinic as the remedial programme. They need to re-register the courses again if failing the soft skills clinic. All clinics are conducted during selected weekends at suitable locations according to the needs of the clinic. Although these courses are not graded, however students are pushed to prove good conduct according to the desired ethics in order to pass the courses. In addition, specifically designed co-curriculum activities that forms part of the compulsory university courses are offered by the Co-curriculum Unit of the university. These activities emphasize on teamwork and ethics of the students.

Contribution of the Faculty in Industrial Development

As the world is rapidly gearing towards globalisations, the emergence of borderless countries has resulted in greater competition for jobs, thus leading to competitive job market. However, the courses are still conventionally taught by focusing on the development of sound fundamental knowledge. Hence, in order to produce competent local and global engineers, additional values must be incorporated in the academic syllabus. Thus, besides imparting fundamentals knowledge, the programmes are blended with both technical and soft skills as to ensure the graduates are fully competent with industrial requirements. For instance, in civil engineering programmes, laboratory courses are offered as to expose the students to the actual industrial environment. Furthermore, students are encouraged to be involved in design project and participate in exposition/competition whereby they create self-learning activities under the guidance of competent academicians.
PRORGRAMMES OFFERED

The faculty offer 2 programme of study for the session 2014/2015
- Bachelor of Civil Engineering (BAA)
- Diploma in Civil Engineering (DAA)

The faculty emphasize the role of stakeholder in the development and improvement of the programs that are conducted. For example, we have identified the following stakeholders which contribute to the program outcomes and graduate employibility.
- Student, alumni and parents
- Employer & industry
- University & faculty advisory board/ panel

The faculty has as number of advisory panels to give advise and feedback matters pertaining to academic and graduate employibility. Such panels are Board of Studies and Industrial Advisory Panel. The members of the panels meet with the faculty members from time to time for program improvement.

The role of these various stakeholders can be explained in Figure I. By having this system of quality management involving all parties, we hope to produce graduates of outstanding quality who possess the required attributes.

Outcome Based Education (OBE) Approach

Since middle of year 2006, the faculty had conducted the programmes based on outcome based education approach (OBE). In the nutshell OBE is the approach that faculty has been adopting as to get the programme accredited and quality/employability of graduates can be improved. OBE is objective.
driven and after determining the PEOs and POs, we have to set appropriate methods to achieve them. Suitable tools are used to measure and evaluate the attainment of the outcomes and the evaluation results.

DEGREE PROGRAMMES

A. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

i. BACHELOR OF CIVIL ENGINEERING – BAA

The program educational objectives of civil engineering program at UMP are to prepare its graduates to:

PEO 1
Function successfully in a professional environment by utilizing and enhancing their problem solving and communication skills.

PEO 2
Become dynamic, creative and innovative engineers through leadership within sustainable environment in their workplace, companies, engineering and civic societies.

PEO 3
Nurture professionals in the fields of engineering and technology who are engaged in life-long learning, stay informed of the emerging technologies and contemporary issues.

B. PROGRAM OUTCOMES (POs)

Degree POs are specific statements regarding graduates’ knowledge, skills and attitudes that describe what students are expected to know and be able to perform or attain by the time of graduation. Consistent with world-class engineering programme, the POs for graduates are as follows:

PO1 Engineering Knowledge - Apply knowledge of mathematics, science, engineering fundamentals and an engineering specializations to the solution of complex civil engineering problems;

PO2 Problem Analysis - Identify, formulate, research literature and analyse complex civil engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;

PO3 Design/Development of Solutions - Design solutions for complex civil engineering problems and design systems, components or processes that meet specified needs with
appropriate consideration for public health and safety, cultural, societal, and environmental considerations;

PO4 **Investigation** - Conduct investigation into complex civil engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data,

PO5 **Modern Tool Usage** - Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex civil engineering activities, with an understanding of the limitations;

PO6 **The Engineer and Society** - Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional civil engineering practice;

PO7 **Environment and Sustainability** - Understand the impact of professional civil engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development;

PO8 **Ethics** - Apply ethical principles and commit to professional ethics and responsibilities and norms of civil engineering practice;

PO9 **Communication** - Communicate effectively on complex civil engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;

PO10 **Individual and Team Work** - Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings;

PO11 **Life Long Learning** - recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PO12 **Project Management and Finance** - Demonstrate knowledge and understanding of civil engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments;
DIPLOMA PROGRAMME

A. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

i. DIPLOMA IN CIVIL ENGINEERING (DAA)

In three to four years after graduation, our diploma holders shall possess the following attributes:

PEO 1
Technically Competent; Produce quality of works at par with counterparts in the global markets

PEO 2
Professionally attached to workplace and the societies: Contribute as skillful assistant/associate Civil Engineers with desires to grow intellectually and professionally within local and global environment.

PEO 3
Internalizing Lifelong Learning: Stayed informed to emerging technologies and contemporary issues and challenges facing career in the future

B. PROGRAMS OUTCOMES (POs)

Upon graduation, the graduates shall demonstrate:
PO 1 Knowledge in required disciplines
PO 2 Adequate technical and practical competency
PO 3 Competency to think critically and scientifically
PO 4 Effective communication skills
PO 5 Competency to undertake social responsibility
PO 6 Interest for lifelong learning and information management
PO 7 Competency in management and entrepreneurship
PO 8 Professionalism and good values, conduct and ethics
PO 9 Competency in leadership
LABORATORIES AND FACILITIES

Laboratories at the faculty comprises of all disciplines in civil engineering and earth resources including those for information and computing technologies. These laboratories are listed as follows:

- Light and heavy structural lab
- Concrete & Material lab
- Highway & traffic lab
- Soil mechanics & geotechnics lab
- Environmental engineering lab
- Hydraulic & hydrology lab
- Surveying lab
- Construction lab
- Computer/CAD/CAE lab
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BACHELOR OF CIVIL ENGINEERING (BAA)

YEAR
FIRST
SECOND
THIRD
FOURTH

SEM
FIRST & SECOND
FIRST & SECOND
FIRST & SECOND
FIRST & SECOND

CIVIL ENGINEERING CORE COURSES

BAA1113 Engineering Mechanics
BAA2113 Theory of Structures
BAA2213 Reinforced Concrete Design I
BAA3922 Research Methodology & Pre-Project
BAA1112 Engineering Drawing
BAA2713 Fluids Mechanics
BAA3813 Hydrology & Water Resources
BAA3223 Steel & Timber Design
BAA1312 Civil Engineering Materials
BAAA2513 Soil Mechanics & Geology
BAA2413 Highway & Traffic Engineering
BAA3921 Engineering Laboratory IV
BAA4513 Foundation Engineering
BAA1133 Mechanics of Materials
BAA2921 Engineering Laboratory II
BAA3012 Law of Contract & Estimation
BAA4222 Engineer in Society
BAA1912 Engineering Surveying Fieldwork
BAA2723 Hydraulics
BAA3213 Reinforced Concrete Design II
BAA4914 Final Year Project
BAA1931 Engineering Laboratory I
BAA2012 Computer Programming
BAA3023 Project Management in Construction
BAA4*23 Elective 1
BAA1322 Construction Engineering
BAA2941 Engineering Laboratory III
BAA3513 Geotechnical Engineering
BAA4*23 Elective 2
## BACHELOR OF CIVIL ENGINEERING (BAA)

### YEAR

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### THIRD

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### FOURTH

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- **SECOND SEMESTER**: BAA2113, BAA2213, BAA2713, BAA2723, BAA2921, BAA3012
- **THIRD SEMESTER**: BAA3922, BAA3223, BAA4513, BAA4222, BAA4222
- **FOURTH SEMESTER**: BAA4222, BAA4513, BAA4914, BAA4231, BAA4231

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  - Elective 1: BAA4*23
  - Elective 2: BAA4*23

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### INDUSTRIAL TRAINING (LJ) 12 WEEKS

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**Total Unit For Graduation**

*Course begins in the first semester but total credits are given upon completion of the second semester*
Elective course to be offer in degree level:

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## Diploma of Civil Engineering (DAA)

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*SHORT SEMESTER*
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BACHELOR OF CIVIL ENGINEERING (BAA)

BAA1112
ENGINEERING DRAWING
Credit : 2 credit
Pre-requisite : None

Synopsis

This subject aims to expose the students to the civil engineering drawing. Students should be able to describe, discuss and analyze the information and conventions as presented in the civil engineering drawings. The learning approach of civil engineering drawings is integrated through a series of hands-on tutorial. The students should be able to draw engineering drawings through selected exercises manually and generate engineering drawings using the application of software packages such as AutoCAD and Autodesk Revit.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Sketch isometric, orthographic and sectional drawings
CO2 Draw detail drawings and write specifications
CO3 Read structural, geotechnical, infrastructural and architectural drawings

CO4 Generate civil engineering drawing using Autodesk software

BAA1113
ENGINEERING MECHANICS
Credit : 3 credit
Pre-requisite : 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 resultant condition of equilibrium, centroid, moment of inertia, force and acceleration, work and energy.

Course Outcomes

At the end of this course, the students 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.
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.

CO4 Analyze the mechanics of impact by applying the linear impulse and momentum principle.

BAA1312
CIVIL ENGINEERING MATERIALS
Credit : 2 credit
Pre-requisite : None

Synopsis

This subject is compulsory and basic subject which will introduce students to the material that been used in construction industry. Students will be exposed to the knowledge on the basic characteristic of each material together with the testing method to determine the material strength. Student who is able to complete this course successfully, would be able understand easily the terms and materials related to construction project.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Illustrate the types of construction materials commonly used in construction industry

CO2 Explain the properties, differences, advantages, and disadvantages of materials of materials.

CO3 Explain the production of materials

CO4 Explain the method to overcome problem in materials

BAA1133
MECHANICS OF MATERIALS
Credit : 3 credit
Pre-requisite: BAA1113 Engineering Mechanics

Synopsis

The aims of this course are the study of the behavior of engineering or structural elements subjected to loads. It is provides an introduction on elastic stress and strain analysis and axial deformations. Thus, properties and behavior of engineering materials including stress-strain relations. This course also deals with the analysis of direct and torsion shear stresses and their deformation; shear force and bending moment of beam also the stresses in beams; transformations of stresses.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Identify and analyze the state of stresses, strains and deformation response of elastic solids in the external loading and axially load assemblies.

CO2 Describe and determine the mechanical behavior
of materials under load.

CO3 Illustrate and analyze the shear-moment diagrams accordingly calculate the bending and shear stress in determinate beams.

CO4 Identify and solve the principal stresses and angles in plane cases using analytical method and Mohr’s circle.

CO5 Identify and calculate the stresses, deformation and twist of angle of a torsional bar

BAA1323
ENGINEERING SURVEYING
Credit : 2 credit
Pre-requisite : 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 Outcomes

At the end of this course, the students should be able to:

CO1 Identify and describe some of the engineering survey roles in civil engineering works.

CO2 Perform horizontal and vertical control based on related provision.

CO3 Understand the range of calculations that can be made with surveying data.

BAA1912
ENGINEERING SURVEYING FIELDWORK
Credit : 2 credit
Pre-requisite : None

Synopsis

This fieldworks encompasses how to handling survey equipments, carry out linear survey, traverse survey, leveling, establishing the temporary bench mark, detailing survey, techniques of gathering the location of man-made and natural features, preparation of site plan, related computation and setting-out simple construction work.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Organize the small survey work project.

CO2 Practice significant of survey work harnessing engineering survey techniques based on related
BAA1331
ENGINEERING SURVEYING CAMP
Credit: 1 credit
Pre-requisite: BAA1323 Engineering Surveying
Fieldwork

Synopsis

This engineering surveying camp encompasses; carry out horizontal and vertical control survey, detailing survey to locate of man-made and natural features, preparation of site plan, related computation and setting-out simple construction work.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Organize the small engineering survey work project
CO2 Practice significant of survey work harnessing engineering survey techniques based on related provision.

CO3 Use various survey instruments at site.
CO4 Communicate affectively in presentation

BAA1931
ENGINEERING LABORATORY I
Credit: 1 credit
Pre-requisite: 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 Outcomes

At the end of this course, the students should be able to:

CO1 Observe and detect the failure from destructive and non-destructive testing.
CO2 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.
BAA2113
THEORY OF STRUCTURES
Credit : 3 credit
Pre-requisite : BAA1133 Mechanics of Materials

Synopsis
This course will be introduced the principal analysis of statically determinate and indeterminate structures. The course covers the fundamental analysis of determinate structure to determine the determinacy and analysis of deflection and internal forces of beams, trusses and arches. Also to determine the influence line of beam and truss. Hence, to analyze the statically indeterminate beams and frames.

Course Outcomes
At the end of this course, the students should be able to:
CO1 Identify the stability and determinacy of structures, thus analyze the deflection and slope of determinate beam.
CO2 Analyze an indeterminate beams and frames to obtain the end moments.
CO3 Analyze internal force and compute deflection of determinate plane trusses.
CO4 Illustrate the influence lines diagram and calculate the vertical reaction, shear force and moment.
CO5 Analyze 3-pinned arch to obtain the internal forces.

BAA2713
FLUIDS MECHANICS
Credit : 3 credit
Pre-requisite : 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 fluid mechanics

Course Outcomes
At the end of this course, the students should be able to:
CO1 Describe fluid properties and the fundamental of Fluid Mechanics concepts
CO2 Analyze fluid mechanics system and devices such as capillary tube viscometer, falling ball viscometer, manometers and piezometers.
CO3 Apply and analyze Fluid Mechanics theories such as Continuity Equation, Bernoulli’s Theorem, Darcy-Weisbach equation, Reynold’s Number in fluid mechanics system.
CO4 Analyze pipeline system problems related in civil engineering.

BAA1322
CONSTRUCTION ENGINEERING
Credit : 2 credit
Pre-requisite : 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 current construction industry developments including on the safety at construction site and also some details regarding parties that usually involved in construction projects. The students will be taught the basic knowledge on the overall construction process and main elements, that would contribute to the development of a strong and stable structure at the end of construction project. Students who are able to complete this course successfully, will be equipped with basic and fundamental knowledge that civil engineers should have.

Course Outcomes
At the end of this course, the students should be able to:

CO1 Explain about construction engineering, the responsibilities of parties involved in construction project and construction work process

CO2 Explain the types of temporary work structure and equipments, sub-structure and superstructure in building construction

CO3 Explain the common construction techniques such as retaining wall, IBS and pre-stressed concrete that being practiced in Malaysia.

CO4 Explain about highway and bridge construction

BAA2941
ENGINEERING LABORATORY II
Credit : 1 credit
Pre-requisite : BAA1133 Mechanics of Materials

Synopsis
This ENGINEERING LAB II covers structural 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 Outcomes
By the end of semester, students should be able to:
CO1 Demonstrate the influence lines diagram and calculate the shear force and bending moment using Muller Breslau Method.

CO2 Conduct and analyze determinate & indeterminate structure to obtain the internal forces and end moment.

CO3 Conduct and analyze the arches and cables to determine internal forces, and apply the Euler formula to determine critical load buckling column.

BAA2123
STRUCTURAL ANALYSIS
Credit : 3 credit
Pre-requisite : 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 Outcomes

At the end of this course, the students should be able to:

CO1 Apply the Euler formula to determine the magnitude of the critical load of buckling column

CO2 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

BAA2723
HYDRAULICS
Credit : 3 credit
Pre-requisite : BAA2713 Fluid Mechanics

Synopsis

This course will be introduced the concept and use of equations for open drainage and analyses flow (uniform & non-uniform flow) in open channels including the various phenomena such as hydraulic jump and backwater, specific energy concept application, design of water distribution
system, analyses of hydraulics machinery principles and dimensional analysis & hydraulic similarity concepts

**Course Outcomes**

At the end of this course, the students should be able to:

**CO1** Define and analyze the uniform and non-uniform flow in open channels.

**CO2** Identify and analyze the Rapidly Varied Flow (RVF) and Gradually Varied Flow (GVF) phenomena in open channels.

**CO3** Apply and design the water distribution systems using Hardy Cross (Loop) and Node (Branching Pipes) methods with Hazen-William & Darcy Weisbach equations.

**CO4** Identify and analyze the hydraulics machinery principles.

**CO5** Identify and analyze the dimensional analysis and hydraulics similarity concepts.

BAA2513
SOIL MECHANICS & GEOLOGY
Credit : 3 credit
Pre-requisite : BAA1133 Mechanics of Materials

**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 Outcomes**

By the end of this course, students will have the ability to:

**CO1** Apply soil/mathematical theory to solve problem given.

**CO2** Prepare soil related graphs/curves/diagrams.

**CO3** Outline the problem given and conduct analysis with proper/appropriate calculation.

**CO4** Acknowledge and express the geological process/output

BAA2941
ENGINEERING LABORATORY III
Credit : 1 credit
Pre-requisite : BAA2713 Fluid Mechanics

**SYNOPSIS**
This ENGINEERING LAB III covers Water and Environmental 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 Outcomes**

By the end of this course, students should be able to:

- **CO1** Demonstrate Fluid Mechanics system and devices, apply and analyze Bernoulli’s Theorem and compute minor losses due to disruption in normal flow.
- **CO2** Conduct open channel and apply the equation of flow (uniform & non-uniform flow) in open channels, hydraulic machinery principles and rainfall-runoff relationship.
- **CO3** Conduct water/wastewater testing and analyze the sample to determine water quality standard such as turbidity, BOD, COD and TSS.

**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 Outcomes**

At the end of this course, the students should be able to:

- **CO1** Describe and analyze the type of construction contracts and tender documents.
- **CO2** Differentiate types of contracts and propose the right type of contracts 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.

**BAA3012**

**LAW OF CONTRACT & ESTIMATION**

*Credit: 2 credit*

*Pre-requisite: None*

**Synopsis**

**BAA3813**

**HYDROLOGY & WATER RESOURCES**

*Credit: 3 credit*

*Pre-requisite: BAA2723 Hydraulics*
Synopsis

This course will be introduced the hydrology theory derived from the natural process of hydrological cycle. Hydrology introduces 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 Outcomes

By the end of this course, students should be able to:

CO1 Define and explain the basic concept of hydrology processes.

CO2 Analyze 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 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 element 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 : 3 credit
Pre-requisite : None

Synopsis


Course Outcomes

By the end of this course, students should be able to:

CO1 Classifying various types of roads and highways and differentiating users characteristics

CO2 Designing road link based on Malaysia Highway Capacity Manual and explaining speed, flow and density relationship
BAA2213
REINFORCED CONCRETE DESIGN I
Credit: 3 credit
Pre-requisite: 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. Code requirements and detailing. Group design project for double storey house

Course Outcomes
At the end of this course, the students should be able to:

CO1 Design reinforced concrete beam in accordance to the relevant codes of practice in building design.

CO2 Design reinforced concrete slab in accordance to the relevant codes of practice in building design.

CO3 Design reinforced concrete staircase in accordance to the relevant codes of practice in building design.

CO4 Design simple reinforced concrete column with axial load only in accordance to the relevant codes of practice in building design.

CO5 Design the reinforced concrete structures of a double storey house to the relevant code of practice, manuals and software.

BAA2941
ENGINEERING LABORATORY IV
Credit: 1 credit
Pre-requisite: BAA2513 Soil Mechanics & Geology
BAA2413 Highway & Traffic Engineering

Synopsis
This ENGINEERING LAB IV 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 practice work at the construction industry

Course Outcomes
By the end of this course, students should be able to:

CO1 Conduct traffic volume survey and analyze the data.

CO2 Demonstrate flexible pavement design based on JKR Standard

CO3 Produce soil related graphs/curves/diagrams.

BAA3023
PROJECT MANAGEMENT IN CONSTRUCTION
Credit : 3 credit
Pre-requisite : 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 Outcomes
At the end of this course, the students should be able to:

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 Explain and differentiate types of project organization practiced in construction industry

CO4 Differentiate and apply methods and techniques of resource management

CO5 Apply and illustrate the appropriate techniques of project planning and scheduling

CO6 Explain activities involved in monitoring and controlling the project

CO7 Apply the appropriate software in performing the project planning and scheduling tasks

BAA3513
GEOTECHNICAL ENGINEERING
Credit : 3 credit
Pre-requisite : 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, Soil improvement and environment geotechnics.

Course Outcomes

By the end of this course, students will have the ability to:

CO1 Describe the principal tests used to determine the compressibility parameters of soil and use them appropriately.

CO2 Calculate consolidation and time for settlements of a foundation and embankment.

CO3 Apply earth pressure theory in the analysis and design of earth retaining wall structure.

CO4 Analyze slope stability using slip surfaces and method of slices and describe the different methods and materials used for stabilizing slopes.

CO5 Calculate the bearing capacity of a shallow foundation.

CO6 Describe the purpose, basic principle of soil improvement and environmental geotechnics in civil engineering.

BAA3613
ENVIRONMENTAL ENGINEERING
Credit: 3 credit
Pre-requisite: None

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 Outcomes

CO1 Identify and calculate the physical, chemical and biological water quality parameters

CO2 Illustrate water treatment processes

CO3 Demonstrate wastewater treatment processes

CO4 Analyze the environmental pollution such as solid waste, water and air pollution

BAA3312
BUILDING SERVICES & MAINTENANCE
Credit: 2 credit
Pre-requisite: None

Synopsis

This course will provide the fundamental knowledge of engineering design and operating principles of the building services and maintenance in buildings.

Course Outcomes
By the end of this course, students should be able to:

CO1 Discuss the fundamental knowledge of the operating principles of the various building services and maintenance system available in buildings

CO2 Analyse the engineering design of the integrated building services system as presented in engineering drawings

CO3 Design selected building services system for a specific building project according to and complying with the engineering policies, regulations, guidelines, manuals, standards and specifications

CO4 Critique the building services design in a specific engineering project

BAA3213
REINFORCED CONCRETE DESIGN II
Credit : 3 credit
Pre-requisite : BAA2213 Reinforced Concrete Design I

Synopsis

This course covers the column design, foundation design, design project, retaining wall design and introduction to prestressed concrete design and also typical design of a reinforced concrete building.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Analyze and design reinforced concrete columns.

CO2 Analyze and design foundations.

CO3 Analyze and design retaining walls.

CO4 Describe the application of prestressed beams.

CO5 Design a four storey building project.

BAA4936
INDUSTRIAL TRAINING
Credit : 6 credit
Pre-requisite : BAA2723 Hydraulics
BAA2213 Reinforced Concrete Design I
BAA3513 Geotechnical Engineering
BAA3012 Law of Contract & Estimation
BAA3023 Project Management in Construction

Synopsis

This course also involve 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.

**Course Outcomes**

At the end of this course, the students should be able to:

**CO1** Show concern (A3) of safety standards and be aware (A1) of safety and health measures at job place.

**CO2** Behave according to (A3) organisation’s regulation and procedures while conforming (A2) to basic professional skill during the available duration.

**CO3** Practice (S3) and contribute (A2) taught theories to solve real-time problem through involvement in various scopes of works such as planning concept, design, construction & project administration.

**CO4** Adjust (A4) to professional and quality work ethics in order to become an effective, motivated and responsible engineer.

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**BAA4023 PROJECT FOR PROFESSIONAL PRACTICES**

**Credit : 3 credit**

**Pre-requisite :** Must be a 4\textsuperscript{th} year student

**Synopsis**

Project for Professional Practice is a group project at the Faculty Civil Engineering & Earth Resources, Universiti Malaysia Pahang. Students are grouped in teams of their choice, preferable based on field similar to their Final Year Project. They may opt to pursue the implementation of one or combination of the Final Year project of the team members or propose a new project or take up the project proposed by the Project Director (the supervising lecturer). Based on the directions but with minimal involvement from/of the Project Director, the group plan and design/undertake the project until the completion of an acceptable project outputs (Plans/Feasibility Study /Detail Feasibility/Project Tender reports) depending on the time and budget constraints. The aims of the course are to develop students professional and ethical responsibilities, communicating effectively with multidisciplinary professions and community at large, functioning effectively as an individual and in a group with the capacity to be a leader, explaining the impact of technology solution in societal, cultural, global, and environmental context, recognizing the needs and posses the capability in life-long learning and to some extends utilizing techniques, skills, and modern engineering tools necessary for technological practice and adaptable to industrial needs, i.e. attributes of PO6 to PO11. Although it is PBL by nature, lectures and e-learning
sessions are conducted as to provide general guidance to the groups.

Course outcomes

At the end of this course, the students are expected to fulfill the following COURSE OUTCOMES:

CO1  Develop professional and ethical responsibilities
CO2  Communicate effectively in-team and with external parties as to share ideas or get feedbacks from the stakeholders
CO3  Organised projects activities as a group effort
CO4  Select sustainable practices in the conduct of the project by providing project’s alternatives/options
CO5  Make appropriate REFERENCES to the code of practice and/or guidelines
CO6  Demonstrate techniques, skills, and modern engineering tools necessary whenever applicable

This course will introduce the students to aspect of foundation engineering design and analysis. The topics cover in the subject includes the review of site investigation report data, settlement of shallow foundation, soil improvement and ground modification method, all aspects of deep foundation including single pile and group piles and also earth retaining structure which involves braced cuts and sheet piles. At the end of this course, student should be able to practiced the knowledge gained and solved problems related to geotechnical engineering field.

Course Outcomes

By the end of this course, students will have the ability to:

CO1  Interpret soil investigation data.
CO2  Recognize the problem and proceed with the solution by applying the soil and geotechnical fundamentals.
CO3  Select and assess solution of a problem.
CO4  Evaluate the soil condition and defend the judgement made.

BAA4513
FOUNDATION ENGINEERING
Credit : 3 credit
Pre-requisite :  BAA3513 Geotechnical Engineering

Synopsis
BAA4222
ENGINEERING IN SOCIETY
Credit : 1 credit
Pre-requisite : 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 student and intended to introduce students to the professional practice of civil engineering, with emphasis on the roles of practicing engineers, professional practice organization, engineering ethics, professional registration and communication skill. 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 who are civil engineering practitioners and professional, providing the students an opportunity to interact with professionals in their major field of interest. The course also includes topics which are important parts of the civil engineering discipline.

Course Outcomes
By the end of this course, students should be able to;

CO1 Adopt and show concern to professional, regulation and ethical responsibilities.

CO2 Ability to function on multi-disciplinary teams and good communication skills.

CO3 Adopt and show concern the relationship between technology, engineering and environment issues.

CO4 Ability to apply the aspects of project management and quality in engineering

BAA3223
STEEL & TIMBER DESIGN
Credit : 3 credit
Pre-requisite : 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 Outcomes
At the end of this course, the students should be able to:

CO1 Describe the concept & philosophy of steel design, analyse & design connections according to the relevant codes of practice in building design
CO2  Analyse & design steel beam in according to the relevant codes of practice in building design

CO3  Analyse and design steel column according to the relevant codes of practice in building design

CO4  Analyse and design trusses & portal frame based on the relevant code of practice in building design

CO5  Describe the concept & philosophy of timber design, analyse and design a typical timber structure according to the relevant codes of practice in building design

BAA3322  
ENGINEERING ECONOMICS  
Credit : 2 credit  
Pre-requisite : None

Synopsis

This subject covers the principles and applications of economic analysis in the field of engineering to make sound decision among alternatives.

Course Outcomes

By the end of this course, 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.

BAA3922  
RESEARCH METHODOLOGY & PRE-PROJECT  
Credit : 2 credit  
Pre-requisite : BAA2723 Hydraulics  
BAA2213 Reinforced Concrete Design I  
BAA3513 Geotechnical Engineering  
BAA3023 Project Management in Construction

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 Outcomes**

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

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**BAA4914**  
**FINAL YEAR PROJECT**  
**Credit**: 4 credit  
**Pre-requisite**: BAA3922 Research Methodology & Pre-Project

**Synopsis**

After successfully completing Research Methodology and Pre-Project (BAA3922 – PSM1), students will continue to proceed with the subsequent tasks of the proposed project program. They have to undertake data collection and conduct experiment or survey, tabulate and analyze the results, and conclude their project findings. They must constantly report and carry out discussion with their supervisors on the extent of the development of their project. At the end of the course, students have to submit the final thesis and present their findings to the examiners.

**Course Outcomes**

At the end of this course, the students should be able to:

**CO1** Compose, develop or formulate, arrange and collect the appropriate required data and information as outlines in the proposed project methodology as to achieve the objectives of an engineering project.
CO2 Arrange, assess and evaluate the results of the project in accordance to the project objectives and proposed methodology while making reference to the literature review or the prevailing standards and specifications.

CO3 Argue or support about the fulfillment of the project objectives and recommend for further works.

CO4 Demonstrate, describe, discuss, illustrate, argue and predict about the finding of the project in an oral presentation.

CO5 Assemble the write up about project in an acceptable and professional format.

CO6 Solve and meet all deadlines and project commitments

**ELECTIVE COURSES**

**BAA4223 PRE-STRESSED CONCRETE DESIGN**  
*Credit:* 3 credit  
*Pre-requisite:* BAA3213 Reinforced Concrete Design II

**Synopsis**

This course is being taught as an elective course to provide the understanding about the analytical method and the design procedures involving pre-stressed concrete. The main purpose of this course is to deliver knowledge and understanding of principles of pre-stressed concrete, pertaining to both its analysis and design aspects. This course deals with the analysis and design of elements of structure. This course includes an assignment and mini project that involves the design of pedestrian footbridge.

**Course Outcomes**

At the end of this course, the students should be able to:

- **CO1** Define and explain the principle of prestressed concrete
- **CO2** Differentiate method of prestressing and their practical applications
- **CO2** Explain the types of loss of prestress in pretensioned and post-tensioned members
- **CO4** Analyze and design flexural members under service and ultimate loads
- **CO5** Design structural elements for shear, anchorage and end block
BAA4243
ADVANCED CONCRETE MATERIALS
Credit : 3 credit
Pre-requisite : None

Synopsis

This course will introduce the students to the concepts, characterization, and application and advantages the recent concrete technology in construction as well as concrete durability in detail. Initially, the course will cover on durability aspect of concrete in terms causes of deterioration, mechanism of attack as well as method to overcome the problem. The course will also touch on the utilization of blended cement in concrete technology before introducing the student to the modern concrete namely lightweight concrete, high strength concrete, high performance Portland cement concrete, fiber-reinforced concrete, high workability concrete, and shrinkage-compensating concrete. Others topics will also be included that quality control for durability of concrete and repairs of concrete structures.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Explain the properties and applications of special concretes; Lightweight concrete, high performance concrete, high strength Portland cement high workability, polymer concrete, and shrinkage compensating concrete.

CO2 Identity the properties of recent concrete technology with their application and characteristic

CO3 Identify several cement replacement materials and to describe the properties of blended cement concrete.

CO4 Ability to access and evaluate damages on concrete buildings.

CO5 Ability to decide the method of assessment and repair of the concrete

CO6 Ability to produce and present an engineering report on condition surveys, proposal of repair/rehabilitation plan.

BAA4813
ARCHITECTURAL DESIGN & ENGINEERING
Credit : 3 credit
Pre-requisite : None

Synopsis

As graduating semester for the Bachelor of Civil Engineering at UMP, the focus of this elective course is a project that will utilise student’s engineering skills and competency to make independent design decisions with creativity and innovativeness. The nature and complexity of the project
shall be in the form of medium rise of three (3) to five (5) stories, such as museum, shopping centres, sport centres and healthcare clinics involving up to 500 people (at one occupancy). The project will incorporate engineering, architectural design, technical and regulatory requirement as part of the design process and submission.

**Course Outcomes**

At the end of this course, the students should be able to:

CO1  Design THREE (3) to FIVE (5) stories building that incorporates engineering and architectural design

CO2  Design engineering solutions such as structural design, geotechnical design, infrastructural design related to the project

CO3  Integrated the engineering innovation and creativity with architectural design considerations

CO4  Analyse building economic principles such as life cycle cost, operational cost and maintenance cost of the facilities proposed for the project

CO5  Proposed sustainable design to the related project

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**BAA4313**  
**GEOGRAPHICAL INFORMATION SYSTEM**  
**Credit**: 3 credit  
**Pre-requisite**: None

**Synopsis**

The goal of this course is to give knowledge and understanding about application of Geographical Information System (GIS) in Civil Engineering. The main content of this course is about an application of GIS in environmental and civil engineering.

Amongst the main topics discussed are:

a) Fundamental and development of GIS in civil engineering  
b) Data processing such as data collection, data management, spatial analysis, data manipulation and data output.  
c) Current application of GIS in civil engineering (focus in Malaysia)

**Course Outcomes**

At the end of this course, the students should be able to:

CO1  Identify and describe to main component of GIS and advantages of GIS in Civil Engineering

CO2  Explore about the data observation, processing, organization and spatial data management.
CO3 Process and solve the spatial problem

CO4 Use GIS software

BAA4823
FACILITIES & ASSET MANAGEMENT
Credit: 3 credit
Pre-requisite: None

Synopsis

The course provides the requisite knowledge for understanding facilities management as a profession with reference to how people, spaces, organisations, services, indoor and natural environment interact within the property and construction industry in an environmentally sustainable fashion. Apart facilities the module also integrate with the nature and concepts of contemporary asset management. Asset management topic aspects as asset management systems, asset management plan, asset knowledge, the use of geographical information systems, delivery (plan, design, risk & value management, procure, construct), audit and review.

Course Outcomes

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

CO1 Understanding what facility management means and how it relates to the core business of organisations.

CO2 Understanding of the strategic value of facilities management, and their potential contribution to organisational effectiveness.

CO3 To outline the potential enhancements to systems and techniques used manage facilities and asset management in a variety of contexts

CO4 To outline and apply skills in the context of facilities management and asset management.

BAA4713
ADVANCED HYDRAULICS ENGINEERING
Credit: 3 credit
Pre-requisite: None

Synopsis

This course enhances and broadens the scope of hydraulics by including the characteristics and influence of groundwater, sediment and sea waves to the hydraulic process itself. The function of hydraulic structures i.e. dam, spillways and coastal structures are also introduced to demonstrate the above influences.
COURSE OUTCOMES

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

CO1 Differentiate uniform flow in open channel and closed conduit
CO2 Describe the hydraulic flow processes on groundwater emphasizing on aquifer hydraulics.
CO3 Describe the types and analyze the functions of dams, spillways and coastal structures.
CO4 Analyse the influence of groundwater, sediment and sea waves to the hydraulic process itself
CO5 Ability to work effectively in a team and demonstrate cooperative effort to carry out a given group project.

BAA4223
FINITE ELEMENT
Credit : 3 credit
Pre-requisite : None

Synosis

This course will enable students to understand the fundamental principles of finite element analysis in civil engineering structures. The finite element analysis use numerical method in solving structural engineering problems involving complicated geometries, loadings and material properties. The finite element formulation of the problem results in a system of simultaneous algebraic equations for solution. Basic concept of structural modelling finite element discretization, interpretations, review of the direct stiffness method are combined for obtain the solution in the framework of structure mechanics. This course also will introduce some of the computational modelling and analysis techniques for comprehensive evaluation and checking when interpreting results. It covers basic theory, modelling, meshing and analysis component models for stresses, deflections, treatment of boundary conditions and restraints, with example of good practice for safe and effective application in use.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Analyse by using the FEM of 2D and 3D truss line elements
CO2 Analyse by using the FEM of 2D plane stress/strain elements
CO3 Analyse by using the FEM of 3D plane stress/strain elements
CO4 Apply a finite element software by using LUSAS to interpret the solutions obtained from the structural finite element analyses
BAA4253
BRIDGE ENGINEERING
Credit : 3 credit
Pre-requisite : None

Synopsis
This course covers prestressed concrete bridge design, prestressing system, loss of prestress, analysis and design of section for flexural, shear and also principles and design of prestressed concrete members for prestressed concrete bridge. Deflection analysis and anchorage zone design are also taught in this course. In addition, this course also covers prestressed concrete one-way slab and two-ways slab design for prestressed concrete bridge.

Course Outcomes
At the end of this course, students should be able to:

CO1 Able to design minimum number of tendons in various types of bridge girders in accordance to different loading condition

CO2 Able to calculate loss of prestress in pretensioned and post-tensioned members for a typical prestressed concrete bridge

CO4 Able to calculate and design for shear requirement, deflection and anchorage zone under ultimate limit states for prestressed concrete bridge elements

CO5 Able to design one-way and two-ways slabs for prestressed concrete bridge

BAE4483
ADVANCED WATER & WASTEWATER TREATMENT
Credit : 3 credit
Pre-requisite : None

Synopsis
Theory, principal and design of biological and physico-chemical unit processes for advanced water and wastewater treatment. The course will address the anaerobic and aerobic processes such as biological removal through attached and suspended growth processes, fluidized bed reactors and control of nitrogen and phosphorous for nutrient removal. Advanced design process development for clarifier, filtration, adsorption, disinfection, ion exchange, membrane processes are also discussed.
Course Outcomes

By the end of this course, students should be able to:

CO1 Define and analyze physical, chemical and biological properties for water & wastewater treatment

CO2 Define and analyze physical, chemical and biological processes for water & wastewater treatment

CO3 Apply and design water treatment process

CO4 Apply and design wastewater treatment process

BAE4613
ENVIRONMENTAL MANAGEMENT
Credit : 3 credit
Pre-requisite : None

Synopsis

Environmental management of civil engineering is of increasing importance throughout the world, so demand is growing for qualified and trained environmental managers. This course is aimed at undergraduates who want to enhance knowledge in environmental management. This subject covers various topics from water, air, noise and solid waste which contribute to pollution during constructions works. Rule and regulation from Department of Environment also will be addressed together with environment impact assessment (EIA) before the construction works and environmental management planning (EMP) during constructions works. International standards and GIS application also will be highlighted with latest development, technology and applications.

Course Outcomes

At the end of this course the student should be able to:

CO1 Understand the important terminology, facts, concepts, principles and theories used in the environmental management field.

CO2 Be able to make sound management decisions based on environmental and scientific data.

CO3 Apply environmental management systems in organizational environmental improvement.

CO4 Recognize economic, environmental, and social issues relevant to the management of organizations and justify the need for environmental strategies in organizations;
BAE4813
HYDROLOGY & WATER RESOURCES MANAGEMENT
Credit : 3 credit
Pre-requisite : None

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 and hydrograph analysis. Other topics will be covered are a detail flood routing analysis, erosion and sedimentation, reservoir design and water resources planning including integrated river basin management, policy and regulation, and economics analysis of water resources system. This course will also familiarize students with various integrated and multi objectives analysis of water resources system.

Course Outcomes

By the end of this course, students should be able to:

CO1 Predict the temporal distribution of runoff using various runoff models, including estimate the time of concentration, peak runoff and entire run off hydrograph from rainfall excess.

CO2 Perform the flood routing analysis and determine the soil loss, bed load, sediment yield and water quality estimation using various method.

CO3 Describe the Integrated River Basin Management (IRBM) and water resources management issues, law, policy, and regulation.

CO4 Analyze the economic and financial feasibility of water resources system and compute reservoir yield by analyzing supply and demand curve.

CO5 Conceptualize and apply an integrated/multi objectives analysis for evaluating various management alternatives of water resources system.
DIPLOMA OF CIVIL ENGINEERING (DAA)

DAA1312
CIVIL ENGINEERING MATERIAL

PRE-REQUISITE

SYNOPSIS
This subject is compulsory and basic subject which will introduce students to the material that been used in construction industry. Students will be exposed to the knowledge on the basic characteristic of each material together with the testing method to determine the material strength. Student who is able to complete this course successfully, would be able understand easily the terms and materials related to construction project.

COURSE OUTCOMES

CO1 Identify and explain the types of construction materials commonly used in construction industry. (C2)

CO2 Explain the properties, differences, advantages and disadvantages of the materials. (C2,P3,A1, CTPS, TS)

CO3 Explain the production of the materials. (A1, C1, TS)

DAA1032
ENGINEERING DRAWING

PRE-REQUISITE

SYNOPSIS
This subject aims to expose the students to the civil engineering drawing and to prepare this knowledge for their future profession. Students should be able to describe, discuss and analyse the information and conventions as presented in the civil engineering drawings. The learning approach of civil engineering drawings is integrated through series of hands-on tutorial. The students should be able to generate engineering drawings through selected exercises manually and using the application of software packages

COURSE OUTCOMES

CO1 Describe the basic characteristics and features of civil engineering drawings. [C2, P3, CTPS3]

CO2 Understand the civil engineering drawings and interpret to the actual construction. [C4, P3, A3, TS3]
CO3 Employ computer-aided software to produce civil engineering drawings. [C5, P3, A3, CTPS3, TS3]

DAA1212
COMPUTER PROGRAMMING

SYNOPSIS
The subject focuses on development of programming skills using computer programming language that is suitable for the current computer operating system.

COURSE OUTCOMES
CO1 Describe basic computer programming and its functionalities (C2)

CO2 Construct and adopt a pseudo code and flow chart for solving a computing problem (C5),(P3),(A4),(CTPS)

CO3 Analyze a simple computing-based project (C4),(P4),(A3),(CTPS)

CO4 Design and develop computer program using basic language programming (P7),(A4)

DAA1113
ENGINEERING MECHANICS

PRE-REQUISITE

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 OUTCOMES
CO1 Analyze the concept of static mechanics system in two and three dimensions problems and solve it by applying the equilibrium condition (C4) (CTPS)

CO 2 Determine the location of centroid and moment of inertia for a body of arbitrary shape. (C4) (CTPS)

CO3 Analyze the kinematics of motion that involves force & acceleration and work & energy principle. (C4,P2,A2) (CTPS,TS).
DAA2313
ENGINEERING SURVEYING

PRE-REQUISITE

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 OUTCOMES
CO1 Identify and describe some of the engineering surveying roles in civil engineering works. (C2,A2) (CTPS)
CO2 Perform horizontal and vertical control based on related provision.(C3,P3,A2) (CTPS,TS)
CO3 Understand the range of calculations that can be made with surveying data.(C3,P3,A2) (CTPS,TS)

DAA2322
ENGINEERING SURVEYING FIELDWORK

SYNOPSIS
This fieldworks encompasses how to handling survey equipments, carry out linear survey, traverse survey, leveling, establishing the temporary bench mark, detailing survey, techniques of gathering the location of man-made and natural features, preparation of site plan, related computation and setting-out simple construction work.

COURSE OUTCOMES
CO1 Organize a small survey work for project (CTPS3,TS2)
CO2 Practice the significant of survey work using engineering survey techniques based on related provision.(C1,CTPS3,TS2)
CO3 Use various survey instruments at site (CTPS3,TS2)
CO4 Write report affectively (C1,TS2)

DAA1123
MECHANICS OF MATERIALS

PRE-REQUISITE
DAA1113
ENGINEERING MECHANICS

SYNOPSIS
Mechanics of materials studies the relationship between external forces on a deformable body and the intensity forces acting within the body. The course focuses on several types of components, bars subjected to axial load, beams in bending and shaft in torsion. The principles and methods
used to meet the objectives are drawn from prerequisite courses in mechanics, physics and mathematics.

**COURSE OUTCOMES**

**CO1** Determine the internal forces, stresses & strains, deformation of axially loaded members and analyze the stress-strains relationships to obtain material properties.

**CO2** Analyze the determinate beams to construct shear force & bending moment diagram and determine the bending and shearing stresses.

**CO3** Analyze the stress transformation at particular coordinate system to other having different orientations by using equations method & Mohr’s circle.

**CO4** Analyze the circular shaft to obtain the torsion.

**DAA1951**

**ENGINEERING LABORATORY I**

(WATER & ENVIROMENT)

**SYNOPSIS**

This ENGINEERING LAB I covers Water and Environmental 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 OUTCOMES**

**CO1** Demonstrate Fluid Mechanics system and devices, apply and analyze Bernoulli’s Theorem and compute minor losses due to disruption in normal flow(C3,A3,P3) (CS,CTPS)

**CO2** Conduct open channel and apply the equation of flow (uniform & non-uniform flow) in open channels, hydraulic machinery principles and rainfall-runoff relationship. (C3,A3,P4) (CS,CTPS)

**CO3** Conduct water/wastewater testing and analyze the sample to determine water quality standard such as turbidity, BOD, COD and TSS. (C4,A4,P4) (CS,CTPS)

**DAA1723**

**FLUID MECHANICS**

**PRE-REQUISITE**

**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 fluid mechanics.

**COURSE OUTCOMES**

**CO1** Define Fluid Properties and the fundamentals of Fluid Mechanics concept.(C1) (CS)
CO2 Explain Fluid Mechanics system and devices such as capillary tube viscometer, falling ball viscometer, manometers, and piezometer. (C2)(CTPS)

CO3 Apply Fluid Mechanics theories such as Bernoulli’s Theorem, Continuity Equation, Darcy-Weisbach Equation and Reynold’s Number in Fluid Mechanics system. (C3)(CTPS)

CO4 Demonstrate the pipeline systems as related to civil engineering. (C3)(CTPS)

DAA2931 ENGINEERING LABORATORY II (MATERIALS & STRUCTURAL )

SYNOPSIS
This ENGINEERING LAB II 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 OUTCOMES
CO1 Observe and detect the failure from destructive and non-destructive testing. (C3,A3,P3) (CS,CTPS)

CO2 Conduct concrete mix design and produce the output from the design. (C3,A3,P3) (CS,CTPS)

CO3 Conduct tensile strength test and discuss the properties of steel from the test. (C3,A3,P3) (CS,CTPS)

DAA2123 THEORY OF STRUCTURES

PRE-REQUISITE
DAA1123 MECHANICS OF MATERIALS

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 and influence lines of beam and truss, and the analysis of indeterminate beams and frames.

COURSE OUTCOMES
CO1 Analyze the deflection and slope of determinate beams (C4,P4,CTPS3)

CO2 Analyze an indeterminate beams and frames to obtain the end moments (C4,P4,CTPS3)

CO3 Analyze internal forces and compute deflection of determinate plane trusses (C4,P4,A3,CTPS3,TS3)
DAA2413
TRAFFIC & HIGHWAY ENGINEERING

PRE-REQUISITE

SYNOPSIS
This course is designed to introduce students on the basic understanding of highway and traffic engineering with an emphasis on the design standards that being used in Malaysia. Topic covers are construction developments and highways planning in Malaysia, highway geometric design, pavement design and construction, pavement maintenance and rehabilitation, traffic engineering studies including traffic volume and capacity studies, and intersection and interchanges design principles.

COURSE OUTCOMES

CO1 Explain the characteristics of road network system based on road design standard in Malaysia and their administration.

CO2 Explain the fundamentals of traffic engineering elements such as road, driver and vehicles characteristics and the traffic control devices. (C4)

CO3 Analyze the fundamental traffic studies data of speed, volume and capacity and outline the intersection design principal based on local standard. (CTPS, TS), (C4), (P4), (A3)

CO4 Analyze the fundamentals of highway geometric design and carry out the mix design and flexible pavement designs based on JKR Standard. (CTPS, CS), (C4), (P4), (A3)

DAA2513
SOIL MECHANICS & GEOLOGY

PRE-REQUISITE

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 OUTCOMES

CO1 Acknowledge and explain the geological background and the soil formation. (C3, A1) (CTPS)

CO2 Describe the fundamental of weight-volume relationship in soil and able to produce the
compaction curve from soil compaction. (C3,A1) (CTPS)

CO3 Identify the soil classification based on AASHTO and USCS system and determine the soil behavior as an engineering material. (C3,P2,A1) (CTPS,TS)

CO4 Identify the soil’s permeability, calculate the amount of water flowing by producing the flow net diagram. (C3,P2,A1) (CTPS)

CO5 Acknowledge the principle of effective stress and able to analyze the soil stresses in various cases. (C3,P2,A1) (CTPS,TS)

DAA2523 GEOTECHNICAL ENGINEERING

PRE-REQUISITE
DAA2513 SOIL MECHANICS & GEOLOGY

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 OUTCOMES
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. (C3) (CTPS)

CO2 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. (C3) (CTPS)

CO3 Describe the important things in site investigation process that need to be consider before a construction can take place (C2) (CTPS)

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. (C3) (CTPS)

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. (C1) (CS) / (C3) (CTPS)
DAA2723
HYDRAULICS & HYDROLOGY

PRE-REQUISITE
DAA1723
FLUIDS MECHANICS

SYNOPSIS
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, streamflow, runoff, hydrograph and groundwater.

COURSE OUTCOMES
CO1 Define the type of channel flow, and evaluate the uniform flow, non-uniform flow in open channel.(C5)(CTPS)(TS)

CO2: Analyse pipe network using head distribution and identify the types of pumps, their selection criteria and performance evaluation.(C4)(CTPS)(TS)(LS)

CO3 Define and explain the basic concept of hydrology processes.(C2)(CTPS)

CO4 Analyze and solve rainfall, hydrological losses, stream flow, runoff, hydrograph and groundwater problems using various methods.(C4)(CTPS)

DAA2213
STRUCTURAL DESIGN I (CONCRETE)

PRE-REQUISITE
DAA2123
THEORY OF STRUCTURES

SYNOPSIS
This course covers the introduction of concrete design, the limit states principles, ultimate strength analysis and flexural design, shear, bond and torsion, analysis and design of beams, slabs and columns, and code requirements and detailing

COURSE OUTCOMES
CO1 Explain the purposes and basic concepts of reinforced concrete design [C2]

CO2 Identify and analyze loads involve in structural design [C4]

CO3 Interpret the architect drawing to engineering drawing according to their application thus construct structural drawing. (P7, A3, TS3,CTPS3)

CO4 Design of structural reinforced concrete beams, slabs, columns and foundation by using relevant
standard code of practice and carry out the concrete structures detail [C4, P3, CTPS3]

DAA2222
STRUCTURAL DESIGN II (STEEL & TIMBER)

PRE-REQUISITE
DAA2123
THEORY OF STRUCTURES

SYNOPSIS
This course covers introduction to the design code for designing beams, trusses, portal frame, connections, tension members, compression members and column. Timber design for simple structural use will also be covered.

COURSE OUTCOMES
CO1 Describe the concept & philosophy of steel & timber design based on the relevant code of practice & differentiate the classes of cross section for steel member structure. [C3]

CO2 Analyze & design a typical bending & compression steel structural member, trusses & portal frame according to the relevant codes of practice in building design [C5, P4, CTPS]

CO3 Analyze & design steel connection according to the relevant codes of practice in building design with producing work project of complete steel building [C4, P4, A2, CTPS, TS]

CO4 Analyze and design a typical timber structural according to the relevant codes of practice in building design. [C4, P4, CTPS]

DAA2612
ENVIRONMENTAL ENGINEERING

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 OUTCOMES
CO1 Identify and calculate the physical, chemical and biological water quality parameters

CO2 Illustrate water treatment processes

CO3 Demonstrate wastewater treatment processes

CO4 Analyze the environmental pollution such as solid waste, water and air pollution

DAA2023
PROJECT MANAGEMENT

SYNOPSIS
This subject is a compulsory and basic subject 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. Students who is able to complete these course successfully, would be able to understand on the management aspect in construction project

**COURSE OUTCOMES**

**CO1** Understand the overall construction project management process and the function of each party involved in construction (C2) (CTPS) (TS)

**CO2** Identify and explain an appropriate construction methods used in project management (C2) (CTPS)

**CO3** Apply the right method of procurement (C3) (CTPS)

**CO4** Carry out the Bill of Quantity and develop Critical Path Method (C5) (CTPS)

**DAA2951**

**ENGINEERING LABORATORY III**

**(GEOTECHNICAL & HIGHWAY )**

**SYNOPSIS**

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 practice work at the construction industry

**COURSE OUTCOMES**

**CO1** Conduct traffic volume survey and analyze the data. (C4,A3,P4) (CS,CTPS)

**CO2** Demonstrate flexible pavement design based on JKR Standard. (C4,A3,P4) (CS,CTPS)

**CO3** Produce soil related graphs/curves/diagrams. (C4,A4,P4) (CS,CTPS)

**DAA3909**

**INDUSTRIAL TRAINING**

**PRE-REQUISITE**

All Subjects Up To 4th Semester

**SYNOPSIS**

Students are exposed to the industrial practice as associate to engineers thorough attachment at public and private sectors. They need to be attached at the workplace for six months or at least through out 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).

**COURSE OUTCOMES**

Students should be able to:
CO1  Experience actual working environment at the workplace
CO2  Practice relevant theory in carrying duties at workplace
CO3  Use logbook as diary for technical personal
CO4  Learn new skills at workplace
CO5  Communicate and work as team member with all levels of work force

DAA3903
INDUSTRIAL TRAINING REPORT

PRE-REQUISITE
Industrial Training Attachment

SYNOPSIS
Students are required to write report of all recorded activities in the log book in a standard format, present it and submit a copy of the report to the industrial training coordinator for evaluation.

COURSE OUTCOMES
At the end of this course, the students should be able to:

CO1  Use information and data collected in the logbook as prime source for writing a technical report.
CO2  Arrange, assess and discuss the results of the data while making reference to the literature review or the prevailing standards and specifications.
CO3  Argue or support about the fulfilment of the project objectives and recommend for further works.
CO4  Demonstrate, describe, discuss, illustrate, argue and predict about the finding of the project in an oral presentation.
CO5  Assemble the write up about project in an acceptable and professional format.
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.

Vision & Mission Of The Faculty

Vision
To become a world class competency-based manufacturing faculty.

Mission
Highly committed to UMP core values, we strive to produce competent engineering graduates by providing excellent engineering programmes. We are also committed to enhance wealth creation through research & development, commercialization, collaboration and consultation in the area of engineering design, process, automation and system.

PROGRAMMES OFFERED

At the undergraduate level, FKP offers degree programmes related to manufacturing engineering as follows:

a) Bachelor of Manufacturing Engineering
b) Bachelor of Mechatronics Engineering
c) Bachelor of Mechatronics Engineering (UMP – HsKA, Germany)

Postgraduate level:

- Doctor of Philosophy (Manufacturing Engineering) - Research
- Doctor of Philosophy (Mechatronic Engineering) - Research
- Master of Engineering (Manufacturing) - Research
- Master of Engineering (Mechatronic) – Research

LABORATORY FACILITIES

Teaching and research laboratory facilities of the Faculty of Manufacturing Engineering 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 manufacturing engineering. These laboratories are as follows:

- Milling Lab
- Turning Lab
- Technical Drawing Lab
- CAD/CAM/CAE Lab
- Programming Lab
- Manufacturing Lab
- Control System Lab
- Mechanic Lab
- Basic Electrical Lab
- Materials Lab
- Thermo Fluid Engineering Lab
- Advanced Machining Lab
- Moulding Lab
- Metal Stamping Lab
FACULTY MANAGEMENT

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**Elective Subjects**: Advanced Machining, Plastic Product Design, Sheet Metal Product Design, Lean Production System, Facility Management, Data 1, Data 2, Lean Production System 2, Total Quality Management, 

**University Required Courses**: Applied Calculus, Applied Statistics, Ordinary Differential Equations, English For Academic Communication, English For Technical Communication, 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, Technopreneurship, Elective Courses.
## Bachelor of Mechatronics Engineering

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### Total Unit for Graduation
- University Required Courses: 129
- Elective Subjects: 29
- Total: 158

### University Required Courses:
- Applied Calculus
- Applied Statistics
- Ordinary Differential Equations
- Fundamentals of English Language
- English for Technical Communication
- English for Professional Communication
- Islamic And Asian Civilizations 1, 2, 3
- Foreign Languages Level 1, 2
- Soft Skills 1, 2
- Co-Curriculum I, II, III
- Technopreneurship
- Elective Courses

### Elective Subjects:
- Power Electronics
- Electrical Power and Machines
- Artificial Intelligence System
- Robot for Engineers
## PROGRAMME CURRICULUM
### BACHELOR OF MECHATRONICS ENGINEERING (UMP-HsKA)

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| SEMESTER | INDUSTRIAL TRAINING (LI) 6 MONTHS | TOTAL UNITS |
| FIRST | | 115 |
| SECOND | | 18 |
| THIRD | | 24 |
| FOURTH | | 31 |
| FIFTH | | 40 |

University Required Courses: Applied Calculus, Ordinary Differential Equations, Islamic And Asian Civilisations 1, Ethnic Relations, Deutsch Sprache 1, Deutsch Sprache 2, Deutsch Sprache 3, Deutsch Sprache 4, Soft Skills 1, Soft Skills 2, Co-Curriculum I, Co-Curriculum II, Technopreneurship.

Total Unit For Graduation: 139
SYLLABUS

MANUFACTURING PROGRAMME

BFF1102
STATICS
Credit : 2 credits
Pre-requisite : None

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 Outcomes
- CO 1: Solve equilibrium of forces on particle problems.
- CO 2: Solve equilibrium of forces on single rigid body problems.
- CO 3: Solve equilibrium of forces on structure problems.
- CO 4: Solve problems on centroid and moment of inertia.

BFF1502
PROJECT MANAGEMENT
Credit : 2 credits
Pre-requisite : None

Synopsis
This course embraces a broad basic overview and principles of project management which has become central to operations in manufacturing enterprises throughout the three primary processes of managing projects; initialization, planning and scheduling, and organizing.

Course Outcomes
- CO 1: Discover project management concept.
- CO 2: Analyze project initialization phase.
- CO 3: Analyze project planning and scheduling phase.
- CO 4: Analyze project organizing phase.

BFF1113
ENGINEERING MATERIALS
Credit : 3 credits
Pre-requisite : None

Synopsis
This course introduces the structure of metals and plastic deformation, the mechanical and physical properties of materials, the structure and strengthening of metal alloys by heat treatment and the structures and properties of polymeric materials, ceramics and composite materials.

Course Outcomes
- CO 1: Analyze the structure of metals and plastic deformation.
- CO 2: Analyze the mechanical and physical properties of materials.
- CO 3: Analyze the structure and strengthening of metal alloys by heat treatment.
- CO 4: Analyze the structures and properties of polymeric materials, ceramics and composite materials.

BFF1303
ELECTRICAL/ELECTRONIC ENGINEERING
Credit : 3 credits
Pre-requisite : 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 Outcomes
- CO 1: Solve DC resistive network analysis.
- CO 2: Solve AC network analysis.
- CO 3: Solve circuits involving diodes and bipolar junction transistor (BJT).
- CO 4: Solve circuit involving operational amplifier.
- CO 5: Solve logic circuits problem.

BFF4911
ENVIRONMENT SAFETY AND HEALTH
Credit : 1 credits
Pre-requisite : None

Synopsis
This course cover 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
CO 1 Explain the importance of environmental safety and health and OSHA regulations in workplace.
CO 2 Analyze the practices in workplace contributing to serious possible damage to life, health and property.
CO 3 Make up solution to ESH problem in a given case study.
CO 4 Evaluate ESH management in different industries.

BFF3513
MANUFACTURING SYSTEM
Credit: 3 credits
Pre-requisite: None

Synopsis
The course provides in-depth understanding of the structure and function of modern manufacturing systems. Methods of managing resources in manufacturing systems to achieve the strategic goals of improved quality, increased flexibility, reduced product cycle time and greater efficiency will be emphasized.

Course Outcomes
CO 1 Classify the manufacturing environment including Jobbing Shop Production, Batch Production and Mass Production.
CO 2 Analyze the requirement planning (MRP and MRP II).
CO 3 Investigate the Just In Time (JIT) approach and Kanban system.
CO 4 Analyze operation of Optimized Production Technology (OPT).
CO 5 Develop the best system which draws the best of JIT, MRP and OPT to use for specific manufacturing environment.

BFF1123
DYNAMICS
Credit: 3 credits
Pre-requisite: Statics BFF1102

Synopsis
This course introduces principles of kinematics of a rigid body utilizing force and acceleration method, work and energy method and impulse and momentum method.

BFF3632
DESIGN OF JIGS & FIXTURES
Credit: 3 credits
Pre-requisite: BFF1602 Technical Drawing, BFF2612 Computer Aided Engineering Design, BFF3622 Computer Aided Manufacturing, BFF1801 Machining 1, BFF1811 Machining 2.

Synopsis
This course starts with the concept and importance of jigs and fixtures in manufacturing for locating and work-holding devices. Important elements in designing jigs and fixtures will be emphasized such as the principles of locating and supporting, Poka Yoke, clamping and positioning, fixture body design, tooling for NC, drilling, milling, turning and grinding fixtures, assembly and joining fixture.

Course Outcomes
CO 1 Comprehend the importance, concept and various types of jigs and fixtures and its components.
CO 2 Comprehend the principles of locating, supporting and locking for jigs and fixtures.
CO 3 Apply jigs and fixtures design procedures for maximum efficiency and economy of production.
CO 4 Design and interpret jigs and fixtures according to industrial standard.
BFF1602
TECHNICAL DRAWING
Credit : 2 credits
Pre-requisite : None

Synopsis
This course introduces basic technical drawing method, symbols and standards. Manual drafting and CAD software are used to produce drawing on assignments throughout the course.

Course Outcomes
CO 1 Apply the standard needs to be followed when producing the drawing.
CO 2 Produce the orthographic drawing including sectioning.
CO 3 Apply the correct symbol and representations in the drawing.
CO 4 Produce the assembly and detailed drawing.

BFF2612
COMPUTER AIDED ENGINEERING DESIGN
Credit : 2 credits
Pre-requisite : Technical Drawing BFF1602

Synopsis
This course introduces 3D surface solid modeling 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
CO 1 Apply modeling principle in product design
CO 2 Produce 3D part models and standard technical drawing
CO 3 Produce assembly models and drawing
CO 4 Perform basic FEA simulation and animation.

BFF1801
MACHINING 1
Credit : 1 credit
Pre-requisite : None

Synopsis
This course introduces the basic technique to perform manual production techniques by selecting and using appropriate hand tools and perform basic turning processes and operations according to the given dimensions, specifications and tolerances.

Course Outcomes
CO 1 Perform basic manual production techniques
CO 2 Perform basic turning processes and operations according to the given dimensions, specifications and tolerances.

BFF1811
MACHINING 2
Credit : 1 credit
Pre-requisite : None

Synopsis
This course introduces student basic application of the measuring instruments, milling process and surface grinding.

Course Outcomes
CO 1 Perform various basic milling operations safely.
CO 2 Perform surface grinding process according to the given dimensions, specifications and tolerances.

BFF2003
COMPUTER PROGRAMMING
Credit : 3 credits
Pre-requisite : 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 Outcomes
CO 1 Write C program for input and output.
CO 2 Write C program using variables, constants declarations, arithmetic operations and mathematics function.
CO 3 Write C program using user-defined functions.
CO 4 Write C program using selection making decision construct.
CO 5 Write C program using repetitive construct.
CO 6 Write C program using array data structure.
**BFF2423**  
MANUFACTURING PROCESSES  

Credit : 3 credits  
Pre-requisite : Engineering Material  

**BFF1113**

**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 Outcomes**  
- CO 1: Analyze metal-casting processes  
- CO 2: Analyze forming processes  
- CO 3: Analyze joining processes  
- CO 4: Analyze material removal processes  
- CO 5: Analyze surface technology processes

**BFF2433**  
ADVANCED MANUFACTURING PROCESSES  

Credit : 3 credits  
Pre-requisite : Engineering Material  

**BFF1113**

**Synopsis**  
This course introduces the processing of ceramics and composites materials. It also covers powder metallurgy, non-traditional machining and rapid prototyping processes.

**Course Outcomes**  
- CO 1: Analyze the processing of composites materials  
- CO 2: Analyze the processing of ceramic materialS  
- CO 3: Analyze the powder metallurgy processes  
- CO 4: Analyze the non-traditional machining processes  
- CO 5: Analyze the rapid prototyping process

**BFF2523**  
QUALITY ENGINEERING  

Credit : 3 credits  
Pre-requisite : None

**Synopsis**  
This course introduces the concept of basic quality tools, fundamental of statistics, control charts for variables, fundamental of probability, control charts for attributes, acceptance sampling systems and reliability.

**Course Outcomes**  
- CO 1: Solve the quality improvement by using the basic Statistical Process Control (SPC) tools  
- CO 2: Analyze the collection of quantitative data pertaining to any subject or group when the data systematically gathered and collated  
- CO 3: Solve the quality improvement by using control chart attributes and variables.  
- CO 4: Analyze the various sampling systems in terms of lot by lot, continuous production attributes and variables.  
- CO 5: Compute the reliability of systems including systems in series, parallel, and hybrid combinations.
BFF4643
MANUFACTURING PROCESS PLANNING
Credit : 3 credits
Pre-requisite : None

Synopsis
This course introduces the process of product design and development. It started with identifying customer needs, product specifications, generate selection and testing concept until the finished product.

Course Outcomes
CO 1 Conduct initial activities of product development.
CO 2 Perform development of product concept phase.
CO 3 Implement Concurrent Product and Process Design (CPPD).
CO 4 Analyze the product development process
CO 5 Manage product development project.

BFF2801
ELECTRICAL / ELECTRONICS LAB
Credit : 1 credit
Pre-requisite : Electrical & Electronics Engineering BFF1303

Synopsis
This course introduces practical electrical and electronics circuits. Students shall design, analyze and build electrical power, digital electronic and electromechanical systems.

Course Outcomes
CO 1 Familiar with soft instruments and Multi SIM.
CO 2 Design, analyze and build electrical power system.
CO 4 Design, analyze and build digital electronic system.
CO 5 Design, analyze and build electromechanical system.

BFF2821
MECHANICS LAB
Credit : 1 credit
Pre-requisite : Mechanics of Material BFF1133, Dynamics BFF1123

Synopsis
This lab introduces engineering materials principles, principles of solid mechanics through practical experiments. It covers most areas of material properties testings. The covered areas for principles of statics are force resolutions, moments and trusses. It also covers experiments on stress and strain in axial & compression loading, torsion, fatigue, bending moment, shearing stress and transformations of stress and strain. Finally, this lab also covers applications on kinematics of particles, force and acceleration, work and energy, and impulse and momentum.

Course Outcomes
CO 1 Identify the microstructure of plain carbon steel at various carbon compositions and different heat treatment
CO 2 Determine the hardness values and strengths for different materials
CO 3 Determine impact properties and toughness characteristic of metal materials using the impact test.
CO 4 Determine the distribution of forces in a central system, a point force of the section principle on the bending bar and the member of forces at varying angles in simple frameworks.
CO 5 Determine effects of bending moment, torsion, pure tension and compression.

BFF2223
FLUID MECHANICS
Credit : 3 credits
Pre-requisite : None

Synopsis
This course introduces properties of fluid, concept of pressure and its application, stability of floating bodies, fluid in motion analysis, fluid momentum analysis, flow measurement devices, fluid friction in piping system and dimensional analysis.

CO1 Solve fluid statics based problems.
CO2 Solve fluid in motion problems.
CO3 Solve fluid friction in pipes problems.
CO4 Solve fluid flow measurement problems.
CO5 Apply the concept of dimensional analysis

BFF2233
THERMODYNAMICS
Credit : 3 credits
Pre-requisite : 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.

**BFF3242**
**HEAT TRANSFER**

**Credit:** 3 credits  
**Pre-requisite:** BFF2233 Thermodynamics

This course introduces the mechanism of heat transfer through conduction, convection and radiation. The course provides an overview of basic principles of heat transfer and their application to engineering problems. This overview includes an introduction to steady and unsteady conduction, numerical methods, free and forced convection, radiation and heat exchanger design.

**Course Outcomes**

- **CO 1** Distinguish heat transfer mechanism of conduction, convection and radiation  
- **CO 2** Solve problems in one-dimensional heat conduction  
- **CO 3** Solve problems in multidimensional and transient heat conduction  
- **CO 4** Solve problems in convection  
- **CO 5** Solve problems in radiation  
- **CO 6** Solve problems in heat transfer through heat exchanger

**BFF1133**
**MECHANICS OF MATERIAL**

**Credit:** 3 credits  
**Pre-requisite:** BFF1102 Statics; BFF1113 Engineering Materials

This course introduces the concept of stress and strain under axial, torsion, bending, transverse shear and combined loadings in elastic structural members. Plane stress transformation is also included.

**Synopsis**

- **CO 1** Solve the stress and strain in structural members subjected to axial loads.  
- **CO 2** Solve the stress and strain in structural members subjected to torsional loads.

**BFF3103**
**VIBRATIONS**

**Credit:** 3 credits  
**Pre-requisite:** Dynamics BFF1123

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**

- **CO 1** Analyze the single degree of freedom system vibration  
- **CO 2** Analyze the harmonically excited vibration of single degree of freedom system.  
- **CO 3** Analyze the two degree of freedom system vibration.  
- **CO 4** Analyze the vibration control problems.

**BFF3123**
**MACHINE DESIGN**

**Credit:** 3 credits  
**Pre-requisite:** Mechanics of Material BFF1133, Dynamics BFF1123

This course focuses on the fundamentals of component design—free body diagrams, force flow concepts, failure theories, and fatigue design, with applications 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**

- **CO 1** Analyze the concept of machine design  
- **CO 2** Solve problems on various loadings and stresses  
- **CO 3** Analyze the failures of machine components
BFF3202
SENSOR AND INTRUMENTATIONS SYSTEMS
Credit : 2 credits
Pre-requisite : Electrical & Electronics Lab

Synopsis
This course covers PC-based data acquisition system to measure speed, position, temperature, strain, force and pressure. Extensive laboratory and group project.

Course Outcomes
CO 1 Conduct PC-based data acquisition circuit.
CO 2 Design and build instrumentation amplifier circuit.
CO 3 Design and build instrumentation filter circuit.
CO 4 Interface with sensors.

BFF1922
ENGINEERING ECONOMY
Credit : 2 credits
Pre-requisite : 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 Outcomes
CO1 Analyze the engineering cost concept.
CO2 Analyze the return to capital
CO2 Analyze the money-time relationship
CO4 Analyze the depreciation of the asset
CO5 Analyze the cost estimation and project evaluation

BFF3503
PRODUCTION ENGINEERING
Credit : 3 credits
Pre-requisite : None

Synopsis
This course introduces the role of production engineering in a manufacturing plant. The concept of production engineering for lean production, planning of a manufacturing plant from layout planning, process planning, equipment and facilities planning up to planning a manual line and automated line will be introduce together with practical project. Student too will expose to the basic knowledge of work measurement, takt time and human elements planning in performing production engineering tasks.

Course Outcomes
CO 1 Illustrate the role of production engineering in selecting appropriate production system and implement steps for capital equipment planning and factory specification for a manufacturing plant.
CO 2 Specify the process requirement for an efficient manufacturing set up which include process flow, process layout and process planning incorporating man & machine relationship and material flow
CO 3 Perform a work cell study to determine the human elements in a particular work cell, and conduct measurement for process cycle time, takt time and line balancing for every processes in the production line.
CO 4 Compute a work cell design for a lean process and plan the facilities for both manual assembly line operation and automated assembly operation.

BFF3513
MANUFACTURING SYSTEM
Credit : 3 credits
Pre-requisite : None

Synopsis
The course provides in-depth understanding of the structure and function of modern manufacturing systems. Methods of managing resources in manufacturing systems to achieve the strategic goals of improved quality, increased flexibility, reduced product cycle time and greater efficiency will be emphasized.
Course Outcomes

CO 1  Classify the manufacturing environment including Jobbing Shop Production, Batch Production and Mass Production.

CO 2  Analyze the requirement planning (MRP and MRP II).

CO 3  Investigate the Just In Time (JIT) approach and Kanban system.

CO 4  Analyze operation of Optimized Production Technology (OPT).

CO 5  Develop the best system which draws the best of JIT, MRP and OPT to use for specific manufacturing environment.

BFF3523
PRODUCTION PLANNING AND CONTROL

Credit  : 3 credits
Pre-requisite  : None

Synopsis

The topics covered in the course are production and operations strategy, forecasting techniques, deterministic inventory planning and control, stochastic inventory planning and control, aggregate production planning, and master production scheduling.

Course Outcomes

CO 1  Analyze the fundamental problem areas of production systems as well as the relationship between production planning and control activities.

CO 2  Justify different strategies employed in manufacturing and service industries to plan production and control inventory.

CO 3  Analyze the planning problems and use the appropriate analytical skills and tools to solve these problems.

BFF3801
THERMAL-FLUID ENGINEERING LAB

Credit  : 1 credit
Pre-requisite  : Thermodynamics BFF2233, Fluid Mechanics BFF2223

Synopsis

This lab introduces practical application of basic thermofluid principles and the covered areas are the practical applications of pure substance, first law and second law of thermodynamics, refrigeration cycle, conduction heat transfer Bernoulli's theorem, flow trajectories over rigid body, friction losses in pipes, flow measurements, fluid pressure and boundary layer.

Course Outcomes

CO 1  To recognize basic concept of thermodynamic and properties of pure substances.

CO 2  To apply the first law of thermodynamics and able to solve energy balance and transfer problem, open-close system analysis.

CO 3  To apply the second law of thermodynamic and able to employ the ideal principle Of Carnot heat engines, refrigerators and heat pumps in practical application.

CO 4  To investigate and evaluate operating characteristics and performance of gas power cycles, vapor cycles, combined gas-vapor power cycles.

CO 5  To solve basic heat transfer analysis of conduction in various medium.

CO 6  Determine the buoyancy, stability and center of fluid pressure.

CO 7  Apply Bernoulli’s theorem.

CO 8  Apply the concept of friction losses in pipes.

CO 9  Determine volumetric fluid flow using orifice and venturi.

CO 10  Apply the concept of static fluid pressure.

BFF1921
ENGINEERS IN SOCIETY

Credit  : 1 credit
Pre-requisite  : 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

CO 1  Determine the engineering profession and code of ethics

CO 2  Analyze the issues in local industries

CO 3  Analyze the working ethics and public responsibility

CO 4  Analyze the law which governing the engineering profession
BFF3906
INDUSTRIAL TRAINING
Credit : 6 credits
Pre-requisite : Third year student and achieved “Kedudukan Baik (KB)” status on current evaluation

Synopsis
The industrial training has to be completed in an industrial firm. The students work in current projects of the firm in the development, production or distribution process. The projects deal with manufacturing or related fields and allow the practical application of university knowledge. The training delivers insight into the future professional life.

Course Outcomes
CO 1 Comprehend how to use their acquired knowledge in practice
CO 2 Comprehend the operational processes in a firm.

BFF4103
CONTROL SYSTEM ENGINEERING
Credit : 3 credits
Pre-requisite : Vibrations BFF3103

Synopsis
This course introduces linear, time-invariant (LTI) control system modeling, analysis and design. The covered topics are state space modeling of dynamic systems; transient, stability and steady-state analysis; control system analysis and design using root-locus and frequency response techniques.

Course Outcomes
CO 1 Analyze and design control system compensators to achieve specified control system performances utilizing state-space technique.
CO 2 Analyze and design control system compensators to achieve specified control system performances utilizing frequency-response technique.
CO 3 Analyze and design control system compensators to achieve specified control system performances utilizing root-locus technique.
CO 4 Analyze system performances.

BFF3403
ADVANCED MACHINING (Electives)
Credit : 3 credits
Pre-requisite : None

Synopsis
This course will introduce the knowledge and technologies in precision machining, technique of making tool and die and engineering measurement using industrial standard equipments

Course Outcomes
CO 1 Analyze precision machining processes
CO 2 Analyze tool & die and mould making processes
CO 3 Analyze engineering measurement processes
CO 4 Analyze advance machining processes in mould and die making

BFF3603
PLASTIC PRODUCT DESIGN (Electives)
Credit : 3 credits
Pre-requisite : CADCAMCAE BFF2623

Synopsis
This course will introduce the knowledge and technology of plastic development.

Course Outcomes
CO 1 Analyze the plastic characteristic
CO 2 Identify the plastic parts
CO 3 Design a plastic product
CO 4 Analyze the product

BFF3613
SHEET METAL PRODUCT DESIGN (Electives)
Credit : 3 credits
Pre-requisite : CADCAMCAE BFF2623

Synopsis
This course will introduce the knowledge and technology of sheet metal product design.

Course Outcomes
CO 1 Analyzing the sheet metal characteristic
CO 2 Identify types of sheet metal operation.
CO 3 Design the sheet metal product
CO 4 Analyze the product
FACTORY MANAGEMENT (Electives)
Credit : 3 credits
Pre-requisite : None
Synopsis
This course introduces student to understand & integrate all the knowledge essential to produce good quality products; at competitive prices & deliver on-time to meet customers’ satisfaction.
Course Outcomes
CO 1: Identify the functional and organisational groups and its integration in a plant
CO 2: Identify the elements of Quality Management Systems in a manufacturing plant
CO 3: Identify types production schedules with material and factory constraints.
CO 4: Solve manufacturing related problems with modern tools

BFF4513
LEAN PRODUCTION SYSTEM (Electives)
Credit : 3 credits
Pre-requisite : Factory Management
Synopsis
This course introduces the role of lean production system in a manufacturing environment. The concept of waste elimination through implementing lean production system. Using the basic principle of Pull system to promote waste elimination, various Lean tools would be introduce which include value stream mapping, SS system, SMED and Total Productive Maintenance.
Course Outcomes
CO 1: Specify the wasteful activities and elements in the manufacturing plant and causes of these non value added activities.
CO 2: Perform a value stream mapping (VSM) study for a manufacturing process from the incoming material until product delivery and illustrate the non-value added activities and methods to improve them.
CO 3: Plan a work place improvement using SS system and changeover improvement for downtime reduction using single minute exchange of die (SMED) activities

CO 4: Compute methods to improve machine availability, performance & product quality measured by Overall Equipment Effectiveness (OEE) using Total preventive Maintenance initiatives.

TOTAL QUALITY MANAGEMENT (Electives)
Credit : 3 credits
Pre-requisite : None
Synopsis
This course introduces the principle, philosophies and techniques of Total Quality Management (TQM) apply in the manufacturing environment. TQM tools and techniques such as the Quality Function Deployment (QFD), Failure Mode Effect Analysis (FMEA), Taguchi Quality Loss Function and Statistical Process Control will be emphasized plus the definition of Quality Management System such as ISO 9000 and Six Sigma.
Course Outcomes
CO1: To develop an understanding of Total Quality and how to manage quality with statistical tools.
CO2: To gain insight on TQM philosophies, strategies and important quality concepts such as customer focus, team working,
CO3: To understand Statistical Process Control and related techniques, interpret control-charts and recognize their importance in TQM.

BFF4613
DIE 1 (Electives)
Credit : 3 credits
Pre-requisite : Sheet metal Product Design
Synopsis
This course enhances student’s theoretical knowledge and practical skill in tool & dies making that can be applied in manufacturing. Students are exposed to analyze various existing and new different metal stamping processes, the concepts and suitable application area of these dies. Technical aspects in progressive die design and fabrication are taught particularly the theories of cutting in sheet metal, cutting clearance, flat blank development, strip layout design and force calculations. The assembly, stamping trial and troubleshooting of the progressive die will also be emphasized.
Course Outcomes

CO1  Analyze various existing and new metal stamping process
CO2  Design and analyze strip layout of progressive die
CO3  Design and fabricate components of a progressive die
CO4  Assembly, stamping trial and troubleshooting of the progressive die

BFF4633
DIE 2 (Electives)
Credit  : 3 credits
Pre-requisite : Die 1 BFF4613, Advance Machining BFF3403

Synopsis
This course is particularly designed to introduce the drawing operation in the press tool technology. The design and analysis of the drawing product and the operation itself will be emphasized. Students should be capable to perform the various drawing die design such including the fabrication of the die. At the end of this module, students should be able to assemble the drawing die, conduct actual trial and analyse the final product together with the troubleshooting.

Course Outcomes

CO 1  Design and analyze the drawing product design and the drawing operation
CO 2  Analyze the mechanics of sheet metal forming related to drawing operation and design the drawing die
CO 3  Fabricate the components of drawing die
CO 4  Fabricate the drawing die, assembly the die, conduct trial, analyse the final product and perform the troubleshooting.

BFF4603
MOLD 1(Electives)
Credit  : 3 credits
Pre-requisite : Plastic Product Design BFF3603, Advance Machining BFF3403

Synopsis
This course is particularly designed to introduce the drawing operation in the press tool technology. The design and analysis of the drawing product and the operation itself will be emphasized. Students should be capable to perform the various drawing die design such including the fabrication of the die. At the end of this module, students should be able to assemble the drawing die, conduct actual trial and analyse the final product together with the troubleshooting.

Course Outcomes

CO 1  Define mould design
CO 2  Analyze the mould design for external undercuts
CO 3  Analyze the mould design for internal undercuts
CO 4  Design a mould for undercuts

BFF4623
MOLD 2 (Electives)
Credit  : 3 credits
Pre-requisite : Mold 1 BFF4603, Advance Machining BFF3403

Synopsis
This course will introduce the knowledge and technologies in designing a multi daylight plastic injection mould.

Course Outcomes

CO1  Define the multi daylight mould design
CO2  Analyze the mould design for multi daylight mould
CO3  Analyze the runnerless mould design
CO4  Design a multi daylight injection mould

BFF4513
LEAN PRODUCTION SYSTEM 2(Electives)
Credit  : 3 credits
Pre-requisite : Factory Management BFF4503

Synopsis
This course introduces the role of lean production system in enhancing product built-in-quality in a manufacturing environment. The built in quality (Jidoka) concept covers principles defect prevention (fool proofing), automation and human intervention (autonomation) and employees small group activities (SGA) as advocate by lean production principles to achieve 6 sigma product quality.

Course Outcomes

CO 1  Apply the principles of Jidoka in a manufacturing plant to promote quality autonomy to the employees, and identify necessary infrastructure required for application of this principles.
CO 2  Application of visual management system and andon system to achieve total plant control through visual control.
CO 3  Conduct process defect prevention and detection through implementing poka-yoke (fool-proofing) system to the production processes.

CO 4  Participate and propose small autonomous group activities to conduct various quality and productivity improvement activities by using the standard problem analysis and solving tools.

CO 5  Participate in Total Productive Maintenance activities and conduct autonomous maintenance activities to improve machine availability, performance & product quality measured by Overall Equipment Effectiveness (OEE)

BFF4902
FINAL YEAR PROJECT 1
Credit : 2 creditS
Pre-requisite : Please refer to PSM handbook (Has passed more than 80 Credit hours)

Synopsis
This course focuses on the real professional approach to engineering studies. Students will practice their engineering knowledge and technical skill from the previous training to solve an engineering problem. The application of project management element as a medium for conducting and integration all expertise areas during the course run is highly encouraged.

Course Outcomes
CO 1  Relate the proposed area to the learned courses
CO 2  Establish techniques for literature review and independently perform the ability to gather information.
CO 3  Define problem statement, objectives, scope, research methods with identification of appropriate tools
CO 4  Plan the project using project management tools i.e Gantt Chart
CO 5  Communicate well on the work progress, presentation and in the final report

BFF4914
FINAL YEAR PROJECT 2
Credit : 4 credits
Pre-requisite : Please refer to PSM handbook (Has passed more than 80 Credit hours)

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 Outcomes
CO 1  Solve equilibrium of forces on particle problems
CO 2  Solve equilibrium of forces on single rigid body problems
CO 3  Solve equilibrium of forces on structure problems.
CO 4  Solve problems on centroid and moment of inertia.
BFF1502  
PROJECT MANAGEMENT  
Credit : 3 credits  
Pre-requisite : None  

Synopsis  
This course embraces a broad basic overview and principles of project management which has become central to operations in manufacturing enterprises throughout the three primary processes of managing projects; initialization, planning and scheduling, and organizing.  

Course Outcomes  
CO 1 Discover project management concept  
CO 2 Analyze project initialization phase  
CO 3 Analyze project planning and scheduling phase  
CO 4 Analyze project organizing phase  

BFF1113  
ENGINEERING MATERIALS  
Credit : 3 credits  
Pre-requisite : None  

Synopsis  
This course introduces the structure of metals and plastic deformation, the mechanical and physical properties of materials, the structure and strengthening of metal alloys by heat treatment and the structures and properties of polymeric materials, ceramics and composite materials.  

Course Outcomes  
CO 1 Analyze the structure of metals and plastic deformation.  
CO 2 Analyze the mechanical and physical properties of materials.  
CO 3 Analyze the structure and strengthening of metal alloys by heat treatment.  
CO 4 Analyze the structures and properties of polymeric materials, ceramics and composite materials.  

BFF1123  
DYNAMICS  
Credit : 3 credits  
Pre-requisite : Statics BFF1102  

Synopsis  
This course introduces principles of kinematics of a particle and a rigid body, kinetics of a particle and a rigid body utilizing force and acceleration method, work and energy method and impulse and momentum method.  

Course Outcomes  
CO 1 Solve problems involving kinematics of a particle and planar kinematics of a rigid body.  
CO 2 Solve problems involving kinetics of a particle and planar kinetics of a rigid body utilizing force and acceleration method.  
CO 3 Solve problems involving kinetics of a particle and planar kinetics of a rigid body utilizing work and energy method.  
CO 4 Solve problems involving kinetics of a particle and planar kinetics of a rigid body utilizing impulse and momentum method.  

BFF4911  
ENVIRONMENT SAFETY AND HEALTH  
Credit : 1 credits  
Pre-requisite : 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  
CO 01 Explain the importance of environmental safety and health and OSHA regulations in workplace.  
CO 02 Analyze the practices in workplaces of employment contributing to serious possible damage to life, health and property.  
CO 03 Make up solution to ESH problem in a given case study.  
CO 04 Evaluate ESH management in different industries.  

BFF1602  
TECHNICAL DRAWING  
Credit : 2 credits  
Pre-requisite : None  

Synopsis  
This course introduces basic technical drawing method, symbols and standards. Manual drafting and
CAD software are used to produce drawing on assignments throughout the course.

**Course Outcomes**

CO 1 Apply the standard needs to be followed when producing the drawing.
CO 2 Produce the orthographic drawing including sectioning.
CO 3 Apply the correct symbol and representations in the drawing.
CO 4 Produce the assembly and detailed drawing.

**BHM2013**

**PROGRAMMING FOR ENGINEERS**

**Credit**: 3 credits

**Pre-requisite**: 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. Besides the advanced level of programming techniques such as pointers, dynamic memory allocation (DMA), data structures (links, stacks, and queues), dynamic link library (DLL), and graphical user interface (GUI) are also taught to fit the purpose.

**Course Outcomes**

CO 1 Program a software using pointers, dynamic memory allocation (DMA) and data structures (links, stacks, and queues)
CO 2 Create a useable DLL file and user-friendly GUI
CO 3 Interface PC with circuits consist of component LEDs, motors (DC/stepper), thermometer etc.
CO 4 Design and develop a mechatronics project using advanced level of C/C++ programming and interfacing techniques

**BFF2612**

**COMPUTER AIDED ENGINEERING DESIGN**

**Credit**: 2 credits

**Pre-requisite**: Technical Drawing BFF1602

**Synopsis**

This course introduces 3D surface solid modeling 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**

CO 1 Apply modeling principle in product design
CO 2 Produce 3D part models and standard technical drawing
CO 3 Produce assembly models and drawing
CO 4 Perform basic FEA simulation and animation.

**BFF1801**

**MACHINING 1**

**Credit**: 1 credit

**Pre-requisite**: None

**Synopsis**

This course introduces student basic application of the measuring instruments, milling process and surface grinding.

**Course Outcomes**

CO 1 Perform various basic milling operations safely.
CO 2 Perform surface grinding process according to the given dimensions, specifications and tolerances.
### BFF2003  
**COMPUTER PROGRAMMING**  
**Credit:** 3 credits  
**Pre-requisite:** 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 Outcomes**  
- CO 1: Write C program for input and output.  
- CO 2: Write C program using variables, constants declarations, arithmetic operations and mathematics function.  
- CO 3: Write C program using user-defined functions.  
- CO 4: Write C program using selection making decision construct.  
- CO 5: Write C program using repetitive construct.  
- CO 6: Write C program using array data structure.

### BFF2403  
**MANUFACTURING PROCESSES 1**  
**Credit:** 3 credits  
**Pre-requisite:** Engineering Material BFF1113

**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 Outcomes**  
- CO 1: Analyze metal-casting processes  
- CO 2: Analyze forming processes  
- CO 3: Analyze joining processes  
- CO 4: Analyze material removal processes  
- CO 5: Analyze surface technology processes

### BFF2821  
**MECHANICS LAB**  
**Credit:** 1 credit  
**Pre-requisite:** Mechanics of Material BFF1133, Dynamics BFF1123

**Synopsis**  
This lab introduces engineering materials principles, principles of solid mechanics through practical experiments. It covers most areas of material properties testings. The covered areas for principles of statics are force resolutions, moments and trusses. It also covers experiments on stress and strain in axial & compression loading, torsion, fatigue, bending moment, shearing stress and transformations of stress and strain. Finally, this lab also covers applications on kinematics of particles, force and acceleration, work and energy, and impulse and momentum.

**Course Outcomes**  
- CO 1: Identify the microstructure of plain carbon steel at various carbon compositions and different heat treatment
CO 2 Determine the hardness values and strengths for different materials
CO 3 Determine impact properties and toughness characteristic of metal materials using the impact test.
CO 4 Determine the distribution of forces in a central system, a point force of the section principle on the bending bar and the member of forces at varying angles in simple frameworks.
CO 5 Determine effects of bending moment, torsion, pure tension and compression.

Course Outcomes
CO 1: Distinguish heat transfer mechanism of conduction, convection and radiation
CO 2: Solve problems in one-dimensional heat conduction
CO 3: Solve problems in multidimensional and transient heat conduction
CO 4: Solve problems in convection
CO 5: Solve problems in radiation
CO 6: Solve problems in heat transfer through heat exchanger

BFF2233
FLUID MECHANICS
Credit: 3 credits
Pre-requisite: None

Synopsis
This course introduces properties of fluid, concept of pressure and its application, stability of floating bodies, fluid in motion analysis, fluid momentum analysis, flow measurement devices, fluid friction in piping system and dimensional analysis.

BFF3242
HEAT TRANSFER
Credit: 2 credits
Pre-requisite: BFF2233 Thermodynamics

Synopsis
This course introduces the mechanism of heat transfer through conduction, convection and radiation. The course provides an overview of basic principles of heat transfer and their application to engineering problems. This overview includes an introduction to steady and unsteady conduction, numerical methods, free and forced convection, radiation and heat exchanger design.

CO 1: Solve fluid statics problems.
CO 2: Solve fluid in motion problems.
CO 3: Solve fluid friction problems.
CO 4: Solve fluid flow measurement problems.
CO 5: Apply the concept of dimensional analysis.

BFF1133
MECHANICS OF MATERIAL
Credit: 3 credits
Pre-requisite: BFF1102 Statics; BFF1113 Engineering Materials

Synopsis
This course introduces the concept of stress and strain under axial, torsion, bending, transverse shear and combined loadings in elastic structural members. Plane stress transformation is also included.

Course Outcomes
CO 1: Solve the stress and strain in structural members subjected to axial loads.
CO 2: Solve the stress and strain in structural members subjected to torsional loads.
CO 3: Solve the stress and strain in structural members subjected to bending loads.
CO 4: Solve the stress and strain in structural members subjected to shear loads.
CO 5: Solve the stress and strain in structural members subjected combined loads.
CO 6: Conduct the stress transformation.

BFF3103
VIBRATIONS
Credit: 3 credits
Pre-requisite: Dynamics BFF1123

Synopsis
This course introduces the fundamental of vibration, free vibration (Single Degree of Freedom - SDOF)
Course Outcomes

CO 1 Analyze the single degree of freedom system vibration
CO 2 Analyze the harmonically excited vibration of single degree of freedom system.
CO 3 Analyze the two degree of freedom system vibration.
CO 4 Analyze the vibration control problems.

BFF3123
MACHINE DESIGN
Credit : 3 credits
Pre-requisite: Mechanics of Material BFF1133, Dynamics BFF1123

Synopsis

This course focuses on the fundamentals of component design—free body diagrams, force flow concepts, failure theories, and fatigue design, with applications 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

CO 1 Analyze the concept of machine design
CO 2 Solve problems on various loadings and stresses
CO 3 Analyze the failures of machine components
CO 4 Design various parts in machine components

BFF3202
SENSOR AND INTRUMENTATIONS
Credit : 2 credits
Pre-requisite: Electrical & Electronics Lab BFF2801

Synopsis

This course covers PC-based data acquisition system to measure speed, position, temperature, strain, force and pressure. Extensive laboratory and group project.

Course Outcomes

CO 1 Conduct PC-based data acquisition
CO 2 Design and build instrumentation amplifier circuit.
CO 3 Design and build instrumentation filter circuit.
CO 4 Interface with sensors.

BFF1922
ENGINEERING ECONOMY
Credit : 2 credits
Pre-requisite: 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 Outcomes

CO 1 Analyse the engineering cost concept.
CO 2 Analyse the return to capital
CO 3 Analyse the money-time relationship
CO 4 Analyse the depreciation
CO 5 Analyse the cost estimation and project evaluation

BFF3801
THERMAL-FLUID ENGINEERING LAB
Credit : 1 credit
Pre-requisite: Thermodynamics BFF2233, Fluid Mechanics BFF2223

Synopsis

This lab introduces practical application of basic thermalfluid principles and the covered areas are the practical applications of pure substance, first law and second law of thermodynamics, refrigeration cycle, conduction heat transfer Bernoulli’s theorem, flow trajectories over rigid body, friction losses in pipes, flow measurements, fluid pressure and boundary layer.
Course Outcomes

CO 1  To recognize basic concept of thermodynamic and properties of pure substances.

CO 2  To apply the first law of thermodynamics and able to solve energy balance and transfer problem, open-close system analysis.

CO 3  To apply the second law of thermodynamic and able to employ the ideal principle Of Carnot heat engines, refrigerators and heat pumps in practical application.

CO 4  To investigate and evaluate operating characteristics and performance of gas power cycles, vapor cycles, combined gas-vapor power cycles.

CO 5  To solve basic heat transfer analysis of conduction in various medium.

CO 6  Determine the buoyancy, stability and center of fluid pressure.

CO 7  Apply Bernoulli’s theorem.

CO 8  Apply the concept of friction losses in pipes.

CO 9  Determine volumetric fluid flow using orifice and venturi.

CO 10  Apply the concept of static fluid pressure.

BFF1921  ENGINEERS IN SOCIETY
Credit : 1 credit
Pre-requisite : 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

CO 1  Determine the engineering profession and code of ethics

CO 2  Analyze the issues in local industries

CO 3  Analyze the working ethics and public responsibility

CO 4  Analyze the law which governing the engineering profession

BFF3906  INDUSTRIAL TRAINING
Credit : 6 credits
Pre-requisite : Third year student and achieved “Kedudukan Baik (KB)” status on current evaluation

Synopsis

The industrial training has to be completed in an industrial firm. The students work in current projects of the firm in the development, production or distribution process. The projects deal with manufacturing or related fields and allow the practical application of university knowledge. The training delivers insight into the future professional life.

Course Outcomes

CO 1  Comprehend how to use their acquired knowledge in practice

CO 2  Comprehend the operational processes in a firm.

BFF4103  CONTROL SYSTEM ENGINEERING
Credit : 3 credits
Pre-requisite : Vibrations BFF3103

Synopsis

This course introduces linear, time-invariant (LTI) control system modeling, analysis and design. The covered topics are state space modeling of dynamic systems; transient, stability and steady-state analysis; control system analysis and design using root-locus and frequency response techniques.

Course Outcomes

CO 1  Analyze and design control system compensators to achieve specified control system performances utilizing state-space technique.

CO 2  Analyze and design control system compensators to achieve specified control system performances utilizing frequency-response technique.

CO 3  Analyze and design control system compensators to achieve specified control system performances utilizing root-locus technique.

CO 4  Analyze system performances.
BFM2313
DIGITAL ELECTRONICS
Credit : 3 credits
Pre-requisite : BFF1303

Synopsis
This course covers flip-flops, counters and registers, Integrated Circuit (IC) logic families, DAC/ADC and memory devices.

Course Outcomes
CO 1  Design and analyze flip-flops circuit
CO 2  Design and build counters and registers applications
CO 3  Analyze Integrated Circuit (IC) logic families
CO 4  Design and build ADC/DAC applications
CO 5  Design and build memory device applications

BFM2303
ANALOG ELECTRONICS
Credit : 3 credits
Pre-requisite : BFF1303

Synopsis
This course introduces Junction Field-Effect Transistor (JFET), Metal Oxide Semiconductor Field-Effect Transistor (MOSFET), thyristor circuit and devices, waveform generator, wave shaping circuit, multivibrator, oscillator, timer and filter circuits.

Course Outcomes
CO 1:  Analyze and solve JFET and MOSFET circuit.
CO 2:  Analyze and solve thyristor circuit and thyristor devices.
CO 3:  Analyze and solve waveform generator and wave shaping circuit.
CO 4:  Analyze and solve multivibrator, oscillator and timer circuits
CO 5:  Analyze and solve filter circuits

BFM3333
MICROCONTROLLED SYSTEM
Credit : 3 credits
Pre-requisite : BFF1303

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 Outcomes
CO 1  Conduct input/output PLC interfacing.
CO 2  Conduct PLC programming.
CO 3  Conduct input/output microcontroller interfacing.
CO 4  Conduct microcontroller programming.

BFM3403
FLUID DRIVE SYSTEM
Credit : 3 credits
Pre-requisite : BFF1303

Synopsis
This course introduces fluid drive system. This includes fluid power component functions. This course also design and build fluid drive system to perform specific requirements.

Course Outcomes
CO 1  Realize fluid power component functions.
CO 2  Design and build hydraulic system to perform specific requirement.
CO 3  Design and build pneumatic system to perform specific requirement.

BFM3303
ELECTRICAL DRIVE SYSTEM
Credit : 3 credits
Pre-requisite : BFF1303

Synopsis
This course introduces generator and transformer circuits, DC motor analysis and design DC motor drive, and single and three phase motor drives analysis and design.

Course Outcomes
CO 1  Analyze generator circuit
CO 2  Analyze transformer circuit
CO 3  Analyze DC motor and design DC motor drive
CO 4  Analyze single phase AC motor and design single phase AC motor drive
CO 5  Analyze three phase AC motor and design three phase AC motor drive.
BFM4643
COMPUTER-CONTROLLED MANUFACTURING
Credit : 3 credits
Pre-requisite : BFF1303

Synopsis
This course introduces computer control application in manufacturing machines. This includes modeling and analyzing processes in discrete form, designing a controller based on discrete model, designing and implementing computer-controlled system, and designing and analyzing discrete control systems using transform methods.

Course Outcomes
CO 1 Model and analyze processes in discrete form
CO 2 Design controller based on discrete model
CO 3 Design and implement computer-controlled system for manufacturing machines
CO 4 Design and analyze discrete control systems using transform methods

BFM4914
FINAL YEAR PROJECT 2
Credit : 4 credits
Pre-requisite : Please refer to PSM handbook (Has passed more than 80 Credit hours)

Synopsis
This course focuses on the real professional approach to engineering studies. Students will practice their engineering knowledge and technical skill from the previous training to solve an engineering. The application of project management element as a medium for conducting and integration all expertise areas during the course run is highly encouraged.

Course Outcomes
CO 1 Design the experiment or questionnaire to start collecting data
CO 2 Set-up and conduct the planned experiment or questionnaire
CO 3 Interpret and analyse collected data
CO 4 Plan the project using project management tools i.e Gantt Chart
CO 5 Communicate well on the work progress, presentation and in the final report

BFM4902
FINAL YEAR PROJECT 1
Credit : 2 credits
Pre-requisite : Please refer to PSM handbook (Has passed more than 80 Credit hours)

Synopsis
This course focuses on the real professional approach to engineering studies. Students will practice their engineering knowledge and technical skill from the previous training to solve engineering problems. The application of project management element as a medium for conducting and integration all expertise areas during the course run is highly encouraged.

Course Outcomes
CO 1 Relate the proposed area to the learned courses
CO 2 Establish techniques for literature review and independently perform the ability to gather information.
CO 3 Define problem statement, objectives, scope, research methods with identification of appropriate tools.
CO 4 Plan the project using project management tools i.e Gantt Chart
CO 5 Communicate well on the work progress, presentation and in the final report.

BHM1103
STATICS
Credit : 3 credit
Pre-requisite : NONE

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 Outcomes
CO 1 Solve equilibrium of forces on particle problems
CO 2 Solve equilibrium of forces on single rigid body problems
CO 3 Solve equilibrium of forces on structure problems.
CO 4 Solve problems on centroid and moment of inertia.
BHM1113
ENGINEERING MATERIALS
Credit : 3 credit
Pre-requisite : None
Synopsis
This course introduces the structure of metals and plastic deformation, the mechanical and physical properties of materials, the structure and strengthening of metal alloys by heat treatment and the structures and properties of polymeric materials, ceramics and composite materials.
Course Outcomes
CO 1 Analyze the structure of metals and plastic deformation.
CO 2 Analyze the mechanical and physical properties of materials.
CO 3 Analyze the structure and strengthening of metal alloys by heat treatment.
CO 4 Analyze the structures and properties of polymeric materials, ceramics and composite materials.

BHM1123
MECHANICS OF MATERIALS
Credit : 3 credits
Pre-requisite : BHM1103 STATICS, BHM1113 ENGINEERING MATERIALS
Synopsis
This course introduces the concept of stress and strain under axial, torsion, bending, transvers shear and combined loadings in elastic structural members. Plane stress transformation is also included.
Course Outcomes
CO 1 Calculate and analyze the stress and strain in structural members subjected to axial loads and torsional loads.
CO 2 Calculate and analyze the stress and strain in structural members subjected to bending loads and shear loads.
CO 3 Calculate and analyze the stress and strain in structural members subjected combined loads.
CO 4 Conduct the stress transformation to solve mechanics of materials problems.

BHM1602
TECHNICAL DRAWING
Credit : 2 credit
Pre-requisite : None
Synopsis
This course introduces basic technical drawing method, symbols and standards. Manual drafting and CAD software are used to produce drawing on assignments throughout the course.
Course Outcomes
CO 1 Apply the standard needs to be followed when producing the drawing.
CO 2 Produce the orthographic drawing including sectioning.
CO 3 Apply the correct symbol and representations in the drawing.
CO 4 Produce the assembly and detailed drawing.
CO 4: Solve circuit involving operational amplifier.
CO 05: Solve logic circuits problem

BHM1612
CAD MODELING
Credit : 1 credit
Pre-requisite : BFF1602

Synopsis
This course introduces 3D surface solid modeling 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
CO 1 Apply modeling principle in product design
CO 2 Produce 3D part models and standard technical drawing
CO 3 Produce assembly models and drawing
CO 4 Perform basic FEA simulation and animation.

BHM1811
MACHINING 2
Credit : 1 credit
Pre-requisite : None

Synopsis
This course introduces student basic application of the measuring instruments, milling process and surface grinding.

Course Outcomes
CO 1 Perform various basic milling operations safely.
CO 2 Perform surface grinding process according to the given dimensions, specifications and tolerances.

BHM2603
CAD/CAM
Credit : 3 credit
Pre-requisite : BHM1612

Synopsis
This course introduces the basic concept CAD/CAM system. The understanding of the of CAD/CAM concept and focus on different procedures in NC programming, the different geometry and the selection of the appropriate cycle and the proper tooling. Understanding the features and application of the various method of creating geometrical surfaces, free form surface and derived surface also ability to handle digitized data to constructed model. Use the available features to machine the different types of surfaces using 3-Axis and the application of tool containment boundaries during machining.

Course Outcomes
CO 1 Apply the CAD tool for geometric construction
CO 2 Create 2D toolpath generation for different problems
CO 3 Produce surface modeling using different technique
CO 4 Apply different type cutting technique on surface modeling for roughing and finishing.

BHM2103
DYNAMICS
Credit : 3 credit
Pre-requisite : BHM1102

Synopsis
This course introduces principles of kinematics of a particle and a rigid body, kinetics of a particle and a rigid body utilizing force and acceleration method, work and energy method and impulse and momentum method.

Course Outcomes
CO 1 Solve problems involving kinematics of a particle and planar kinematics of a rigid body.
CO 2 Solve problems involving kinetics of a particle and planar kinetics of a rigid body utilizing force and acceleration method.
CO 3 Solve problems involving kinetics of a particle and planar kinetics of a rigid body utilizing work and energy method.
CO 4 Solve problems involving kinetics of a particle and planar kinetics of a rigid body utilizing impulse and momentum method.
BHM2003
COMPUTER PROGRAMMING
Credit : 3 credit
Pre-requisite : 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 Outcomes
CO 1 Write C program for input and output.
CO 2 Write C program using variables, constants declarations, arithmetic operations and mathematics function.
CO 3 Write C program using user-defined functions.
CO 4 Write C program using selection making decision construct.
CO 5 Write C program using repetitive construct.
CO 6 Write C program using array data structure.

BHM2203
DIGITAL ELECTRONICS
Credit : 3 credit
Pre-requisite : BHM2801

Synopsis
This course covers flip-flops, counters and registers, Integrated Circuit (IC) logic families, DAC/ADC and memory devices.

Course Outcomes
CO 1 Design and analyze flip-flops circuit
CO 2 Design and build counters and registers applications
CO 3 Analyze Integrated Circuit (IC) logic families
CO 4 Design and build ADC/DAC applications
CO 5 Design and build memory device applications.

BHM2403
MANUFACTURING PROCESSES 1
Credit : 3 credit
Pre-requisite : 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 Outcomes
CO 1 Analyze metal-casting processes
CO 2 Analyze forming processes
CO 3 Analyze joining processes
CO 4 Analyze material removal processes
CO 5 Analyze surface technology processes

BHM2403
THERMAL-FLUID ENGINEERING 1
Credit : 3 credit
Pre-requisite : None

Synopsis
This course introduces basic principles of thermal-fluid science covering first law of thermodynamics, properties of pure substances, control volume analysis, second law of thermodynamics and entropy.

Course Outcomes
CO 1 Solve thermodynamic problems involving closed system using first law of thermodynamics.
CO 2 Determine the properties of pure substances.
CO 3 Solve thermodynamic problems involving open system using first law of thermodynamics.
CO 4 Solve thermodynamic problems involving second law of thermodynamics.
CO 5 Apply entropy properties for thermodynamic analysis.
BHM2203  
THERMAL-FLUID ENGINEERING 2  
Credit : 1 credit  
Pre-requisite : BHM2203  
Synopsis  
This course is the continuation of BFF2203 Thermal Fluid I. It covers fluid and flowing fluids, similitude and dimensional analysis, heat transfer by conduction, convection and radiation.  
Course Outcomes  
CO 1 Solve problems involving fluid statics.  
CO 2 Solve problems involving flowing fluids.  
CO 3 Use similitude, dimensional analysis and modeling to simplify experimental investigation of fluid mechanics.  
CO 4 Analyze heat transfer by conduction.  
CO 5 Analyze heat transfer by convection.  
CO 6 Analyze heat transfer by radiation.  

BHM3303  
SENSOR AND INSTRUMENTATIONS  
Credit : 3 credit  
Pre-requisite : None  
Synopsis  
This course covers PC-based data acquisition system to measure speed, position, temperature, strain, force and pressure. Extensive laboratory and group project.  
Course Outcomes  
CO 1 Conduct PC-based data acquisition  
CO 2 Design and build instrumentation amplifier circuit.  
CO 3 Design and build instrumentation filter circuit.  
CO 4 Interface with sensors.  

BHM3103  
VIBRATIONS  
Credit : 3 credit  
Pre-requisite : None  
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  
CO 1 Analyze the single degree of freedom system vibration  
CO 2 Analyze the harmonically excited vibration of single degree of freedom system  
CO 3 Analyze the two degree of freedom system vibration  
CO 4 Analyze the vibration control problems.  

BHM4103  
CONTROL SYSTEM ENGINEERING  
Pre-requisite  
BHM3513  
Synopsis  
This course introduces linear, time-invariant (LTI) control system modeling, analysis and design. The covered topics are state space modeling of dynamic systems; transient, stability and steady-state analysis; control system analysis and design using root-locus and frequency response techniques.  
Course Outcomes  
CO 1 Analyze and design control system compensators to achieve specified control system performances utilizing state-space techniques.  
CO 2 Analyze and design control system compensators to achieve specified control system performances utilizing frequency-response technique.  
CO 3 Analyze and design control system compensators to achieve specified control system performances utilizing root-locus technique.  

BHM4923  
ENGINEERING ECONOMY  
Credit : 2 credit  
Pre-requisite : 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 Outcomes  
CO 1 Analyze the engineering cost concept  
CO 2 Analyze the return to capital
CO 2  Analyze the money-time relationship
CO 4  Analyze the depreciation of the asset
CO 5  Analyze the cost estimation and project evaluation

BHM4911
ENVIRONMENT SAFETY AND HEALTH
Credit  : 1 credits
Pre-requisite : None

Synopsis
This course cover 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
CO 1: Explain the importance of environmental safety and health and OSHA regulations in workplace.
CO 2: Analyze the practices in work places of employment contributing to serious possible damage to life, health and property.
CO 3: Make up solution to ESH problem in a given case study.
CO 4: Evaluate ESH management in different industries

BHM2303
ANALOG ELECTRONICS
Credit  : 3 credits
Pre-requisite : BHM1303 ELECTRICAL/ELECTRONICS ENGINEERING

Synopsis
This course introduces active device characteristics, amplifier circuits, operation amplifier circuits, waveform generators and filter circuits using operational amplifier.

Course Outcomes
CO1: Analyze Active Device (e.g. Diode, BJT and MOSFET) Characteristics
CO2: Analyze Amplifier Circuits
CO3: Analyze Operational Amplifier Circuits
CO4: Analyze Waveform Generator Circuits
CO5: Analyze Filter Circuits

BHM2013
PROGRAMMING FOR ENGINEERS
Credit  : 3 credits
Pre-requisite : 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. Besides the advanced level of programming techniques such as pointers, dynamic memory allocation (DMA), data structures (links, stacks, and queues), dynamic link library (DLL), and graphical user interface (GUI) are also taught to fit the purpose.

Course Outcomes
CO0 1: program a software using pointers, dynamic memory allocation (DMA) and data structures (links, stacks, and queues)
CO0 2: create a useable DLL file and user-friendly GUI
CO0 3: interface PC with circuits consist of components LEDs, motors (DC/stepper), thermometer etc.
CO0 4: design and develop a mechatronics project using advanced level of C/C++ programming and interfacing techniques

BHM3702
CLEAN ROOM TECHNOLOGY
Credit  : 2 credits
Pre-requisite : None

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
BHM3002
COMPUTER SIMULATION
Credit : 2 credits
Pre-requisite : None

Synopsis
This course introduces MATLAB (Simple operations, matrices and vectors, functions, plot, programming and symbolic calculation with MATLAB) and Simulink (functional principle of Simulink, designing a block diagram, solving differential equations, starting Simulink systems from MATLAB and importing plots to Word and Power Point)

Course Outcomes
CO 1: solve engineering problems numerically using MATLAB/Simulink
CO 2: design the simulation of a dynamic system using MATLAB/Simulink

BHM3722
SMD TECHNOLOGY
Credit : 2 credits
Pre-requisite : None

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
CO 1: Explain development and manufacture of printed circuit boards and the respective mounting technologies,
CO 2: Explain the assembly, soldering and testing (electrical, optical, …) processes in the production of mechatronic boards
CO 3: Evaluate general SMD related problems in manufacturing

BHM4921
ENGINEERS AND SOCIETY
Credit : 1 credits
Pre-requisite : 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

CO 1: Determine the engineering profession and code of ethics
CO 2: Analyze the issues in local industries
CO 3: Analyze the working ethics and public responsibility
CO 4: Analyze the law which governing the engineering profession

BHM3602 QUALITY INSPECTION
Credit : 2 credits
Pre-requisite : None

Synopsis
This course introduces important terms of Quality Inspection, attributive and variable inspection features, measurement and gauging, CMM (coordinate measurement machines), introduction to statistical methods of quality inspection and use of spreadsheets.

Course Outcomes

CO 1: understand the basics of quality planning and quality inspection,
CO 2: understand systematic and statistical bias and able to analyze them
CO 3: understand methods of least square for geometrical elements like straights, circles and planes,
CO 4: distinguish different operations and applications of coordinate measuring systems.

BHM3313 MICROCOMPUTER TECHNOLOGY
Credit : 3 credits
Pre-requisite : None

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

CO 1: Analyze the periphery and structure of a microcontroller
CO 2: Assembler for the 8051 controller family
CO 3: Design a program using microcontroller to solve a problem

BHM3323 SOFTWARE ENGINEERING
Credit : 3 credits
Pre-requisite : None

Synopsis
This course introduces practical methods in software engineering via project based modules of software systems with emphasis on Mechatronic Engineering.

Course Outcomes

CO 1: Understand and use software engineering tools for project based modules
CO 2: Analyze strength and weaknesses of software modules
CO 3: Develop new software modules related to Mechatronic Engineering
CO 4: Develop software with network and graphical user interface
CO 5: Work on software project individually or in a team

BHM3922 INTERNSHIP PREPARATION
Credit : 2 credits
Pre-requisite : None

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

CO 1: complete excellent documentations to apply an internship placement
CO 2: define the professional target for internship as well as after graduation

BHM3932 INTERNSHIP FOLLOW-UP
Credit : 2 credits
Pre-requisite : None

Synopsis
This course exposes the 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**

CO 1: complete a report about a new technologies/tendencies in the mechatronics engineering
CO 2: present a new technologies/tendencies in the mechatronics engineering

**BHM 3512 MANUFACTURING QUALITY**

**Credit**: 2 credits  
**Pre-requisite**: None

**Synopsis**

This course introduces the basics of process-oriented management systems, techniques and tools for quality improvement, Quality Management Systems (ISO 9000), and Quality Management Systems in automotive industry. Besides that the Quality scores and the human factor in quality management are also covered.

**Course Outcomes**

CO 1: Develop an understanding objectives and imperatives of Management systems.  
CO 2: Apply the techniques and tools used for quality improvement, troubleshooting and solving problems. The tools are Quality control charts, cause effect diagrams, statistical methods, and Statistic process control (SPC).  
CO 3: Develop an understanding Quality Management System in the automotive industry.  
CO 4: Define quality scores and quality improvement in processes  
CO 5: Develop an understanding on quality management system (ISO 9000) and its implementation.

**BHM4702 INDUSTRIAL AUTOMATION**

**Credit**: 2 credits  
**Pre-requisite**: None

**Synopsis**

This course is the 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**

CO 1: understand specific applications and functions related to automation  
CO 2: program and use the automation device of machine control systems with a PLC  
CO 3: develop a solution for an industrial automation problem with PLCs.

**BHM4102 FINITE ELEMENT ANALYSIS**

**Credit**: 2 credits  
**Pre-requisite**: None

**Synopsis**

This course introduces finite element methods for structural, thermal flow, electrostatic and electromagnetic problem analysis of microelectromechanical systems (MEMS)

**Course Outcomes**

CO 1: analyze structural problem using finite element methods  
CO 2: analyze thermal flow problem using finite element methods  
CO 3: analyze electrostatic problem using finite element methods  
CO 4: analyze electromagnetic problem using finite element methods  
CO 5: analyze complex mechatronics problem using finite element methods

**BHM4904 TEAM ORIENTED PROJECT STUDY**

**Credit**: 4 credits  
**Pre-requisite**: None

**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. 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 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**

CO 1: apply the product development process in the form of a team-oriented project work  
CO 2: analyze and specify products  
CO 3: provide technical documents of an engineering project  
CO 4: apply technical communication and review skills.

**BHM4932 FINAL EXAMINATION**

**Credit**: 2 credits  
**Pre-requisite**: None

**Synopsis**

This course will test the content of all lectures via written examination, viva and presentation

**Course Outcomes**

CO 1: Ability to answer to questions related to the content of the lectures  
CO 2: Ability to answer to questions related to the content of the bachelor thesis in order to show profound technical knowledge

**BHM3612 OPTOELECTRONICS**

**Credit**: 2 credits  
**Pre-requisite**: None

**Synopsis**

This course introduces 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**

CO 1: elaborate the fundamental principles of optoelectronics and optical measurement systems,  
CO 2: evaluate optical measurement systems for their use in the quality inspection process,

**BHM4002 INFORMATION SYSTEM**

**Credit**: 2 credits  
**Pre-requisite**: None

**Synopsis**

This course introduces signals and systems, Fourier transformation, discrete Fourier transformation (DFT), system theory and numerical processing of digital signals.

**Course Outcomes**

CO 1: classify transmission and processing of information in present-day communications technologies  
CO 2: understand the basics of signal processing of HDTV material in IPTV

**BHM4914 BACHELOR THESIS**

**Credit**: 4 credits  
**Pre-requisite**: None

**Synopsis**

The final year project 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**

CO 1: Conduct project independently based on project planning  
CO 2: Solve project problems based on project methodology  
CO 3: Prepare the research findings into a technical report
BHM4402
ELECTRONICS IN MECHATRONICS SYSTEMS
Credit : 2 credits
Pre-requisite : None

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
CO 1 apply different concepts for transmitting and storing digital information,
CO 2 install electrical circuits for power electronics and to adapt these to changing conditions,
CO 3 assess the reliability of electronic devices
FACULTY OF MECHANICAL ENGINEERING
INTRODUCTION

The Faculty of Mechanical Engineering is situated in Royal town of Pekan in the state of Pahang. It is located at the waterfront facing the South China Sea, approximately 270 km to the east of the capital city of Kuala Lumpur. The university was established more than a decade ago and has since made big strides as a research and learning institution, equipped with high-end facilities and driven by capable faculties.

The Faculty of Mechanical Engineering offers 8 academic programmes whose development in academic and research activities are coordinated by 7 focus groups. The overall students enrollment is 1200, and 85% of the students population are in the undergraduate programmes. The faculty is manned by 120 academic and technical supporting staffs.

The faculty is currently embarking on Research and Development activities in the area of automotive, combustion, hybrid engine, NVH, robotic, CAD/CAM, CNC, products design and development as well as materials engineering and sustainable energy. This faculty aspires to be the centre of reference for automotive and manufacturing engineers, especially in the east coast region. The latest updated information regarding our faculty is available at: http://fkm.ump.edu.my/

VISION & MISSION

Vision

“To be a world class competency-based mechanical engineering faculty”

Mission

“We are dedicated to produce mechanical engineers with high-level professionalism in global context. We are committed to the advancement of teaching, research and development in innovative engineering and technology to promote national growth”.

FACULTY’S OBJECTIVE

The main objective of the faculty is to provide the programmes offered through the conduct of excellence in learning, teaching, research and consultancy services.

PROGRAMMES OFFERED

There are a total of 2 degree programmes and one diploma programme offered by the faculty for the 2013/2014 academic session, as follows:

- Bachelor of Engineering (Hons.) Mechanical Engineering
- Bachelor of Engineering (Hons.) Mechanical Engineering (Automotive)
- Bachelor of Engineering (Hons.) Automotive Engineering -(Dual Degree Programme with HsKA Germany)
- Diploma of Mechanical Engineering
PROGRAMS’ EDUCATIONAL OBJECTIVES (PEO) & PROGRAM OUTCOME (PO)

Programme Educational Objectives (PEO)

After a series of strategic planning sessions, the Faculty of Mechanical Engineering has decided to adopt the following Programme Educational Objectives for the Bachelor of Mechanical Engineering programme, as stated below:

The Bachelor of Mechanical Engineering programme strives to produce graduates with the following two attributes:

PE01: Graduates are competent, responsible and practise professionalism in the global context.
PE02: Graduates are knowledgeable and capable to apply the evolving technology in mechanical engineering field.

Programme Outcome (PO)

Programme outcomes are specific statements of graduates’ knowledge, skills and attitudes that are evident in the programme objectives achievements. Consistent with faculty’s Vision and Mission, the following is the list of 12 Programme Outcomes for the Bachelor of Mechanical Engineering programme. The Bachelor of Mechanical Engineering program ensures that its students attain:

PO1 An ability to apply the fundamental knowledge of mathematics, science, and mechanical engineering;
PO2 An ability to design and conduct experiments for thermal, fluid and mechanical systems, as well as to analyze and interpret results;
PO3 An ability to design a system, component, or process to meet desired needs include costing, manufacturability, environmental, societal, ethical, sustainability and other constraints;
PO4 An ability to function as a successful team member on multi-tasking and multi-disciplinary issues;
PO5 An ability to identify, formulate and solve well-defined and open-ended mechanical engineering problems;
PO6 An ability to understand and practice professional as well as unethical responsibilities;
PO7 An ability to communicate effectively;
PO8 An ability to recognize and apply knowledge to solve mechanical engineering issues in a global, economic, environmental, and societal context;
PO9 An ability to recognize the needs and motivation to engage in life-long learning;
PO10 An ability to apply knowledge of current and contemporary issues;
PO11 An ability to use the techniques, skills, and modern engineering tools necessary for mechanical engineering practice;
PO12 An ability to acquire entrepreneurship knowledge.

Although the Faculty of Mechanical Engineering has decided on the above twelve Programme Outcomes, efforts are continuously made to expand the Programme Outcomes based on feedbacks from our working graduates and consultations with stakeholders.
LABORATORY FACILITIES

Laboratories in the faculty complement all courses and programmes offered by the faculty, including information and computing technologies (ICT). Detailed laboratory facilities provided by the Faculty of Mechanical Engineering are as listed below:

- Statics and Dynamics Laboratory
- CAE Laboratory 1 and 2
- Metrology Laboratory
- Electric & Electronics Laboratory
- Automation (Hydraulics & Pneumatic) Laboratory
- General Machining Laboratory
- Mechanical Design Laboratory
- Thermodynamics Laboratory
- Welding and Fabrication Laboratory
- Mechanic of Materials Laboratory
- Fluid Mechanics Laboratory
- Plastics Processing Laboratory
- Metal Forming Laboratory
- CNC Machining Laboratory
- CIM Laboratory
- Noise, Vibration & Harshness Laboratory
- Automotive Design Laboratory
- Automotive Service and Maintenance
- Engine Performance Laboratory
- Vehicle System Laboratory
- Alternative Energy & Combustion Laboratory
- Industrial Engineering Laboratory
- Heating, Ventilation and Air Conditioning Laboratory
- Foundry Laboratory
FACULTY MANAGEMENT

DEAN

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HEAD OF TECHNICAL

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Muhammad Adib bin Shaharun</td>
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## CURRICULUM STRUCTURE

### B. ENG (HONS.) MECHANICAL ENGINEERING - (BMM)

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### University Courses:
- UQ1**1 CO. CURRICULUM 1, UQ2**1 CO.CURRICULUM 2
- BUM 2123 APPLIED CALCULUS, BUM2133 ORDINARY DIFFERENTIAL EQUATIONS, BUM2133 NUMERICAL METHODS, BUM2413 APPLIED STATISTICS, UHL2312 TECHNICAL ENGLISH, UHL2332 TECHNICAL WRITING, UHL2332 ACADEMIC REPORT WRITING, UHR1012 ISLAMIC AND ASIA CIVILIZATION, UHM2022 ETHNIC RELATIONS, UHE3**2 ELECTIVE SOCIAL SCIENCE, UHF11*1 FOREIGN LANGUAGE LEVEL 1, UHF21*1 FOREIGN LANGUAGE LEVEL 2, UHS1021 SOFTSKILLS 1, UHS2021 SOFTSKILLS 2, UOE3002 TRENDS AND MANAGEMENT

### Total Unit for Graduation:
- 128
## CURRICULUM STRUCTURE

**B. ENG (HONS.) MECHANICAL ENGINEERING (AUTOMOTIVE) -- (BMA)**

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| | University Courses: UQB1**1: CO CURRICULUM 1, UQ**2**2: CO CURRICULUM 2, BUM 2123 APPLIED CALCULUS, BUM2133 ORDINARY DIFFERENTIAL EQUATIONS, BUM2313 NUMERICAL METHODS, BUM2413 APPLIED STATISTICS, UHL2312 TECHNICAL ENGLISH, UHL2322 TECHNICAL WRITING, UHL2332 ACADEMIC REPORT WRITING, UHR1012 ISLAMIC AND ASIA CIVILIZATION, UHM2022 ETHNIC RELATIONS, UHE3**2 ELECTIVE SOCIAL SCIENCE, UHF11**1 FOREIGN LANGUAGE LEVEL 1, UHF21**1 FOREIGN LANGUAGE LEVEL 2, UHS1021 SOFTSKILLS 1, UHS2021 SOFTSKILLS 2, UGE2002 TECHNOPRENEURSHIP |
| | 128 | Total Unit for Graduation |
CURRICULUM STRUCTURE FOR
DEGREE PROGRAMME

BMM1312 Computer Programming
Credit Hour: 2
Prerequisite: None

Synopsis

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

CO1: Recognize about computing fundamentals and construct a simple and straightforward manner C programs.
CO2: Construct C programmes with the most suitable variables, perform correct arithmetic operations and math functions.
CO3: Construct C programs with the desired input/output.
CO4: Construct C programs with control structure and looping.
CO5: Construct C programs with functions and numeric arrays.

References

BMM1563 Statics
Credit Hour: 3
Prerequisite: None

Synopsis
An introduction to solving engineering static problems for: - particles, rigid bodies, effect of friction on rigid bodies, structures, frames and machines. Determine the centroids, center of gravity and moment of inertia of composite bodies.

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

CO1: Analyze equilibrium of particles.
CO2: Analyze equilibrium of rigid bodies involve frames and machines.
CO3: Analyze equilibrium of structural members.
CO4: Analyze equilibrium of rigid bodies involve friction
CO5: Determine the centroid and moment of Inertia, of composite cross sectional area of beams.

References


BMM1523 Engineering Materials
Credit Hour: 3
Prerequisite: None

Synopsis
This course introduce students to the fundamentals of engineering materials which includes its application, atomic bonding, crystal structure, mechanical and physical properties, corrosion and degradation mechanism, microstructure analysis, phase diagram, ferrous and non-ferrous alloys, polymer and advanced materials and issues in economic, environmental, societal of materials engineering.

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

CO1: Explain the classification of engineering materials and describe its applications.
CO2: Analyse and evaluate the mechanical, physical and chemical properties engineering materials.
CO3: Analyse and explain metal alloys microstructure, phase diagram and heat treatment processes.
CO4: Analyse and explain ferrous and non-ferrous alloys microstructure, strengthening mechanism and its applications.
CO5: Analyse and define the polymeric materials and advanced materials classification.

References

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 & 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: To practice the fundamentals of safety, drawing interpretation and measurement.
CO2: To apply benchwork and drilling operation.
CO3: To perform various basic turning operations.

References
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, CNC milling simulator operation and surface grinding machines and processes.  

Course Outcome  
By the end of semester, students should be able to:  
CO1: Practice the fundamentals of workshop safety and precaution, drawing interpretation and measurement.  
CO2: Apply the appropriate techniques when handling basic measuring equipments and instruments.  
CO3: Apply various basic milling operations.  
CO4: Understand surface grinding process.  

References  

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, Brinell hardness test, 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: Determine Vickers hardness values for different materials, calculate the ultimate tensile strength by using the empirical formulas and compare the testing results.  
CO2: Determine the typical phenomena of creep responses at different creep rate and temperature-dependent creep behavior and determine fracture toughness and characteristics of metals from impact test.  
CO3: Measure the friction with increased precision, friction coefficient for different materials combination and friction on inclined plane.  
CO4: Determine the distribution of forces in simple girder structure and central force system and investigate the lever principle and application of moment on a crank with varied transmission ratio.  
CO5: Determine the property and structural changes of several plain carbon and low alloy steels at different heat treatment.  

References  

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 the stresses and strains problems in structural members.
CO2: Analyze the circular and noncircular member problems which are subjected to twisting couples or 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.

References


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). Students will also be exposed to a mini project using Working Model 2D software.

Course Outcome

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

CO1: Apply the theory of kinematics (motion of rigid body) inclusive of absolute and relative motion (displacement, velocity and acceleration).
CO2: Analyzed the problem of kinematics (motion of rigid body) inclusive of absolute and relative motion (displacement, velocity and acceleration).
CO3: Apply the theory of kinetics inclusive forces, work, energy, inertia and momentum.
CO4: Analyzed the problems of kinetics inclusive forces, work, energy, inertia and momentum.
CO5: Design a working mechanical system to transmit motion or load.

References

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: Understand and analyse the principle of electrical circuits.
CO2: Analyse the circuit network analysis.
CO3: Analyse the inductance circuits, capacitance circuits, magnetic field and DC Motor.
CO4: Analyse the diodes, BJT and operational amplifier problems.
CO5: Analyse the logic circuits problems and design of logic circuit.

References


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 experiments. Students will conduct experiments of tensile, compression, torsion, fatigue, bending moment, shearing stress, transformations of stress and strain in material lab. Experiments on dynamic aspect includes projectile, pendulum, 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: Determine the common properties of material under tension and compression.
CO2: Determine the common properties of material under torsion and cyclic loading.
CO3: Determine the effect of bending moment and shearing force on a bar.
CO4: Investigate the effect of free-flight projectile motion in gravitational field through an experiment and determination of conservation of energy through pendulum experiment.
CO5: Determine planar kinetics of rigid bodies utilizing force and acceleration principles and planar kinematics of rigid bodies on inclined plane through experiment.

References

BMM2533 Fluid Mechanics 1
Credit Hour: 3
Prerequisite: None

Synopsis
The objective of the course is to introduce knowledge and understanding about 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 projects dealing with problems regarding the course outcomes.

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

CO1: Understand and be able to solve fluid statics problems.
CO2: Understand and be able to solve some problems in fluid in motion continuum concept.
CO3: Understand and be able to solve problems in fluid friction in pipes.
CO4: Understand and be able to solve some problems in fluid flow measurement.
CO5: Understand and be able to apply the concept of dimensional analysis

References

BMM2543 Fluid Mechanics 2
Credit Hour: 3
Prerequisite: BMM2533 Fluid Mechanics 1

Synopsis
This course introduces the flow over immersed body, boundary layer analysis, compressible fluids flow, application in pumps and turbines.

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

CO1: Describe and solve flow over immersed bodies and boundary layer problems.
CO2: Describe and solve compressible flow problems.
CO3: Analyze pump and pump systems problems.
CO4: Analyze turbine problems.

References
BMM2583 Strength of Materials 2
Credit Hour: 3
Prerequisite: BMM1533 Strength of Materials 1

Synopsis
This course introduces students to analyse shearing stresses in beams and thin-walled members, transformations of stress and strain state, stresses under combined loadings on rectangular and round members, deflection of beams, buckling of columns.

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

CO1: Analyze Shearing Stresses in Beams and Thin-Walled Member
CO2: Analyze Transformations of Stress and Strain
CO3: Evaluate state of stresses under combined loadings
CO4: Evaluate the deflection of a beam under transverse load, analysis statically indeterminate beams, determine the deflection and slope of the beam using singularity functions, determine the deflection of beam using method of superposition.
CO5: Analyze stability of structure, derive Euler’s formula for pin-ended column, derive Euler’s formula of columns for other boundary conditions, design of column using centric load, derive Secant formula for eccentrically loading, design of column for eccentrically loading.

References

BMM2613 Computer Aided Design
Credit Hour: 3
Prerequisite: None

Synopsis
This course introduces engineering drawing, fundamentals of drawing, introduction to CAD software, 2D & 3D drawing command, coordinate system, organizing the drawing and CAD drawing setting.

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

CO1: Apply the fundamentals of drawing and information in CAD.
CO2: Apply 2D drawing using CAD software.
CO3: Apply 3D drawing using CAD software.
CO4: Model the mechanical engineering product using CAD software.

References
BMM 2673 Thermodynamics
Credit Hour: 3
Prerequisite: None

Synopsis
This course focuses on the understanding fundamental and application of thermodynamics knowledge in various engineering systems. The subject covers the concepts of thermodynamics laws and entropy, and analysis of energy, heat engines, refrigerators and heat pumps.

Course Outcome
By the end of semester, students should be able to:
CO1: To understand and apply the concepts in various problems involving gas power cycles
CO2: To understand and apply the concepts in various problems involving mechanical vapour compression cycles
CO3: To understand and apply the concepts in various problems involving mechanical vapour power cycles
CO4: To understand and apply the concepts in various problems involving air conditioning processes
CO5: To understand and apply the concepts in various problems involving the combustion processes

References
4. Robert Balmer: Thermodynamics, Jaico Publication
5. Russell & Adebiyi: Classical Thermodynamics Saunders

BMM2683 Applied Thermodynamics
Credit Hour: 3
Prerequisite: BMM2673
Thermodynamics

Synopsis
This course focuses on the application of the thermodynamics knowledge in various engineering systems. The subject covers the gas and vapour power cycles, refrigeration and heat pump systems, the complete air conditioning system, and the concepts of chemical reactions in combustion.

Course Outcome
By the end of semester, students should be able to:
CO1: Apply Thermodynamics concept and statements of Thermodynamics law.
CO2: Evaluate properties of pure, simple compressible substances and ideal gases.
CO3: Analyze the concept of 1st law in closed system.
CO4: Analyze the concept of 1st law in open system.
CO5: Evaluate entropy change in 2nd law analysis of thermodynamics systems

References
BMM3623 Mechanical Design  
Credit Hour: 3  
Prerequisite: BMM1533 Strength of Material 1

Synopsis

Introduction to design of machine elements, static and fatigue failure theories analyses of the implementation of machine component are covered. Design of machine elements such as shafts, keys, bearings, gears, springs, screws and fasteners, bolted, permanent joints. Selecting rolling bearings, sealing elements, and lubrication of the speed reducer. Design of flexible mechanical elements (belts and chains), clutches, brake and coupling.

Course Outcome

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

CO1: Analyze the components to prevent premature failure due to static and dynamic service loads.  
CO2: Analysis of shafts and non-permanent joints includes screws, bolts and fasteners.  
CO3: Design of springs and permanent joints  
CO4: Analysis of the bearings and flexible elements such as brakes, clutches, belts and pulleys  
CO5: Design of gears including spur, bevel, worm and helical gears.

References


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 apply the concept of sensor instrumentations and design the complete measurement technique/system for data collection during laboratory experimentations.  
CO2: To devise detailed experimental methods and conduct experiments to prove thermodynamics concepts.  
CO3: To devise detailed experimental methods and conduct experiments to prove heat transfer concepts.

References


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 analysis 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: To understand and analyse the concept of conduction, convection and radiation heat transfer.
CO2: To understand and evaluate one-dimensional heat flow and in different geometries.
CO3: To understand and evaluate problems in single phase forced and free convection heat transfer.
CO4: To understand and evaluate simple radiation heat transfer.
CO5: To understand and evaluate the overall heat transfer coefficient for different kinds of heat exchangers.

References


BMM3613 Automatic Control
Credit Hour: 3
Prerequisite: BMM 1553 Dynamics

Synopsis

This course introduces control system modelling, analysis and design. The covered topics are frequency domain modelling of mechanical, electrical and electro-mechanical systems; time and 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: Understand the basic control system concepts and illustrate the required control system into block design process.
CO2: Develop frequency domain transfer function of control systems for electrical, mechanical and electromechanical systems
CO3: Solve the transient response, steady-state response and stability of control system.
CO4: Solve control system compensators to achieve specified control system performances utilizing root-locus technique.
CO5: Design and analysis control system to achieve specified control system performances utilizing PID controller.

References


BMM3643 Manufacturing Processes
Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces students to industrial 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: Distinguish different types of metal & polymer solidification processes.
CO2: Distinguish forming processes for metals, plastics, ceramics and composite materials of different forms of raw materials e.g. sheet, bulk or powder.
CO3: Compare major types of material removal process and rapid prototype and their limitation responding to surface finish, tolerance and manufacturing volume.
CO4: Compare the joining processes and surface treatments.
CO5: Design and present a process flow to manufacture a conceptual product by considering sustainable manufacturing process.

References


BMM3532 Measurement & Instrumentation
Credit Hour: 2
Prerequisite: None

Synopsis

This course introduces the principles of measurement, signal analysis and provides the students hands-on laboratory experiences with a variety of transducers and instruments (including 'virtual instruments'). Students also expose how to write substantial, professional, computer-generated technical reports.

Course Outcome

By the end of semester, students should be able to:
CO1: Understand the basic element in measurement and instrumentation system.

CO2: Apply the basics of signal analysis in measuring signal from transducers.

CO3: Design the virtual instrumentation system to acquire data from transducer and analyze the data in Time and Frequency Domain.

References


BMM3562 Finite Element Methods
Credit Hour: 2
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.

References


BMM3553 Mechanical Vibrations
Credit Hour: 3
Prerequisite: BMM1553 Dynamics

Synopsis

This course introduces the fundamental of vibration, free vibration response for single, two and multi-degree of freedom, harmonically excited vibration response for single,two and multi DOF system and some applications of vibrations in engineering.

Course Outcome

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

CO1: Describe the vibration elements and dynamic characteristics of the mechanical systems and concept of resonance.

CO2: Model, formulate and obtain the solutions to vibration problems that contain free-vibration and forced-vibration analysis of one degree of freedom systems.

CO3: Model, formulate and obtain the solutions to vibration problems that contain free and forced-
vibration analysis of two degree of freedom systems.

CO4: Model, formulate and obtain the solutions to vibration problems that contain undamped free vibration analysis of multi degree of freedom systems

References

1. S. Timoshenko, D.H. Young and W. Weaver, Vibration Problems In Engineering,

BMM3633 Industrial Engineering
Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces Industrial engineering, productivity, facilities planning, facilities design, work study, human factors engineering, introduction to production planning and control, inventory management, total quality management system and quality control.

Course Outcome

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

CO1: Analyze the productivity in an organization by using productivity concept and fundamentals.

CO2: Select and apply the best layout based on the layout design procedure location and basic layout design by taking into account the impact of sustainable environment.

CO3: Design working environment based on work study and human factor engineering concept.

CO4: Analyze production planning, control and inventory management activities based on given cases.

CO5: Evaluate solutions for given cases based on total quality management systems.

References


BMM3521 Engineering Fluid Mechanics Lab
Credit Hour: 1
Prerequisite: BMM2543 Fluid Mechanics 2

Synopsis

This lab introduces the students to fundamental concepts of fluid mechanics experimentation, from 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 different
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: Design complete measurement technique for fluid flow and validate Bernoulli’s Theorem
CO2: Investigate flow patterns over different immersed bodies
CO3: Determine friction losses in pipes
CO4: Determine pump performance with different configurations
CO5: Determine the performance and efficiency of different turbine

References


BMM3611 Manufacturing Processes Laboratory
Credit Hour: 1
Prerequisite: BMM3643 Manufacturing Processes

Synopsis

This lab gives hands-on experience for students to learn about manufacturing processes with emphasized on safety requirements, knowledge on engineering material application and processing tools/machines. At the end of this course, students 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: Identify safety awareness during manufacturing activities.
CO2: Understand various type of raw material for manufacturing process.
CO3: Understand application of tools for manufacturing process.
CO4: Practicing manufacturing activities and machine setup for manufacturing process.
CO5: Analyse the product defects based on various process setting.

References


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 organisation. OSHA 1994, Factories and Machinery Act 1967, and basic
principle of accident prevention and occupational health will be covered in safety part. In engineering economy, students are exposed to engineering economic principles and methods of engineering economic analysis. At the end, students 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: Understand the classification and life cycle of the project, its organizational structures and apply techniques of management strategic plan, work breakdown structure and its scheduling, project cost estimating and risk management

CO2: Understand the safety concept and application tools (OSHA 1994), Malaysian Act – Factories and Machinery Act 1967

CO3: Understand the engineering economic principles and methods of engineering economic analysis

CO4: Integrate the knowledge gathered throughout the course to design knowledgeable management, safe workplace implementation and financially competitive organization

References

2. Factories and Machinery Act 1967
3. OSHA 1994 documents

Prerequisite: BMM3623 Mechanical Design

Synopsis

This course covers the comprehensive mechanical engineering design process, ethics, teamwork, brainstorming, conceptual designs, proposal writing, project planning, project management, product attributes, design criteria, engineering targets, physical simulation, virtual simulation, analysis techniques, design synthesis, alternative designs, bill of materials, bill of process, manufacturability, product variations, product quality, design reports and presentations.

Course Outcome

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

CO1: Design for a complex mechanical system and components

CO2: Analysis and interpretation of data, and synthesis of information to provide effective conclusions

CO3: Write an effective reports and design documentation, make effective presentations, and receive a clear directions

CO4: Function effectively as an individual, and as a ember/leader

CO5: Apply appropriate techniques and modern engineering tools for prediction and modelling of complex mechanical system

References

1. R.C.Mishra, Simant, Mechanical system design, 2013, PHI private learning limited, New Delhi

BMM4021 Engineer and Society
Credit Hour: 1
Prerequisite: None

Synopsis
This course introduces the history of science and technology; the engineering profession and the role and responsibilities of mechanical engineers. Students are reminded of their future responsibilities through abiding closely the code of ethics, code of conduct and code of practice well laid out for engineers. The course includes narration of the status and growth of selected local industry, job opportunities in both government and private sectors, the law that governs the engineering profession, the importance of engineering societies and organisations, as well as exposure to the route to become a professional engineer. Throughout the course students are exposed to the challenges that future engineers face in this changing world with regards to environment and sustainability, and entrepreneurial opportunities that they could identify in meeting and coping up with these challenges. External speakers (e.g. from IEM, BEM, and CIDB) will be invited to provide real-life lectures to the students.

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

CO1: Understand the engineering profession and its role to the society; (History of science and technology with relation to development of human civilization; code of ethics, code of conducts, code of practice; public responsibility and professional liabilities; job opportunities in private and public sectors)

CO2: Understand the engineering governance (local industries development and the
government development plans and programmes; the Malaysian Government and Legal System; acts and laws that govern the engineers; route to become a professional engineer; engineers’ role towards sustainability, and entrepreneurial opportunities).

References
3. Abdul Rahim Abdul Manaf, Alam Jurutera, Penerbit Universiti Malaya, 2003;
4. J.D. Kemper & B.R. Sanders, Engineers and Their Profession, Oxford University Press;

Elective Subjects for Mechanical Engineering (BMM)

BMM4703 Hydraulics and Pneumatics
BMM4713 Stress Analysis
BMM4723 Mechanism Design
BMM4733 Power Plant Technology
BMM4753 Renewable Energy Resources
BMM4763 Fatigue Design and Analysis
BMM4773 Materials Characterization
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
BMM4863 Design for Manufactured
& Assembly
BMM4873 CAD/CAM
BMM4883 Metal Castings
BMM4893 Mechanics of Composite Materials

*The above information are subjected to amendment of the Senate from time to time.

BMM Elective courses:

BMM4703 Hydraulic and Pneumatics
Credit Hour: 3
Prerequisite: BMM2543 Fluid Mechanics 2

Synopsis

This course introduces hydraulic system, hydraulic components, hydraulic system design, pneumatics system, pneumatic components, pneumatic system design, electro fluid power system and its design, as well as programmable logic controller (PLC) and its design. The hydraulic section will touch on introducing fluid power, hydraulic systems and components, as well as basic fluid-related measurements. For the hydraulic circuit design section, students will be able to design and analyze basic hydraulic and electro-hydraulic circuit using Automation Lab software. In the pneumatics section, students will be able to calculate pneumatic problems using basic gas laws, as well as explain the pneumatic systems and components. For the pneumatic circuit design section, students will be able to design and analyze basic and multiple pneumatic circuits as well as electro-pneumatic circuits using Automation Lab software. Lastly, in the programmable logic control section, students will learn to explain the components of Programmable Logic Controller (PLC) and will be able to design, analyze and integrate basic and repeated sequence of ladder diagram with hydraulic components in the Automation Lab.

Course Outcome

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

CO1: Explain, design and analyze the hydraulic system.
CO2: Explain, design and analyze the pneumatic system.
CO3: Explain and analyze of electro fluid power system with electro components.
CO4: Design and analyze of electro fluid power with programmable logic controller system via simulation and experimental.

References


BMM4723 Mechanism Design
Credit Hour: 3
Prerequisite: BMM1553 Dynamics and BMM3623 Mechanical Design

Synopsis

This course introduces the fundamentals in the design of mechanisms. Theory of mechanism will be carried out in a 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, cam design and kinematics
analysis and mechanism analysis and synthesis and other mechanism design related to mechanical engineering complex application.

**Course Outcome**

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

CO1: Design mechanism parameters related to motion, degree of freedom.

CO2: Analyze the position of the links in a mechanism and the limiting position of the mechanism.

CO3: Analyze the angular velocity of a link and the velocity of any point on a link using relative velocity method.

CO4: Analyze the acceleration of a point using relative acceleration method.

CO5: Application and synthesis of the mechanism in mechanical engineering complex activities.

**References**


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 steam generators, 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: Analyze steam power plants and gas turbines.

CO2: Analyze fuels and combustions in power plants.

CO3: Analyze the sustainable energy issues in power generations.

CO4: Analyze combined cycles and renewable energy power systems.

CO5: Analyze the basic process of power generation systems including sustainable power generation systems.

**References**


**BMM4733 Power Plant Technology**

**Credit Hour:** 3

**Prerequisite:** BMM2523 Thermodynamics 2, BMM2543 Fluid Mechanics 2

**Synopsis**

This course introduces the need and concept of renewable energy systems such as steam turbines, gas turbines, combined cycle power plants and sustainable energy power systems. This course also covers steam generators, fuels and combustions, economics of power generation and environmental issues on power generation.

**BMM4753 Renewable Energy Resources**

**Credit Hour:** 3

**Prerequisite:** None

**Synopsis**

This course introduces the need and concept of renewable energy
resources including solar, geothermal, wind, biomass, ocean thermal, wave, tidal and other forms including fuel cells. Aspect of sustainability, technopreneurship and effective communication are embedded in the assignment of case studies.

Course Outcome

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

CO1: Evaluate the current and contemporary issues of renewable energy resources.
CO2: Analyzing solar and geothermal energy thermal energy conversion systems.
CO3: Evaluate the energy potential
CO4: Analyzing biomass conversion techniques into liquid and gaseous forms including the design of biogas digester.
CO5: Analyzing ocean energy conversion and fuel cells.

References

4. Energy Technology, S Rao&Dr B.B. ParulekarPrentice-Hall of India.
5. Renewable Energy Sources and Emerging Technologies, KothariKhanna Publisher.

This subject is to introduce the fundamentals 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, analyzing 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 problems based on actual physical appearance which is more complex boundaries.

Course Outcome

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

CO1: Understands the governing equations in fluid dynamics.
CO2: Apply basic discrezation method.
CO3: Apply numerical simulation in common fluid flow.
CO4: Apply commercial software to solve fluid dynamics problem.
CO5: Analyze and evaluate the simulation results of fluid problem.

References

4. J. Tu, G.H. Yeoh, C. Liu, Computational Fluid Dynamics
BMM4793 Welding and Joining Technology
Credit Hour: 3
Prerequisite: BMM3643 Manufacturing Processes and BMM2583 Strength of Materials 2

Synopsis
This course introduces about joining and welding technology. The topic includes the overview of joining & welding processes, the fusion welding, arc physics, solid state welding, welding design, welding defects and its countermeasure. It also includes quality management system in welding and defect detection.

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

CO1: To understand the fusion welding processes and arc physic.
CO2: To understand the various of solid state joining, brazing, soldering and modern joining techniques.
CO3: To design welded structure and analysis the welding strength.
CO4: To determine the welding metallurgy and defects of welded structure.
CO5: To determine the quality management system, welding defect and defect detection.

References

BMM4813 Ergonomics
Credit Hour: 3
Prerequisite: BMM1563 Statics

Synopsis
This course introduces ergonomics study focusing on human physiological and psychological needs that cover anthropometry, biomechanics, anatomical and mechanical structure of the human body, energy utilizations and environment aspect. This course emphasizes onto productivity, health and safety of human.

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

CO1: Identify ergonomics risk factor and hazards.
CO2: Illustrate the concept of human body.
CO3: Propose work station design and synthesize the influence of working environment.
CO4: Justify the overall concept of man-machine interaction environment.
CO5: Completion of ergonomics lab.

References

BMM4823 Production Planning and 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: Apply quantitative, causal, and time series method to forecast the future production demand.
CO2: Apply chase demand, level demand and linear programming to determine the production schedule.
CO3: Analyze appropriate techniques to schedule the timing and sequence of operations.
CO4: Analyze two types of production control system between Just in Time and Material Requirement Planning
CO5: Analyse and determine optimum production layout by using Witness software.

References


BMM4833 Quality Engineering

Credit Hour: 3
Prerequisite: BMM3633 Industrial Engineering

Synopsis

This course introduces students with basic knowledge on quality control engineering and management. It also introduces the statistical tools and techniques to monitor, control and improve product, process quality and expose students the concept of integrating human and technical aspects for managing quality itself.

Course Outcome

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

CO1: Describe fundamental knowledge on quality control, engineering, management and basic quality tools.
CO2: Evaluate frequency distribution, central tendency, dispersion and population of data by using statistical analysis method.
CO3: Construct appropriate control chart to analyze the variation in data and calculate the probability using statistical tools.
CO4: Develop control chart for non-conforming units and count of non-conformities.

References

BMM4803 Corrosion Science and Engineering
Credit Hour: 3
Prerequisite: None

Synopsis

The course 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 shall 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: Determine specifically the fundamental concepts of electrochemistry in corrosion process.
CO2: Analyse corrosion theories in industries sectors.
CO3: Analyse material selection to solve various problems in several environments conditions.
CO4: Evaluate corrosion test to calculate and analyse failure in industrial facilities.
CO5: Analyse how to measure and predict rates of corrosion reactions, and how to design for material protection.

References


BMM4743 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: Understand and identify the properties of fiber and matrix materials used in commercial composites, as well as manufacturing techniques.
CO2: Analyze a laminated plate, including finding laminate properties from lamina properties.
CO3: Predict the failure strength of a laminated composite plate.
CO4: Identify different modes of micromechanics failure and to evaluate types of failure criteria of laminates.
CO5: Understand and explain standard test procedures for strength, stiffness and toughness for quality assurance.

References

3. I.M. Daniel, O. Ishai, 2006. Engineering mechanics of


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 an engineering problem or project. Integration of various subject areas they have acquired throughout their mechanical engineering programme is strongly encouraged in this course.

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

CO1: Plan the project development flow based on proper methods.

CO2: Assess an independent project with the minimum supervision from the project instructor.

CO3: Identify, examine, collect data, analyze and solve a research problem efficiently.

CO4: Devise techniques in literature review and information prospection independently and build up specific knowledge and research interest in the engineering field.

CO5: Communicate during presentation and defend the research outcome at the end of the semester.

References


BMM4924 Final Year Project 2
Credit Hour: 4
Prerequisite: Refer to PSM handbook (Has passed more than 80 Credit hours)

Synopsis
This course is, in fact, the continuation of the Final Year Project 1. The Final Year Project is designed in two parts to ensure that the final year students conduct and spread their work consistently throughout the two semesters, and being evaluated at the end of both semesters. Throughout the two semesters, the students are guided and supervised closely by their respective project supervisors.

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

CO1: Plan the project development flow based on proper methods.

CO2: Assess an independent project with the minimum supervision from the project instructor.

CO3: Identify, examine, collect data, analyze and solve a research problem efficiently.

CO4: Establish techniques for literature review and independently perform the ability to gather information and build up specific knowledge for report writing.

CO5: Communicate well during presentation and deliver the research outcome effectively.
References


BMM3996 Industrial Training
Credit Hour: 6
Prerequisite: BMM2543, BMM2583, BMM2683, BMM3643

Synopsis:

This training exposes the students to professional skills and experience in the aspect of mechanical engineering practices. The exposure will help shape and produce future mechanical engineers with high responsibility, positive attitude and professional conduct, ready to face all challenges encountered in their future career.

Course Outcome:

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

CO1: Practice basic professional engineering skills at industry level.
CO2: Practice and relate the theory that had been learned during the involvement of real problems solving such as planning, design, construction and management of the projects.
CO3: Identify and solve practical problems that exist.
CO4: Identify the company or department structure and recognize the jobscope of specific post in the organization.

CO5: Build up interpersonal skills and professional ethics to be an excellent, motivated and responsible to the creator.

References:

1. Buku Panduan Latihan Industri, Jawatankuasa Latihan Industri Fakulti, KUKTEM.

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 drivetrain, and the whole automotive chassis.

Course Outcome

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

CO1: Understand and recognize the importance of the workshop safety, 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
CO3: understand the working principles of automotive electrical and electronic systems
CO4: understand the working principles of automotive HVAC
CO5: understand the working principle of drivetrain and the chassis system

References

1. CDX Automotive, 2013, Fundamentals of Automotive Technology: Principles and Practice, Jones and Bartlett Learning, Burlington, MA
4. Steven Daly, 2011, Automotive Air Conditioning and Climate Control Systems, Elsevier Butterworth-Heinemann

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 the stresses and strains problems in structural members.
CO2: Analyze the circular and noncircular member problems which are subjected to twisting couples or 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.

References


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 includes 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 experiments.

Course Outcome

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

CO1: To analyze the engine performance and the effect of design parametric changes.
CO2: To analyze the engine performance using the fundamental principles of thermodynamic.
CO3: To analyze the engine performance using various
thermodynamic cycles for ideal engines analysis.

CO4: To evaluate the engine performance using detail analysis and differentiate the normal, abnormal combustions, and the effect of operational parametric changes on exhaust pollutant emissions.

CO5: To identify the engine types, instrumentation and conduct actual analysis of engines.

References

BMA3623 Engine Design
Credit Hour: 3
Prerequisite: BMM2583 Strength of Materials 2

Synopsis
This course introduces design of internal combustion engine components, focusing on reciprocating-piston internal-combustion engine. Designs of key engine components such as cylinder, piston, connecting rod, crankshaft, camshaft and gear are included. Fundamental of operational principles, working relationships among all internal components, engine validation and durability are covered. Limitations of the current designs and implementations of the modern internal combustion engine are discussed.

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

CO1: Understand and identify engine and its components.

CO2: Design of cylinder, piston and connecting rod.

CO3: Design of crankshaft, camshaft and gear.

CO4: Analysis of internal combustion engine validation and durability

CO5: Identify the limitations of the current designs and implementations of the modern internal combustion engine

References
Course Outcome

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

CO1: To apply the concept of sensor instrumentations and design the complete measurement technique or system for data collection during laboratory experimentations.

CO2: To devise detailed experimental methods and conduct experiments to prove thermodynamics and heat transfer concepts.

CO3: To devise and investigate flow patterns over different immersed bodies.

CO4: To devise detailed experiment and determine the pump performance with different configuration.

CO5: To devise detailed experiment and determine the performance and efficiency of different turbine.

References


BMA4704 Integrated Design Project
Credit Hour: 4
Prerequisite: BMA3623 Engine Design

Synopsis

This course covers the comprehensive automotive engineering design process, ethics, teamwork, brainstorming, conceptual designs, proposal writing, project planning, project management, product attributes, design criteria, engineering targets, physical simulation, virtual simulation, analysis techniques, design synthesis, alternative designs, bill of materials, bill of process, manufacturability, product variations, product quality, design reports and presentations.

Course Outcome

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

CO1: Design for a complex automotive system and components.

CO2: Analysis and interpretation of data, and synthesis of information to provide effective conclusions.

CO3: Write an effective reports and design documentation, make effective presentations, and receive clear directions.

CO4: Function effectively as an individual, and as a team/leader.

CO5: Apply appropriate techniques and modern engineering tools for prediction and modelling of complex automotive system.

References

1. R.C.Mishra, Simant, Mechanical system design, 2013, PHI private learning limited, New Delhi.
4. P.Boulet, Automotive System Design and Autosar,
BMA4763 Noise Vibrations and Harshness for Automotive
Credit Hour: 3
Prerequisite: None

Synopsis

This course introduces to automotive NVH, fundamental of noise, noise source identification, assessment and control for exterior and interior noise vehicle, introduction to automotive vibration, finite element method (normal mode analysis) and modal testing of automotive structure.

Course Outcome

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

CO1: Understand the basic principles aspects of noise, vibration and harshness in vehicle.
CO2: Overview of state-of-the art in assessment and control for exterior and interior noise vehicle.
CO3: Model, formulate and obtain the solutions to noise problems by using noise source identification method.
CO4: Model, formulate and obtain the solutions to automotive structural vibration by using finite element method (normal mode analysis)
CO5: Model, formulate and obtain the solutions to automotive structural vibration by using modal testing.

References


BMA4723 Vehicle Dynamics
Credit Hour: 3
Prerequisite: BMM1553 Dynamics

Synopsis

This course focuses on the fundamentals of vehicle dynamics, vehicle acceleration and braking performance, mechanics of pneumatic tires, vehicle ride, cornering characteristics, suspension and steering system behavior. By accomplishing a series of laboratories such as car handling, acceleration, braking, double lane change and suspension performance, students 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: Solve the basic vehicle motion problems and acceleration performance for different cases.
CO2: Evaluate the performance characteristics of the braking system.
CO3: Evaluate the aerodynamics, drag and rolling resistance of the tire.
CO4: Investigate the ride characteristics of the road vehicles and evaluate the performance for different cornering scenario.
CO5: Distinguish the characteristics of various suspension system designs and evaluate the performance of steering system.

References

5. H. B. Pacejka, 2005 *Tire and vehicle dynamic*, 2nd edition, SAE international

**BMA Elective Courses**

BMA4803 Automotive Advance Technology
BMA4813 Automotive Development Process
BMA4823 Green Technology Vehicle
BMA4833 Automotive Electric and Electronics
BMA4843 Alternative Fuel
BMA4853 Diesel Engine Technology
BMA4863 Motorsports Engineering
BMA4873 Heavy Duty Vehicles

**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**: Investigate the antilock braking, vehicle aerodynamics, tire tread design advances.
- **CO2**: Identify electronically controlled anti-vibration engine mountings and transport refrigeration.
- **CO3**: Evaluate electricity, alcohol, and hydrogen fuel cells, as well as advanced additives and oils, in environmentally sustainable transport.
- **CO4**: Analyse 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.
- **CO5**: 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.

**References**


**BMA4813 Automotive Development Process**
Credit Hour: 3
Prerequisite: None
Synopsis

This course introduces the concept of automotive 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: Describe product development process and its organization
CO2: Describe product planning stages and process of identifying customer needs in products development.
CO3: Analyse the tooling development and trials process
CO4: Analyse the manufacturing process and quality confirmation activities

References

5. Maurer, Markus, Winner, Hermann (Eds.), 2013. Automotive Systems Engineering, Springer

BMAA4823 Green Technology Vehicle
Credit Hour: 3
Prerequisite: None

Synopsis

This course presents the current development in vehicle systems that incorporate the latest technology towards greener transportation solution. Mechanisms on how the conventional engines operated with the assist of green power plants will be revealed and discussed. Analysis on the potential usage of these green power plants and its system to eventually replace the conventional prime movers will be studied, and consequently, the overall impact of the green power plants to the world's economic aspect, and level of emissions will be presented.

Course Outcome

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

CO1: Investigate the cutting edge technology revolutionizing the automotive industry
CO2: Design of new and up coming electric vehicles of hybrids and fuel cell including smart systems such as MEMS and ICT components
CO3: Identifying green vehicle construction from basic design, batteries and motors. New mobility and infrastructure concepts as well as to renewable energies
CO4: Analyse the political and social impact of green vehicles as well as life time emissions and sustainability over the entire product life-cycle
CO5: Evaluate service procedures and safety together with materials selection for the high profile vehicles

References

3. Lecture Notes in Mobility, 2013, Advanced Microsystems for
Automotive Applications 2013: Smart Systems for Safe and Green Vehicles (Lecture Notes in Mobility), 1 edition, Springer.
4. Lecture Notes in Mobility, 2014, Evolutionary Paths Towards the Mobility Patterns of the Future (Lecture Notes in Mobility), 1 edition, Springer.

BMA4833 Automotive Electric and Electronics
Credit Hour: 3
Prerequisite: None

Synopsis
This course covers topics with a comprehensive knowledge in the area of automotive electrical and electronics. It familiarizes students with both analytical and computational approaches in designing the advanced technology in automotive mechatronics such as body control, stability control, safety system, powertrain control.

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

CO1: Describe general electrical system diagnosis used in automotive industry
CO2: Describe the fundamentals of automotive starting and ignition systems.
CO3: Explain the principles of automotive charging systems.
CO4: Analyze the electrical system of a passenger car.
CO5: Define the vehicle instrumentation and electronic control system.

References

BMA4843 Alternative Fuel
Credit Hour: 3
Prerequisite: None

Synopsis
This course focuses on the use of alternative fuels in energy conversion for producing power. Various alternative fuel from many sources namely natural gas, alcohol based fuels, hydrogen, biodiesels, electricity, and biomass will be discussed as possible replacements to the crude oil based fuels. Performance parameters of these fuels will be accessed, and its compatibility to the existing power plant systems will be analysed. Impacts from using these fuels to the world’s energy demand and supply as well as the impact to the economic sectors will be presented.

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

CO1: To explain the current alternative fuels available today and the technologies involved in developing alternative fuels including the advantages and disadvantages of each.
CO2: To compare and discuss current energy technologies of alternative fuels and explain how both resources can be managed with a view to future sustainability.
CO3: To analyze the performance of each alternative fuels and its potential to replace current fossil fuels.
CO4: To evaluate in detail the power plants efficiency in terms of power using alternative fuel, and the effect of operational parametric changes on exhaust emission.
CO5: To discuss the impact of alternative fuels to the global demand and supply chain.

References
4. Bernard Challen, Diesel Engine, Butterworth Heineman, 2005

BMA4853 Diesel Engine Technology
Credit Hour: 3
Prerequisite: None

Synopsis
This course will explain the fundamental technology of diesel engines which include introduction of the diesel combustion cycle, fuel line system, cooling system, turbocharging and after-treatment technology. The course also includes aspects of engine design, emission control design, and fuel injection parameters which contribute most to the engine performance and emission control. Students will also be exposed to the alternative fuel for diesel engine and the environmental issues arise from the usage of diesel engine.

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

CO1: Introduction to diesel engine and system
CO2: Diesel engine performance and emission
CO3: Fuel injection system and management
CO4: Alternative fuel for diesel engine & environmental issues

References
1. Sean Bennett, Modern Diesel technology, Delmar, 2009
3. Bosch Diesel Engine Management, Bently Publisher, 2005
4. Bernard Challen, Diesel Engine, Butterworth Heineman, 2005

BMA4863 Motorsports Engineering
Credit Hour: 3
Prerequisite: None

Synopsis
This course covers the introduction, regulation and safety in motorsport engineering, advance vehicle materials and structures, racing engines with theories and strategies, and also manufacturing technique extant in the world of motorsport itself. It focuses on two main field of motorsport engineering which are motorcar and motorbike.

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

CO1: Define the fundamental of motorsports engineering and types of racing engines.
CO2: Define the advanced materials and structure used in motorsports engineering field.
CO3: Describe the manufacturing technique been used to produce parts or components for motorsport.
CO4: Define technique of modification as an enhancement to the motorsport system feature.
CO5: Define the racing theories, strategies, regulation and safety involved in motorsports engineering.

References
Dynamics, Society of Automotive Engineers


4. M. Blundell and D. Harty 2004 The multibody approach to vehicle dynamic, Butterworth-Heinemann

5. H. B. Pacejka, 2005 Tire and vehicle dynamic, 2nd edition, SAE international
### CURRICULUM STRUCTURE

#### B. ENG (HONS.) AUTOMOTIVE ENGINEERING - (DUAL DEGREE PROGRAMME WITH HSKA, GERMANY)

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#### UNIVERSITY COURSES

- UQB1**1 CO. CURRICULUM 1
- UQB1**2 CO. CURRICULUM 2
- BUM 2123 APPLIED CALCULUS
- BUM2133 ORDINARY DIFFERENTIAL EQUATIONS
- BUM2413 APPLIED STATISTICS
- UHR1012 ISLAMIC AND ASIA CIVILIZATIONS
- UHM2002 ETHNIC RELATIONS
- UHG1002 DEUTSCHESPRACHE 1
- UHG1012 DEUTSCHESPRACHE 2
- UHG2002 DEUTSCHESPRACHE 3
- UHG2012 DEUTSCHESPRACHE 4
- UHS1021 SOFTSKILLS 1
- UHS2021 SOFTSKILLS 2
- UGE2002 TECHNOPRENEURSHIP
CURRICULUM STRUCTURE FOR DUAL-DEGREE PROGRAMME (BHA)

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, microstructural analysis, phase diagram, ferrous and non-ferrous alloys, polymer and advance materials.

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

CO1: Explain and illustrate the materials' atomic bonding and crystal structure.
CO2: Analyse and explain the mechanical, physical properties of engineering materials and concept of corrosion.
CO3: Analyse and explain metal alloys microstructure, phase diagram and heat treatment processes.
CO4: Analyse and explain ferrous and non-ferrous alloys microstructure strengthening mechanism and its applications.
CO5: Analyse and define the polymeric materials and advanced materials classification, structure and properties.

BHA1103 Statics
Credit Hour: 3
Prerequisite: None

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

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

CO1: Solve equilibrium of forces on particle problems
CO2: Solve equilibrium of forces on single rigid body problems
CO3: Solve equilibrium of forces on structure problems
CO4: Solve problems on centroid and moment of inertia

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: Perform basic manual production techniques.
CO2: Perform basic turning processes and operations according to the given dimensions, specifications and tolerances.

BHA1303 Electrical and Electronics Engineering
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: Solve DC resistive network analysis.
CO2: Solve AC network analysis.
CO3: Solve circuits involving diodes and bipolar junction transistor (BJT).
CO4: Solve circuit involving operational amplifier.
CO5: Solve logic circuits problem.

BHA 2123 Mechanics of Materials
Credit Hour: 3
Prerequisite: BHA113 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: Solve the stress and strain in structural members subjected to axial loads.
CO2: Solve the stress and strain in structural members subjected to torsion loads.
CO3: Solve the stress and strain in structural members subjected to bending loads.
CO4: Solve the stress and strain in structural members subjected to shear loads.
CO5: Solve the stress and strain in structural members subjected to combined loads and conduct the stress transformation.

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: Perform appropriate techniques when handling basic measuring equipments and instruments
CO2: Perform conventional milling and CNC milling simulator operation
CO3: Analyze surface grinding process

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: Analyze and solve problems involving kinematics of a particle.
CO2: Analyze and solve problems involving kinetics of a particle utilizing force and acceleration method, work and energy
method and impulse and momentum method.

CO3: Analyze and solve problems involving kinematics of a planar rigid body.

CO4: Analyze and solve problems involving kinetics of a planar rigid body utilizing force and acceleration method.

**BHA 2513 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 and air-conditioning and combustion

**Course Outcome**

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

CO1: Discuss and 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: Determine and sketch the properties of pure, simple compressible substances and ideal gases.

CO3: Analyse the concept of heat, work and mass to the typical problems.

CO4: Analyse the entropy changes problems for pure substances and ideal gas

**BHA 3613 Mechanical Design**  
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 and to perform deformation and stress analysis to design safe machine components.
CO2: Analyze static and fatigue failure theories to mechanical design problems
CO3: Design shafts, keys and coupling to meet desired specifications
CO4: Design mechanical elements for non-permanent joint including screws, bolts, fasteners, keys and coupling to meet desired spec.
CO5: Identify and design the mechanical springs and the permanent joints.

BHA 2013 Finite Element Method
Credit Hour: 3
Prerequisite: -

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
CO3: formulate and solve FE equations for scalar field problems
CO4: formulate and solve FE equations for solid mechanics problems
CO5: set up an appropriate FE model of real world problems and analyze the resulting system using FE software

BHA2533 Fluid Mechanics
Credit Hour: 3
Prerequisite: None

Synopsis
After having 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: Material characteristics of fluids
CO2: Hydrostatics and aerostatics
CO3: Evaluation of basic flow processes of incompressible fluids (continuity, Bernoulli and pulse equations, similarity laws, loss of energy)
CO4: Theory of airfoil circulation
BHA 3022 Occupational Safety & Health
Credit Hour: 2
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: Describe the OSHA regulation and implementation in Malaysia
CO2: Identify the industrial hazards
CO3: Discuss the industrial hygiene programs
CO4: Analyze the accident phenomenon
CO5: Apply the safety and health management

BHA 2313 Microcomputer Technology
Credit Hour: 3
Prerequisite: BHA1303 Electrical and Electronics Engineering

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: Conduct input/output PLC interfacing.
CO2: Conduct PLC programming.
CO3: Conduct input/output microcontroller interfacing.
CO4: Conduct microcontroller programming.
CO5: Apply programming and interfacing to actuator and signal devices.

BHA 3313 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: Applying systems and their properties, impulse responses, convolution.
CO2: Determine LTI systems and their properties.
CO3: Analyze frequency response of systems.
CO4: Characterize Discrete-time signals and their properties.
CO5: Analyze Frequency-domain analysis with applications stochastic signal analysis.

BHA 3602 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: Describe product development process and its organization
CO2: Describe product planning stages and process of identifying customer needs in products development.
CO3: Differentiate the overview of establishing the target specification and refining the specification process.
CO4: Design, select and perform testing analysis.
CO5: Design and analysis a product.

BHA 3513 Heat Transfer
Credit Hour: 3
Prerequisite: BHA 2513
Thermodynamics

Synopsis

This course introduces the mechanism of heat transfer through conduction, convection and radiation. The course provides an overview of basic principles of heat transfer and their application to engineering problems. This overview includes an introduction to steady and unsteady conduction, numerical methods, free and forced convection, radiation and heat exchanger design.

Course Outcome

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

CO1: Distinguish heat transfer mechanism of conduction, convection and radiation
CO2: Solve problems in multidimensional and transient heat conduction
CO3: Solve problems in convection
CO4: Solve problems in radiation
CO5: Solve problems in heat transfer through heat exchanger

BHA 4922 Engineers and Society
Credit Hour: 2
Prerequisite: None

Synopsis

This course introduces the history of science and technology, local industries sector, engineering profession, ethics and public responsibility, engineer and law, and contract law.

Course Outcome

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

CO1: Describe the engineering profession and code of ethics
CO2: Determine the local industries sector
CO3: Identify the issues in local industries
CO4: Describe the working ethics and public responsibility
CO5: Describe the law which governing the engineering profession

BHA 3113 Vehicle Electronics 1
Credit Hour: 3
Prerequisite: None

Synopsis

This course covers topics with a comprehensive knowledge in the area of automotive electronics and familiarize students with both analytical and computational approaches in designing the advanced technology in automotive mechatronics such as body control, stability control, safety system, powertrain control.

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

CO1: applying the basic theories behind the current and future trends in automotive mechatronic system.
CO2: design and integrate simulation models and controls of the advanced technology in automotive mechatronic systems.
CO3: implement a real-time controller on an automotive mechatronic system through the use of rapid control prototyping.
CO4: apply these skills to a variety of automotive mechatronic systems and automotive safety systems.

BHA 3323 Automatic Control
Credit Hour: 3
Prerequisite: None

Synopsis
This course introduces linear, time-invariant (LTI) control system modeling, analysis and design. The covered topics are frequency domain modeling of mechanical, electrical and electro-mechanical systems; time response analysis, stability analysis and steady-state analysis; control system analysis and design using root-locus and frequency response techniques.

Course Outcome
CO1: Develop frequency domain transfer function of linear, time-invariant (LTI) control systems for electrical, mechanical and electromechanical systems.
CO2: Solve and analyze the transient response, steady-state response and system stability of LTI control system
CO3: Solve and analyze and design control system compensators to achieve specified control system performances utilizing root-locus technique
CO4: Solve and analyze and design control system compensators to achieve specified control system performances utilizing frequency response technique
CO5: Solve control problems using MATLAB and SIMULINK

BHA 3523 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: Describe the vibrational elements and dynamic behaviour of the mechanical systems.
CO2: Model, formulate and obtain the solutions to vibration problems that contain free-vibration analysis of one degree of freedom systems
CO3: Model, formulate and obtain the solutions to vibration problems that contain forced-vibration analysis of one degree of freedom systems
CO4: Model, formulate and obtain the solutions to vibration problems that contain free and forced-vibration analysis of two and multi degree of freedom systems
CO5: Perform the vibration measurement and demonstrate knowledge of various methods of vibration control.

BHA 3912 Internship
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: Practice basic professional engineering skills at industry level.  
CO2: Practice and relate the theory that had been learned during the involvement of real problems solving such as planning, design, construction and management of the projects.  
CO3: Identify and solve a practical problem that exits.  
CO4: Identify the company or department structure and recognize the job scope of specific post in the organization.  
CO5: Build up interpersonal skills and professional ethics to be an excellent, motivated and responsible to the creator.

**BHA 3223**  
**Internal Combustion Engine**  
Credit Hour: 3  
Prerequisite: None  

**Synopsis**  
This course provides the engineering foundations for understanding the engine design and operation parameters, thermo chemistry, combustion, heat transfer, ideal models of engine cycle, pollutant formation and control, and engine auxiliary systems.  

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

CO1: Evaluate the engine type, performance and effect of design parametric changes on engine performance.  
CO2: Evaluate the engine combustion and heat transfer processes using fundamental of thermochemistry and actual combustion processes.  
CO3: Analyze the thermodynamic cycles of internal combustion engine.  
CO4: Evaluate the effect of operational parametric
changes on exhaust pollutant emissions.
CO5: Evaluate the importance of engine auxiliary systems on overall engine performance.

BHA 3233 Software Engineering
Credit Hour: 3
Prerequisite: None

Synopsis
This course covers 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: understand and apply a broad range of concepts from software engineering, spanning all aspects the software engineering process
CO2: determine, recognise and define the use of generally accepted software engineering terminology
CO3: able to develop a software for engineering project
CO4: characterize and applying a representative cross section of software engineering techniques

BHA 3932 Internship Follow Up
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: Practice basic professional engineering skills at industry level.
CO2: Practice and relate the theory that had been learned during the involvement of real problems solving such as planning, design, construction and management of the projects.
CO3: Identify and solve a practical problem that exists.
CO4: Identify the company or department structure and recognize the job scope of specific post in the organization.
CO5: Build up interpersonal skills and professional ethics to be an excellent, motivated and responsible to the creator.

BHA 4113 Vehicle Electronics 2
Credit Hour: 3
Prerequisite: Vehicle Electronics 1

Synopsis
Vehicle Electronics 2 focus on case studies of smart automotive systems operated electronically namely; engine management system, electronic control transmission system, electrical steering and active suspension system, ABS, traction control and vehicle stability control systems, all case studies are included for further understanding.

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

CO1: understanding data acquisition and control for automotive systems
CO2: analyzing and implementing fuel control and ignition strategy for engine management system
CO3: analyze electric propulsion and hybrid system
CO4: create working model of automated vehicle

BHA 4303 Sensors and Actuators
Credit Hour: 3
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 analog electronics)
• Physical fundamentals and functional principles of various (electrical) actuators

Course Outcome

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

CO1: know the fundamentals of measurement engineering - especially terms as accuracy, resolution, repeatability and error
CO2: be able to discuss and evaluate the influences on measurements and influences concerning electro-magnetic compatibility (EMC)
CO3: be provided with an overview on different sensors for measuring temperature, pressure, speed, magnetic fields, angle, acceleration, rotation rate and flow.
CO4: understand signal conditioning,
CO5: be provided with an overview on the various kinds of actuators, electronic motors

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 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 Outcome

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

CO1: analyze and model dynamic systems
CO2: simulate dynamic systems with MATLAB/Simulink
CO3: design controllers

BHA 4224 Automotive Engineering
Credit Hour: 4
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 drivetrain, and the whole automotive chassis.

Course Outcome

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

BHA 4903 Team Oriented Project Study
Credit Hour: 3
Prerequisite: None

Synopsis
CO1: Determine the function of an automotive engine in terms of cycles, types, classification and construction as well as engine performance.

CO2: Describe the function of automotive engine systems such as fueling, valve train, intake, exhaust, supercharging, turbo charging, lubricating, cooling and emission control.

CO3: Investigate, explain and evaluate the function of automotive electrical, electronic, HVAC (heating, ventilation and air conditioning) System and Engine Management System (EMS).

CO4: Investigate, explain and evaluate the function of the manual and automatic transmission, front and rear drive axle and the four wheel drive system.

CO5: Investigate, explain and evaluate the function of the automotive chassis, which include the suspension, steering and braking system.

BHA 4906 Final Year Automotive Project (FYP)
Credit Hour: 6
Prerequisite: 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 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.

Course Outcome

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

CO1: Plan the project development flow based on proper methods with the minimum supervision from the project instructor.

CO2: Identify, examine, collect data, analyze and solve research problems efficiently.

CO3: Establish techniques for literature review and independently perform the ability to gather information.

CO4: Communicate well during presentation and deliver the research outcome efficiently.

CO5: Build up specific for report writing

BHA 4012 Quality Management
Credit Hour: 2
Prerequisite: None

Synopsis

This course introduce 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: Describe the objectives and imperatives of quality management

CO2: Describe the continuous quality improvement and its consequences of poor quality.

CO3: Select proper method of quality tools to solve any quality problems

CO4: Produce International Standard documents based on given cases
CO5: Produce TS16949 documents based on given cases and human factor engineering concepts

BHA 4906 Final Year Automotive Project (FYP)
Credit Hour: 6
Prerequisite: 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 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.

Course Outcome

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

CO1: Plan the project development flow based on proper methods with the minimum supervision from the project instructor.
CO2: Identify, examine, collect data, analyze and solve research problems efficiently.
CO3: Establish techniques for literature review and independently perform the ability to gather information.
CO4: Communicate well during presentation and deliver the research outcome efficiently.
CO5: Build up specific for report writing

BHA 4932 Final Examination
Credit Hour: 2
Prerequisite: None

Synopsis

This course will test the content of all lectures via written examination, viva and presentation.

Course Outcome

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

CO 1: Ability to answer to questions related to the content of the lectures
CO 2: Ability to answer to questions related to the content of the bachelor thesis in order to show profound technical knowledge

BHA 4022 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: Describe the classification and life cycle of the projects
CO2: Describe and differentiate the project management organizational structures
CO3: Describe and apply various frameworks and techniques of strategic plans of management.
CO4: Develop and analyze work breakdown structure (WBS) and project scheduling
CO5: Describe various methods for estimating project costs and analyze the project risk management.
## CURRICULUM STRUCTURE
### DIPLOMA IN MECHANICAL ENGINEERING

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FIRST</th>
<th>SECOND</th>
<th>THIRD</th>
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</table>
|      | DMM1312  
COMPUTER PROGRAMMING | DMM2633  
MANUFACTURING TECHNOLOGY | DMM3999  
INDUSTRIAL TRAINING |
|      | DMM1412  
ENGINEERING DRAWING | DMM2412  
METROLOGY | DMM3993  
INDUSTRIAL TRAINING REPORT |
|      | DMM1911  
MECHANICAL TECHNOLOGY LAB 1 | DMM2513  
SOLID MECHANICS | |
|      | DMM1423  
ELECTRICAL AND ELECTRONIC TECHNOLOGY | DMM2523  
DYNAMICS | |
|      | DMM1512  
COMPUTER AIDED DESIGN | DMM2543  
THERMODYNAMICS | |
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ENGINEERING MATERIALS | DMM2931  
MECHANICAL TECHNOLOGY LAB 3 | |
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OCCUPATIONAL SAFETY & HEALTH | |
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MECHANICAL TECHNOLOGY LAB 2 | DMM2533  
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HYDRAULICS & PNEUMATICS TECHNOLOGY |
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CNC TECHNOLOGY |
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FINAL YEAR PROJECT |
|      | | | DMM2941  
MECHANICAL TECH LAB 4 |
| 63  | 16  | 35  | 12  |

**University Courses:**
- FOUNDATION ENGLISH, SOFT SKILLS 1, BRIGED SISWA (SEMESTER 0)
- ENGLISH FOR ACADEMIC SKILLS, ISLAMIC & ASIAN CIVILIZATIONS I, BASIC MATHEMATICS, PHYSICS, GENERAL CHEMISTRY, ENGLISH FOR OCCUPATIONAL COMMUNICATION, HUBUNGAN ETNIK, SOFT SKILLS 2, CALCULUS, ASASPEMBUDAYAAN KEUSAHAWANAN, STATISTICS & PROBABILITY

**Total Unit for Graduation:** 93

**# Elective Courses**
CURRICULUM STRUCTURE FOR 
DIPLOMA OF MECHANICAL 
ENGINEERING 2014/2015

DMM1312 Computer Programming  
Credit Hour: 2  
Prerequisite: None

Synopsis
This course formally introduces the concept of computers, algorithms, pseudo code, problem solving, and programming languages. The programming language introduced in this course is C.

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

- CO1: Interpret the computers and computing fundamentals.
- CO2: Utilize C programmes structure, printing and comments and construct C programmes with the desired input/output.
- CO3: Construct C programmes with most suitable variables to perform correct arithmetic operations and math functions.
- CO4: Construct C programmes with control structure and looping.
- CO5: Construct C programmes with functions and numeric arrays.

References

DMM1412 Engineering Drawing  
Credit Hour: 2  
Prerequisite: None

Synopsis
This course exposes and implements the core engineering drawing knowledge to students. Students will learn the standard engineering drawing and its rules. This course is critical to students before they are exposed to Computer Aided Engineering, CAD course, DMM 1512 in the following semester.

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

- CO1: Understand and interpret symbols of engineering drawing as a communicating language.
- CO2: Draw basic shapes and tangencies and simple First/Third angle Projection.
- CO3: Draw and interpret auxiliary view, isometric views and tolerance.
- CO4: Draw and interpret simple assembled and section views in Third/First angle projection.

References
DMM1423 Electrical & Electronic Technology  
**Credit Hour:** 3  
**Prerequisite:** None  

**Synopsis**  
This course introduces the fundamental of electric circuit, circuit network analysis, inductance and capacitance. The electronics technology involved with basic understanding of usage and application of semiconductors devices: diodes, transistor, and digital logic circuits.

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

CO1: Interpret electric series and parallel circuits.  
CO2: Apply Ohm’s Law and Kirchoff’s Law to calculate current, voltage, resistance and power.  
CO3: Calculate equivalent capacitance or inductance connected either in series or in parallel.  
CO4: Describe and analyze the fundamental operation of semiconductor diodes performance.  
CO5: Solve the digital electronics circuits, Boolean Algebra and design of logic circuits.

**References**  

DMM1512 Computer Aided Design  
**Credit Hour:** 2  
**Prerequisite:** None  

**Synopsis**  
This subject is designed to teach engineering drawing to the students using Computer Aided Design Drawing (CAD) software. This will include from beginning to intermediate levels of CAD. Students should be able to draw 2D as well as 3D drawing standard upon completion of this course.

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

CO1: Explain basic knowledge in engineering drawing principles and standard practice using CAD fundamentals.  
CO2: Apply knowledge and techniques to create standardised CAD related to engineering product design by using CAD software.  
CO3: Define and differentiate the different functions and interfaces of other CAD software.  
CO4: Able to use CAD software to produce a technical drawing of 2D and 3D components on project based.

**References**  
2. James A Leach Autocad 2009 Instructor, McGraw Hill  
5. Dix, M & Riley Discovering AutoCAD Prentice Hall
6. Cook, T ABC's of Mechanical Drafting Prentice Hall

DMM1523 Engineering Materials
Credit Hour: 3
Prerequisite: None

Synopsis
This course introduce students to the fundamentals of engineering materials which include application, atomic bonding, crystals structure, mechanical and physical properties, corrosion and degradation mechanism, microstructure analysis, phase diagram, ferrous and non-ferrous alloys, polymer and advanced materials and issues in economic, environmental, societal of materials engineering.

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

CO1: Explain the classification of engineering materials and describe its applications.
CO2: Analyse and evaluate the mechanical, physical and chemical properties engineering materials.
CO3: Analyse and explain metal alloys microstructure, phase diagram and heat treatment processes.
CO4: Analyse and explain ferrous and non-ferrous alloys microstructure, strengthening mechanism and its applications.
CO5: Analyse and define the polymeric materials and advanced materials classification.

References

DMM1532 Statics
Credit Hour: 2
Prerequisite: DUF 1113

Synopsis
This course introduces students to mechanics, force vector, equilibrium of particles, force system resultants, equilibrium of rigid body, structural analysis, friction, centroids and centre of gravity and moment of inertia.

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

CO1: Solve force vector operation and resultant systems problem by using SI units and applying the Newton's Law of Motion.
CO2: Solve equilibrium of particle and rigid body problems.
CO3: Solve structural analysis problems.
CO4: Solve friction problems.
CO5: Solve centroid and centre of gravity problems.
References

3. Yusof Ahmad, Mekanik Statik, Penerbit UTM, 1999

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.

Course Outcomes

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

CO1: Recognize unsafe conditions and practices in a workshop.
CO2: Practice the basic fundamentals of the use of basic measuring instruments, read and interpret blue prints.
CO3: Identify and use common hand tools.
CO4: Make correct selection and use of saws, drill and pedestal grinder.
CO5: Safely perform the various basic turning operations.

References


DMM 1921 Mechanical Technology Laboratory 2
Credit Hour: 1
Prerequisite: DMM1911

Mechanical Technology Laboratory 1

Synopsis

The course provides workshop practice, giving students hands-on experience of some of milling operations and surface & cylindrical grinding operations.

Course Outcomes

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

CO1: Safely perform various basic milling operations.
CO2: Safely perform the surface grinding process.

References


DMM2412 Metrology
Credit Hour: 2
Prerequisite: None

Synopsis
This course covers the engineering measuring instruments such as micrometer, Vernier calliper, mechanical dial indicator, gauge block, surface plate, instruments for testing angle and gauges as well as principles of surface metrology and roundness measurement. The relationship of drawing dimensions to the measurement of parts, precision, accuracy and measurement errors are also discussed.

**Course Outcomes**

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

- **CO1:** Explain the fundamental of inspections and procedures by utilizing various methods and techniques.
- **CO2:** Identify measurement errors and platform preventive or corrective actions.
- **CO3:** Demonstrate and inspection of linear and angular measurements using various measurement instrument.
- **CO4:** Describe and identify the principles of surface metrology and calculate surface roughness by various methods.
- **CO5:** Describe and identify the principles of roundness measurement by using various methods.

**References**


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**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, analysis and design of beam for bending as well as deflection of beam.

**Course Outcomes**

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

- **CO1:** Solve the simple stress problems in load-bearing structures.
- **CO2:** Solve the stresses and strains in structural members subjected to axial loads.
- **CO3:** Solve the circular shafts subjected to twisting couples or torques.
- **CO4:** Solve the stresses and strains in prismatic members subjected to pure bending and transverse loading by using shear force and bending moment diagram.
- **CO5:** Solve beam deflection problems.

**References**


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**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, kinetics of particles
utilizing impulse and momentum principles, planar kinematics of rigid bodies and planar kinetics of rigid bodies utilizing force and acceleration principles.

**Course Outcomes**

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

**CO1:** Solve kinematics of particle problems.

**CO2:** Solve kinetics of particles problems utilizing force-acceleration and work-energy principles.

**CO3:** Solve kinetics of particles problems utilizing impulse and momentum principles.

**CO4:** Solve planar kinematics of rigid-body problems.

**CO5:** Solve planar kinetics of rigid body problems utilizing force and acceleration principles.

**References**


**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 Outcomes**

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

**CO1:** Apply the basic concepts and terminology of fluid mechanics.

**CO2:** Apply tables of property data for fluids properties of pure substances.

**CO3:** Apply concepts of fluid in motion.

**CO4:** Solve the problems involving analysis of flow measurement and fluid friction.

**CO5:** Understand the concept of flow, work and pump to the typical problems.

**References**


**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 Outcomes**

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

**CO1:** Apply the basic concepts of thermodynamics and properties of pure substances.

**CO2:** Apply the concept of heat, work and mass to typical problems.

**CO3:** Solve the problems involving first law & second law analysis of thermodynamics systems.

**CO4:** Solve the entropy changes problems for pure substances and ideal gas.

**References**

DMM2632 Industrial Design
Credit Hour: 2
Prerequisite: None

Synopsis
This course introduces students on how to formulate product design development problem for simple mechanical components and systems through lectures and design projects. A large portion of this class lectures will be devoted into class projects and product fabrication job.

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

CO1: Define the term of Industrial Design and express the importance of Industrial Design.
CO2: Describe the steps of identifying customer needs.
CO3: Define and construct product design specifications.
CO4: Identify and practice concept generation and concept selection process.

References

DMM2633 Manufacturing Technology
Credit Hour: 3
Prerequisite: None

Synopsis
This course provides basic principles in machine tools, forming and shaping, joining and metal-casting processes, and non-traditional manufacturing processes used in manufacturing.

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

CO1: Explain the definition and importance of manufacturing.
CO2: Identify and compare different types of machining processes and machine tools in manufacturing.
CO3: Distinguish of various kinds of forming and shaping processes and equipment.
CO4: Explain about joining and metal-casting processes and equipment.

References
DMM2931 Mechanical Technology
Laboratory 3
Credit Hour: 1
Prerequisite: None

Synopsis
To introduce and involve hands-on activities, putting knowledge and understanding into practice. The students should be able to carry out the basic knowledge of welding by several of welding operations using welding equipment and using electrode, MIG, TIG and spot weld. This course also introduces student’s basic application of sheet metal fabrication.

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

CO1: Differentiate several types of welding procedures and methods.
CO2: Safely perform various welding operations using welding equipment.
CO3: Differentiate several types of metal fabrication procedures and methods.
CO4: Safely perform various metal fabrications.

References

DMM2941 Mechanical Technology
Laboratory 4
Credit Hour: 2
Prerequisite: None

Synopsis
This course introduces students to apply safe working conditions, identify common materials to use in fabrication work, draw and reading technical drawings, identification, care and use basic measuring instruments, layout methods and basic hand tools. Emphasis is placed on operation of machining equipment such as drill press, lathe, milling and surface grinding. The students should also be able to carry out the knowledge of welding process and method by several welding operations using welding equipment and using electrodes, MIG, TIG and spot weld, and finally a fabrication process.

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

CO1: Apply technique to use machining equipment.
CO2: Apply technique writing technical report.
CO3: Apply the materials handling equipment concept and the principles of material handling.
CO4: Apply technique to use welding equipment.
CO5: Apply all knowledge to safely perform a various process for fabrication work.

References

**DMM3623 Hydraulics & Pneumatics Technology**

**Credit Hour:** 3  
**Prerequisite:** None

**Synopsis**

This course provides the necessary information of hydraulics and pneumatics for automation application purposes. It will cover all information of hydraulics and pneumatics such as, pump, cylinders, fluid control valves and hydraulics and pneumatics circuit.

**Course Outcomes**

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

- CO1: Design hydraulics and pneumatics circuits.
- CO2: Design electro hydraulics and electro-pneumatics circuit.
- CO3: Design and simulate pneumatic/hydraulic system using PLC (Programmable Logic Controller).

**References**


**DMM3663 CNC Technology**

**Credit Hour:** 3  
**Prerequisite:** None

**Synopsis**

This course is a study of the CNC machining technology which focuses on the understanding and application of CNC profile and 2-D contouring. A proper selection of jig needs to be considered so as not to overlap with the profile and 2-D contouring. The profile is then simulated using CNC simulator, and finally, a CNC project is developed from the simulation.

**Course Outcomes**

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

- CO1: Explain basic CNC machine system.
- CO2: Develop CNC programme manually.
- CO3: Understand process planning for machining process.
- CO4: Present the completed product of the machining process.

**References**


**DMM3673 Mechanical Design**

**Credit Hour:** 3  
**Prerequisite:** None

**Synopsis**

This course introduces simple design processes of machine components for static and dynamic loading. Machine elements design includes screws, bolts, fasteners, welded joints, springs and shafts, as well as keys.
Course Outcomes

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

CO1: Understand the fundamentals of machine design and apply knowledge of mechanical elements for non-permanent joint including screws, bolts and fasteners.

CO2: Understand and apply knowledge of welding and permanent joints.

CO3: Understand and apply knowledge of mechanical springs.

CO4: Understand and apply knowledge of shafts, keys and coupling.

References


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, and preparation and presentation of the project report.

Course Outcomes

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

CO1: Plan the project development flow based on proper methods.

CO2: Establish techniques for literature review and independently perform the ability to gather information.

CO3: Utilise technical knowledge to finish the project and solve the problems.

CO4: Communicate effectively during project presentations and build up specific for report writing.

References

Prerequisite: Pass all core subjects with the status “Kedudukan Baik (KB)” on current evaluation.

Synopsis

This training exposes students to professional skills and experience in aspects related to mechanical engineering practices. The exposure will help to shape and produce future technical assistants of high responsibility, positive attitude, and able to face all challenges in their career development.

Course Outcomes

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

CO1: Practice basic professional engineering skills at industry level.

CO2: Practice and relate the theory that had been learned during the involvement of real problems solving such as planning design, construction and management of the projects.

CO3: Identify and solve practical problems that exist.

CO4: Identify the company or organizational structure and recognize the job scope of specific positions in the organization.

CO5: Build up interpersonal skills and professional ethics to become excellent, motivated and responsible to the Creator.

References

1. Buku Panduan Latihan Industri, Jawatankuasa Latihan Industri Fakulti, UMP.

DMM3993 Industrial Training Report

Credit Hour: 3

Prerequisite: Pass all core subjects with the status “Kedudukan Baik (KB)” on current evaluation.

Synopsis

Following the Industrial Training, this course trains the final year students to write professional reports related to the experience and exposure gathered during the Industrial Training.

Course Outcomes

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

CO1: Practice basic professional engineering skills at industry level.

CO2: Practice and relate the theory that had been learned during the involvement of real problems solving such as planning, design, construction and management of the projects.

CO3: Identify and solve practical problems that exist.

CO4: Identify the company or organizational structure and recognize the job scope of specific positions in the organization.

CO5: Build up interpersonal skills and professional ethics to be excellent, motivated and responsible to the Creator.

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INTRODUCTION

The Faculty of Industrial Sciences & Technology, Universiti Malaysia Pahang was established in May 2008 with the initial offering of the Bachelor of Applied Sciences (Hons) Industrial Chemistry during the 2008/2009 Academic Session, followed by the Bachelor of Applied Sciences (Hons) Industrial Biotechnology during the 2009/2010 Session. The latest program addition is the Bachelor of Applied Sciences (Hons) Material Technology with the first intake of students during Semester 1 of the 2012/2013 Session.

The main objective of the Faculty is to address the need for increased manpower requirements in Science and Technology. It also aligns efforts to increase knowledgeable and competent human capital especially Research Scientists and Engineers (RSE) as well as technical support for petrochemical, oleo-chemical, bioresources, and material technology based industries.

The Faculty staff is headed by a Dean. The Dean is assisted by Deputy Deans, Heads of Programmes and Assistant Registrar.

PROGRAMMES OFFERED

For the 2014/2015 intake three programmes are offered as follows:

- Bachelor of Applied Science (Honours) - Industrial Chemistry
- Bachelor of Applied Science (Honours) - Industrial Biotechnology
- Bachelor of Applied Science (Honours) – Material Technology

LABORATORY FACILITIES

Teaching and research laboratory facilities of the Faculty of Industrial Sciences & Technology are designed to meet current teaching and learning, research and industrial requirements. It is also designed to meet current safety guidelines and standards. Laboratories at the faculty comprise of disciplines in industrial chemistry, biotechnology and advanced material technology. These laboratories include:

- Organic Chemistry laboratory
- Inorganic Chemistry laboratory
- Analytical Chemistry laboratory
- Physical Chemistry laboratory
- Unit Operation laboratory
- Physics laboratory
- Bioinformatics laboratory
- Biochemistry laboratory
- Molecular Biology laboratory
- Plant Technology laboratory
- Mamalian Technology laboratory
- Bioprocess laboratory
- Biotechnology Postgraduate laboratory
- Chemistry Postgraduate laboratory
- Microbiology laboratory
- Enzyme Technology and Fermentation laboratory
- Biomaterial & Biosensor laboratory
- Centrifuge Room
- Instrumentation Room
- Computer laboratory
- Lecture Theatre
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SYNOPSIS & PROGRAMME OBJECTIVES

Bachelor of Applied Science (Honours) – Industrial Chemistry

The objectives of the Bachelor of Applied Science (Honours) – Industrial Chemistry, are to produce graduates with :-

- competency in industrial chemistry and innovative applications,
- high level of professionalism, responsive towards commercial and social issues and,
- competency in analysis, research and development in science, technology and innovation.

PROGRAMME OUTCOMES (PO)

Bachelor of Applied Science (Honours) - Industrial Chemistry

Programme outcomes are specific statements regarding a graduate’s knowledge, skills and attitudes that describe what students are expected to know and be able to perform or attain at graduation time. Consistent with world-class applied science programmes, the POs for graduates are as follows:

PO1 Possess knowledge and understanding of chemical sciences.

PO2 Ability to design, conduct experiments as well as to analyze and interpret data in relation to laboratory and research works.

PO3 Possess problem solving skills thru creative and innovative solutions.

PO4 Ability to communicate effectively in verbal and written forms.

PO5 Ability to work responsibly as a team.

PO6 Ability to undertake life-long learning and strive for continuous knowledge and professional development.

PO7 Possess business acumen and entrepreneurship.

PO8 Possess professional and ethical responsibility, and their obligation to the society.

PO9 Possess effective leadership quality with good interpersonal skills.

Programme outcomes are specific statements regarding a graduate’s knowledge, skills and attitudes that describe what students are expected to know and be able to perform or attain at graduation time. Consistent with world-class biotechnology programme, the POs for graduates are as follows:

PO1 Acquire and apply knowledge relevant to biotechnology.

PO2 Operate and maintain a range of biotechnology instruments.

PO3 Analyse, synthesize, integrate knowledge and information to provide solutions in addressing challenges and concerns, appropriate to biotechnology.

PO4 Conduct basic guided research.

PO5 Communicate ideas scientifically in verbal and written forms, with communities.

PO6 Deliver responsibilities and demonstrate good interpersonal skills in a team.

PO7 Manage information and engage in life-long learning.

PO8 Manage laboratory and industrial occupational safety and quality.

PO9 Explore business opportunity pertaining to the field of industrial biotechnology.

PO10 Demonstrate understanding and awareness of basic commercial, ethical, legal and social issues related to biotechnology.

PO11 Lead and work efficiently in a multidisciplinary project team.
PO2 Operate and maintain a range of biotechnology instruments.

PO3 Analyse, synthesise, integrate knowledge and information to provide solutions in addressing challenges and concerns, appropriate to biotechnology.

PO4 Conduct basic guided research.

PO5 Communicate ideas scientifically, in verbal and written forms, with communities.

PO6 Deliver responsibilities and demonstrate good interpersonal skills in a team.

PO7 Manage information and engage in life-long learning.

PO8 Manage laboratory and industrial occupational safety and quality.

PO9 Explore business opportunity pertaining to the field of industrial biotechnology.

PO10 Demonstrate understanding and awareness of basic commercial, ethical, legal and social issues related to biotechnology.

PO11 Lead and work efficiently in a multidisciplinary project team.

SYNOPSIS & PROGRAMME OBJECTIVES

Bachelor of Applied Science (Honours) – Material Technology

The objective of the Bachelor of Applied Science (Honours) – Material Technology, is to produce a graduate who has mastered the required expertise in advanced material industries as follow:

- Expertise needed in science and material technology industry.
- Possess high level of professionalism, leadership, responsibility and adaptation in high society.
- Competent in analysis, research and development in science and technology.

The basic concepts of technopreneurship and soft skills are embedded into the curriculum to develop the graduate’s acumen towards entrepreneurship, generic and communicative skills.

PROGRAMME OUTCOMES (PO)

Bachelor of Applied Science (Honours) – Material Technology

Programme outcomes are specific statements regarding a graduate’s knowledge, skills and attitudes that describe what students are expected to know and be able to perform or attain at graduation time. Consistent with world-class applied science programmes, the POs for graduates are as follows:

PO1: Possess comprehensive knowledge and theory of science and material technology in synthesis and characterization of materials.
PO2: Possess technical skills in guided experiments comprises the synthesis and characterization in material science and technology.

PO3: Able to identify problems and formulate creative and innovative solutions that comply with principles of material science & technology.

PO4: Able to communicate well through the medium neither written and oral by project presentation sessions, laboratory reports, project proposals, industrial visits and final year project using the latest ICT technology.

PO5: Able to work as a team in the laboratory work, research and coursework.

PO6: Adopts the theory, scientific problem-solving skills and technical skills in daily lives and jobs and able to further study at a higher level.

PO7: Conduct science and material technology research based on entrepreneurship elements.

PO8: Demonstrate ethical and professional characteristic in appearance, attitude and project management in daily work.

PO9: Demonstrate leadership characteristics such as participate, taking the role and lead the projects that involve all levels and backgrounds of the members group.
### CURRICULUM STRUCTURE

**BACHELOR OF APPLIED SCIENCE (HONOURS)**

**INDUSTRIAL CHEMISTRY 2013/2014**

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**University Required Courses:**
- Fundamental Of English Language
- English For Academic Communication
- Islamic & Asian Civilization
- Co-Curriculum I
- Technical Writing
- Co-Curriculum II
- English For Technical Academic
- English For Professional Communication
- Soft Skills I
- Ethnic Relationship
- Elective Social Sciences
- Foreign Language I
- Entrepreneurship
- Foreign Language II
- Soft Skills II

Total Unit For Graduation: 124
Elective subject to be offer in Bachelor of Applied Science (Honours) – Industrial Chemistry

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Bachelor of Applied Science (Hons) – Industrial Chemistry

FACULTY & PROGRAMME COURSES WITH PRE-REQUISITE
## SYNOPSIS OF FACULTY COURSE

### BUM241
**APPLIED STATISTICS**
- **Credit:** 3 credits
- **Pre-requisite:** 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 outcomes**
- **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.

**References**

### BUM212
**APPLIED CALCULUS**
- **Credit:** 3 credits
- **Pre-requisite:** 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 intergal evaluation; interpolation, extrapolation, errors.

**Course Outcomes**
- **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.

**References**
BSF1212  
LABORATORY SAFETY MANAGEMENT  
Credit : 2 credits  
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 Outcomes  
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.  

References  

BSF2222  
LABORATORY QUALITY MANAGEMENT  
Credit : 2 credits  
Pre-requisite : None  

Synopsis  

Course Outcomes  
CO1 Explain the OECD GLP Principles and the ISO 17025 requirements to Laboratory Quality Management.  
CO2 Follow Good Laboratory Practice Recognition from ISO 17025 Certification.  
CO3 Explain thoroughly and practise the quality infrastructure that supports customer requirements for testing laboratories.  
CO4 Read appropriate reference materials of GLP Principles and ISO 17025.  

References  


BSF3242
**METHOD VALIDATION & VERIFICATION**

**Credit :** 2 credits

**Pre-requisite :** None

**Synopsis**

This course serves as a generic introduction to testing and calibration. We will discuss the rationale behind testing and calibration, and the factors that affect the need to test and calibrate measurement equipments. One should always make sure that the data produced by the measurement equipment is reliable and accurate. Naturally the equipment must be fit for the purpose and used in such appropriate and suitable courses. The course is part of a series of faculty of industrial sciences and technology compulsory courses. It will concentrate upon calibration and testing of measurement equipments as an operation that relates an output quantity to an input quantity for measuring system under given conditions. Discussion on the relationships among metrology, calibration, and quality systems will be emphasized. Fundamentals of single component calibration and multispecies calibration as well as practical aspects of calibration will be presented. Finally, a brief introduction to uncertainty and methods validation will also be discussed.

**Course Outcomes**

CO1  Describe the technical and philosophical aspects of validation in testing.

CO2  Trace possible source of uncertainties in testing.

CO3  Clearly present specific validation method suitable to a particular testing condition or research step.

References


BSF2232
**QA & QC FOR TESTING LABORATORY**

**Credit :** 3 credits

**Pre-requisite :** None

**Synopsis**

This course focuses on the design and management of quality of 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 principles. Part two focuses on the management system, which is concerned with planning to meet customer needs, arranging to meet those needs through leadership and strategic planning, and accomplishing goals through the action of people and work processes.
Course Outcomes

CO1 Describe principle and basic methodologies of quality management system related to testing lab.

CO2 Distinguish philosophies of quality and apply it in a management system

CO3 Explain quality effectively in written and oral form through group discussion and presentation

CO4 State a clear conclusion or suggestion based on the quality management system to meet customers’ needs.

References


SYNOPSIS OF PROGRAMME COURSES

BSK1103 ORGANIC CHEMISTRY I
Credit : 3 credits
Pre-requisite : None

Synopsis

This course discusses the fundamental theory of properties, synthesis and organic reactions where use the functional group as framework as a basis for second level courses with an organic chemical content. This course focuses on the key concepts of organic chemistry through a study of the reactions of selected nonfunctional aliphatic, alicyclic, cyclic and aromatic molecules. Particular emphasis is placed on the underlying mechanistic pathways that are involved and their stereochemical consequences. The stereochemistry of the molecular structure is also considered. The development of key skills is facilitated by a program of tutorials and practical.

Course Outcomes

CO1 Explain the bonding properties of carbon which cause it to be present in such a large number and variety of important compounds and the common types of reaction mechanism and modern synthetic techniques and point out the relationship between structure with physical

CO2 Show the ability to communicate the types of functional in organic chemistry orally during the presentation

CO3 Select appropriate reference materials for organic chemistry methods

CO4 Identify and differentiate the types of organic structure based on their functional groups and describe the reaction invovles

References


BSK1402 ORGANIC CHEMISTRY LABORATORY
Credit : 2 credits
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. The students also are exposed in writing a laboratory safety manual.

**Course Outcomes**

CO1 Apply the knowledge of organic chemistry to solve the problem given based on experiments
CO2 Communicate by explain the questions given based on experiments
CO3 Report and discuss the data and information of the experiment

**References**

1. Silbey, R.J., AA, and Bawendi, M.G. Physical Chemistry. John Wiley & Son

**BSK1133**

**PHYSICAL CHEMISTRY**

**Credit : 3 credits**

**Pre-requisite : 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 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 practices.

**Course Outcomes**

CO1 Understand principles in physical chemistry
CO2 Respond to a given problem based on physical chemistry
CO3 Select appropriate reference materials for physical chemistry

**References**


**BSK1412**

**PHYSICAL CHEMISTRY LABORATORY**

**Credit: 2 credits**

**Pre-requisite: None**

**Synopsis**

Practical comprises laboratory experiments related to physical chemistry. Students will be exposed to chemical equilibrium, thermochemistry, calorimetry, electrochemistry and kinetic theory of gases and various experiments related to physical chemistry concepts.

**Course Outcomes**

CO1 Show appropriate experimental technique in physical chemistry laboratory
CO2 Identify principles in physical chemistry laboratory
CO3 Write scientific report with relevant reference materials

**References**

BSK1143
INORGANIC CHEMISTRY I
Credit: 2 credits
Pre-requisite: None

Synopsis
The aim of this subject is to provide a comprehensive and contemporary introduction to the diverse and fascinating discipline of inorganic chemistry. Inorganic chemistry deals with the properties of all the elements in the periodic table. These elements range from highly reactive metals to noble metals, such as gold. The nonmetals include solids, liquids and gases. Although this variety and diversity are intrinsic features of inorganic chemistry, there are underlying patterns and trends which enrich and enhance our knowledge of the discipline. The objective is to provide an insight into these ordering principles, and a foundation on which to build understanding.

Course Outcomes
CO1 Explain principles in inorganic chemistry.
CO2 Respond to a given problem based on inorganic chemistry.
CO3 Show the ability to communicate inorganic chemistry orally.
CO4 Select appropriate reference materials for inorganic chemistry.

References

BSK1422
INORGANIC CHEMISTRY LABORATORY
Credit: 2 credits
Pre-requisite: None

Synopsis
This course provides the students a clear idea of the reactivity of the elements in different groups from IA to VIIA in periodic table.

Course Outcomes
CO1 Relate the principles and knowledge of inorganic chemistry to solve the problem given based on experiments
CO2 Show appropriate experimental technique in a team work.
CO3 Write scientific report with relevant reference materials

References
1. Silbey, R.J.,AA, and Bawendi, M.G. Physical Chemistry. John Wiley & Son

BSK1153
ANALYTICAL CHEMISTRY
Credit: 3 credits
Pre-requisite: None

Synopsis
The objective of this course is to provide students with a basic understanding of analytical chemistry, 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 equilibriums 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 discussed.

Course Outcomes

CO1 Explain principles in analytical chemistry
CO2 Respond to a given problem based on analytical chemistry
CO3 Select appropriate reference materials for analytical chemistry analysis

References


BSK1432
ANALYTICAL CHEMISTRY LABORATORY
Credit: 2 credits
Pre-requisite: 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 equilibriums 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 Outcomes

CO1 Show appropriate experimental technique in analytical chemistry laboratory
CO2 Identify principles in analytical chemistry laboratory
CO3 Write scientific report with relevant reference materials

References


BSK2143
INSTRUMENTATION METHOD
Credit: 3 credits
Pre-requisite: 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, AES, MS, UV/VIS, FTIR, X-RAY, and NMR) and deals with the methods of electroanalytical chemistry and radiochemical.
Course Outcomes

CO1 Apply analytical chemistry knowledge in modern instrumentation techniques.

CO2 React to a given problem based on contemporary instrumentation techniques.

CO3 Show the ability the communicate instrumentation techniques orally.

CO4 Select appropriate reference materials for instrumentation methods.

References


BSK2442

INSTRUMENTATION METHOD
LABORATORY
Credit: 2 credits
Pre-requisite: None

Synopsis

Students will conduct experiments involving techniques, methods, investigations and data collection using instruments such as UV/VIS spectrophotometer, gas chromatography (GC), gas chromatography mass spectrometry (GC-MS), ion chromatography (IC), atomic absorption spectrometry (AAS), fourier transform infrared spectroscopy (FTIR) and electroanalytical method. Emphasis is on analyses of samples as conducted in industrial laboratories.

Course Outcomes

CO1 Show appropriate experimental technique in instrumentation method.

CO2 Identify principles in instrumentation laboratory.

CO3 Show the ability the communicate instrumentation techniques orally.

CO4 Write scientific report with relevant reference materials.

References


BSK2133

SEPARATION TECHNIQUE
Credit: 3 credits
Pre-requisite: 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. The development of key skills is facilitated by a program of tutorials and practices.
Course Outcomes

CO1 Analyze separation process based on optimal area of application, performance and limitation of techniques in separation.
CO2 Respond to a given problem based on separation techniques.
CO3 Comply to the obligation for green chemistry and other measures that support energy-saving and environmental conservation.
CO4 Propose solution for problem in separation technique based on the latest innovation.

References


BSK2123
MATERIAL CHEMISTRY
Credit: 3 credits
Pre-requisite: None

Synopsis

This course exposes students to inorganic, organic materials and recent development in nanomaterials. Composite materials consisting of reinforced polymer with conventional fillers and nanomaterials will be discussed. The type of reinforcements, the types of matrices as well as others constituent are discussed in details. Emphasis will be placed on types, characteristics, processing and applications of the various types of materials. The course will explain the properties of materials i.e. mechanical, electrical, magnetic, thermal and optical properties.

Course Outcomes

CO1 Apply fundamental chemistry knowledge in material chemistry technology.
CO2 Explain solution for a given problem based on knowledge in physical properties of the materials.
CO3 Show the ability the communicate instrumentation techniques orally.
CO4 Select appropriate reference materials for material chemistry

References


BSK2452
MATERIAL CHEMISTRY LABORATORY
Credit: 2 credits
Pre-requisite: 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 syntheses, determination of
their properties and characterizations of some important materials discussed in the Materials Industry course.

Course Outcomes

CO1 Explain the relationship between the raw material properties, the processing and the physical properties of materials.

CO2 Explain the mechanical, electrical, magnetic, thermal and optical properties of materials and their composites as well as the influence of fillers on these properties.

CO3 Write scientific report with relevant reference materials

References


BSK3103
ORGANIC SPECTROSCOPY
Credit: 3 credits
Pre-requisite: None

Synopsis

This course deals with the four major instrumental methods such as ultraviolet/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 Outcomes

CO1 Apply concepts in electromagnetic radiation interaction in organic chemistry
CO2 Explain organic functional groups determination with the aid of spectroscopy instrumentation
CO3 Show understanding in spectroscopy knowledge in written and verbal form
CO4 Discuss spectroscopy knowledge with the updated technology and references

References


BSK3462
ORGANIC SPECTROSCOPY Laboratory
Credit: 2 credits
Pre-requisite: 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 Outcomes

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 effectively in verbal form.

CO4 Write scientific report with relevant reference materials.

References


BSK2183 THERMODYNAMICS
Credit: 3 credits
Pre-requisite: 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 Outcomes

CO1 Interpret thermodynamics concepts in terms of laws and processes.

CO2 React to the thermodynamic problems by applying thermodynamic equations.

CO3 Explain the thermodynamic principles effectively in written form.

CO4 Form working knowledge on the relationship between the law of thermodynamic principles and its applications.

References


BSK3163 INORGANIC CHEMISTRY PROCESS
Credit: 3 credits
Pre-requisite: BSK1123

Synopsis

This course is a continuation from the courses Inorganic Chemistry I and Inorganic Chemistry II and presents modern inorganic chemical processes in the context of society and market demands versus technology offers within the framework of trade lobalization and competition.

Course Outcomes

CO1 Apply and relate the inorganic chemical process industrial to the organizing scales and complexity levels.
CO2: Respond and discuss technology developments related to the inorganic chemical process.

CO3: Select appropriate reference materials for advances in industrial chemistry and the chemical processes involved.

CO4: Explain effectively in written and oral form through group discussion.

References


BSK3153

ORGANIC CHEMISTRY PROCESS

Credit: 3 credits

Pre-requisite: None

Synopsis

The course covers the basic principles of various organic chemicals manufacturing processes, hazards and safety in organic chemical manufacturing, the principles of catalysis and awareness of this particular process to the environment. Emphasis on manufacturing of C1 chemicals, olefins, synthesis involving carbon monoxide, oxidation products of ethylene, alcohols, vinyl compounds, polyamides, propene conversion products, aromatics and derivatives, and biofuels are covered in this course. The development of key skills is facilitated by a programme of tutorials and practical.

Course Outcomes

CO1: Recognize the nature and function of organic chemical industry and the primary products

CO2: Respond to a given problem based on organic chemistry process

CO3: Show the ability to communicate organic chemistry process orally

CO4: Select appropriate reference materials for organic chemistry process

References


BSK3143

UNIT OPERATION

Credit: 3 credits

Pre-requisite: None

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 Outcomes

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

References

BSK3472
UNIT OPERATION LABORATORY
Credit: 2 credits
Pre-requisite: 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 Outcomes
CO1  Follow good laboratory skill in an open laboratory concept and relate into several industrial processes.
CO2  Apply theory in project scale-up of bench-scale laboratory into pilot scale environment

CO3  Demonstrate effective communication in written (lab reports) with compile experimentally generated data into concise, clearly written laboratory reports, present the reports within the timeline and also communication through team work.

References

BSK3302
FINAL YEAR PROJECT I
Credit: 2 credits
Pre-requisite: None

Synopsis
Students will conduct continuous scientific research activity in a chosen topic under the guidance of a lecturer. Students will be guided and trained on literature review, 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 the semester, each student will be required to write a satisfactory research progress report. Evaluation will be based on written progress report, research work, literature review and oral presentation.

Course Outcomes
CO1  Originate problem statement, objective and scope of the research 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.

References
1. Technical Papers & Publications.

BSK4314
FINAL YEAR PROJECT II
Credit: 4 credits
Pre-requisite: None

Synopsis
This course is intended as the second part of Final Year Project I (BSK3302). 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.

References
CO1 Summarize the project finding based on data collection, data interpretation and supported by literature reviews.
CO2 Organize experimental procedure and data collection method for the project objectives.
CO3 Display novel ideas in completing research project.
CO4 Organize presentation in professional way and respond to suggestions and critics.
CO5 Defend about the fulfillment of the project objectives and recommend for further works.

References
1. Technical Papers & Publications

BSK4608
INDUSTRIAL TRAINING
Credit: 8 credits
Pre-requisite: All faculty and programme courses

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 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
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.

References
BSK4614
INDUSTRIAL TRAINING REPORT
Credit: 4 credits
Pre-requisite: 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 Outcomes
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 Practise the related approach to get relevant information from various sources
CO4 Demonstrate good attitude in fulfilling the requirement of Industrial Training Unit

References

SYNOPSIS OF ELECTIVE COURSES

BSK3513
PETROCHEMISTRY
Credit: 3 credits
Pre-requisite: None

Synopsis
This course covers topics on petrochemical processes such as refinery and production of methane, ethane-ethylene, propane-propylene, butane-butene, other aromatic hydrocarbon and downstream processes to produce elastomers, fine chemicals other petro-based products.

Course Outcomes
CO1 Apply fundamental chemistry knowledge in petroleum and petrochemical processes
CO2 Explain the relationship between the properties of precursor and product in chemical transformations of petroleum and petrochemical products
CO3 Show ability to communicate effectively in written and oral form through assignment presentation session
CO4 Recognize latest petrochemical technology as a strategy in sustainable development

References
BSK3523
OLEOCHEMISTRY
Credit: 3 credits
Pre-requisite: None

Synopsis
Oleochemistry is the chemistry of oils and fats. The sources of oils and fats can be vegetable or animal. Although oils and fats from these sources have been exploited in the past, the availability of fossil fuel in particular throughout the last century has all but relegated oils and fats of non-fossil origin to mainly the food industries. 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. As such oleochemical technology research and development have entered a new dimension and is an important component of Green Technology. In this course, recent trends in industrial development of oleochemical technology will be discussed.

Course Outcomes
CO1 Examine underlying physico-chemical principles behind oleochemicals and the global impact
CO2 Recognize oleochemical technology as a strategy in sustainable development
CO3 Communicate effectively in written and oral form through group discussion (assignment), tutorial and presentation session.

References
4. Malaysian Oil Scientists’ and Technologists’ Association (MOSTA).
5. Salmiah Ahmad and Ooi Tian Lye. Oleokimia dalam Sains dan Teknologi. Persatuan Ahli-ahli Sains Malaysia (Publisher).

BSK3533
POLYMER CHEMISTRY
Credit: 3 credits
Pre-requisite: None

Synopsis
The course discusses the fundamental principles of polymer chemistry. The discussion covers the determination of molecular weight of polymers, reactions mechanism and types of polymers based on reactions category such as chain-growth and step-growth polymerization and polymerization kinetics. The general characteristics of polymer, polymerization process/ polymer synthesis, specific characteristic of polymer including thermal and morphology, and progress/ development of industrial polymers. Discuss some advanced polymers such as biomedical engineering and drug delivery, electrically-conductive polymers, liquid crystalline polymers for LCD and polymer dispersed liquid crystals (PLDC).

Course Outcomes
CO1 Examine underlying physico-chemical principles behind polymer chemistry in industry
CO2 Recognize polymer technology as a strategy in sustainable development
CO3 Communicate effectively in written and oral form through group discussion (assignment), tutorial and presentation session.

References
BSK4163
ENVIRONMENTAL CHEMISTRY
Credit: 3 credits
Pre-requisite: 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 Outcomes
CO1 Classify and explain the complex physical, chemical and biochemical systems of natural environments and different types of environmental monitoring strategies.

CO2 Construct well-reasoned solutions to environmental predicaments, testing them against relevant criteria and standards.

CO3 Show the ability to communicate effectively through group assignment or presentation.

CO4 Read appropriate reference materials regarding environmental issues

References
3. Harrison, R.M. (1999) Understanding Our Environment: An Introduction to Environmental Chemistry and Pollution. 3rd ed. RSC (This is the latest edition)
CO1 Classify and explain the complex
Course Outcomes
and organic analyte in environment.
monitoring strategies and analysis of inorganic
Malaysia. It also covers the environmental
covers environment quality guidelines used in
atmosphere, waters, and soil. This course
fundamental aspects of the science of
and environmental issues. It covers some
This course introduces the concepts of
Pre-requisite: None
ENVIRONMENTAL CHEMISTRY
BSK4163
Intersciecne, NY, USA
Polymer Science, 3rd Edition, Willey-
different types of environmental
systems of natural environments and
physical, chemical and biochemical
References
CO4 Read appropriate reference materials
CO3 Show the ability to communicate
effectively through group assignment
or presentation.
standards.
them against relevant criteria and
environmental predicaments, testing
monitoring strategies.
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Comment [U17]: BSB3573 Reactor Design
Comment [U18]: BSB3583 Advanced Enzyme Technology
Comment [U19]: BSB3593 Biosensor Technology
Comment [U20]: BSB3503 Biomanufacturing
Comment [U21]: Tidak ditawarkan. Hanya empat sahaja kursus elektif.
SYNOPSIS OF PROGRAMME COURSES

BSB1102
BIOPHYSICAL CHEMISTRY
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes

C01 Understand and describe the principle of physical chemistry in biological studies.
C02 Apply biochemical calculation for biological studies.
C03 Compare and contrast the principles and applications of physical chemistry for biological studies.
C04 Work in group to answer biochemical calculation and other tasks.
C05 Plot graph based on data calculated using specific formulas.

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.

References


BSB1112
INDUSTRIAL BIOTECHNOLOGY
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes

C01 Describe and explain the potentials and applications of biotechnology fields.
C02 Relate biosafety and bioethics consideration for biotechnology-related products commercialization.
C03 Compare and contrast the policy, scope and research area of industrial biotechnology in Malaysia and other countries.
C04 Be aware on biosafety, bioethics and the important of IP for biotechnology products.
C05 Discuss on the potential of biotechnology products and their commercialization opportunity.
C06 Demonstrate mapping and grouping of Industrial Biotechnology Companies with their related fields.

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 focuses 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.

References


BSB1113
BIOCHEMISTRY
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes

C01 Describe the structure and properties of biomolecules and explain their biosynthesis and degradation mechanisms.
C02 Illustrate the energy sources and metabolisms that involved in energy storage and production.
C03 Relate the function of metabolic pathways with our daily life consumption.
C04 Compare and contrast the functionality and importance of various metabolisms in organisms.
C05 Present idea in verbal and written form effectively and provide feedback on the given topic.
C06 Demonstrate mapping and grouping of biochemical compounds with their related biosynthetic pathways.

Synopsis

The course is designed to study the physical and biochemical characteristics of biomolecules including nucleic acids, amino acids and proteins, carbohydrates and lipids. Importance pathways for biosynthesis and degradation of nucleic acids, amino 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.

References


BSB1402
BIOCHEMISTRY LABORATORY
CREDIT : 2 CREDITS
PRE-REQUISITE ::

Course Outcomes
C01 Relate the fundamental theories with laboratory experiments
C02 Demonstrate skills in performing biochemistry experiments
C03 Demonstrate skills in handling cell and biochemistry-related equipment
C04 Analyze, interpret and relate experimental data with the fundamental theories
C05 Communicate through report writing
C06 Work in team during laboratory session

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.

References

BSB1133
ORGANIC CHEMISTRY
CREDIT : 3 CREDITS
PRE-REQUISITE ::

Course Outcomes
C01 Describe and explain characteristics and physical properties of organic molecules
C02 Classify chemical compounds based on their structures
C03 Compare and contrast the main functional groups in organic chemistry and predict their reactions
C04 Perform illustration of organic structure backbones with their functional groups
C05 Work in group to complete the assigned tasks in a given time

Synopsis
In this course you will be introduced to the fundamental principles of organic chemistry. Structure, properties and stereochemistry of organic molecules and basic organic reaction to prepare common functional groups will be studied.

References

BSB1412
ORGANIC CHEMISTRY LABORATORY
CREDIT : 3 CREDITS
PRE-REQUISITE ::

Course Outcomes
C01 Relate the fundamental theories with laboratory experiments
C02 Demonstrate skills in performing organic chemistry experiments
C03 Demonstrate skills in handling organic chemistry-related equipment
C04 Analyze, interpret and relate experimental data with the fundamental theories
C05 Communicate through report writing
C06 Work in team during laboratory session

Synopsis
Practical 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.

References

BSB1173
MICROBIOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE ::

Course Outcomes
C01 Describe the concepts of microorganisms, their cell structure and nutrition requirements.
C02 Classify microorganisms based on their general properties.
C03 Compare and contrast microbial nutrition and growth between different types of microorganisms
C04 Perform mapping and grouping of microorganisms based on their structure and morphology.
C05 Differentiate between pathogenic and non-pathogenic microorganism by gathering information from multiple sources.
Synopsis
This course introduces basic concepts in microbiology, techniques and microscopy. Discussion includes microorganism characteristics and classification, structures, growth, nutrient requirement and metabolisms, physical and chemical control of microorganisms.

References

BSB1432
MICROBIOLOGY LABORATORY
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes
CO1 Relate the fundamental theories with laboratory experiments
CO2 Demonstrate skills in performing basic microbiology experiments
CO3 Demonstrate skills in handling basic microbiology-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

Synopsis
This course covers practical in experiments and analyses in microbiology laboratory. Emphasis on the basic techniques in handling microorganisms, including aseptic technique, media preparation, inoculation and isolation of pure culture. Analysis and control of microbial growth, and biochemical and morphological characterization, will also be carried out.

References

BSB2133
CELL AND MOLECULAR BIOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE : -

Course Outcomes
C01 Describe the concept and function of macromolecules of the cells and explain the principle of DNA replication and repair.
C02 Illustrate the pathway from DNA to protein including transcription, translation and expression.
C03 Compare and contrast between prokaryotes and eukaryotes in both cell and molecular biology aspects.
C04 Demonstrate mapping and grouping of different classes of cells with their respective structure and function
C05 Convey ideas clearly and effectively, as well as giving feedback on given topics

Synopsis
This course discusses fundamental concepts of cell biology, structure and function of cellular organelles and their biomolecules. Emphasis will be given on compositions, structures and functions of cell membrane and concepts of cell division. Concepts of central dogma of molecular biology and gene regulation and its control are also discussed. Discussion includes techniques and applications of molecular biology such as DNA recombinant technology, gene cloning application and bioinformatics software.

References

BSB1422
CELL AND MOLECULAR LABORATORY
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes
C01 Relate the fundamental theories with laboratory experiments
C02 Demonstrate skills in performing cell and molecular biology experiments
C03 Demonstrate skills in handling cell and molecular biology-related equipment
C04 Analyze, interpret and relate experimental data with the fundamental theories
C05 Communicate through report writing
C06 Work in team during laboratory session

Synopsis
In this course, students will be introduced and practice modern biotechnology laboratory techniques and theories. The subjects that will be covered are basic laboratory equipments handling and techniques such as nucleic acid isolation and purification, deoxyribonucleic acid (DNA) cloning, polymerase chain reaction (PCR) and gel electrophoresis.
analysis. In addition, students will be exposed to basic bioinformatics tools for analysis of genes.

References

BSB2122
GENETICS
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes
CO1 Describe and explain the theory and concept of fundamental genetics.
CO2 Interpret population and conservation genetics.
CO3 Relate gene interaction and the changes of genetic information with the mechanism in race and species diversification.
CO4 Demonstrate mapping of chromosome pairs.
CO5 Convey ideas verbally on genetics related issues as well as giving feedback on given topics.

Synopsis
The course will provide the students with a strong background in the basic concepts of genetics. Students will be introduced to the brief history pertaining to genetics, cell division and chromosomes. Apart from that, the students will be exposed to the Mendelian Law of Inheritance, gene interaction including epistasis, sex linkages and determination, crossing, inbreeding, heterosis and environmental effect on genetics. Other topics to be discussed include genetic application and mechanism in race and species diversification formation. Population genetics and evolutionary genetics will also be discussed.

References

BSB2442
BIOANALYTICAL CHEMISTRY LABORATORY
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes
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 Communicate through report writing
CO6 Work in team during laboratory session

Synopsis
This course introduces spectrosopic methods for matrix characterization, principles of electrophoresis, isoelectric focusing, capillary electrophoresis, centrifugation methods, chromatography and mass spectrometry of biomolecules.

References

BSB2143
ENZYME TECHNOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE : BSB1113

Course Outcomes
CO1 Describe and discuss enzyme properties, nomenclatures, characteristics and mechanisms
CO2 Apply biochemical calculation for enzyme kinetics
CO3 Compare and contrast the methods for production, purification and characterization of enzymes
CO4 Discuss various application of enzymes in industrial biotechnology that can benefit human life
CO5 Discuss the important aspects of enzyme technology for commercialization purpose of biotechnological products.
CO6 Plot graphs based on kinetics data calculated

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 life long learning.

References

BSB2452
ENZYME TECHNOLOGY LABORATORY
CREDIT : 2 CREDITS
PRE-REQUISITE : BSB1402

Course Outcomes
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

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.

References

BSB2193
INDUSTRIAL MICROBIOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE : BSB1173

Course Outcomes
CO1 Explain basic concept of industrial microbiology.
CO2 Illustrate the flow of product development in industrial microbiology.
CO3 Compare and contrast metabolite pathways and regulations that are important for the biosynthesis of microbial products.
CO4 Discuss on various emerging areas in industrial microbiology that can benefit human life
CO5 Discuss on regulation and safety of microbiology products.
CO6 Illustrate various industrial microbiology products in a schematic diagram

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.

References
5. Rajavari, N., & Morkandry, D. K. Industrial application of microbiology APH Publisher.
BSB2462
INDUSTRIAL MICROBIOLOGY LABORATORY
CREDIT: 2 CREDITS
PRE-REQUISITE: BSB1432

Course Outcomes
CO1 Relate the fundamental theories with laboratory experiments
CO2 Demonstrate skills in performing industrial microbiology experiments
CO3 Demonstrate skills in handling industrial microbiology-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

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, immunological and antibiotic tests.

References

BSB3113
GENE TECHNOLOGY
CREDIT: 3 CREDITS
PRE-REQUISITE: BSB2133

Course Outcomes
CO1 Describe and explain 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 and contrast 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).
CO6 Prepare video on application of gene technology in biotechnology-related industries

Synopsis
Topics discussed include the advance techniques in gene technology including molecular markers, genomic and cDNA libraries, recombinant technology, DNA hybridization and plant genetic engineering. This course emphasize on the application of gene technology in medicine, agriculture, forensic and archaeology. Students are also trained to participate in group discussion and present on the application of gene technology and related ethical issues.

References
BSB3123
BIOPROCESS TECHNOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE : -

Course Outcomes

CO1 Describe and explain the principle and applications of bioprocess technology.
CO2 Apply fundamental calculation in bioprocessing.
CO3 Compare and contrast the principle and application of different types of bioreactors for large scale production.
CO4 Recommend suitable condition or bioprocessing flowsheet for different types of cells, tissues and organisms.
CO5 Discuss the important aspects in bioprocess technology for commercialization purpose of biotechnological products.
CO6 Illustrate schematic diagram for downstream bioprocessing.

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 as well. 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.

References


BSB3482
BIOPROCESS TECHNOLOGY LABORATORY
CREDIT : 2 CREDITS
PRE-REQUISITE : -

Course Outcomes

CO1 Relate the fundamental theories with laboratory experiments.
CO2 Demonstrate skills in performing bioprocess experiments.
CO3 Demonstrate skills in handling bioprocess-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.

Synopsis

Bioprocess technology laboratory course deals with and cover the extraction and bioseparation of different microbial industrially important by-products. The course will be given on different techniques of mini-project for preparing and drawing the microbial growth curve. Also, mini project will cover the bioprocesses for citric acid production from different microbial isolates including acid production, extraction, titration, quantification, precipitation and filtration.

References


BSB3163
PLANT AND MAMMALIAN CELL TECHNOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE : BSB2173

Course Outcomes

CO1 Describe the principle and techniques of plant and mammalian cell/tissue cultures.
CO2 Relate plant and mammalian cell technology approaches for agriculture and healthcare industries applications.
CO3 Compare and contrast the advantages, disadvantages and applications of each techniques used in culturing plant and mammalian cell/tissues.
CO4 Recommend the suitable plant and mammalian cell technology approaches to be used in related biological applications.
CO5 Discuss the important aspects in commercialization of plant and mammalian cell/tissue culture products.
CO6 Illustrate in schematic diagram the flow cells and tissue culture processes with the suitable laboratory design.

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.

References

BSB3442
PLANT AND MAMMALIAN CELL TECHNOLOGY LABORATORY
CREDIT: 2 CREDIT
PRE-REQUISITE:

Course Outcomes
C01 Relate the fundamental theories with laboratory experiments
C02 Demonstrate skills in performing plant and animal cell/tissue culture practices
C03 Demonstrate skills in handling plant and animal cell/tissue culture related equipment
C04 Analyze, interpret and relate experimental data with the fundamental theories
C05 Communicate through report writing
C06 Work in team during laboratory session

Synopsis
This course introduces 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 the techniques of 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, calculating viability of cells and also cell toxicity studies.

References

BSB4422
EXTRACTION AND BIOSEPARATION TECHNOLOGY LABORATORY
CREDIT: 2 CREDIT
PRE-REQUISITE:

Course Outcomes
C01 Relate the fundamental theories with laboratory experiments
C02 Demonstrate skills in extraction and separation procedure of bioproducts
C03 Demonstrate skills in handling equipment related to extraction and bioseparation
C04 Analyze, interpret and relate experimental data with the fundamental theories
C05 Communicate through report writing
C06 Work in team during laboratory session

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.

References

BSB4173
EXTRACTION AND BIOSEPARATION TECHNOLOGY
CREDIT: 3 CREDITS
PRE-REQUISITE:

Course Outcomes
C01 Explain the principle of extraction and bioseparation of bioproducts
C02 Apply fundamental calculation in extraction and bioseparation
C03 Compare and contrast different bioseparation approaches of biological materials
C04 Recommend suitable extraction and bioseparation approaches for small and large scale production of biological materials
C05 Outline and propose a suitable extraction and bioseparation methods, flow and equipment for production of products from different samples in a schematic diagram
C06 Discuss the important aspects in extraction and bioseparation of biotechnological products for commercialization purpose

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.

References

SYNOPSIS OF ELECTIVE COURSES

BSB3503
BIOMANUFACTURING
CREDIT: 3 CREDITS
PRE-REQUISITE:

Course Outcomes
C01 Describe flow sheet as well as feedback and feedforward system in biomanufacturing process.
C02 Illustrate proper facilities, quality

303
control method and documentation in Good Manufacturing Practice (GMP)

C03 Compare and contrasts different types of downstream processing in biomanufacturing

C04 Invent new products by using requirements of Good Manufacturing Practice (GMP)

C05 Discuss related ethical issues in biomanufacturing including rules and regulation as well as impact to human and environment.

C06 Demonstrate the new invented product with their suitable applications.

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 flowsheets in process plant and able to explain all processes that involved in manufacturing for example up-streaming, scale up and downstreaming process. Other than that, students will learn how to construct a feedback and feedforward system in biomanufacturing. Students also will be introduced to GMP, 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.

References


BBS3563

BIOREMEDIATION

CREDIT : 3 CREDITS

PRE-REQUISITE : BSB3123

Course Outcomes

CO1 Describe different types of bioreactors with their specifications and standard operations

CO2 Illustrate schematic diagrams for specific bioreactors with their specific functionality

CO3 Analyze kinetic parameters of different fermentation processes and choose suitable bioreactor for the growth of organisms and product formation at industrial level.

CO4 Design a hypothetical scale up bioreactor based on geometric similarities for industrial biotechnology application

CO5 Discuss related ethical issues in bioprocess technology including rules and regulation as well as impact to human and environment.

CO6 Demonstrate the functions and applications of the designed hypothetical scale up bioreactor in a schematic diagram

Synopsis

The course will emphasize on the basic design of a fermentor which include the principle and concept of the process control involved. This course introduces two basic concepts: (i) reaction mechanisms and kinetic rate expressions for homogeneous and heterogeneous reacting systems, including enzyme catalyzed reactions and cell growth kinetics, and (ii) reactor design for the homogeneous reaction systems. The design principles for ideal homogeneous reactors are introduced, followed by the concept of RTD (residence time distribution) to diagnose and account for the non-idealities in flow patterns. For heterogeneous reactions, the role of transport (diffusion) effects, Thiele modulus, and catalyst effectiveness factor are introduced.

References


BSB3583
ADVANCED ENZYME TECHNOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE : BSB2143

Course Outcomes

CO1 Describe and explain the concept and applications of enzymes in biotechnology-related industries

CO2 Illustrate the process of large scale production of enzymes for biotechnology-related industries

CO3 Compare and contrast between recombinant and non-recombinant enzymes that are currently used in biotechnology-related industries

CO4 Propose a new application of enzymes as biosensor to benefit human life

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

Synopsis

This course provides the advanced knowledge and information on enzyme technology. It will emphasize on the recycling of coenzyme, enzymatic biotransformation 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.

References


BSB3593
BIOSENSOR TECHNOLOGY
CREDIT : 3 CREDITS
PRE-REQUISITE : -

Course Outcomes

CO1 Classify the components of a biosensor and differentiate methods for immobilization that can be used for surface derivatisation.

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 function and application of the new designed hypothetical biosensor device

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.

References

## CURRICULUM STRUCTURE

### BACHELOR OF APPLIED SCIENCE (HONOURS) MATERIAL TECHNOLOGY 2013/2014

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<thead>
<tr>
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<td>BSP1113 Physical Chemistry</td>
<td>BSF1132 Laboratory Safety Management</td>
<td>BSF1132 Laboratory Quality Management</td>
<td>BSF1132 Business Organization Skill</td>
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<td>BSF1132 Laboratory Quality Management</td>
<td>BSF1132 Laboratory Quality Management</td>
<td>BSF1132 Business Organization Skill</td>
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### UNIVERSITY REQUIRED COURSES:
- Fundamental of English Language
- English For Academic Communication
- Islamic & Asian Civilization
- Co-Curriculum I
- English For Professional Communication
- Soft Skills I
- Ethnic Relationship
- Elective Social Sciences
- Foreign Language I
- Technopreneurship
- Foreign Language II
- Soft Skills II

**Total Unit For Graduation:** 128
Elective subject to be offer in Bachelor of Applied Science (Honours) – Material Technology

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<td>Solar Cell Technology</td>
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Bachelor of Applied Science (Honours) – Material Technology

**Core Courses**
- Material Science & Technology
- Polymer & Composite
- Nondestructive Test
- Metal & Alloy
- Material Processing
- Nanotechnology
- Advanced Material Lab
- Polymer, Composites & Ceramics Lab
- Rheology & Colloid Lab
- Rhenology
- Surface Characterization & analysis
- Colloid & Surface Science
- Material Science & Solid State Lab
- Solid State Physics I
- Solid State Physics II

**Elective Courses**
- FYP I
- FYP II

**University Courses**
- Industrial Training
- Industrial Training Report
- Elective I
- Elective II
- Elective III
- Elective IV
- Elective V

**Faculty Courses**
- Physics
- Physics I
- Physics II
- Laboratory
- Laboratory: Safety Management
- Laboratory: Quality Management
- Lab: Technical Writing
- Lab: Applied Statistics
- Lab: Applied Calculus
- Lab: Ethic Relation
- Lab: Technical English
- Co-Curriculum I
- Co-Curriculum II
- Co-Curriculum III
- Co-Curriculum IV
- FAMSK
- Elective
- Elective
- Elective
- Elective
- Elective

**Pre-requisite Courses**
- Physical Chemistry
- Organic Chemistry
- Physics I
- Physics II
- Physics I: Laboratory
- Physics II: Laboratory
- Polymer & Composite
- Nondestructive Test
- Metal & Alloy
- Material Processing
- Nanotechnology
- Advanced Material Lab
- Polymer, Composites & Ceramics Lab
- Rhenology & Colloid Lab
- Surface Characterization & analysis
- Colloid & Surface Science
- Material Science & Solid State Lab
- Solid State Physics I
- Solid State Physics II

**Matriculation/STPM/Diploma**
- Laboratory: Safety Management
- Laboratory: Quality Management
- Lab: Technical Writing
- Lab: Applied Statistics
- Lab: Applied Calculus
- Lab: Ethic Relation
- Lab: Technical English
- Co-Curriculum I
- Co-Curriculum II
- Co-Curriculum III
- Co-Curriculum IV
- FAMSK
- Elective
- Elective
- Elective
- Elective
- Elective

**Soft Skills**
- Soft Skills I
- Soft Skills II

**FYP**
- FYP I
- FYP II
SYNOPSIS OF PROGRAMME COURSES

BSP111 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 properties, 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 practices.

Course outcomes
CO1 Students will be able to explain and describe the concept of physical chemistry
CO2 Students will be able to apply the concept and understanding in physical chemistry to solve a given problem.
CO3 Students will be able to discuss physical chemistry concept in relations to various fields of research and industries.
CO4 Respond to the assigned task in group discussion and presentation

References

BSP1123 PHYSICS I
Credit: 2
Prerequisite: None

Synopsis
This course introduces to the basic Physics principle in Mechanics and Thermodynamics field. Topic covered in this course including measurement, vectors, kinetics, Newton’s law of motion, work, energy, power, fluid mechanics, static equilibrium, temperature, heat and also first law of thermodynamics.

Course outcomes
CO1 Students will be able to apply basic Physics concepts and theories learned to solve problems of Mechanics including Kinematics and Dynamics and also basic Thermodynamics.
CO2 Students will be able to explain the relationship between structure with physical and chemical properties
CO3 Students will be able to explain the significance of stereoselectivity and stereochemistry in organic chemistry
CO4 Students will be able to explain the common types of reaction mechanisms and modern synthetic techniques and point out the relationship between structure with physical and chemical properties
CO5 Students will be able to explain the relationship of chemistry in general and organic in specific to the rest of science to explain the important role of organic chemistry in life, both biological and economical

References

BSP1123 PHYSICS I
Credit: 2
Prerequisite: None

Synopsis
This course introduces to the basic Physics principle in Mechanics and Thermodynamics field. Topic covered in this course including measurement, vectors, kinetics, Newton’s law of motion, work, energy, power, fluid mechanics, static equilibrium, temperature, heat and also first law of thermodynamics.

Course outcomes
CO1 Students will be able to apply basic Physics concepts and theories learned to solve problems of Mechanics including Kinematics and Dynamics and also basic Thermodynamics.
CO2 Students will be able to explain the relationship between structure with physical and chemical properties
CO3 Students will be able to explain the significance of stereoselectivity and stereochemistry in organic chemistry
CO4 Students will be able to explain the common types of reaction mechanisms and modern synthetic techniques and point out the relationship between structure with physical and chemical properties
CO5 Students will be able to explain the relationship of chemistry in general and organic in specific to the rest of science to explain the important role of organic chemistry in life, both biological and economical

References

BSP1133 ORGANIC 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 properties, 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 practices.

Course outcomes
CO1 Students will be able to identify the suitable concepts and theories to solve problems in various fields.
CO2 Students will be able to explain solution of any related problems using the right principles and laws.
CO3 Students will be able to identify the suitable concepts and theories to solve problems in various fields.
CO4 Respond to the assigned task in group discussion and presentation

References
Synopsis

This course is designed to expose the concept of nature and its association with material bonding and the other of atoms and molecules structure (microstructure connection with macrostructure). There are six (6) headlines in the course: atomic structure, bonds and crystal structure, defect structure and strengthening mechanisms, failure, material properties (thermal, electrical, magnetic, optical & mechanical), economic and environmental issues.

Course outcomes

CO1 Students will be able to analyze materials properties in term of atomic bonding and molecular structures
CO2 Students will be able to explain materials properties in term of defect and diffusion phenomena
CO3 Students will be able to Work on industrial and economic issues in a well constructed study proposal that benefit society

References

2. Florian S., Quantum Physics, Springer, 2007
3. Bruce C.R., Quantum Mechanics, Jonesand Bartlett, 2008

BSP 2163

COLLOID & SURFACE SCIENCE
Credit: 3
Prerequisite: None

Synopsis

Colloid science is the study of systems involving small particles of one substance suspended in another. Suspensions in liquids form the basis of a wide variety of systems of scientific and technological importance, including paints, ceramics, cosmetics, agricultural sprays, detergents, soils, biological cells, and many others. The course is aimed to familiarize students with the fundamentals of colloid and surface science, from various types of colloids and colloidal phenomena, classical and modern characterization/measurement techniques to applications of colloids and surface science in engineering, technology, chemistry, physics and material science. The course will discuss the “how and why” of modern Colloid science.

Course outcomes

CO1 Construct the binary and ternary phase diagram of colloidal system based on structural information from microscopy and spectroscopy results.
CO2 Explain the association phenomena of surface-active materials such as micellization, emulsification, liquid crystallization and the commercial values.
CO3 Perform collaborative work as part of a team as well as demonstrate social skills and responsibilities.

References

density state of Debye and Einstein model, Fermi free electron, Hall effect, energy band, Bloch functions, Kronig-Penney model.

Course outcomes

CO1 Students will be able to apply the basic knowledge about crystal structure and explain the properties of the crystals using various model learned.

CO2 Students will be able to display problem solving and critical thinking skills that associated with the learned properties in the given assignment.

CO3 Students will be able to discuss the proposal in a way to comply the future needs in industries and communities.

References

4. Omar, M.A. Elementary solid state physics, Addison Wesley, 1993

BSP2183 SURFACE CHARACTERIZATION AND ANALYSIS
Credit: 3
Prerequisite: BSP2153
Co requisite: BSP2173

Synopsis

Provide an introduction to surface characterization and analysis, leading to thorough understanding of the various types of surface analytical methods, especially electron spectroscopy and microscopy. Gain thorough knowledge of the general surface characterization and analysis and be able to apply several methods of electron spectroscopy and microscopy leading to high quality surface analytical characterization and measurement results. Excel on the elucidation of macro and micro structural properties of materials and in visualizing and measuring microscopic features to nanoscale dimensions.

Course Outcomes

CO1 Apply and use the theory of spectroscopy and microscopy techniques in problem solving.

CO2 Measure and analyze of raw data either directly or collectively using spectroscopy and microscopy instruments to determine the characterization of materials.

CO3 Explain the working principle of spectroscopy and microscopy instrument.

CO4 Perform in a team and report completely the task given using pectroscopy and microscopy instruments.

References


BSP 2193 RHEOLOGY
Credit: 3
Prerequisite: None

Synopsis

The course discusses the way in which rheology interacts with in use situations which most of us come across in everyday life at home and work. A few chapters follow on the explanation of the different kinds deformation (chapter 2), the use of graphs in general (chapter 3), and rheology graphs in particular (chapter 4), the Newtonian liquid (chapter 5), calculation of flow behaviour in lots of simple geometries (chapter 6), rheology measurement (chapters 7 & 8) for non-Newtonian behaviour in liquids.

Course Outcomes

CO1 Apply the knowledge of fluid/solid fluid flow and deformation to interpret and generate graphical data.

CO2 Display the ability to apply the equations of Newtonian’s fluid flow calculations to provide solutions that comply with principles of material science & technology and economic values.

CO3 Perform collaborative work as part of a team as well as demonstrate social skills and responsibilities.

References


BSP2103 SOLID STATE PHYSICS II
Credit: 3
Prerequisite: BSP2173

Synopsis

This course is continuity from Solid State Physics I course. This course emphasizes on semiconductor physics, ferri surfaces, superconductivity, dielectrics, ferroelectric and noncrystalline materials.

Course outcome

CO1 Students will be able to use the learned electrical properties of solid state to explain some related phenomena hence solve the related problems.

CO2 Students will be able to react on industrial and economic issues in a well constructed study proposal.

CO3 Students will be able to discuss the proposal in a way to comply the future needs in industries and communities.

References

4. Omar, M.A. Elementary solid state physics, Addison Wesley, 1993

BSP2422 MATERIAL SCIENCES AND SOLID STATE LAB
Credit: 2
Prerequisite: Co requisite with MATERIAL SCIENCE & TECHNOLOGY / BSP 2173

Synopsis

This course introduces students to the fundamentals experiment in material science and solid state which include mechanical, electrical and optical measurement. Students will experience hands on learning using related experimental set ups and methods. They will be guided for the first 10 weeks of the course and they are required to accomplish a small project in group.

Course Outcomes

CO1 Follow the procedure to characterize the mechanical, electrical, optical and magnetic properties of the samples and analyze the data using the correct procedure.

CO2 Display the knowledge of concept and methods to conduct basic guided research related to material sciences or solid state field.
CO3 Select appropriate instruments and techniques to apply in the experiment.

References
1. Hsu C. H., Materials Science and Engineering Laboratory, California State University, Chico, 2005.

BSP 2432
RHEOLOGY & COLLOID LABORATORY
Credit: 2
Prerequisite: BSP 2163
Co requisite: BSP 2432

Synopsis
Students will experience hands on learning using related experimental set ups and methods. Students will be guided for the first 10 weeks of the course and they are required to accomplish a small project in group. This course consists of two related field of study, colloidal systems and rheology. Students will be guided on the synthesis and characterization part.

Course Outcomes
CO1 Construct phase diagram of colloidal systems consists of micellar, emulsions, nanoemulsions, lyotropic liquid crystals phases using appropriate instruments and technique.
CO2 Follow the procedure to characterize the optical and mechanical properties of the prepared colloidal samples using microscopy, spectroscopy technique and rheometer and analyze the data using the correct procedure.
CO3 Report the findings in a way to comply the future needs of colloidal technology to be applied in industries and community.
CO4 Analyze the raw data from rheology experiments using appropriate methodology and tools.

References

BSP3112
CERAMICS
Credit: 2
Prerequisite: None

Synopsis
This course exposes students to ceramic materials in general. The type of reinforcements, the types of matrices as well as others constituent are discussed in details for composites. The course will further explain the properties of materials i.e. mechanical properties and defects.

Course Outcomes
CO1 Analyze and discover the knowledge of ceramic materials properties, processing and mechanical behaviour.
CO2 Reproduce the knowledge learned in solving ceramic processes.
CO3 Propose a proposal on industrial problem that relate to ceramic materials which benefit society.

References
1. C. Barry Carter, M. Grant Norton, Ceramic Materials Science and Engineering, Springer

BSP3123
POLYMER AND COMPOSITE
Credit: 3
Prerequisite: None

Synopsis
This course is to give the strong knowledge and understanding about the polymer with emphasize on polymer synthesis, phase behaviour and properties of polymer also composite materials consisting of reinforcements, the types of matrices as well as others constituent are discussed in details for composites. The course will further explain the properties of materials i.e. mechanical properties and defects. Students will experience hands on learning using related experimental set ups and methods. Students will be guided on the synthesis and characterization part.

Course Outcomes
CO1 Apply and use polymer and composite synthesis and properties concepts to solve any problem related to polymer and composite.
CO2 Display the concepts and methods learned about polymer and composite properties and materials comprehensively.
CO3 Propose a proposal on industrial problem that relate to polymer and composite materials which benefit society.

References

BSP3133
NON DESTRUCTIVE TEST
Credit: 3
Prerequisite: None

Synopsis
Nondestructive testing (NDT), also called nondestructive evaluation (NDE) and nondestructive inspection (NDI), is testing that does not destroy the test object. NDE is vital for constructing and maintaining all types of components and structures. The course contains a few focus techniques of NDT namely as, dye penetrant inspection, radiographic testing, electromagnetic testing and ultrasonic testing. Upon completion of this course, the students will be able to understand the principle, needs and the technique to conduct a simple testing. This course will elaborate on the theory behind each method, the production of the probes and the mechanism to detect them, the properties of materials to be tested, the test methods involved and the advantages and disadvantages of each method.

Course Outcomes
CO1 Students will be able to manipulate the NDT equipments for material analysis during lab works
CO2 Students will be able to analyze the data from Non Destructive Test experiments using appropriate methodology and tools
CO3 Students will be able to follow the appropriate technique of NDE during lab work
CO4 Students will be able to Report the findings in a way to comply the future needs of colloidal technology to be applied in industries and community.

References

BSP3302
FINAL YEAR PROJECT I
Credit: 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 Outcomes
CO1 Propose a project topic with regards to material science and technology field by referring to literature review.
CO2 Identify the most suitable solution and technique to be applied.
CO3 Respond effectively in written and oral form through group discussion and presentation session.
CO4 Comply the need of society through integration of notion of awareness (safety and cost effective) into the project.

References

BSP 4152
MATERIAL PROCESSING
Credit: 2
Prerequisite: None

Synopsis
To strengthen and expose to students of several processing techniques in polymer, composite and ceramic materials. The main topics include; types of processing techniques in related industries and process control criteria. This course includes methods of manufacturing and processing materials such as polymer, composites and ceramics materials. Emphasis is given to the selection criteria and process control to produce high quality products including the casting, extruding and molding.

Course Outcomes
CO1 Apply and explain the concept of material processing techniques in problem solving.
CO2 Display comprehensive understanding in manufacturing and processing of materials using laboratory scale experiments.
CO3 Respond and react appropriately to suggestions and new ideas during discussions and talk about material processing.
CO4 Perform in a team and report completely the task given in a group that related to the material processing.

References
1. Kalamakjian, S. Manufacturing Engineering and Technology, Addison Wesley
5. Tim Osswald, Juan P. Hernandez Ortiz. Polymer Processing Modeling and Simulation, Hanser, 2006

BSP 4163
NANOTECHNOLOGY
Credit: 3
Prerequisite: None

Synopsis
This course is design to exposes nanotechnology (nanomaterials and nanostructures) for students. Subject will focus on science approach including fundamental sciences; techniques growth, tools for measuring nanostructures and tools to make nanostructures. Student will be introduced to zero-dimension and one-dimension materials, and special
Course Outcomes

CO1 Use the knowledge of fundamental sciences, zero-dimension (0D) and one-dimension (1D) of materials for understand in nanotechnology scope

CO2 Discuss the nanomaterials or nanostructures of future that can use for application in nanotechnology

CO3 Show the ability to incorporate cost effective and marketable prospect to local industry in mini group project

References


BSP4314
FINAL YEAR PROJECT II
Credit: 4
Prerequisite: None

Synopsis

Thesis preparation is the second stage of the final year project, the final stage of the four years material technology curriculum. During this phase, students articulate and develop the material technology position they have formulated during preparation of the proposal and transform it into an actual material technology intervention. 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. In Final Year Project II, students work individually on their thesis. Each student is assigned an advisor from the panel of faculty (lecturer). Students meet with their advisors on a weekly basis. In addition, a technical advisor is available for students to consult throughout the semester.

Course Outcomes

CO1 Construct experimental procedure and tools to achieve predetermined research objectives.

CO2 Manipulate experiment finding with regards to the objectives and transformed them into meaningful informations.

CO3 Plan a strategy in order to solve predetermined problems as stated in research objectives.

CO4 Analyze the research results to evaluate the efficiency of the research objectives.

CO5 Organize and work effectively in group consists of multidisciplinary, multiracial and multilevel environment to solve daily tasks given by the supervisor.

BSP4614
INDUSTRIAL TRAINING REPORT
Credit: 4
Prerequisite: All faculty and programme courses

Synopsis

Students are required to undergo industrial training at selected industry or research institution for four months. During the training there will be two visits from the faculty panel to monitor their work progress and to get feedback from their 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 Outcomes

CO1 Plan a strategy in order to solve predetermined problems as stated in research objectives.

CO2 Adapt scientific approach and creativity to comply with current need of the department in order to solve given tasks.

CO3 Follow the procedure and format of scientific reporting with ample evidence that comply with industry.

SYNOPSIS OF ELECTIVE COURSES

BSP3503
SOLAR CELL TECHNOLOGY
Credit: 3
Prerequisite: None

Synopsis

Students will learn how solar cells convert light into electricity, how solar cells are manufactured, how solar cells are evaluated, what technologies are currently on the market, and how to evaluate the potential and potential of existing and emerging solar cell technologies. The potential & drawbacks of currently manufactured technologies (single- and multi-crystalline silicon, micromorph tandem cells, CdTe, CIGS, CPV, PVT), as well as pre-commercial technologies (organics, biomimetic, organic/inorganic hybrid, and nanostructure-based solar cells) are also will be discussed. Students will be focusing on limits of solar cell performance and cost, and the major hurdles — technological, economic, and political — towards widespread substitution of fossil fuels. Students will apply this knowledge towards developing and critiquing a solar energy technology prospectus.

Course outcome

CO1 Students will be able to apply the knowledge basic working principle of photovoltaic to solve problems in solar cell technology

CO2 Students will be able to Display the knowledge to conduct basic guided research related to solar cell technology with emphasis on entrepreneurship values

CO3 Students will be able to Perform collaborative work as part of a team as well as demonstrate social skills and responsibilities

References

This course will cover the basic concept of liquid crystals such as order, parameter, phase transition and free energy. The knowledge about liquid crystals also will learn in this course. Student expose to the application of liquid crystal like technology of liquid crystal displays in local industry respects to marketable prospect to local industry in mini project.

Course outcomes

CO1 Students will be able to distinguish types of electronic ceramics and apply the knowledge in problems solving
CO2 Students will be able to work in a team and report completely the task given in a group that related to the properties of electronic ceramics
CO3 Students will be able to display the knowledge to conduct basic guided research related to latest electronic ceramic materials in industry with emphasize on entrepreneurship values

References


BSP4503
THIN FILM TECHNOLOGY
Credit: 3
Prerequisite: None
Synopsis
This course exposes students to overview the Thin Film Technology in various industry. This course will explain the preparation method of thin film and the properties of thin film such as optical properties, electrical properties, magnetic properties and mechanical properties. The reactions of thin film and several techniques for thin film characterization are discuss in details. Students will also learn the applications of thin film.

Course outcomes

CO1 Students will be able to Use the knowledge of preparation methods, properties, reactions and applications of thin film
CO2 Students will be able to differentiate every techniques that can be use in thin film characterization in group
CO3 Students will be able to Show the ability to incorporate cost effective and marketable prospect to local industry in mini project

References


BSP4513
SUPERCAPACITOR TECHNOLOGY
Credit: 3
Prerequisite: None
Synopsis

This course is designed to introduce knowledge about supercapacitor from the electrical and electrochemical properties in more details using the latest technology. This course mainly deals with the properties of supercapacitor and their technology development in industry.

Course outcomes

CO1 Students will be able to apply the knowledge of electrical properties of super capacitor in problem solving
CO2 Students will be able to organize a working group to solve the given task related to super capacitor
CO3 Students will be able to display the knowledge to conduct basic guided research related to latest super capacitor materials in industry with emphasize on entrepreneurship values.

References


two or more materials with different properties. Because metals are the most used type of structural materials most of this course will be devoted to the corrosion of metals. Most corrosion of metals is electrochemical in nature. Corrosion can be broadly classified into wet aqueous and dry high temperature corrosion.

Course Outcomes

CO1 Investigate a given situations using the fundamental laws of materials corrosion to that will aid in the corrosion prevention & control.

CO2 Respond effectively in written and oral form through discussion and task presentation regarding the corrosion problems occur within Gambang area with suggestions of materials that can be used for corrosion protection (low cost and high effectiveness)

CO3 Follow the guided principles of corrosion monitoring to monitor corrosions within Gambang area to look for future business prospect.

References


BSP4523
RECYCLE TECHNOLOGY
Credit: 3
Prerequisite: None

Synopsis

Material resources to support our industrial age have become increasingly scarce. On the other hand, garbage or trash or solid wastes resulted from our economic system that urges disposable lifestyles have become difficult problem to solve for those responsible for their management. Indeed, 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.

Course outcomes

CO1 Students will be able to apply and explain the concept of recycle technology to solve related problems

CO2 Students will be able to follow the procedure and analyze data from materials recovery techniques of hazardous solid waste, such as Activated Carbon Adsorption, Distillation, Hydrolysis, Ion Exchange, Solvent Extraction, Electrolytic Recovery, Membrane Separation, Air and Steam Stripping, Thin Film Evaporation, and Freeze Crystallization

CO3 Students will be able to display comprehensive understanding in completing the assignment related to the recycle technology

CO4 Students will be able to perform in a team and report completely the task given in a group that related to the recycle technology

References


BSP4533
MOLECULAR MODELING
Credit: 3
Prerequisite: None

Synopsis

The course discusses technical development that have made the total-energy pseudopotential the most powerful ab-initio quantum mechanical modeling method presently available. In addition to presenting technical details of the pseudopotential method, the course aims to heighten awareness of the capabilities of the method in order to simulate its application to as a wide range of problems in as many scientific disciplines as possible.

Course Outcomes

CO1 Apply the knowledge of molecular dynamics using Gaussian 09W software to simulate the needed output by optimization of energy technique.

CO2 Display the knowledge to conclude the molecular modelling results related with emphasis on economic values.

CO3 Show collaborative work as part of a team as well as demonstrate social skills and responsibilities.

References


BSP4543
SEMICONDUCTOR DEVICES
Credit: 3
Prerequisite: None

Synopsis

This course introduce to major application of technology from solid state physics. This course start with the most basic semiconductor devices which is p-n junction and also its fabrication followed with more complex devices such as MOSFET, MESFET, transistors and some application of those devices such as diode, LED, photodetector and solar cell.

Course Outcomes

CO1 Apply and explain the basic knowledge about semiconductor devices in term of structure and operation using lerned physics phenomena and principles

CO2 Discuss issues on industrial and economic in a way to comply the future needs in a well-constructed study proposal

CO3 Show the ability to incorporate cost effective and marketable prospect to local industry in mini group project

References


BSP4553
COMPUTATIONAL PHYSICS
Credit: 3
Prerequisite: None

Synopsis

This course will provide an introduction to techniques and applications in computational physics. This course focuses specifically on methods...
FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING
FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

INTRODUCTION

The Faculty of Chemical and Natural Resources Engineering was established on 15 February 2002. The first set of programs offered to students enrolling for session 2002/2003 was Bachelor in Chemical Engineering and Diploma in Chemical Engineering. Two additional programs were offered to students starting with enrolments for session 2003/2004 namely Bachelor in Chemical Engineering (Biotechnology) and Bachelor in Chemical Engineering (Gas Technology). These were competency-based and application-based programs, with emphasis on the combination of theory and practical skills in a learning process which identifies the problems and challenges in industry and solve them. These programs cover the areas of separation process, chemical reaction engineering, process engineering, system control and environmental engineering. These three (3) Bachelor programs were later upgraded to fulfill the requirements for accreditation with the Engineering Accreditation Council (EAC), under the Washington Accord, and were all duly accredited under the EAC. On 12 October 2010 the Faculty was approved by the Ministry of Higher Education Malaysia to offer Masters of Chemical Engineering with Entrepreneurship (by coursework) and intake of students was started in semester 1 of session 2011/2012.

VISION & MISSION OF THE FACULTY

VISION

To be a leading centre in producing professionals in the area of chemical and natural resources engineering, with emphasis on industrial best practices and applications.

MISSION

To provide for the study of chemical and natural resources engineering in an industrial context through outstanding education; research; and development.

PROGRAMS OFFERED

FKKSA offers both diploma and degree programs related to chemical and natural resources engineering as follows:-

Undergraduate level;

a) Bachelor of Chemical Engineering  
b) Bachelor of Chemical Engineering (Biotechnology)  
c) Bachelor of Chemical Engineering (Gas Technology)  
d) Diploma in Chemical Engineering (Process Plant)

Postgraduate level;

a) PhD in Chemical Engineering  
b) PhD in Bioprocess Engineering  
c) PhD in Gas Engineering
d) Masters in Chemical Engineering (By Research)
e) Masters in Bioprocess Engineering (By Research)
f) Masters in Gas Engineering (By Research)
g) Masters in Chemical Engineering with Entrepreneurship (By Course)

LABORATORY FACILITIES

Teaching and research laboratory facilities of the Faculty of 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, Occupational Safety & Health, Project Management and Industrial technology Management. These laboratories are as follows:

Bio-Processing Lab
Autoclave, evaporator, centrifuge, incubator, safety hood, oven, homogenizer, microscope, shaker, ultrasonic cleaner etc.

Bio-Analytical Lab
Protein purification system, bio-imaging system, glucose analyzer, sizer data system etc.

Bio-Scale Up Processing Lab
Bioreactor, large scale fermenter, filtration system, spray dryer, filling machine, chromatography system, flash point tester, cetane analyzer, density/specific gravity meter, potentiometric titrator, biohazard safety cabinet, gloveness anaerobic chamber, microbial cultivation, co2 monitor system, moisture meter, high speed centrifuge etc.

Analytical Lab
FTIR, GC, GCMS, TGA, DSC, pycnometer, UV-Vis, refractometer, AAS, vaporization mercury analyzer, HPLC, HPLC-MS, UV-Vis, microwave extractor, Physisorption Analyzer, UPLC etc.

Basic Science Lab
Furnace, pressure instrument, fume hood, hot plate, ph meter, water bath, cloud & pour point apparatus, vacuum pump, dropping point apparatus etc.

Basic Engineering Lab
Rockwell hardness tester, bomb calorimeter, tensile and brinell tester, losses in pipe apparatus, micro vickers hardness tester, pressure measurement system, marcet boiler, twist & bending tester etc, diaphragm pump demonstrator, water cooling tower etc.

Reaction Lab
PFR, CSTR reactor, batch reactor, mixing unit, plug flow reactor, catalytic tubular reactor, reactor test rig, supercritical reactor etc.

Unit Operation Lab
Shell and tube heat exchanger, plate heat exchanger, rotary evaporator, thin film evaporator, plate and frame filter press, climbing & falling film evaporator, solid liquid extraction unit, absorption column, pressure swing adsorption, crystallization unit, sieve tray distillation, short path distillation, fixed & fluidized bed etc.
Process Control & Instrumentation Lab
WLF plant, AFPT plant, DLT plant, MIMO plant, process control simulation, calibration bench etc.

Gas Engineering Lab
Gas meter calibration system, gas turbine gas, service station unit, combustion unit, gas fuel caloric meter, fire & gas detection system, corrosion study unit, gas absorption system, gas fire & explosion testing unit, wet test meter, coulometer, porous catalytic combustion test rig, micro gas analyzer, flame propagation & stability unit, NDT magnetic particle set, NDT penetrant test set, butt fusion unit, etc.

Pilot Plant
Multipurpose extraction pilot plant, spray dryer pilot plant, waste water treatment pilot plant, scott modular pilot plant, Batch & CSTR reactor pilot plant, LGM pilot plant etc.

Engineering Workshop
Circular saw, tool kit bag engineers, grinding/polishing machine, welding set, digital vernier caliper, digital micrometer, metal file set, bending machine, stamping machine, thread marker, angle grinder, cutting machine, threading machine, spanner set, shearing machine, press machine, hydraulic plate rolling machine etc.

Computer Lab
Matlab, Aspen Hysys, SuperPro Designer, CFD Fluent, AutoCAD, PDMS etc.

Glass Blowing Area
Tools for shaping glass, cutter, glass lapping machine, glass cutting machine, bench burner torch, glassblower lathe machine, tailstock system etc.
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MANAGEMENT TEAM

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### YEAR SEMESTER

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130

TOTAL CREDIT
FOR
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15

Biochemistry

16

BKB2213

Engineering Ethics
& Professionalism

BKF1313

BKF1243

BKF1513

Basic Science &
Engineering Lab

Soft Skills 1

Thermodynamics

BKF2751

UHS1021

BKF1333

Applied Calculus

Ordinary Differential
Equations

Organic Chemistry

BUM2123

BUM2133

BKF1323

Co-Curriculum II

Co-Curriculum I

Engineering Mechanics

UQ*2**1

UQB1**1

Analytical Chemistry

English For Technical
Communication

SECOND

English For
Academic
Communication

FIRST

UHL2422

FIRST

UHL2412

TOTAL CREDIT
PER
SEMESTER

COURSES

SEMESTER

YEAR

18

Molecular & Cell
Biology

BKB2132

Material & Energy
Balance

BKF2343

Fluid Mechanics

BKF2353

SECOND

16

Chemical Reaction
Engineering I

BKF2453

Numerical Methods &
Optimization

BKF2443

Mass Transfer

BKF2432

Heat Transfer

BKF2423

Computer
Programming For
Engineers

BKF2143

English For
Professional
Communication

UHL2432

SECOND

Chemical Engineering
Thermodynamics

BKF2413

Electrical &
Instrumentation
Technology

BKF1332

Applied Statistics

BUM2413

Islamic And Asian
Civilisations 1

UHR1012

FIRST

THIRD

15

Chemical Reaction
Engineering Lab

BKF3741

Process Control &
Dynamic

BKF3413

Unit Operation

BKF3463

Chemical Reaction
Engineering II

BKF3472

Process Simulation and
Computer Aided
Design

BKF3553

Industrial
Biotechnology

BKB2412

Foreign Languages
Level 1

UHF11*1

FIRST

15

Process Control &
Instrumentation Lab

BKF4791

Undergraduate
Research Project I

BKC3922

Unit Operation Lab

BKF3731

Bioseparation
Engineering

BKB4493

Bioreactor
Engineering

BKB3423

Environmental
Biotechnology

BKB3513

Technopreneurship

UGE2002

SECOND

CURRICULLUM STRUCTURE - BACHELOR OF CHEMICAL ENGINEERING (BIOTECHNOLOGY) (BKB)

BKF4916 - INDUSTRIAL TRAINING (LI) 12 WEEKS
6

Soft Skills 2

Elective 1

14

Process
Engineering
Economics

BKF4142

Process & Plant
Design I

BKC3913

Bioseparation
Engineering Lab

BKB3781

OSH in Chemical &
Biotechnology
Industries

14

Process Engineering
Management

BKF3812

BKC4944
Undergraduate
Research Project II

Process & Plant Design
II

BKC4934

Ethnic Relations

UHM2022

UHS 2021

BKC3**3

BKB3533

Foreign Languages
Level 2

Elective Courses

SECOND
UHF21*1

FOURTH

UHE3**2

FIRST

UNDERGRADUATE PROSPECTUS 2014/2015


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**Total Credit for Graduation:** 130

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COURSE STRUCTURE

DEGREE LEVEL

BKF1513
ENGINEERING ETHICS & PROFESSIONALISM
Credit : 3
Pre-requisite
NONE
Synopsis
This subject gives an overview of engineering, the profession and its requirements in Malaysian scenario. Topics include ethics, management and contribution of engineering. Also generic skills and study skills. Basic calculations, unit conversions, engineering graph and solving iterative problem using computer are consisted in this subject as preparation for engineering students. Plant visits and seminars serve as exposure for students 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 conservation and sustainability of resources, and recommend effective solutions.
- CO4 Perform basic calculation and computational knowledge used in chemical the engineering field.
- CO5 Apply generic skills and study skills.

BKF1243
ANALYTICAL CHEMISTRY
Credit : 3
Pre-requisite
NONE
Synopsis
The syllabus covers basic knowledge and application of sample and data handling, calibration technique, 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 technique used in chemical analysis such as UV-Visible, FTIR, AES, ICP, and AAS are discussed. The combinations of above technique with their advantages are covered in this course.

Course Outcomes
- CO1 Explain and describe theory and application of analytical chemistry.
- CO2 Interpret and analyze analytical data.
- CO3 Solve problems related to analytical chemistry.
- CO4 Explain the concept and application of analytical equipments such as SPE, GC, HPLC, AAS, UV-Vis and MS.
BKF1253
PHYSICAL CHEMISTRY

Credit : 3

Pre-requisite
NONE

Synopsis
This course discusses some introduction 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 practices.

Course Outcomes
- CO1 Explain and describe the concept of physical chemistry.
- CO2 Apply basic thermodynamics concept to solve problems related to physical chemistry.
- CO3 Describe the properties of mixtures and interpret the phase diagram.
- CO4 Explain the principles of chemical reactions and solve problems related to it.

BKF1323
ORGANIC CHEMISTRY

Credit : 3

Pre-requisite
NONE

Synopsis
This course discusses the fundamental theory of properties, synthesis and organic reactions where use the functional group as framework as a basic for second level courses with an organic chemical content.

This course focuses on the key concepts of organic chemistry through a study of the reactions of selected nonfunctional aliphatic, salicylic, cyclic and aromatic molecules. Particular emphasis is placed on the underlying mechanistic pathways that are involved and their stereo-chemical consequences. The stereo-chemistry of the molecular structure is also considered. The development of key skills is facilitated by a program of tutorials and practical.

Course Outcomes
- CO1 Explain the common types of reaction mechanism and modern synthetic techniques.
- CO2 Explain the significance of stereochemistry in organic chemistry
- CO3 Describe the different functional groups that undergo reaction in devising syntheses of other organic compounds.
BKF2353
FLUID MECHANICS
Credit : 3
Pre-requisite
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 applications, analysis of flow in pipeline system and dimensional analysis.
Course Outcomes
- CO1 Recognize and describe 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

BKF1313
ENGINEERING MECHANICS
Credit : 3
Pre-requisite
NONE
Synopsis
This subject will introduce students to concepts 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 Define 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

BKF1333
THERMO DYNAMICS
Credit : 3
Pre-requisite
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.

**BKF2343 MATERIAL & ENERGY BALANCE**

**Credit : 3**

**Pre-requisite** NONE

**Synopsis**

The course helps students to understand and acquire basic knowledge and skill in engineering calculations usually used in chemical processes. Beginning with chapter 1 and 2, conversion of units and determination of process variables is taught on how scale differs as resulted in using different units within particular dimension of measurement and how variables of a process are identified and calculated. Next, from chapter 3 to 7, material balance calculations are taught covering various aspects of mass and mole change in a system.

Furthermore, consequences appeared when different number of phase is considered in a system are taken into account in the subsequent chapters: 9 to 12.

Finally, energy balance associated with the material system is taught from chapter 13 to 15 to complete a conceptual design of chemical process system. The ultimate goal of this course is to aid students to develop MEB of a process in Excel and Aspen Plus.

**Course Outcomes**

- **CO1** Apply basic chemical engineering calculations involving conversion of units and determination of process variables.

- **CO2** Apply ideal and non-ideal gas calculations to solve problems related to single phase system.

- **CO3** Solve problems on multiphase systems related to multi-component gas-liquid system and liquid-liquid system

- **CO4** Analyze and solve material balance of process systems for nonreactive and reactive processes in single and multiple units.

- **CO5** Analyze and solve energy balance calculation in both non reactive and reactive systems
BKF2413
CHEMICAL ENGINEERING THERMODYNAMICS

Credit : 3

Pre-Requisite
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 covers 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 Estimate thermodynamic properties from available data by using appropriate methods.
- CO2 Select specific equations of state or the generalized correlations that is appropriate for solving given problems.
- CO3 Apply thermodynamic concepts to solve problems in VLE, solution thermodynamics and chemical reaction equilibrium.

BKF1332
ELECTRICAL & INSTRUMENTATION TECHNOLOGY

Credit : 2

Pre-requisite
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 and parallel combination or resistor, inductor and capacitor, power in AC circuit and multiphase systems, and also alternating current (a.c.) and direct current motor. Apart of that, student also introduce to the topics on instrumentation include introduction to process instrumentation elements, data communications 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 implement the concepts of electrical systems in student’s projects
BKF2143
COMPUTER PROGRAMMING FOR ENGINEERS

Credit: 3
Pre-requisite
NONE

Synopsis
This subject aims to introduce the fundamental element and feasibilities of the computer programming by using Excel and MATLAB mathematical computing program. Students will be taught on analyzing data, developing a program using m-file and using the command window. 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 data by using EXCEL and MATLAB softwares
- 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 problem into design and from design to operational program.

BKF2423
HEAT TRANSFER

Credit: 3
Pre-requisite
NONE

Synopsis
The objective of this course is to provide students with concepts of heat transfer. This course will emphasize on the principles of heat transfer in a steady state by conduction, convection and radiation. The students will be exposed to the procedure for general problem solving and its application on heat exchanger.

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 Integrate design equations for heat exchanger to solve problems related to heat exchanger and chemical reactors.
- CO3 Solve heat transfer problems related to unsteady-state systems.
MASS TRANSFER

Credit: 2

Pre-requisite
NONE

Synopsis

This course is to provide students with concepts of mass transfer. This course will emphasize on the principles of 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.

NUMERICAL METHODS & OPTIMIZATION

Credit: 3

Pre-requisite
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. The course is divided into several chapters starting from basics to problem solving in engineering applications. Matlab software will be introduced to empower students in developing simple and well-structured programs.

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 and MATLAB
BKC3363
SCIENCE & ENGINEERING MATERIALS
Credit: 3
Pre-requisite
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, and polymers used in construction materials, particularly for pollution control. Each of the materials classes (metals, ceramics, semiconductors, and polymers) is discussed in detail in this context.
Course Outcomes
- CO1 Describe the relationships between structure of a material and its underlying properties.
- CO2 Apply the science and engineering materials principles into the solution of real engineering-based problems.
- CO3 Explain the fundamental knowledge of strength of material in various aspects of materials construction.

BKF3413
PROCESS DYNAMICS AND CONTROL
Credit: 3
Pre-requisite
BKF2453 MATERIAL & ENERGY BALANCE
BKF3463 UNIT OPERATION
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 analysis of processes, application of laplace transform and transfer function, construct block diagram, Process & Instrumentation Diagram (P&ID) drawing, design and stability analysis of control system.
Course Outcomes
- CO1 Recognize the importance of process control to chemical industries
- CO2 Analyze the typical dynamic process
- CO3 Analyze the feedback control system
- CO4 Construct Process and Instrumentation Diagram
- CO5 Apply the PID tuning and analyze the stability
BKF2453 CHEMICAL REACTION ENGINEERING I

Credit : 3

Pre-requisite
BKF2343 MATERIAL & ENERGY BALANCE
BKF2413 CHEMICAL ENGINEERING THERMODYNAMICS

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 commercial chemical reactors, emphasizing synthesis of chemical kinetics and transport phenomena. The topics cover in this subject are kinetic rate theory, homogeneous reaction in batch and continuous systems, heterogeneous reaction and catalysis, temperature effect, effect of heat transfer and catalytic reactor also reactor design, sizing and modeling performance.

Course Outcomes

- CO1  Combine the basic fundamentals of chemical reaction engineering such as mole balance, rate law and stoichiometry in reactor design
- CO2  Design the industrial reactors for the chemical processes using the analytical and modeling skills
- CO3  Evaluate the complex solution in design reactor using commercial software

BKF3463 UNIT OPERATION

Credit : 3

Pre-requisite
BKF2343 MATERIAL & ENERGY BALANCE

Synopsis

The objective of this course is to provide students with concepts of separation processes in unit operation. This subject will emphasize in various unit operations, namely evaporation, distillation, absorption and extraction. By completing the subject, students will understand the basic mechanisms of the unit operations in chemical engineering fields.

Course Outcomes

- CO1  Of evaporation, distillation, absorption and extraction processes
- CO2  Apply knowledge of unit operation in the identification, formulation and solution of chemical engineering problems.
- CO3  Analyse basic design parameters associated with certain unit operations.
BKF3472
CHEMICAL REACTION ENGINEERING II

Credit: 2

Pre-requisite
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 non-ideal 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 non-ideal 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 and other limiting situation.
- CO2 Apply fundamental of biochemical reaction systems.
- CO3 Analyze the effect factors of catalytic reaction performance.
- CO4 Develop an understanding of catalysts, reaction mechanisms and catalytic reactor design.
- CO5 Investigate the model and solve the problems of non-ideal reactor using commercial software.

BKF3553
PROCESS SIMULATION AND COMPUTER AIDED DESIGN

Credit: 3

Pre-requisite
NONE

Synopsis
This particular course will introduce the usage of two common engineering tools for process simulation and flow sheeting to students, i.e; Aspen Plus/Aspen Hysys and SuperPro. Aspen Plus/Aspen HYSYS will be used to simulate steady state for chemical, and oil and gas processes. Meanwhile, the use of the modelling software SuperPro Designer is introduced as a tool for biochemical and batch process. This subject is very important to prepare students for future usage of the softwares 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 softwares to model and simulate problems related to chemical engineering unit operations.
- CO3 Develop flowsheet to model and simulate problems related to chemical
BKF3731
UNIT OPERATION LAB

Credit : 1

Pre-requisite
NONE

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, crystallisation 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.

BKF3741
CHEMICAL REACTION ENGINEERING LAB

Credit : 1

Pre-requisite
NONE

Synopsis
This laboratory course is to strengthen their understanding through experiments by observing the application of theories learnt in chemical reaction engineering subject. Numbers of reaction in various reactors are to facilitate student to gain the objective of each experiment whereby the procedure will be instructed to run the experiment. Every 5-students group 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 engineering and chemical reaction knowledge in operation of chemical engineering equipment.
- CO2 Operate & demonstrate the different type of reactors with different reactions.
- CO3 Use critical data analysis to solve the problem related to chemical reaction engineering

BKF2751
BASIC SCIENCE AND ENGINEERING LAB
Credit : 1
Pre-requisite: NIL
Synopsis
In basic engineering lab, students are required to perform laboratory work which covered the basis concept of physical and chemistry such as concepts of solubility and miscibility, buffer effect, calorimetry and gravimetric determination 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 & engineering materials.

Course Outcomes
- CO1 Apply all basic science and engineering theory in labarotory.
- CO2 Apply concept and interpretation of data, knowledge in operation of basic science and engineering equipment to solve lab experimental problem.
- CO3 Operate and demonstrate different type of equipment that applies in science and engineering principle theories.
- CO4 Able to work in group and commit with all the lab rules and regulations

BKC3492
Separation Process
Credit : 2
Pre-requisite
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 Understand the concept and principles of unit operations in Chemical Engineering.
- CO2 Able to apply the formulas and do the calculations relating to the unit operations.
- CO3 Able to solve problems or issues associated with unit operations in Chemical Industry.
BKC3543
ENVIRONMENTAL ENGINEERING

Credit : 3

Pre-requisite
NONE

Synopsis
This subject is designed to introduce to the students the principles of environmental engineering. Topics includes introduction of environmental engineering, water and wastewater quality management, water and wastewater treatment, air pollution, and solid waste and hazardous waste management.

Course Outcomes
- CO1 Apply the standards and laws in environmental problems
- CO2 Analyze and solve environmental problems
- CO3 Describe the current environmental issues

BKF4142
PROCESS ENGINEERING ECONOMICS

Credit : 2

Pre-requisite
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. 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 Apply 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.

BKF4791
PROCESS CONTROL & INSTRUMENTATIONS LAB

Credit : 1

Pre-requisite
NONE

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 is based on computer simulation and plant experimental works. In computer
Simulation, students will simulate a case study using Matlab environment software and also operate a system on Distributed Control System (DCS). While 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** Apply the process instrumentation and control hardware of the control system
- **CO2** To implement control strategies manually and automatically using software packages and plant
- **CO3** To perform scan, control, alarm and data acquisition (SCADA) functions and operate a system using DCS
- **CO4** To develop convenient graphical interface for students that allowed them to interact in real-time with the evolving virtual experiment
- **CO5** Function effectively as an individual and in a group throughout the semester based on tasks/modules assigned

The course is intended to expose students to the nature of recycling industry in Malaysia and worldwide. Explanation and description will be given on the nature of wastes in Malaysia, trend of activities, rules and regulations in handling wastes etc. Students will also be given hands-on projects to conduct and present in the area of waste recycling related to the Malaysian scenario.

**Course Outcomes**

- **CO1** Ability to differentiate various types of wastes, scheduled and non-scheduled waste.
- **CO2** Understand the requirement for handling of wastes
- **CO3** Able to prepare market study and business plan for waste recycling activities.

**BKC3833 RECYCLING TECHNOLOGY (E)**

**Credit : 3**

**Pre-requisite**
NONE

**Synopsis**

This subject covers the basic concepts of mixing such as power consumption, flow patterns and blending in single phase systems, fluid and particulate mixtures, gas-liquid dispersion and mass transfer, liquid-liquid dispersion with applications in emulsion formation, solids suspension and distribution in agitated flows and non-Newtonian flow effects. The subject also emphasizes on CFD modeling of stirred tank reactor, mixing effects on product structure and selection of
mixers for multi-purpose batch operations. This subject also taught a CFD simulation of mixing tank using FLUENT.

**Course Outcomes**

- **CO1** Explain, discuss and present the common types of mixing operations and measurement techniques for fluids and particles mixing.

- **CO2** Solve mathematical problems related to mixing i.e. power number, flow regimes, impeller Reynolds number, aeration number, mass transfer, mixing time, scale-up and homogeneity.

- **CO3** Design a suitable mixing technique for a given process conditions with or without chemical reactions and performing the scale-up calculation especially for multiphase system.

- **CO4** Evaluate and analyse performance of stirred tank via CFD.

**BKC4683 FOOD ENGINEERING (E)**

**Credit** : 3

**Pre-requisite**
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** Discuss and elaborate on the production of refrigerated foods

- **CO3** Interpret the materials used and roles of food packaging

- **CO4** Discuss the importance of safety and hygiene in food production

- **CO5** Apply and analyze the principles of dehydration in food products

**BKC3533 OSH IN CHEMICAL INDUSTRIES**

**Credit** : 3

**Pre-requisite**
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 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 included.
Course Outcomes

- CO1  Value fundamentals of technical safety for chemical industries.

- CO2  Explain the various features of OSH management and regulations.

- CO3  Review OSH aspects in the design and operation of chemical industries such as source model, dispersion model, fire triangle & prevention and HAZOP study.

BKF4916
INDUSTRIAL TRAINING

Credit : 6

Pre-requisite
COMPLETE ALL LEARNED SUBJECTS

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 ten weeks of industrial training during the short 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

BKB2213
BIOCHEMISTRY

Credit : 3

Pre-requisite
NONE

Synopsis

The subject provides an overview of fundamental concepts in biochemistry, which focuses upon the living organisms and major biomolecules in living systems. Important topics include the structure and function of water, amino acids, proteins, carbohydrates, lipids, nitrogen and amino acids. The application of buffers as well as enzyme kinetics will be extensively emphasized. Various metabolisms for carbohydrates, lipids, nitrogen and amino acids will be discussed in detail. The course will also emphasize on the laboratory skills which includes introduction to biochemistry analysis (DNS calorimetric method and Lowry method).
method), and enzyme kinetic analysis.

Course Outcomes

- CO1 Describe the overview of living organism and the chemical processes that occur in living organism.
- CO2 Explain the structural chemistry of the components of living matter and the relationship of biological function to chemical structure.
- CO3 Describe the various metabolisms that occur in living matters and their regulatory pathways.
- CO4 Analyze the carbohydrate and protein concentration using biochemistry analysis.
- CO5 Evaluate the effects of different parameters towards enzyme activity.

BKB2412
INDUSTRIAL BIOTECHNOLOGY

Credit : 2

Pre-requisite
NONE

Synopsis

The subject introduces students to introductory microbiology and fundamentals of biochemical engineering as used in industrial biotechnology such as microorganisms, microbial growth, nutrition and design of industrial growth media. It also covers design and operation of clean-in-place systems, clean rooms and heating, ventilation and air-conditioning (HVAC) systems. In addition, facility layout and engineering for compliance with Good Manufacturing Practices are discussed. Design for containment and validation, flowsheets and case studies are used to illustrate several representative industrial microbial processes relevant to biotechnology industry facilities.

Course Outcomes

- CO1 Classify major types of micro-organism and their characteristic.
- CO2 Implement Good Manufacturing Practices and construct bioprocess facility.
- CO3 Automated in place cleaning that complied to the industry GMP standard.
- CO4 Discover the bioprocess involved in the industrial microbial and construct.
- CO5 Flow-sheets for several representative process.
- CO6 Construct the application of biotechnology for industrial application.

BKB3423
BIORECTOR ENGINEERING

Credit : 3

Pre-requisite
NONE

Synopsis

This subject covers the basic concepts of microbial growth phases and growth kinetic, selection and operating factors of bioreactor. This subject also emphasizes on the
application of transport phenomena in bioreactor, sterilization methods, scale up and control system and instrumentation.

Course Outcomes

- **CO1** Summaries current issue, development and application of bioreactor (i.e. journals review)

- **CO2** Solve the calculation problem regarding to the cell growth and kinetic in different fermentation mode. Explain and discuss the different operation mode of bioreactor and its related instrumentation.

- **CO3** Designing a mass (i.e OUR, DO, kLa) and heat transfer (i.e jacket or cooling coil) system in a bioreactor. Solving mathematical models related to the mass and heat transfer in bioreactor. Explain and discuss the different operation various method for heat and mass transfer measurement in bioreactor.

- **CO4** Designing a sterilization system in a bioreactor as well as solving the mathematical model related to sterilization.

- **CO5** Evaluate the effect of scale-up to the performance of gas-liquid stirred tank bioreactor.

BKB3533

**OSH IN CHEMICAL & BIOTECHNOLOGY INDUSTRIES**

**Credit : 3**

**Pre-requisite**

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** Review OSH aspects in the design and operation of chemical and biotechnology industries such as Threshold Limit Values, source model, dispersion model, fire triangle & prevention, and HAZOP study.
BKB2132
MOLECULAR & CELL BIOLOGY
Credit : 2
Pre-requisite
NONE
Synopsis
This subject intends to develop an understanding of the cell as the basic biological unit, molecular biotechnology, basic principles of genetic engineering and its applications. The students will be able to discuss the basic molecular biology knowledge to genetically engineered living organisms. By completing this subject, students should be able to emphasize issues relevant to process knowledge.
Course Outcomes
- CO1 Describe the concept and the function of macromolecules of the cells
- CO2 Explain the pathway from DNA to protein
- CO3 Explain the concept and basic steps in gene cloning
- CO4 Explain the concept and the use of Agrobacterium for genetic engineering in plants.

BKB4493
BIOSEPARATION ENGINEERING
Credit : 3
Pre-requisite
NONE
Synopsis
This course is designed to introduce that commonly employed to separate biological products. An idealized process of bio-separation consists of four phases which are the removal of insoluble products, the isolation of desired biological products. The basic methods that will be covered in this course include microfiltration, sedimentation and centrifugation, coagulation and flocculation, cell disruption, precipitation, extraction, adsorption, ultra-filtration, chromatography, electrophoresis, crystallization and drying.
Course Outcomes
- CO1 Differentiate four phases involve bio-separation which are recovery, isolation, purification and polishing
- CO2 Explain the principles of each technique Justify the underlying reasons for choosing a particular technique, as well as suggest any related improvement
- CO3 Utilize the related engineering or scientific principles in solving any related bio-separation problems
- CO4 Propose a train of bio-separation for any Bio product

BKB3781
BIOSEPARATION ENGINEERING LAB
Credit : 1
Pre-requisite
NONE
Synopsis
This course aims to provide hands on experience on separation units for biological products. The experiments cover the upstream and downstream of bioprocess. The students will be exposed to the preliminary works in bioprocess which are inoculum preparation, bioreactor setup and operation, and shake flask fermentation. Subsequently, recovery phase is introduced which covers centrifugation (bench-top and disk stack) and microfiltration. For the recovery of intracellular products, homogenization processes (stator-rotor, high pressure homogenizer and ultrasonic) are introduced. The obtained liquid product is then concentrated using cross-flow filtration or ammonium sulphate precipitation (isolation). The purification processes are also included which is size exclusion chromatography and ion-exchange chromatography. Sodium dodecyl sulphate polyacrylamide gel electrophoresis is also introduced to monitor the product.

Course Outcomes
- CO1 Prepare inoculum for initial bioprocess
- CO2 Operate a bioreactor (set up, calibrate, run & clean)
- CO3 Perform recovery process either to obtain solid or liquid as final product
- CO4 Perform isolation and purification of product
- CO5 Perform standard analysis to monitor the process
- CO6 Analyze and interpret the data

BKB4944, BKG4944, BKC4944
UNDERGRADUATE RESEARCH PROJECT II
Credit : 4
Pre-requisite
BKC3922, BKB3922, BKG3922
UNDERGRADUATE RESEARCH PROJECT I
Synopsis
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 Analyze data, discuss and conclude the findings
- CO2 Manage the research work
- CO3 Practice positive attitude in research activities
- CO4 Present the research report and cited latest publications on the subject
BKC3922, BKB3922, BKG3922
UNDERGRADUATE RESEARCH
PROJECT I

Credit : 2

Pre-requisite
BKF3463 UNIT OPERATION I

Synopsis
This course is designed to expose 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, 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 Outcomes
- CO1 Propose background study, problem statement, objective and scopes of the research.
- CO2 Practice positive attitude in research activities
- CO3 Present the research proposal and cited latest publications on the subject

BKC3912, BKB3913
BKG3912
PROCESS & PLANT DESIGN I

Credit : 3

Pre-requisite
BKF3463 UNIT OPERATION I
BKF2453 CHEMICAL REACTION ENGINEERING I

Synopsis
In this subject, students will be exposed to the chemical plant design principles. This subject will emphasize on synthesizing complete process flow diagram, synthesis and simulate of process using commercial simulation software. Subsequently, students will be exposed to heat integration to minimize utilities cost, sizing of equipment and costing, and economic analysis to determine the profitability as well as the consideration of environmental aspect. At the end of this subject, students are expected to complete a design project until mass and energy balance.

Course Outcomes
- CO1 Review on equipment sizing, utilities in process plant and safety issues
- CO2 Estimate minimum energy requirement, cost and profitability of a process plant
- CO3 Solve material and energy balance manually and using commercial simulation software
- CO4 Synthesis of process flow diagram
- CO5 Present design report for he proposed case study
BKC4934, BKG4934, BKB4934

PROCESS & PLANT DESIGN II

Credit : 4

Pre-requisite
BKC3912, BKG3912, BKB3912

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 a Chemical/ Biological/ Gas processing plant. They will also apply their previously obtained knowledge from Process & Plant Design I and other related subject, in completing the design task given. Students will be assessed based on their presentations, reports, log book and attitude wise.

Course Outcomes

- CO1 Solve mass & energy balance manually and using commercial process simulators
- CO2 Calculate utilities, equipment sizing, cost involves
- CO3 Propose control mechanism, HAZOP and waste management approach
- CO4 Present design report for the proposed case study

BKG 3412

OIL AND GAS PRODUCTION SYSTEM

Credit : 2

Pre-requisite
NONE

Synopsis

The main objective of this course is to provide a deeper understanding of the upstream activities of the oil and gas industry to non-petroleum engineering students. By the end of this course, students should be able to explain the stages and process of hydrocarbon formation, how it is found and later produced. Students should also be able to identify and describe the main topics related to petroleum exploration and exploitation activities. These include geology and geophysics, drilling, reservoir engineering and production processes. 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 petroleum life cycle, the downstream aspects of the petroleum industry such as refinery operations, gas processing, product transportation, emulsions as well as current issues affecting industry will also be covered.

Course Outcomes

- CO1 Identify and describe the processes involved in exploring, drilling, producing, processing and transporting of petroleum products.
- CO2 Explain the concepts of rock cycle and sedimentation, oil and gas formation and deposition,
also the factors contributing to the importance and activities of the oil and gas industry in Malaysia and the world.

- CO3 Apply basic engineering principles to calculate important reservoir properties, estimate reservoir volumes and hydrocarbons in place and production calculations

- CO4 Compare and describe different types of reservoir mechanisms and how it relates to the wells deliverability.

**BKG 4423**

**OSH IN OIL AND GAS INDUSTRY**

**Credit : 3**

**Pre-requisite**
NONE

**Synopsis**
This course addresses the legal framework of the safety aspects of the working environments for the oil and gas industries. The students will be exposed with the fundamental concepts, practical aspects and applications of occupational safety and health (OSH) in industries. The fundamental application and day-to-day aspects of OSH and at management aspects of OSH will be included in this course. Local and international regulations of SH&E such as OSHA, FMA and Gas Supply Act & Regulation also will be covered. Case studies from several chemical and oil & gas industries also will also be highlighted.

**Course Outcomes**

- CO1 Value fundamentals of technical safety for industries.

- CO2 Explain the various features of OSH management and regulations.

- CO3 Extract and analyse the cause and effect of industrial incidents and proposed for the improvement.

- CO4 Evaluate OSH aspects in the design and operation of chemical and oil & gas industries such as threshold limit values, source model, dispersion model, fire triangle and prevention also HAZOP study

**BKG3453**

**GAS PROCESSING AND LIQUEFACTION**

**Credit : 3**

**Pre-requisite**
NONE

**Synopsis**
This course mainly presents the treatment processes involved in transforming raw hydrocarbon gas produced from offshore fields into several valuable products. Such processes that include hydrocarbon gas processing, conditioning and liquefaction are vital in meeting the pipeline specifications and the user requirements. Besides being utilized as a source of energy, the treated hydrocarbon gas, specifically the natural gas will be used as a feedstock for petrochemicals processes that apply the principles of natural gas conversion. Both of the indirect-and-direct conversion
processes are being discussed in details. Furthermore, the course also encompasses the common processes that commercially applied in the production of non-hydrocarbon gases.

**Course Outcomes**

- **CO1** Differentiate the hydrocarbon gases properties, hydrocarbon gas's well-to-user chains and synthesize a PFD of gas processing plant that treating raw natural gas to become sales gas and NGLs

- **CO2** Evaluate the important negative effects of having impurities such as water, acid gases, heavier hydrocarbons and others in natural gas flow and decide suitable type of treatment processes

- **CO3** Evaluate natural gas liquefaction processes that involve refrigeration and solve related engineering calculations.

- **CO4** Explain the principles of natural gas conversion to produce feedstock for petrochemical plants

- **CO5** Synthesize a PFD for the production of non-hydrocarbon gases such as oxygen, nitrogen, hydrogen and etc

**Synopsis**

In this laboratory session, student will be exposed to the equipment and facility related to the gas transmission & distribution system, corrosion protection system and combustion process. Students will be given the opportunity to conduct equipment that is related to combustion process and demonstrate principle on pipe jointing and pipeline corrosion. Besides that, students will generate various skills including skills that are related to surface breaking test, hydrostatic test, corrosion test and many more. Instructor will explain about the standard operating procedure to run the experiment and students will run experiment in groups under the supervision of the instructor.

**Course Outcomes**

- **CO1** Discuss the testing equipment properly and explain the purpose of each equipment

- **CO2** Apply the relevant code and standard for jointing, defect detection and corrosion study

- **CO3** Perform team-working environment and leadership during experiment

- **CO4** Relate and recognize the fundamental and theory learnt in all experiments with industrial applications

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**BKG4731**

GAS TECHNOLOGY LAB

Credit : 1

Pre-requisite
NONE

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**BKG 3433**

GAS TRANSMISSION AND DISTRIBUTION

Credit : 3

Pre-requisite
NONE
Synopsis

This course aims to provide fundamentals knowledge to design piping systems for 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 Explain the conceptual understanding of natural gas pipeline in Malaysia.

- CO2 Classify the relevant acts, regulation, codes and standard that be used in gas pipeline installation.

- CO3 Describe the basic equipment in gas pipeline installation and gas metering.

- CO4 Calculate flow rate and pressure drops for gas transmission and distribution piping system.

- CO5 Analyze pressure losses and flow rate in gas pipeline network using several analysis.

BKG 4463
GAS STORAGE AND RETICULATION

Credit : 3

Pre-requisite

Synopsis

This subject aims to enable students to identify various types of storing methods of liquefied petroleum gas (LPG), natural gas (NG) and liquefied natural gas (LNG). Besides that, the understanding of gas reticulation system as well as corrosion and leakage phenomena also 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 Liquefied Petroleum Gas (LPG, Natural Gas (NG) and LNG storage systems.

- CO2 Apply calculation on the gas load consumption, pipe and storage sizing, total of gas withdraw from LNG storage and others related equipment.

- CO3 Perform calculations on natural gas line packing system.

- CO4 Respond with the current issues in gas storage technologies and development.

- CO5 Design LPG storage system and its accompanying piping system or reticulation system.

BKG4**2
GAS COMBUSTION AND UTILIZATION

Credit : 2

Pre-requisite
Synopsis

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.

Course Outcomes

- CO1 Explain the fundamental concepts of combustion processes, fuel properties, explosion phenomena and other related terms.
- CO2 Describe flame characteristics and distinguish between combustion, detonation, deflagration, explosion and venting/ventilation system.
- CO3 Perform mass and energy balance in combustion system and burner conversion calculation.
- CO4 Develop a simple combustion calculation using Microsoft Excel software.
- CO5 Classify types of burner and gas equipment, burner conversion design and explain related energy generating technologies.

DKK2363
ENGINEERING MECHANICS

Credit : 3

Pre-requisite
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 Analyze problems involving the equilibrium of a particle or rigid body, and use the fundamental principles in statics to solve them.
- CO2 Apply the basic principles in dynamics to analyze problems involving the rectilinear and curvilinear motions of a particle.
- CO3 Apply Newton’s second law to solve problems involving the relationship between forces and acceleration.

DKK1352
ELECTRICAL TECHNOLOGY

Credit : 2

Pre-requisite
NONE
Synopsis

This course is designed to introduce the fundamental of electrical system principles to chemical engineering students. The underlying principles that will be covered in this course include an introduction to an electrical system, electrical safety, basic laws, method 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 transformer. A part of that, student also needs to carry out simple technical project in order to assess their understanding on the basic principles of electrical system.

Course Outcomes

- CO1  Ability to explain the concepts of electrical system and understand issues on electrical safety

- CO2  Ability to analyse and solve electric circuit problems both for direct and alternate currents.

DKK1781

BASIC SCIENCE & ENGINEERING LAB

Credit : 1

Pre-requisite
NONE

Synopsis

In basic science & engineering lab, students are required to perform laboratory work which covered the basis concept of physical and chemistry such as concepts of solubility and miscibility, buffer effect, calorimetry and gravimetric determination 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 & engineering materials.

Course Outcomes

- CO1  Apply all basic science and engineering theory in laboratory.

- CO2  Apply concept and interpretation of data, knowledge in operation of basic science and engineering equipment to solve lab experimental problem.

- CO3  Operate and demonstrate different type of equipment that applies in science and engineering principle theories.

- CO4  Able to work in group and commit with all the lab rules and regulations.

DKK1524

COMPUTER APPLICATION AND ENGINEERING GRAPHICS

Credit : 4

Pre-requisite
NONE

Synopsis
The aim of this course is to introduce students the basic concepts of computer system and engineering drawing. The subject also aim to provide experience and to be familiar in using the computer system as well as its accepted conventions and abbreviations and the use of engineering drawing in the development of process flow diagram (PFD) and process & instrumentation diagram (P&ID). The students acquaint with the basic knowledge and skills in computer system and engineering drawings which introduce the students to problem solving using a computer as well as the capability to read and write the language of engineering graphics. The students can also develop an understanding of 2D computer aided drafting (CAD) software with the requirements of good engineering drawings and be able to apply them to their work.

**Course Outcomes**

- **CO1** Apply the engineering tools in order to create technical drawings for the chemical engineering equipment and related disciplines.
- **CO2** Identify capabilities, limitations and procedures for using computer systems to solve personal, business and educational problems.
- **CO3** Demonstrate knowledge of the main computer applications used in education and be able to choose the appropriate application for a given task.
- **CO4** Ability to describe the engineering tools by using techniques, skills and modern engineering tools necessary for chemical engineering practice.

**DKK1413 MATERIAL & ENERGY BALANCE**

**Credit : 3**

**Pre-requisite**
**DUM1113 BASIC MATHEMATICS**

**Synopsis**

This course is designed to give students a foundation in the basics of chemical engineering (mass and energy balance, thermodynamics, kinetic, etc). Students will be exposed to the applications of ideal and non-ideal gas calculations in single phase system. 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** Apply basic chemical engineering calculations involving conversion of units and determination of process variables.
- **CO2** Analyze and solve material balance problems for systems with or without chemical reactions involving single unit, multiple unit processes, recycle, bypass and purge.
- **CO3** Apply the ideal and non-ideal gas calculations to solve problems related to single phase system.
- **CO4** Ability to analyze, formulate and solve energy balances for systems with or without chemical reactions
DKK1493
TRANSPORT PROCESSES

Credit : 3

Pre-requisite
NONE

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

DKK1761
MASS AND HEAT TRANSFER LAB

Credit : 1

Pre-requisite
NONE

Synopsis
This laboratory course is offered to enhance their understanding through experiments to observe the application of theories learn in tray dryer unit, liquid diffusion, gas diffusion, fixed and fluidized bed unit, co-current shell & tube heat exchanger, counter-current plate & frame heat exchanger, co-current plate & frame heat exchanger, counter-current shell & tube heat exchanger. In this lab, student will be given a main objective of each experiment and instructor will explain about the Work Instruction to run the experimental. 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 Determine suitable equipment when certain chemical substance is given

DKK1771
ANALYTICAL INSTRUMENTAL LAB

Credit : 1

Pre-requisite
NONE

Synopsis
In Analytical Instrument Lab, students conduct experiment which involves different types of analytical
equipments. 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 consist of seven experiments which involves ten analytical equipments i.e Melting Point Apparatus, Atomic Absorption Spectrometer (AAS), UV-Visible Absorption Spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), Malven Mastersizer, Viscometer, Turbiditimeter, Refractometer, pH meter and Conductivity Meter.

Course Outcomes

- **CO1** Applied all the basic science and analytical chemistry knowledge in operation of analytical chemistry equipment.

- **CO2** To demonstrate the theories applied in analytical chemistry

- **CO3** To operate and demonstrates each analytical equipment.

- **CO4** Ability to indicate any minor/major malfunction of equipment, incorrect step/ result & troubleshoot it

**DKK2333 THERMODYNAMICS**

**Credit : 3**

**Pre-requisite**

NONE

**Synopsis**

This subject introduces basic concept in thermodynamics. Topics covered are properties of pure substances, thermodynamics system, 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, introduction to refrigeration, heat pump and steam power plant and entropy.

**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** Analyse the thermal efficiency of heat engine, heat pump, and refrigerator and Carnot cycle using Second Law of Thermodynamics.
DKK2433
CHEMICAL REACTION ENGINEERING

Credit : 3

Pre-requisite
DKK1413
MATERIAL & ENERGY BALANCE

Synopsis
This subject covers the knowledge of the reaction kinetics and reactor design which distinguishes chemical engineer from other engineer. 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, PFR and PBR. The topics covers in this subject are kinetic rate theory, homogeneous reaction in batch and continuous system and catalysis process.

Course Outcomes
- CO1 Explain the fundamentals of chemical reaction engineering such as mole balance, rate law, and stoichiometry in reactor design.
- CO2 Apply the concepts for the design and operation of industrial reactors using analytical skill.
- CO3 Solve problems related to designing reactor in chemical engineering problem.

DKK2771
CHEMICAL REACTION ENGINEERING LAB

Credit : 1

Pre-requisite
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
Pre-requisite
NONE
Synopsis
This particular 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
Pre-requisite
NONE
Synopsis
This subject is designed to introduce to the students the principles of environmental engineering. Topics includes introduction of environmental engineering, water and wastewater quality management, water and wastewater treatment, air pollution, solid waste treatment and hazardous waste management.
Course Outcomes
- CO1 Describe the ethics & responsibilities as engineer towards environment and expose to environmental legislation & regulation practices in Malaysia
- CO2 Review problems and its solving involving water and wastewater treatment
- CO3 Analyze the concept involved in management of solid waste, hazardous waste and air pollution control

DKK 2373
FLUID MECHANICS
Credit : 3
Pre-requisite
DKK2363
ENGINEERING MECHANICS
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 applications, analysis of flow in pipeline systems.
Course Outcomes
- CO1 Identify and describe the fundamentals of fluid mechanics
DKK 2462
PLANT COMMISSIONING & START-UP

Credit: 2
Pre-requisite
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 concepts of plant commissioning and start-up.
- CO2 Explain the common activities that take place during plant commissioning and start-up.
- CO3 Apply the concept of fluid mechanics to overcome chemical engineering problems
- CO4 Identify, analyse and find solutions to problems related to fluid

DKK2473
PLANT SAFETY AND HEALTH

Credit: 3
Pre-requisite
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 including local and international regulations such as OSHA, COMAH, 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 : 3

Pre-requisite
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 utility 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 and describe the basic mechanisms, principles and applications of boiler, cooling tower, air compressor, gases and water systems.

- CO2 Propose design criterions and safety aspects on plant utilities system.

- CO3 Apply knowledge of the function of equipment and utility systems.

DKK2463
PROCESS INSTRUMENTATION & CONTROL

Credit : 3

Pre-requisite
NONE

Synopsis
The course will introduce the basic instrumentation principles contained in a typical process control system both in theory and practical. The discussion covers various areas such as introduction to process, process measuring device which consist of flow, temperature, pressure, level and analytical analysis, data communication and presentation, control valves, distribution control system (DCS) and alarm systems.

Course Outcomes

- CO1 Understand basic control system, analogue and digital systems and final control elements.

- CO2 Obtain full understanding of the main elements in the instrumentation used – transducer and signal modifier.

- CO3 Recognize instrumentation system used in industry through Problem Based Learning technique.

- CO4 Apply the process instrumentation and control hardware for process measurement and control system.

- CO5 Perform scan, control, alarm and data acquisition
DKK2564
UNIT OPERATIONS

Credit : 4

Pre-requisite
DKK1413
MATERIAL & ENERGY BALANCE

Synopsis
This course aims to expose students on the basic principles of unit operations involved in chemical engineering process and industry. The unit operations discussed include distillation, absorption, evaporation, drying, leaching and extraction. 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 the knowledge in unit operation the students will be exposed to the related experiments at such as distillation, evaporation and absorption.

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 certain unit operations.
- CO3 Solve calculation problems related to selected unit operations.
- CO4 Apply the knowledge from the theories in unit operation experiments.
- CO5 Communicate effectively in group or individually through lab report or oral presentation.

DKK3919
INDUSTRIAL TRAINING

Credit : 12

Pre-requisite
COMPLETE ALL LEARNED SUBJECTS

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 ten weeks of industrial training during the short 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
CAREER PROSPECTS

- Chemical Engineer
- Project Engineer
- Design Engineer
- Operations Engineer
- Research & Development Engineer
- Energy Engineer
- Process Plant Engineer
- Oil & Gas Engineer
- Bioprocess Engineer
- Sales Engineer
- Quality Assurance Engineer
- Production Engineer
- Pharmaceutical Engineer
- Materials Engineer
- Consulting Engineer
- Instrumentation/Control Engineer
- Technopreneur/Management
- Lecturer

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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.

VISION

To be a world class competency-based faculty in computer technology.

MISSION

We provide computer technology education, high-quality research and consultation in line with the needs of industries through excellent academic programs by providing a conducive environment to produce creative and innovative human capital.

PROGRAMS OFFERED

Diploma in Computer Science

Bachelor of Computer Science (Software Engineering)
Bachelor of Computer Science (Computer Systems & Networking)
Bachelor of Computer Science (Graphics & Multimedia Technology)
Master by Coursework
Master of Science (Software Engineering)
Master of Science (Computer Networking)
Master of Science (Information & Communication Technology)

Master by Research
Master in Computer Science
Master in Software Engineering

Doctor of Philosophy (PhD in Computer Science)
Doctor of Philosophy (PhD in Software Engineering)

LABORATORIES AND FACILITIES

There are 21 laboratories at the faculty which are located in Block X, Y and M. These laboratories are listed as follows:

- CCNA Lab (2)
- Undergraduate Research Lab (1)
- Innovative Programming (2)
- Distributed Databases (1)
- SQL Databases Lab (1)
- Operating System Lab (1)
- ICT Lab (3)
- CISCO Lab (1)
- LAN Workshop Lab (1)
- Software Engineering Lab (3)
- Postgraduate Research Lab (3)
- Creative Lab (1)
- Modeling Lab (1)
- IBM Center Of Excellence

All these labs are managed by technical unit headed by Head of Technical Unit. Several subordinates comprises of Vocational Training Officer, Information Technology Officer, Assistant of Vocational Training Officer and Technician are located at the laboratories to help in management and administration of all equipments and labs. There are three technical unit rooms provided services to our staffs and students such as printing services, maintenance services, repair and troubleshooting services, and lab management services. These technical unit rooms are placed at each block.

Among equipments (hardware and software) provided to assist teaching and learning in labs are as follows:

- Sun Server
- Server, High-End Desktop and PCs
- Switches and Routers
- Fiber Splicer
- Optical Time-Domain Reflectometer (OTDR)
- Fluke Cable Network Analyzer and Tester
- Wireless Access Point
- Wireless Network Interface Card (NIC)
- Antenna for Wireless Systems (indoor and outdoor)
- Hardware-based firewall
- Network Cabling Tools and Components
- PC Assembly and Disassembly Tools and Components
- Camcorder
- Digital Single-Lens Reflex (DSLR)
- Mobile Studio Lighting
- Radio Frequency Identification (RFID) System
- Fingerprint Reader
- Personal Digital Assistant (PDA) and Mobile Device
- Global System for Mobile Communications (GSM) Modem
- Xbox Set
- MyKad Reader
- Laser Scanner and Printer
- All Microsoft Softwares available through MSDN Academic Alliance Software Center
- Rational Suite
- Adobe Products
- Matrix Laboratory (MATLAB)
- Code Gear C++
- Sun Solaris, Linux and Microsoft Operating System
- S-Plus
- LEGO Robot
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Mahmud bin Abdul Samad
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Telephone No.: 09- 5491146
Email: mahmud@ump.edu.my
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## CURRICULUM STRUCTURE - BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING) WITH HONOURS

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**Core Courses**

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**OVERALL TOTAL CREDIT FOR GRADUATION**

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**BUM2133**  
**ORDINARY DIFFERENTIAL EQUATIONS**  
Credit: 3 credit  
Pre-requisite: None

**Synopsis**  
This course introduces the Ordinary differential equations, Laplace transform and Fourier series and their applications in solving engineering problems.

**Course outcomes**

- **CO 1** Use the basic principles and methodologies of differential equations, Laplace transform and Fourier series to solve various problems in differential equations, Laplace transform and Fourier series.
- **CO 2** Use appropriate tool to solve the computational problems in ordinary differential equation.
- **CO 3** Apply concepts and methods learned to solve any related problem of differential equations, Laplace Transform and Fourier Series in various fields.

**DCN1013**  
**COMPUTER ARCHITECTURE & ORGANIZATION**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Identify and classify computer structure and its functions.
  - CO2 - Identify the importance of computer system design, in order to achieve high performance.
  - CO3 - Explain the internal components and their functionality of a computer, i.e., control unit, ALU, register, memory and CPU addressing modes.
  - CO4 - Demonstrate team working by solving problems in groups.

**Synopsis**

This course discusses the structure and function of a computer. It exposes students to the architecture and organization of a computer. This subject covers the number 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.

**PROGRAMMING TECHNIQUES DCS1053**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Demonstrate various techniques in solving a problem.
  - CO2 - Construct and run programs.
  - CO3 - Present various programming techniques in computer.

**Synopsis**

This course discusses the fundamental of mathematics focusing on providing a solid theoretical foundation for further work. Students 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.

**DCS2103**  
**DATA STRUCTURE & ALGORITHM**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Use various types of data structures and algorithms techniques in a related problem.
  - CO2 - Construct a programme by applying the data structure and algorithms techniques for a related problem.
  - CO3 - Join online collaboration tool and able to discuss new idea for learning autonomy.

**Synopsis**

This subject introduces and discusses the fundamental of the discrete as apply to computer science, focusing on providing a basic theoretical foundation for further work. Students are exposed to logic, set theory, elementary number of theory, functions, relations, fundamentals of counting, Boolean algebra and simple proof technique. This course integrates symbolic tools, graphical concepts, and numerical calculations.

**DCI2033**  
**DATABASE SYSTEMS**

**Course Outcomes**

- 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.

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.

CALCULUS
DUM1123

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Apply and solve for elementary function and any related problem using the basic techniques and methodologies of calculus.
✓ CO2 - Think critically a wide range of problem and solve it using ideas and methods in calculus.
✓ CO3 - Relate and apply the concepts and methods studied into other courses.

Synopsis
This subject discusses single-variable calculus as they apply to computer science and focusing on providing a basic theoretical foundation for further work. Students are exposes to limits and continuity, derivatives, application of the derivatives, integrals, and application of the integrals. This course integrates symbolic tools, graphical concepts and numerical calculations.

DATA COMMUNICATION & NETWORKING
DCN1053

Course Outcomes
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 - Propose the solution of given problems using object-oriented programming technique.

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

OPERATING SYSTEMS
DCN2063

Course Outcomes
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

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.

STATISTICS & PROBABILITY
DUM2413

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Describe and data analyze using statistical theory and methodology
✓ CO2 - Apply statistical concepts and methods learned to solve any related problems in various scientific disciplines
✓ CO3 - Relate and apply the techniques and methods studied into other courses.

Synopsis
In this course, students are exposed to basic statistics and analyze statistically. The topics covered are introduction to statistics, descriptive statistics, probability, discrete probability distributions, continuous probability distributions, sampling distribution and simple linear regression and correlation.
INDUSTRIAL TRAINING
DCC3068
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Adapt working culture in ICT related industry.
✓ CO2 - Construct solution by applying the theory learned to solve real problem in organization.
✓ CO3 - Work effectively with others in organization to perform task given.
✓ CO4 - Practise interpersonal skills and professional ethics in organization.

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.

INDUSTRIAL TRAINING REPORT
DCC3074
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Organize the industrial training knowledge, experience and skills in appropriate written report.
✓ CO2 - Organize technical writing skill in preparing the project report.
✓ CO3 - Report understanding of the leadership hierarchy in the organization.
✓ CO4 - Build communication skills on oral presentation.

Synopsis
During the placement, we expect students to keep a log book, in which they make regular entries describing the work they are undertaking. The industrial training report need to hand in to the university supervisor. Students also need to do final presentation for assessment.

ICT COMPETENCY WORKSHOP
DCC1022
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Discover problems statements from given scenarios and translate them into programming codes
✓ CO2 - Construct an executable application by going through all the processes of application development
✓ CO3 - Work effectively in team in order to complete the given assessment in specific time

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.

APPLICATION DEVELOPMENT WORKSHOP
DCC1032
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Demonstrate the knowledge for installation, maintenance and troubleshooting of Personal Computer and related Peripheral Devices base on Standard procedure.
✓ CO2 - Follow the installation, maintenance and troubleshooting Steps for Personal Computer and related Peripheral based on standard procedure.
✓ CO3 - Perform professionalism behavior and good communication skills

Synopsis
This course is designated to expose the student an IT Technician and Desktop Support Technician such as be able to troubleshoot and manage all the computer hardware and software. The work is carried out independently and in a team. Student must be able to carry out assigned tasks.

PROBLEM SOLVING
DCS1072
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Demonstrate the methods and approaches for solving the computing problem
✓ CO2 - Display logical thinking skills in solving problem
✓ CO3 - Demonstrate team working and communication skills through group assignment.

Synopsis
This course is an introductory computer course that covers the fundamental of computer technology. The internet and World-wide web, application and system software, computer hardware, communication and networks, Information Technology (IT) trends and its challenges, and information systems and its development will also be discussed.

INTRODUCTION TO IT
DCI1012
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Demonstrate knowledge and understanding of the benefits of IT, the use of computers, the use of computer’s components and function, current applications and latest knowledge on computer technology.
✓ CO2 - Select appropriate approaches to update with current IT.
✓ CO3 - React, communicate and work in group work in order to complete the given assessment in specific time frame.

Synopsis
This is an introductory course that covers the fundamental of computer and information technology. The internet and World-wide web, application and system software, computer hardware, communication and networks, Information Technology (IT) trends and its challenges, and information systems and its development will also be discussed.

GRAPHICAL USER INTERFACE DCM2013
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Classify the Graphical User Interface (GUI) in various types of softwares.
✓ 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.

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.

WEB PROGRAMMING
DCS2143
Course Outcomes
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 - Show effective communication in written and oral form through group discussion, meeting and presentation.

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.

LOCAL AREA NETWORK WORKSHOP
DCN2072
Course Outcomes
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 with Wide Area Network (WAN).
✓ CO2 - Construct the plan, implement, test and troubleshoot structured cabling for LAN based on rules and standards.
✓ CO3 - Explain the problem, discuss and make suggestion on the structured cabling network based on the real issue.

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.

SYSTEMS ANALYSIS & DESIGN
DCS1093
Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Classify the stages of Systems Development Life Cycle.
✓ CO2 - Reproduce the design of a new system from scratch that comply with the stages of systems development life cycle.
✓ CO3 - Discuss effectively in a team and propose the team decision/solution for a given problem.
✓ CO4 - Demonstrate leadership’s skills through group assignment.

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.

FINAL YEAR PROJECT
DCC3016
Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Build solution based on problem statement which comply with the principles of computer science.
✓ CO2 - Explain the appropriate tools organization to realize the solution and join online community to search and manage relevance information from various sources.
✓ CO3 - Explain the solution through oral and written form in order to defend their proposal.
✓ CO4 - Comply commercialization element in project solution.

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.

ELECTIVE SUBJECT
MULTIMEDIA TECHNOLOGY AND APPLICATIONS
DCM2033
Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Categorize characteristics and functions of each multimedia element.
✓ CO2 - Manipulate multimedia elements (text, graphic, audio, video & animation) using software tools.
✓ CO3 - Identify business opportunity in multimedia technology and application.
✓ CO4 - Demonstrate and explain security concepts, fundamentals, purpose, implementation and current trends.  CO4 - Demonstrate and explain security concepts, fundamentals, purpose, implementation and current trends.
✓ CO5 - Join collaborative learning platform for searching and managing relevance information from various sources.

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 text and audio, image and video, the art of multimedia, and multimedia over the network.

DATA & NETWORK SECURITY
DCN2033
Course Outcomes
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 leadership’s skills through group assignment.

Synopsis
The course introduces fundamental of security. Every chapter will explain security concepts, fundamentals, purpose, implementation and discussion in their respective areas related to data and network security. Topics include: Introduction to security, cryptographic tools,
user authentication and access control, security in networks, intrusion detection systems, firewalls and intrusion prevention systems and wireless security.

**COURSE SYNOPSIS – BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING)**

**PROGRAMMING TECHNIQUES**

**BCS1023**

**Course Outcomes**

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

**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.

**ICT COMPETENCY WORKSHOP**

**BCC1012**

**Course Outcomes**

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

- CO1 - Demonstrate the knowledge for installation, maintenance and troubleshooting of Personal Computer and related Peripherall Devices base on Standard procedure.
- CO2 - Organize the installation, maintenance and troubleshooting Steps for Personal Computer and related Peripherall based on Standard procedure
- CO3 - Construct a programme by applying the data structure and good communication skills

**Synopsis**

This course is designated to expose the student an IT Technician and Desktop Support Technician such as be able to troubleshoot and manage all the computer hardware and software. The work is carried out independently and in a team. Student must be able to carry out assigned tasks.

**APPLICATION DEVELOPMENT WORKSHOP**

**BCC1032**

**Course Outcomes**

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

- CO1 - Analyze problems statements from given scenarios and translate them into programming codes.
- CO2 - Construct an executable application by going through all the processes of application development.
- CO3 - Work effectively in team in order to complete the given assessment in specific time.
- CO4 - Communicate effectively in team in order to complete the given assessment in specific time.

**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.

**FUNDAMENTAL DISCRETE STRUCTURE**

**BUM1213**

**Course Outcomes**

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

- CO1 - Use the basic principles and methodologies of discrete structure to solve various problems in discrete structure.
- CO2 - Apply concepts and methods learned to solve any related problem of discrete structure in various fields.
- CO3 - Relate and apply the concepts and methods studied into other courses

**Synopsis**

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

- CO1 - Use the basic principles and methodologies of discrete structure to solve various problems in discrete structure.
- CO2 - Apply concepts and methods learned to solve any related problem of discrete structure in various fields.
- CO3 - Relate and apply the concepts and methods studied into other courses.

**DATA STRUCTURE & ALGORITHMS**

**BCS1093**

**Course Outcomes**

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

- CO1 - Analyse various types of data structures and algorithms techniques in a related problem.
- CO2 - Construct a programme by applying the data structure and algorithms techniques for a related problem.
- CO3 - Join online collaboration tool and able to discuss new idea for learning autonomy.

**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.

**DATA COMMUNICATION & NETWORKING**

**BCN1053**

**Course Outcomes**

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 - Build basic configuration of network design using real network devices such as switches and routers
- CO4 - Perform standard configuration and troubleshooting network using professional technique

**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.
COMPUTER ARCHITECTURE & ORGANIZATION
BCN1043

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Identify and classify computer structure and its functions
✓ CO2 - Identify the importance of computer system design, in order to achieve high performance
✓ CO3 - Explain the internal components and their functionality of a computer, i.e. control unit, ALU, register, memory and CPU addressing modes
✓ CO4 - Demonstrate team working by solving problems in groups.

Synopsis
This course discusses the structure and function of a computer. It exposes students to the architecture and organization of a computer. This subject covers 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.

SYSTEMS ANALYSIS & DESIGN BCS1133

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Differentiate the stages of Systems Development Life Cycle.
✓ CO2 - Reproduce a system from the given case study that comply with the stages of systems development life cycle
✓ CO3 - Work effectively in a team and propose the team decision/solution for a given problem.
✓ CO4 - Demonstrate team working by solving problems in groups.
✓ CO5 - Communicate effectively in a team for a given problem.

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.

OBJECT ORIENTED PROGRAMMING
BCS2143

Course Outcomes
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

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 thorough 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.

DATABASE SYSTEMS
BCI2023

Course Outcomes
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 Structured 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
✓ CO5 - Communicate effectively in group in order to complete the given assessments in specific time frame

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.

WEB SCRIPTING
BCS2303

Course Outcomes
✓ By the end of semester, students should be able to:
✓ CO1 - Demonstrate the understanding of dynamic web-based applications
✓ CO2 - Construct a Web-based application prototype using HTML, web server, database and scripting language.
✓ CO3 - Demonstrate leadership skill through group project
✓ CO4 - Demonstrate teamwork skill through group project
✓ CO5 - Show ability to identify business opportunities

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.

DISCRETE STRUCTURE AND APPLICATIONS
BUM2223

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Use the basic principles and methodologies of advanced discrete structure to solve various problems in discrete structure.
✓ CO2 - Write programs to describe and solve discrete structure problems using any programming language.
✓ CO3 - Apply concepts and methods learned to solve any related problem of discrete structure in various fields.
✓ CO4 - Relate and apply the concepts and methods studied into other courses.

Synopsis
This subject discusses an in depth of the discrete structures as they apply to computer science, focusing on providing a basic theoretical foundation for further work. Topics include review on algorithm, integers and matrices, advanced counting technique, graphs, trees, and modeling computation. This course integrates symbolic tools, graphical concepts, and numerical calculations.
OPERATING SYSTEMS  
BCN2053

Course Outcomes

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

- **CO1** - 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** - Construct the program for given problem on an operating System (Case Study).
- **CO3** - Organize the related problems using theoretical concepts of operating system.

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.

APPLIED STATISTICS  
BUM2419

Course Outcomes

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 tools.
- **CO3** - Apply statistical concepts and methods learned to solve any related problems in various scientific disciplines.
- **CO4** - Relate and apply the techniques and methods studied into other courses

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.

UNDERGRADUATE PROJECT I  
BCC3013

Course Outcomes

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

- **CO1** - Design the proposed solutions for a specific problem that comply with principles of computer science.
- **CO2** - Organize the concept and usage of appropriate tools to be used in the development of the solution
- **CO3** - Organize the solution based on specific problem with minimum supervision and self independent
- **CO4** - Explain the solution through oral and written form following the provided standard
- **CO5** - Demonstrate understanding the effect of professional practices in the development of the solution

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.

UNDERGRADUATE PROJECT II  
BCC3024

Course Outcomes

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 the appropriate tools to realize the solution
- **CO3** - Construct the solution with the best alternative
- **CO4** - Explain the solution through oral and written form following the provided standard
- **CO5** - Show the commercialize potential on a solution project

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.

SOFTWARE QUALITY ASSURANCE  
BCS3263

Course Outcomes

- 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 task.

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.

INDUSTRIAL TRAINING  
BCC4018

Course Outcomes

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

- **CO1** - Adapt working culture in ICT related industry.
- **CO2** - Construct solution by applying the theory learned to solve real problem in organization.
- **CO3** - Work effectively with others in organization to perform task given.
- **CO4** - Practise interpersonal skills and professional ethics in organization.
- **CO5** - Practice the related theory in the community and prepare for better career opportunity in computing area.

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
This course exposes the student to software project planning and industrial training report need to hand in to the university supervisor. Then, student need to provide industrial training report to describe the work they are undertaking. 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 need to do final presentation for assessment.

**INDUSTRIAL TRAINING REPORT**

**BCS4024**

**Course Outcomes**

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

- CO1 - Organize the industrial training knowledge, experience and skills in appropriate written report.
- CO2 - Organize technical writing skill in preparing the project report.
- CO3 - Report understanding of the leadership hierarchy in the organization.
- CO4 - Build communication skills on oral presentation.

**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 also need to do final presentation for assessment.

**SOFTWARE DESIGN WORKSHOP**

**BCS2343**

**Course Outcomes**

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

- CO1 - Demonstrate the Software Design Description (SDD) document based on IEEE or DOD Software development standard.
- CO2 - Construct a comprehensive Software Design Description (SDD) and system prototype that comply with the software development document.
- CO3 - Work effectively in group and promote leadership's skills through effective communication either in written, oral form, presentation and group discussion.

**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 (from course BCS2293 Software Planning & Requirement Workshop), students must produce Software Design Description (SDD) document by following standard format which being customized from DOD and IEEE standard.

**INTRODUCTION TO SOFTWARE ENGINEERING**

**BCS2283**

**Course Outcomes**

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 - Demonstrate leadership’s skills through group assignment.

**Synopsis**

This course presents an introduction to software engineering concepts including: software engineering paradigms, requirements specification, functional design, object-oriented design, software verification, and maintenance.

**SOFTWARE PLANNING & REQUIREMENT WORKSHOP**

**BCS2333**

**Course Outcomes**

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

- CO1 - Demonstrate the Software Design Description (SDD) document and Software Requirement Specification (SRS) customized from DOD and IEEE standard.
- CO2 - Manipulate web service components, configuration, securing and deployment in web application.
- CO3 - Identify appropriate solution using web technology to the specified problem.

**Synopsis**

This course exposes the student to software project planning and software requirement stages. It will concentrate on analysis of options and risks, configuration management plan and project planning, discovering and eliciting requirements techniques, languages and models for representing requirements, requirement documentation standard, handling requirement changes and writing Software Development Plan (SDP) document and Software Requirement Specifications (SRS) customize from DOD and IEEE standard.
component and deploy application. The students will implement what they have learned in a mini project.

**ARTIFICIAL INTELLIGENCE TECHNIQUES**

**BCS3213**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Point out the artificial intelligence concept in computer science.
  - CO2 - Construct an intelligence system prototype/module.
  - CO3 - Work effectively in a team to solve a given problem.

**Synopsis**

This course introduces students to the theory and practice of the Artificial Intelligence (AI). Students are expose to the main artificial intelligence concept currently most applied in application such as Artificial Neural Networks(ANN), Fuzzy Logics(FL), Genetic Algorithms(GA) and Expert Systems(ES). Practical examples of how artificial intelligence is applied to commercial, scientific and consumer applications will be covered.

**SOFTWARE CONFIGURATION AND MANAGEMENT**

**BCS3283**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Illustrate all the SCM method and task into the software engineering field.
  - CO2 - Explain the SCM procedure in the software engineering task.
  - CO3 - Work effectively in written and oral form through group discussion and presentation session.

**Synopsis**

This course comprises factors such as configuration identification, configuration control, status accounting, review, build management, process management, and teamwork - SCM practices taken as a whole define how an organization builds and releases products and identifies and tracks changes. It also concerns with the aspects of SCM that have a direct impact on the day-to-day work of the people writing code and implementing features and changes to that code.

**SOFTWARE TESTING AND MAINTENANCE**

**BCS3323**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Analyze different types and levels of methods which used in software testing and maintenance.
  - CO2 - Construct test sets using testing techniques and available tools.
  - CO3 - Work effectively in a team to find a number of case studies and to identify the basic test cases and documentation.
  - CO4 - Demonstrate the leadership skills in the selected case study.

**Synopsis**

This course introduces students to software testing and maintenance, where the student learn and apply basic skills needed to create and automate the test plan for a software development environment. Students also expose to maintenance process including maintenance method and techniques.

**FORMAL METHODS**

**BCS2213**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Demonstrate the understanding of theory and principles of Formal Methods in developing software.
  - CO2 - Construct the software specification using appropriate techniques, skills and tools in Z notation.
  - CO3 - Work and communicate effectively in group to complete the software development based on software specification.

**Synopsis**

This course is introducing Formal Methods, which can be used in developing software specification. Formal Methods is the software specification language 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 language to be introduced is Z notation or any language related to Formal Methods.

**ARTIFICIAL INTELLIGENCE TECHNIQUES**

**BCS3231**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Point out the artificial intelligence concept in computer science.
  - CO2 - Construct an intelligence system prototype/module.
  - CO3 - Work effectively in a team to solve a given problem.

**Synopsis**

This course introduces student to the theory and practice of the Artificial Intelligence (AI). Students are expose to the main artificial intelligence concept currently most applied in application such as Artificial Neural Networks(ANN), Fuzzy Logics(FL), Genetic Algorithms(GA) and Expert Systems(ES). Practical examples of how artificial intelligence is applied to commercial, scientific and consumer applications will be covered.

**ELECTIVE SUBJECT**

**ARCHITECTURE OF SOFTWARE SYSTEM**

**BCS3343**

**Course Outcomes**

- By the end of semester, students should be able to:
  - CO1 - Discover some major architectural structures (styles, patterns, tactics, etc.) and their impact on overall system properties.
  - CO2 - Apply the technical, organizational and business role of software architecture CO3 - Reproduce a medium-sized software system that satisfies an architectural specification.
  - CO4 - Demonstrate the ability of communication skills and team working elements in group work.

**Synopsis**

This course introduces architectural design concepts critical to designing complex software-intensive systems. It considers commonly used software system structures, techniques for designing and implementing these structures, models and notations for characterizing and reasoning about architectures, tools for generating specific instances of an architecture, and case studies of actual system architectures. The course teaches the skills needed to evaluate the architectures of existing systems and to design new systems using well-founded architectural paradigms.
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.

**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.

**DATA & NETWORK SECURITY BCM2023**

**Course Outcomes**

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

✓ CO1 - Inquire and analyze theory and principles of information security, types of attacks, cryptography, firewalls, wireless and intrusion detection system.
✓ CO2 - Construct attack and defence methods into computer and network environments.
✓ CO3 - Demonstrate usage of data and network security methods and tools and organize public awareness for newest attack and defence solution.

**Synopsis**

The course introduces fundamental of security. Every chapter will explain security concepts, fundamentals, purpose, implementation and discussion in their respective areas related to data and network security. Topics include: Introduction to security, cryptographic tools, user authentication and access control, security in networks, intrusion detection systems, firewalls and intrusion prevention systems and wireless security.

**CO3083**

**Course Outcomes**

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 - Explain both theoretical and practical foundation concepts in mainframe environment.
✓ CO3 - Construct configuration for a specific mainframe environment.
✓ CO4 - Demonstrate team working and communication skills through group assignment.

**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.
BY THE END OF SEMESTER, STUDENTS SHOULD BE ABLE TO:

- CO1 - Identify and apply the basic concepts of a computer ethics and policies and the related area
- CO2 - Construct the components of a structured plan for solving computing ethical problems
- CO3 - Study and demonstrate several examples of professional codes of ethics related to computing, discuss their commonalities, differences, and implications.

**Synopsis**

This course introduces the overview of how computers have affected society and how they could further affect it in the future. Student will learn how to examine various ethical issues surrounding computers. These will include piracy, hacking, viruses, responsibility and liability for the use of software, cyberporn, computerized invasion of privacy, computers in the workplace, and the use of artificial intelligence and expert systems. This course will also consider many of the moral and professional issues that those who work with computers might expect to face.

**FACULTY CORE SUBJECT**

**PROGRAMMING TECHNIQUES BCS1023**

**Course Outcomes**

- CO1 - Demonstrate understanding on best approaches and updates for current issues or topics in software Engineering
- CO2 - Reproduce a solution to a given problem based on current topics or issues in software engineering
- CO3 - Discuss and present in group or individual to elaborate the given task

**Synopsis**

Advanced topics in specifying, designing, modeling, developing, deploying, testing, and maintaining software. May include such topics as software engineering economics, data security and privacy, ethics of computing, programming languages, visual languages, expert systems, machine vision, web applications and web services. May be repeated with change in topic. May include several topics through-out the semester.

**SYLLABUS FOR BCN**

**FUNDAMENTAL DISCRETE STRUCTURE BUM1213**

**Course Outcomes**

- CO1 - Use the basic principles and methodologies of discrete structure to solve various problems in discrete structure.
- CO2 - Apply concepts and methods learned to solve any related problem of discrete structure in various fields.
- CO3 - Relate and apply the concepts and methods studied into other courses

**Synopsis**

This subject introduces and discusses the fundamental of the discrete as apply to computer science, focusing on providing a basic theoretical foundation for further work. Students are exposed to logic, set theory, elementary number of theory, functions, relations, fundamentals of counting, Boolean algebra and simple proof technique. This course integrates symbolic tools, graphical concepts, and numerical calculations.

**DATA STRUCTURE & ALGORITHMS BCS1093**

**Course Outcomes**

- CO1 - Demonstrate the knowledge for installation, maintenance and troubleshooting of Personal Computer and related Peripherall Devices base on Standard procedure.
- CO2 - Organize the installation, maintenance and troubleshooting Steps for Personal Computer and related Peripherall based on Standard procedure.
- CO3 - Demonstrate professionalism behavior and good communication skills

**Synopsis**

This course is designated to expose the student an IT Technician and Desktop Support Technician such as be able to troubleshoot and manage all the computer hardware and software. The work is carried out independently and in a team. Student must be able to carry out assigned tasks.
DATA COMMUNICATION & NETWORKING
BCN1103

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

✓ CO1 - Analyse various types of data structures and algorithms techniques in a related problem.
✓ CO2 - Construct a programme by applying the data structure and algorithms techniques for a related problem.
✓ CO3 - Join online collaboration tool and able to discuss new idea for learning autonomy.

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.

DATABASE SYSTEMS
BC12203

Course Outcomes
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), 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
✓ CO5 - Communicate effectively in group in order to complete the given assessments in specific time frame

Synopsis
This 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.

COMPUTER ARCHITECTURE & ORGANIZATION
BCN11043

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

✓ CO1 - Identify and classify computer structure and its functions
✓ CO2 - Identify the importance of computer system design, in order to achieve high performance
✓ CO3 - Explain the internal components and their functionality of a computer, i.e. control unit, ALU, register, memory and CPU addressing modes
✓ CO4 - Demonstrate team working by solving problems in groups.

Synopsis
This course discusses the structure and function of a computer. It exposes 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.

OBJECT ORIENTED PROGRAMMING
BCS2143

Course Outcomes
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

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.

DISCRETE STRUCTURE AND APPLICATIONS
BUM2223

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

✓ CO1 - Use the basic principles and methodologies of advanced discrete structure to solve various problems in discrete structure.
✓ CO2 - Write programs to describe and solve discrete structure problems using any programming language.
✓ CO3 - Apply concepts and methods learned to solve any related problem of discrete structure in various fields.
✓ CO4 - Relate and apply the concepts and methods studied into other courses.

Synopsis
This subject discusses an in depth of the discrete structures as they apply to computer science, focusing on providing a basic theoretical foundation for further work. Topics include review on algorithm, integers and matrices, advanced counting technique, graphs, trees, and modeling computation. This course integrates symbolic tools, graphical concepts, and numerical calculations.
OPERATING SYSTEMS
BCN2053

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

- CO1 - 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 - Construct the program for given problem on an operating System (Case Study).
- CO3 - Organize the related problems using theoretical concepts of operating system

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.

APPLIED STATISTICS
BUM2419

Course Outcomes
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 tools.
- CO3 - Apply statistical concepts and methods learned to solve any related problems in various scientific disciplines.
- CO4 - Relate and apply the techniques and methods studied into other courses

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.

INDUSTRIAL TRAINING
BCC4018

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

- CO1 - Adapt working culture in ICT related industry.
- CO2 - Construct solution by applying the theory learned to solve real problem in organization.
- CO3 - Work effectively with others in organization to perform task given.
- CO4 - Practise interpersonal skills and professional ethics in organization.
- CO5 - Practice the related theory in the community and prepare for better career opportunity in computing area

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.

INDUSTRIAL TRAINING REPORT BCC4024

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

- CO1 - Organize the industrial training knowledge, experience and skills in appropriate written report.
- CO2 - Organize technical writing skill in preparing the project report.
- CO3 - Report understanding of the leadership hierarchy in the organization.
- CO4 - Build communication skills on oral presentation.

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 also need to do final presentation for assessment.

SYSTEMS ANALYSIS & DESIGN
BCS1133

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

- CO1 - Differentiate the stages of Systems Development Life Cycle.
- CO2 - Construct a new system from scratch that comply with the stages of systems development life cycle
- CO3 - Work effectively in a team and propose the team decision/solution for a given problem.
- CO4 - Demonstrate team working by solving problems in groups.
- CO5 - Communicate effectively in a team for a given problem.

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

WEB SCRIPTING
BCS2303

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

- CO1 - Demonstrate the understanding of dynamic web-based applications
- CO2 - Construct a Web-based application prototype using HTML, web server, database and scripting language.
- CO3 - Demonstrate leadership skill through group project
- CO4 - Demonstrate teamwork skill through group project
- CO5 - Show ability to identify business opportunities

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.
NETWORK TECHNOLOGIES  
BCN2193  

Course Outcomes  
By the end of semester, students should be able to:  
✓ CO1 - Discover the critical role routers play in enabling communications across multiple networks  
✓ CO2 - Configure and verify basic operations for a newly-installed router with primary routing protocols  
✓ CO3 - Explain the role of dynamic routing protocols and select these protocols in the context of modern network design  
✓ CO4 - Identify router show and debug commands to troubleshoot common errors that occur in small routed networks  

Synopsis  
This course describes the architecture, components, and operation of routers, and explains the principles of routing and routing protocols. Students analyze, configure, verify, and troubleshoot the primary routing protocols RIPv1, RIPv2, EIGRP, and OSPF. By the end of this course, students will be able to recognize and correct common routing issues and problems. Students complete a basic procedural lab, followed by basic configuration, implementation, and troubleshooting labs in each chapter.

LOCAL AREA NETWORK WORKSHOP  
BCN1052  

Course Outcomes  
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.  

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.

DATA & NETWORK SECURITY  
BCN2023  

Course Outcomes  
By the end of semester, students should be able to:  
✓ CO1 - Inquire and analyze theory and principles of information security, types of attacks, cryptography, firewalls, wireless and intrusion detection system.  
✓ CO2 - Construct attack and defence methods into computer and network environments.  
✓ CO3 - Demonstrate usage of data and network security methods and tools and organize public awareness for newest attack and defence solution.  

Synopsis  
The course introduces fundamental of security. Every chapter will explain security concepts, fundamentals, purpose, implementation and discussion in their respective areas related to data and network security. Topics include introduction to security, cryptographic tools, user authentication and access control, security in networks, intrusion detection systems, firewalls and intrusion prevention systems and wireless security.

NETWORK ANALYSIS & DESIGN  
BCN2093  

Course Outcomes  
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 function effectively as an individual and in a group to produce RFP and finalize a specific project  

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/evaluation 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 fulfill this subject requirement.

COMPUTER NETWORKS  
BCN2083  

Course Outcomes  
By the end of semester, students should be able to:  
✓ CO1 - Experiment knowledge and understanding of how a switch communicates with other switches and routers in a small or medium-sized business network to implement VLAN.  
✓ CO2 - Identify and correct common network problems at layers 1, 2, 3, and 7 using a layered model approach.  
✓ CO3 - Organize the configuration, verification, and troubleshooting VLANs, trunking on Cisco switches, inter/VLAN routing, VTP, RSTP and wireless network.  

Synopsis  
The primary focus of this course is on LAN switching and wireless LANs. This course focuses on Layer 2 switching protocols and concepts used to improve redundancy, propagate VLAN 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 switching technologies. Each switching concept will be introduced within the context of a single topology for each chapter.

UNDERGRADUATE PROJECT I  
BCC3013  

Course Outcomes  
By the end of semester, students should be able to:  
✓ CO1 - Design the proposed solutions for a specific problem that comply with principles of computer science.  
✓ CO2 - Organize the concept and usage of appropriate tools to be used in the development of the solution  
✓ CO3 - Organize the solution based on specific problem with minimum supervision and self independent  
✓ CO4 - Explain the solution through oral and written form following the provided standard
✓ CO5 - Demonstrate understanding the effect of professional practices in the development of the solution

**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. Students 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.

**UNDERGRADUATE PROJECT II**

**BC33026**

**Course Outcomes**

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 the appropriate tools to realize the solution
✓ CO3 - Construct the solution with the best alternative
✓ CO4 - Explain the solution through oral and written form following the provided standard
✓ CO5 - Show the commercialize potential on a solution project

**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 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.

**WAN TECHNOLOGY**

**BC33032**

**Course Outcomes**

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

✓ CO1 - Analyze and classify the components required for network and Internet communications, operation and benefits of DHCP and DNS, purpose and types of access control lists (ACLs), the basic operation of Network Address Translation (NAT) and components of VPN technology.
✓ CO2 - Assemble, build, construct and organize WAN serial connection, a Point-to-Point Protocol (PPP) connection between Cisco routers, Frame Relay on Cisco routers, DHCP, DNS, NAT and ACLs operations on a router.
✓ CO3 - Formulate common network problems at layers 1, 2, 3 and 7 using a layered model approach, NAT issues and WAN implementation issues.

**Synopsis**

This course discusses the WAN technologies and network services required by converged applications in enterprise networks. The course uses the Cisco Network Architecture to introduce integrated network services and explains how to select the appropriate devices and technologies to meet network requirements. Students learn how to implement and configure common data link protocols and how to apply WAN security concepts, principles of traffic, access control and addressing services. Finally, students learn how to detect, troubleshoot and correct common enterprise network implementation issues.

**DISTRIBUTED SYSTEM**

**BC33123**

**Course Outcomes**

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

✓ CO1 - Demonstrate the principles and fundamentals of distributed systems, the technical challenges and current issues in distributed systems design and apply the knowledge of Java, Shell programming and Linux environment
✓ CO2 - Construct network application with adequate knowledge in distributed systems such Interprocess communication, distributed transaction and replication
✓ CO3 - Explain common and current issues and challenges in distributed computing

**Synopsis**

Owing to new technologies like the Internet and cluster computing, distributed systems have become reality and are widely applied in practice. Well known are the Web and distributed component infrastructures like CORBA or J2EE compliant application servers. Moving from a centralized to a distributed environment introduces new complexity: communication, synchronous and asynchronous behaviour of the different components in the system, architectural considerations, failures and more. Distributed systems handle these issues by providing tools and protocols for efficient and powerful coordination among the cooperating components. The objectives of this new subject is to learn the state-of-the-art of practical distributed systems, to understand the typical problems and challenges encountered in distributed environments, and to discuss both sound and practical solutions for them.

**INTERNET TECHNOLOGY**

**BC33183**

**Course Outcomes**

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

✓ CO1 - Classify the services supported by the Internet Technology.
✓ CO2 - Fix the problems to install and configure servers and clients applications individually
✓ CO3 - Synthesize and implement all the services and protocols supported by the Internet Technology.

**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.

**NETWORK MANAGEMENT**

**BC33023**

**Course Outcomes**

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

✓ CO1 - Identify and explain the five areas of network management and related tools in a group.
✓ 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 - 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.
Synopsis
This course introduces the overview of network management to familiarize students with network management systems and the five areas of network management. Students will learn a practical means of designing or evaluating a network management system for particular networking environment. Students 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.

**BCN3083**

**Course Outcomes**

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 - Explain both theoretical and practical foundation concepts in mainframe environment.
- CO3 - Construct configuration for a specific mainframe environment.
- CO4 - Demonstrate team working and communication skills through group assignment.

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.

**BCN2103**

**Course Outcomes**

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

- CO1 - Demonstrate knowledge and understanding of how an IP Addressing in computer network is defined to manage all the network communication.
- CO2 - Organize the ways of actual IP Addressing performed, for instance IPv6 according to a systematic IP addressing network-wide standard.
- CO3 - Demonstrate on how network can be managed and associated with Network Address Translation (NAT).

Synopsis
This course develops a possible network-wide system for IP Addressing. The fundamental problem of IP Addressing and Network Address Translation is mainly highlighted in this course to be the problem of networking communication. The hypothetical application of the system to an existing network is also discussed.

**BCM2063**

**Course Outcomes**

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

- CO1 - Identify and apply the basic concepts of a computer ethics and policies and the related area.
- CO2 - Construct the components of a structured plan for solving computing ethical problems.
- CO3 - Study and demonstrate several examples of professional codes of ethics related to computing, discuss their commonalities, differences, and implications.

Synopsis
This course introduces the overview of how computers have affected society and how they could further affect it in the future. Students will learn how to examine various ethical issues surrounding computers. These will include piracy, hacking, viruses, responsibility, and liability for the use of software, cyberporn, computerized invasion of privacy, computers in the workplace, and the use of artificial intelligence and expert systems. This course will also consider many of the moral and professional issues that those who work with computers might expect to face.

**BCT3133**

**Course Outcomes**

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

- CO1 - Demonstrate knowledge and understanding of how an IP Addressing in computer network is defined to manage all the network communication.
- CO2 - Organize the ways of actual IP Addressing performed, for instance IPv6 according to a systematic IP addressing network-wide standard.
- CO3 - Demonstrate on how network can be managed and associated with Network Address Translation (NAT).

Synopsis
This course develops a possible network-wide system for IP Addressing. The fundamental problem of IP Addressing and Network Address Translation is mainly highlighted in this course to be the problem of networking communication. The hypothetical application of the system to an existing network is also discussed.

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

**SYLLABUS FOR BCG**

**PROGRAMMING TECHNIQUES**

**BCS1023**

**Course Outcomes**

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

**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.

**FUNDAMENTAL DISCRETE STRUCTURE**

**BUM1213**

**Course Outcomes**

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

- CO1 - Use the basic principles and methodologies of discrete structure to solve various problems in discrete structure.
- CO2 - Apply concepts and methods learned to solve any related problem of discrete structure in various fields.
- CO3 - Relate and apply the concepts and methods studied into other courses.

**Synopsis**

This subject introduces and discusses the fundamental of the discrete as apply to computer science, focusing on providing a basic theoretical foundation for further work. Students are exposed to logic, set theory, elementary number of theory, functions, relations, fundamentals of counting, Boolean algebra and simple proof technique. This course integrates symbolic tools, graphical concepts, and numerical calculations.

**DATA STRUCTURE & ALGORITHMS**

**BCS1093**

**Course Outcomes**

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

- CO1 - Analyse various types of data structures and algorithms techniques in a related problem.
- CO2 - Construct a programme by applying the data structure and algorithms techniques for a related problem.
- CO3 - Join online collaboration tool and able to discuss new idea for learning autonomy.

**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.

**DATA COMMUNICATION & NETWORKING**

**BCN1053**

**Course Outcomes**

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 - Build basic configuration of network design using real network devices such as switches and routers
- CO4 - Perform standard configuration and troubleshooting network using professional technique

**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.
**COMPUTER ARCHITECTURE & ORGANIZATION**  
**BCN1043**

**Course Outcomes**

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

- CO1 - Identify and classify computer structure and its functions
- CO2 - Identify the importance of computer system design, in order to achieve high performance
- CO3 - Explain the internal components and their functionality of a computer, i.e. control unit, ALU, register, memory and CPU addressing modes
- CO4 - Demonstrate team working by solving problems in groups

**Synopsis**

This 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.

**DISCRETE STRUCTURE AND APPLICATIONS**  
**BUM2223**

**Course Outcomes**

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

- CO1 - Use the basic principles and methodologies of advanced discrete structure to solve various problems in discrete structure.
- CO2 - Write programs to describe and solve discrete structure problems using any programming language.
- CO3 - Apply concepts and methods learned to solve any related problem of discrete structure in various fields.
- CO4 - Relate and apply the concepts and methods studied into other courses.

**Synopsis**

This subject discusses in depth of the discrete structures as they apply to computer science, focusing on providing a basic theoretical foundation for further work. Topics include review on algorithm, integers and matrices, advanced counting technique, graphs, trees, and modeling computation. This course integrates symbolic tools, graphical concepts, and numerical calculations.

**OPERATING SYSTEMS**  
**BCN2053**

**Course Outcomes**

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

- CO1 - Distinguish the relationship between OS and hardware systems.
- CO2 - Construct the program for given problem on an operating System (Case Study).
- CO3 - Organize the related problems using theoretical concepts of operating system

**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.

**APPLIED STATISTICS**  
**BUM2413**

**Course Outcomes**

By the end of the 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 tools.
✓ CO3 - Apply statistical concepts and methods learned to solve any related problems in various scientific disciplines.
✓ CO4 - Relate and apply the techniques and methods studied into other courses

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 correlation techniques and regression and correlation including simple and multiple linear regressions. Appropriate software is used by students to implement some of these ideas in practice.

UNDERGRADUATE PROJECT I
BCC3013

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Design the proposed solutions for a specific problem that comply with principles of computer science.
✓ CO2 - Organize the concept and usage of appropriate tools to be used in the development of the solution
✓ CO3 - Organize the solution based on specific problem with minimum supervision and self independent
✓ CO4 - Explain the solution through oral and written form following the provided standard
✓ CO5 - Demonstrate understanding of the effect of professional practices in the development of the solution

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.

UNDERGRADUATE PROJECT II
BCC3024

Course Outcomes
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 the appropriate tools to realize the solution
✓ CO3 - Construct the solution with the best alternative
✓ CO4 - Explain the solution through oral and written form following the provided standard
✓ CO5 - Show the commercialize potential on a solution project

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.

SYSTEMS ANALYSIS & DESIGN
BCC5133

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Differentiate the stages of Systems Development Life Cycle.
✓ CO2 - Construct new system from scratch that comply with the stages of systems development life cycle
✓ CO3 - Work effectively in a team and propose the team decision/solution for a given problem.
✓ CO4 - Demonstrate leadership’s skills through group assignment
✓ CO5 - Communicate effectively in a team for a given problem.

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

INDUSTRIAL TRAINING
BCC4018

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Adapt working culture in ICT related industry.
✓ CO2 - Construct solution by applying the theory learned to solve real problem in organization.
✓ CO3 - Work effectively with others in organization to perform task given.
✓ CO4 - Practise interpersonal skills and professional ethics in organization.
✓ CO5 - Practice the related theory in the community and prepare for better career opportunity in computing area

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.

INDUSTRIAL TRAINING REPORT
BCC4024

Course Outcomes
By the end of semester, students should be able to:
✓ CO1 - Organize the industrial training knowledge, experience and skills in appropriate written report.
✓ CO2 - Organize technical writing skill in preparing the project report.
✓ CO3 - Report understanding of the leadership hierarchy in the organization.
✓ CO4 - Build communication skills on oral presentation.

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 also need to do final presentation for assessment.
IMAGE PROCESSING
BCM2063

Course Outcomes

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.

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.

MULTIMEDIA TECHNOLOGY AND APPLICATIONS
BCM2043

Course Outcomes

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

✓ CO1 - Categorize characteristics and functions of each multimedia element.
✓ CO2 - Manipulate multimedia elements (text, graphic, audio, video & animation) using software tools.
✓ CO3 - Identify business opportunity in multimedia technology and application.
✓ CO4 - Justify contribution of multimedia technology and application towards economy development, environment and culture preservation.
✓ CO5 - Join collaborative learning platform for searching and managing relevance information from various sources.

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 text and audio, image and video, the art of multimedia, and multimedia over the network.

HUMAN COMPUTER INTERACTION
BCS2173

Course Outcomes

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

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.

ARTIFICIAL INTELLIGENCE TECHNIQUES
BCS2313

Course Outcomes

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

✓ CO1 - Point out the artificial intelligence concept in computer science.
✓ CO2 - Construct an intelligence system prototype/module.
✓ CO3 - Work effectively in a team to solve a given problem.

Synopsis
This course introduces student to the theory and practice of the Artificial Intelligence (AI). Student are expose to the main artificial intelligence concept currently most applied in application such as Artificial Neural Networks(ANN), Fuzzy Logics(FL), Genetic Algorithms(GA) and Expert Systems(ES). Practical examples of how artificial intelligence is applied to commercial, scientific and consumer applications will be covered.

COMPUTER GRAPHICS
BCM2053

Course Outcomes

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

✓ CO1 - Demonstrate the basic 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 - Respond to instruction by listening actively and give feedback using online application. (e.g LMS)
✓ CO4 - Work together effectively to achieve the same goal by building a good relationship and interaction among team members.

Synopsis
This course is designed to expose the student to the basic concept of digital graphic technology. This includes understanding and designing aspects by using a computer graphics application. The student will be exposed to the skill of using a computer graphics application. Through this course, the students will expose to explore on the latest graphics design context which will focus on the ‘graphic thinking’ and ‘creative design process’.

MODELING & SIMULATION
BCM2073

Course Outcomes

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

✓ CO1 - Apply certain statistic techniques in analyzing the simulation output and approve the simulation model and also to differentiate between model and proposed model.
✓ CO2 - Construct discrete simulation model to assist in decision making based on given problem.
✓ CO3 - Propose new idea and capable to model and simulate it.

Synopsis
This course will discuss on general knowledge and a few techniques of the simulation. Topics to be covered are introduction to simulation, a few examples of simulation system, general principles in simulation, techniques to develop simulation system, how to analyze input and output, how to verify and validate the models and comparison and validation of alternatives system design. Students are expected to equip themselves with adequate skill of modelling and simulation.
VIRTUAL REALITY
BCM3103
Course Outcomes
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.

Synopsis
This module introduces the concepts of virtual reality, using Virtual Reality Modelling Language (VRML) and enables the students to gain hands-on experience by developing their own applications.

3D MODELLING
BCM3113
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Experiment with the geometrical 2D and 3D shapes.
✓ CO2 - Construct 3D models by implementing concepts of 3D modelling.
✓ CO3 - Work effectively to achieve the project goals by building a good relationship and interaction among team members.
✓ CO4 - Display an idea clearly, effectively and confidently in written and oral form among team members.

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

DATA VISUALIZATION
BCM3123
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Analyze the concept of the data visualization in various visualization applications.
✓ CO2 - Construct visualization application by implementing the data processing stages which include data acquisition, data filter
✓ CO3 - Display an idea clearly, effectively and confidently in written and oral form through group discussion, meeting and presentation.
✓ CO4 - Propose and lead data visualization group project.

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.

MULTIMEDIA INTERACTIVE DEVELOPMENT
BCM3183
Course Outcomes
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 and tools.
✓ CO3 - Report on impact of ethical issues in multimedia interactive application.

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

CREATIVE WRITING
UHE3082
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Demonstrate creative writing through a variety of activities
✓ CO2 - Write at least one fiction and/or non-fiction piece applying the elements of creative writing
✓ CO3 - Work in group to produce a short video and improve editing skills

Synopsis
This Creative Writing course generally aims to foster and bring out the potential and creativity in students by developing descriptive writing using the five senses. This course models a writer's workshop structure which consists of Mini Lessons, Independent Writing, Conferring and Sharing. This course also generates critical thinking skills in students as well as exposes students to the beauty of the written language by having a reader's log. Students will be introduced to the elements of creative fiction and non-fiction writing as well as certain elements of grammar, which will be emphasized in the writing process through language software or online resources. Collaborative editing skills will also be introduced before students publish their writing to the public, online or otherwise.

COMPUTER ANIMATION
BCM3093
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Apply computer animation principle and computer animation process.
✓ CO2 - Construct an animation project using animation tools within a group.
✓ CO3 - Work effectively to achieve the project goals by building a good relationship and interaction among team members.

Synopsis
This course is designed to provide a platform where comprehensive computer animation skills and technique are introduced. The topic includes an overview of story-boarding, type of animations, animation techniques and animation tools. Through this course, student will explore current research topics in computer animation and work in group to develop a short story using computer animation.

MULTIMEDIA DATA PROCESSING
BCM3153
Course Outcomes
By the end of semester, students should be able to:

✓ CO1 - Analyze the basic theory of data sampling, algorithm for data storage, and presentation of multimedia data.
✓ CO2 - Construct multimedia data processing application using current software/applications development tools.
✓ CO3 - Work in a team by identify and respect attitude, behaviour and trust among team members.
Synopsis
This course concentrates on using current existing software/applications for processing the multimedia data as well as theory and techniques used within the software. For this purpose student are exposed with the theory of data sampling, basic algorithm for data storage and data presentation. Students are exposed to data processing by programming. Students are required to produce their own software/application for editing, storage, and presentation of multimedia data by using the library/frame-work. At this stage students are also exposed with the techniques on how to handling multimedia data presentation in network environment.

GEOGRAPHICAL INFORMATION SYSTEM
BCM3173
Course Outcomes
By the end of semester, students should be able to:

- CO1 - Analyze the concept of the GIS and Information Visualization Concept.
- CO2 - Manipulate data management module to Construct Geographical Information System application in any related area.
- CO3 - Share ideas, accept new ideas and take charge of their own learning (autonomy).

Synopsis
Topics include introduction to Geographical Information Systems (GIS) application, principle of information visualization, spatial and attribute data management, analysis and manipulation of the data and information to create useful information. This course also covers the development of the Geographical Information Systems which is generally used in many applications. The development interactive information visualization by using computer graphics and multimedia technology will be discussed. Two type of applications are used; vector data and raster data.

MOBILE APPLICATION DEVELOPMENT
BCS3283
Course Outcomes
By the end of semester, students should be able to:

- CO1 - Analyze the limitations and challenges in mobile applications.
- CO2 - Build a mobile application using selected software development environment.
- CO3 - Demonstrate ability to recognize and respect group member's attitude, act and belief.

Synopsis
This course is concerned with the development of applications on mobile and wireless computing platforms. It explores mobile
FACULTY OF
TECHNOLOGY
INTRODUCTION

Faculty of Technology was established in 2011. 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 technologists 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.

Running with two departments namely Department of Engineering Technology and Department of Technology Management, Faculty of Technology is on the verge of splitting into two faculty.

Academic programmes of Occupational Safety and Health (OSH), Project Management (PM) and Industrial Technology Management (ITM) which are offered at Faculty of Technology are developed to enhance graduates capabilities to secure jobs in government or private sector employment in their corresponding field of specialization. Business Engineering program collaborated with Reutlingen University, Germany will start to its intake in September 2014.

Academic programmes on Engineering Technology specializing in Manufacturing, Electrical and Energy & Environmental collaborated with Northern Illinois University are also offered beginning in 2012 to fulfil government vision to produce highly competence workforce in the rapidly evolving and high demand field of Engineering Technology. In 2013 another two more Engineering Technology was offered in Pharmaceutical and Infrastructure Management. Both programs are also paired with international university; Pharmaceutical joined with Institute of Technology Tallaght, Ireland and Infrastructure Management joined with University of Southern Queensland.

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.

All programmes consist of three major elements:

(i) Humanity including subjects in communication, language and ethics;
(ii) Business and management; and
(iii) Technical

VISION & MISSION

Vision
The establishment aspires to become a reputable centre for academic, research and consultation in the fields of Occupational Safety and Health, Industrial Technology Management, Project Management and Engineering Technology.

Mission
To produce and train professionals who are creative, innovative, competent and responsible through holistic academic programs.
PROGRAMMES OFFERED

Department of Engineering Technology
- Bachelor of Occupational Safety and Health with Honors
- Bachelor of Engineering Technology (Electrical) with Honors
- Bachelor of Engineering Technology (Manufacturing) with Honors
- Bachelor of Engineering Technology (Energy and Environmental) with Honors
- Bachelor of Engineering Technology (Pharmaceutical) with Honors
- Bachelor of Engineering Technology (Infrastructure Management) with Honors

Department of Technology Management
- Bachelor of Project Management with Honors
- Bachelor of Industrial Technology Management with Honors
- Bachelor of Business Engineering with Honors

LABORATORY FACILITIES

Teaching and research laboratory facilities of the Faculty of 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, Occupational Safety & Health, Project Management and Industrial technology Management. These laboratories are as follows:

- Industrial Hygiene Laboratory
- Ergonomics Laboratory
- Quality Laboratory
- Studio Laboratory
- Safety Simulation Laboratory
- Project Management Laboratory
- Product Development Laboratory
- CAM Laboratory
- Industrial Safety Laboratory
- Fire Safety Laboratory
- Sprinkler Testing Chamber
- Ventilation And Environmental Engineering Laboratory
- CAD Laboratory
- Audiometry & Spirometry Laboratory
- Industrial System Laboratory
- Technology Index Research Room
- PPE Storage Room
- Toxicology Laboratory
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Elective course to be offer in Bachelor of Occupational Safety & Health (Honours)

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<td>Wastewater Treatment Technology</td>
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<tr>
<td>4</td>
<td>BPS3623</td>
<td>Air Pollution Control Technology</td>
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</tbody>
</table>

Total Credit: 12
CORE FACULTY

BUM2123
APPLIED CALCULUS
Credit: 3 credit
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 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.

BPF1123
Industrial Psychology
Credit: 3 credit
Prerequisites: None

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 Outcome
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

BPF2413
Management Information System
Credit: 3 credit
Prerequisites: None

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 cover 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 Outcome

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.

BPF2113 Research Methods
Credit: 3 credit
Prerequisites: None

Synopsis

This subject is intended to give an understanding and knowledge on the methodology of research and its application when conducting research projects. The topics to be covered are: Introduction to Research; Research topic, research question and research design; Reviewing the Literature; Sampling and measurement; Observation; Research instruments; Analyzing Data, Completing the Research Project.

Course Outcome

CO 1 Define and identify research methods

CO 2 Relate research methods in developing research proposals

CO 3 Design research proposals.

BPF2123 Quality Management System
Credit: 3 credit
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 Outcome

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.

BUM2413 Applied Statistic
Credit: 3 credit
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 and scientific calculator.

**CO 3** Apply statistical concepts and methods learned to solve any related problems in various disciplines.

### CORE PROGRAM

**BPS1113**  
OSH Fundamental  
Credit: 3 credit  
**Prerequisites**: None

**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 Outcome**

**CO 1** Understand the importance of occupational safety and health at the workplace in any organization and Occupational Safety and Health Act introduced in 1994 and aware of the person’s rights at work including the responsibilities of employees and employers.

**CO 2** Identify the risk, safety and health factors at the workplace in order to take action effectively and efficiently.

**CO 3** Practice the application and reduction of the risk, hazard and loss impact due to unhealthy practices at the workplace.

**BPS1413**  
Fire Prevention & Protection System  
Credit: 3 credit  
**Prerequisites**: None

**Synopsis**  
This subject is aimed to give an understanding on the basic concept of Fire Prevention and Protection System including its application in buildings. The course will cover topics such as: Introduction to Basic Principles of Fire, The Components of Fire Safety, The (Protection) Active and (Prevention) Passive Fire Safety System, The Life Cycles of A Building, Loss Impact and Means of Escape During Emergencies. Upon completion of this course, the student will have studied the major topic areas within the field of fire hazard management and other sources of hazard, fire safety best practices and fire management system as well as emergency preparedness. Besides, they will learn about 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 use a Live Fire Training Unit to learn how to use fire extinguishers correctly and safely.
Course Outcome

CO 1 To recognize the importance of fire safety technology theoretically within the building industries.

CO 2 To apply and detect correctly the importance of fire safety system based on the loss impact studies on individual, organization, society and country.

CO 3 To recognize efficiency of the escape route design according to the needs of occupancies during fire emergencies at work place.

CO 4 To demonstrate and response towards extinguishing fire during any emergency and practice their knowledge on fire safety at all time.

BPS1423 Industrial Hygiene
Credit: 3 credit
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

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 Outcome

CO 1 Explain basic terms, concepts, calculations, legislations, profession and historical frameworks integral to the practice of industrial hygiene.

CO 2 Apply basic principles of industrial hygiene such as anticipation, recognition and evaluation of occupational health hazards.

CO 3 Discuss and choose appropriate controls for prevention or reduction of occupational health hazards exposure.

BPS1433 Hazard Recognition & Risk Management
Credit: 3 credit
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

Synopsis

The most important aspect of OSH study is the ability in recognizing and understanding the existence of hazardous substance or materials within the work place or living areas. The level of risk is depends on how the hazards are being managed and controlled. This course is aimed to give an understanding on the basic steps in recognizing hazards at work place and managing the risks to an acceptable standard. These include the studies of hazard identification, types of risks, risk characterization, international standards, total quality management and impact assessment.

Course Outcome

CO 1 Recognize the concept of managing risk in industrial setting

CO 2 identify the hazardous materials, substance and acts at work place within the industries.

CO 3 assess and calculate the level of risk at work place and surrounding environment.

CO 4 Manage the risk available within work place, propose a safe working and living environment to an acceptable standard based on the impact assessment and healthy culture
BPS2113
OSH Management System
Credit: 3 credit
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

Synopsis
This course will expose the candidates to the latest and existing occupational safety and health management system, the evolution and the elements in the systems that cater current requirement in occupational safety and health. The course also introduces the concepts, relationships and principles of managing the occupational safety and health function and the development of training procedures and practices to integrate that function into the organization.

Course Outcome
CO 1 To understand the importance of occupational safety and health at work place in any organization.
CO 2 To apply the Occupational Safety and Health Act introduced in 1994 and the persons at work rights including the employee and employers responsibilities.
CO 3 To identify the risk, safety and health factors at work place in order to manage action effectively and efficiently.
CO 4 To establish the safety and health working procedure at workplace by ensuring the emergency preparedness system ready to cater any incidents.
CO 5 To ensure the continuous effort on OSH is maintained and a safe and health environment is materialized.

BPS1443
Industrial Toxicology
Credit: 3 credit
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

Synopsis
This course provides students with a basic understanding and appreciation of the principles of the 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 Outcome
CO 1 Explain the 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 Describe the types of responses or toxic effects that can result from exposure to a substance
CO 4 List dan discuss several types of toxic chemicals available in the occupational environment
CO 5 Apply the principles of chemical safety management in the workplace
BPS2123
Behaviour Based Safety
Credit: 3 credit
Prerequisites : BPF1123 Industrial Psychology

Synopsis
This course will introduce usage of behavior-based safety as a tool for widespread involvement and change. The course will review the relationship between attitudes, culture, systems, and behavior; explain how behavior-based safety fits into the hierarchy of control; and introduce four elements of the behavior-based safety process. Underlying concepts related to performance management and a powerful tool (ABC analysis) is learned and applied to understanding behavior and to developing a change plan. Overall, the course provides a clear understanding of how attitudes, cultures, and systems influence or affect behavior, and focuses on understanding how successful behavioral change efforts really work. Effective leadership and management are seen as the cornerstone to success in promoting 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 Outcome

CO 1 Recognize the concepts of person-based safety and behavior based safety in behavioral based safety approach

CO 2 Identify the technique to recognize at-risk behavior due to the complexity of people

CO 3 Conduct the behavioral based approach in intervening the work process in order to manage the at-risk behavior

CO 4 Conduct behavioral based analysis by considering the factor of cost and benefit

BPS2413
Toxic & Hazardous Waste Management
Credit: 3 credit
Prerequisites : BPS1443 Industrial Toxicology

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 Outcome

CO 1 Understand the terminologies, theories and principle of toxic and hazardous waste management, the impact and the risks towards human health and environment.

CO 2 Understand the legal requirements on toxic and hazardous waste management.

CO 3 Identify the physical, chemical, biological and thermal treatment of toxic and hazardous waste.

CO 4 Apply pollution prevention and waste minimization principles in toxic and hazardous waste management.

CO 5 Understand the final disposal of toxic and hazardous waste.
BPS2423
Industrial Safety
Credit: 3 credit
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

Synopsis
This course is 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. Hazards and control of confined space and pressure vessel are also exposed to student. Basic electrical safety topics are discussed as part of industrial safety management.

Course Outcome
CO 1 Recognise physical hazards that may exist in the workplace.
CO 2 Discuss the history and regulatory background of industrial safety and related regulations or standards.
CO 3 Apply the practice of industrial safety, and how the management of industrial safety issues and standards in the workplace and explain different approaches for dealing with workplace hazards.

BPS2433
Ergonomics
Credit: 3 credit
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

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 Outcome
CO 1 Recognize ergonomics related problems and solutions
CO 2 Identify occurrences of failing to consider ergonomics design procedure.
CO 3 Conduct ergonomic assessment and measure risk associated with ergonomics
CO 4 Apply ergonomics concepts to the design process and do cost justification for implementing ergonomics intervention

BPS2613
Environmental Management & Sustainability
Credit: 3 credit
Prerequisites : None

Synopsis
This course will cover principles and concepts about ecology and ecosystems, weather and human impacts on the environment and its management and pollution. Natural renewable and non-renewable resources and its management, current issues on the environment, including economics, global view and ethics comprise the materials of the course. The topics that will be discussed include issues related to trade, environment and development and roles that are played by the consumer, community, industry and government towards sustainable development. The students will be also introduced to the ISO 14000 series of Environmental Management Standards.
Course Outcome

CO 1 Understand the terminologies, theories and principle of environmental management and sustainable development.

CO 2 Understand the current environmental issues and the appropriate solutions.

CO 3 Understand the local and international environmental legislations and standards.

CO 4 Identify and apply environmental management tools in solving environmental problems.

CO 5 Implement environmental management system to achieve sustainability.

BPS3413
Construction Safety
Credit: 3 credit
Prerequisites : BPS1113 Occupational Safety And Health Fundamentals

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 fire safety awareness. It is also designed to increase their confidence in the action to take in case of any emergencies or fire occurring. 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 Identify the hazardous materials, substances and unsafe practices at constructions industries

CO 2 Assess the level of risk and safety of work places compliance to the national safety regulation.

CO 3 Outline a proposal to enhances and increase a safer work practices in construction industries.

BPS3423
Exposure Measurement Techniques & Analysis
Credit: 3 credit
Prerequisites : BPS1423 Industrial Hygiene

Synopsis

This course is for advanced in-depth study of the approaches to workplace and personal 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 works. This course is also designed to assist students in understanding the various instruments that are utilized in industrial hygiene studies and give them the chance to fully understand the way these instruments are calibrated and applied.

Course Outcome

CO 1 Recognize the principles of industrial hygiene sampling

CO 2 Identify and select the appropriate analytical instruments and methods for evaluating the workers exposure to hazards.

CO 3 Perform data collection and analysis through surveys, calibration, sampling, monitoring by using the instantaneous or integrated
instruments to assess the risk of health hazards.

CO 4 Report health hazards assessment cases to comply with relevant legislation.

BPS3613
Solid Waste Management
Credit: 3 credit
Prerequisites : None

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 Outcome
CO 1 To explain the importance of the legal aspect of solid waste management.
CO 2 To identify the technology of managing the solid waste that are available within the national and international practices.
CO 3 To analyze and recognize the characterization of solid waste.
CO 4 To apply the management and technological approach in reducing the impact of solid waste into the environment.
CO 5 To analyze the most suitable method of handling solid waste disposal management system.

BPS3512
Final Year Project 1
Credit: 3 credit
Prerequisites : All the first and second year subjects

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 Outcome
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

BPS3443
Human Factor in Safety engineering
Credit: 3 credit
Prerequisites : Ergonomics

Synopsis
An analysis of the man-machine relationship and the biological, physiological and psychological factors that contribute to accident causation; examination of theoretical and applied research findings.
Course Outcome

CO 1 Describe human factors principles to their safety engineering procedures.

CO 2 Explain the basic human systems of cognition and perception and interpret their affects to safety aspects.

CO 3 Identify and analyze the designs that avoid occupation-related injuries.

BPS3433
Applied Mechanics for Safety
Credit: 3 credit
Prerequisites: Mathematics

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 Outcome

CO 1 Explain a fundamental knowledge of engineering science principles such as theories, laws, equations and models.

CO 2 Use the equations in engineering science for OSH applications.

CO 3 Apply a systematic approach of engineering science for problem solving in OSH.

BPS3453
Accident & Incident Investigation & Analysis
Credit: 3 credit
Prerequisites: BPS1113 Occupational Safety And Health Fundamentals

Synopsis

This subject is aimed to introduce and give an understanding on the methodologies for accident and incident investigation and analysis. Topics include data collection, investigation methodologies, interviewing techniques, techniques of data analysis, reporting formats, system safety and developing recommendations to prevent recurrences. An accident investigation can be seen as a safety analysis which includes the analysis of safety management and safety culture within the industries.

Course Outcome

CO 1 To describe practical approach in handling accident and incidents investigation within the industries.

CO 2 To understand the role of an investigation team and the typical management system involved in dealing with accident and incidents at workplace.

CO 3 To respond and implement correctly towards the importance of accident and incident investigation and analysis task as a safety officer or manager in an organization.

CO 4 To manage and design an investigation team to deal the data gathering on accident and incidents evidence at workplace.
BPS3623
Air Pollution Control Technology
Credit: 3 credit
Prerequisites: None

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 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.

BPS4514
Final Year Project II
Credit: 3 credit
Prerequisites: 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 Outcome
CO 1 Develop research instruments
CO 2 Analyze data collected using research instruments developed
CO 3 Prepare Final Year Project report comprising research problem, RQs, literature review, research methods, data analysis and conclusions

BPS4413
Process Safety and Loss Prevention
Credit: 3 credit
Prerequisites: Hazard Recognition and Risk Management

Synopsis
This course presents the principles and methodology for Process Safety Management (PSM) in chemical and process based industries. In particular, it emphasizes on the Process Hazard Analysis (PHA) and Quantitative Risk Assessment (QRA) including risk contours. 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 including safety case report development and disaster planning based on major accident case studies.

Course Outcome
CO 1 Explain the concepts of process safety and historical cases of major hazard disasters.
CO 2 Apply the Process Hazards Analysis (PHA) and Quantitative Risk Assessment (QRA) techniques.

CO 3 Analyze the process loss prevention techniques and safety systems.

CO 4 Demonstrate skill in implementation of the Process Safety Management (PSM) system.

CO 5 Demonstrate skill in the implementation of the requirements for managing major hazards.

BPS4423
Occupational Epidemiology & Disease
Credit: 3 credit
Prerequisites: Industrial Toxicology, Statistics

Synopsis
This course will expose the students to basic principles of epidemiology necessary to understand scientific literature, monitor data in industry, and/or to conduct scientific investigations or surveillance activities. This course will emphasize on aspects of disease transmission and causation, 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 learn how to review a number of published articles related to epidemiologic issues.

Course Outcome
CO 1 Understand the basic concepts, nomenclature, and importance of epidemiology in discovering causes, measuring risks and determining priorities for intervention and evaluation.

CO 2 Demonstrate the knowledge of measuring health and disease occurrence

CO 3 Differentiate the main types of study design and calculate basic ratios and rates in epidemiologic studies.

CO 4 Differentiate the communicable and non-communicable diseases

CO 5 Apply the epidemiology concepts and methods to current environmental and occupational health problem

BPS4113
Occupational Safety & Health Legislation
Credit: 3 credit
Prerequisites: None

Synopsis
This course introduces the history of occupational safety and health law and the principle of tort and liability. It focuses on existing Malaysian legislations pertaining to occupational safety and health. The main objective is to expose students on the applicable law and how it affected their organizations and themselves as safety and health personnel in the organizations.

Course Outcome
CO 1 Identify the legislations related to Occupational Safety and Health (OSH).

CO 2 Apply OSH legislations to solve issues related to safety and health.

CO 3 Analyze cases related to OSH malpractice.
BPS4613
Wastewater Treatment Technology
Credit: 3 credit
Prerequisites: None

Synopsis
This course gives the students exposure to the physical, biological and chemical processes that are used in the treatment of wastewater. Process design calculation for specific processes will be stressed. Examples of the use of these processes in the manufacturing sector and agriculture including low waste zero discharged technology also 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 Outcome
CO 1 Describe the physical, chemical, and biological characteristics necessary to analyze basic wastewater treatment pollutions.
CO 2 To analyze the level of pollutions for determining appropriate wastewater treatment technologies.
CO 3 Report the environmental impact assessment (EIA) in order to control and supervise the level of wastewater pollution by complying to the related legislation.

BPS4538
Industrial Training
Credit: 8 credit
Prerequisites: All Subject

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
CO 1 Adapt working culture and regulation of host industry or agency
CO 2 Solve problem in the host industry or agency by applying the theory or methodology as learned previously
CO 3 Work effectively with others in the host organization as a team
CO 4 Practice interpersonal skills and professional ethics in host organization
CO 5 Perform assigned task as required by host industry or agency training supervisor
BPS4534
Industrial Training Report
Credit: credit
Prerequisites: Industrial Training

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

CO 1 Organize the industrial training knowledge, experience and skill in the preparation of the industrial training report

CO 2 Apply technical writing skill in preparing the final industrial training report

CO 3 Submit binded final industrial training reports complying with faculty academic standards and industrial training regulations.

CO 4 Present industrial training experience to faculty
## CURRICULUM STRUCTURE
### Bachelor of Engineering Technology (Electrical) With Honors

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COURSE STRUCTURE

CORE FACULTY

BTU1001
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

BTU1004
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

BTU1011
Chemistry Lab
Credit: 1
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

BTU1013
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: 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.

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 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.

CO 4 Relate and applied the concepts and methods studied into other courses.
BTU1064

Computer Programming
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.

BTU1041

Calculus II Laboratory
Credit: 1
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

BTE1004
Electric & Electronics Fundamentals
Credit: 4
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 electronic fundamentals

BTE1011
Electrics & Electronics Fundamentals Lab
Credit: 3
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 electronic fundamentals

BTE2001
Electric Fundamental & CA I Laboratory
Credit: 1
Prerequisites: 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 Outcome**

CO 1  Explain the basic concepts of electrical quantities by using basic circuit laws (Ohm's law and Kirchhoff's law) and simplification of resistive circuits [PO1,P2]

CO 2  Shows the DC and AC circuit problems using nodal analysis and mesh analysis, and evaluate the most efficient methods among them [PO2,P2]

CO 3  Explain the natural and forced responses of voltages and currents of first-order circuits [PO2,P2]

CO 4  Construct DC and AC electric circuits to understand the concept of electrical quantities and verify circuit theorems [PO3,P3,CTPS4]

CO 5  Demonstrate the role of individual in team to achieve task completion [PO8,A3,TS3]

**BTE2004**

**Electric Fundamental & Circuit Analysis I**

**Credit:** 4

**Prerequisites:**  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 Outcome**

CO 1  Explain the basic concepts of electrical quantities by using basic circuit laws (Ohm's law and Kirchhoff's law) and simplification of resistive circuits [PO1,P2]

CO 2  Shows the DC and AC circuit problems using nodal analysis and mesh analysis, and evaluate the most efficient methods among them [PO2,P2]

CO 3  Explain the natural and forced responses of voltages and currents of first-order circuits [PO2,P2]

CO 4  Construct DC and AC electric circuits to understand the concept of electrical quantities and verify circuit theorems [PO3,P3,CTPS4]

CO 5  Demonstrate the role of individual in team to achieve task completion [PO8,A3,TS3]
BTM1003
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.

BTE2011
Electrical Fundamental & CA II Laboratory
Credit: 1
Prerequisites: Electrical Fundamental & CA I

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 Outcome

CO 1 Follows voltages, currents and powers using basic laws and principles of circuit theorems (DC and AC). [PO1,P3]

CO 2 Explain the variation of RLC circuits using frequency domain and resonant parameter. [PO1,P2]

CO 3 Reproduce second order circuits of series and parallel RLC circuits. [PO2,P3]

CO 4 Assemble schematic circuits in actual circuit and interpret the experimental results into report. [PO3,P4,CTPS4]

CO 5 Work in a team and communicate effectively. [PO8,A3,TS4]

BTE2014
Electrical Fundamental & CA II
Credit: 4
Prerequisites: Electrical Fundamental & CA I

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 Outcome**

**CO 1** Analyze voltages, currents and powers using basic laws and principles of circuit theorems (DC and AC). [PO1,C4]

**CO 2** Analyze variation RLC circuits using frequency domain and resonant parameter. [PO1,C4]

**CO 3** Analyze second order circuits of series and parallel RLC circuits. [PO2,C4]

**CO 4** Assemble schematic circuits in actual circuit and interpret the experimental results into report. [PO3,P4,CTPS4]

**CO 5** Work in a team and communicate effectively. [PO8,A3,TS4]

**BTE2021**

*Electricity & Electronic Numerical Simulation Lab*

**Credit:** 1

**Prerequisites:** None

**Synopsis**

Laboratory activities on numerical and computer software simulation with respect to electrical and electronic problems etc.

**Course Outcome**

**CO 1** Apply the specific computer software to assist electrical design

**BTE2023**

*Electricity & Electronic Numerical Simulation*

**Prerequisites:** None

**Synopsis**

Use of computer software in the design, troubleshooting and simulation of electrical/electronic circuitry.

**Course Outcome**

**CO 1** Apply the specific computer software to assist electrical design

**CO 2** Apply the specific computer software to assist electronic design

**BTM1004**

*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 Anaylze 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.

BTM2014
Manufacturing Computer Application
Credit:4
Prerequisites: Trigonometry and Elementary Functions

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 Display the characteristic and operation of semiconductor diodes and BJT transistor properties in AC and DC condition.[PO3,P5, CTPS5]

CO 2 Vary the operating condition of various BJT configuration in AC and DC condition.[PO2,P6, CTPS4]

CO 3 Construct the frequency response of various BJT configuration.[PO3,P4,CTPS4]

CO 4 Construct the semiconductor diode and BJT transistor circuit. [PO11,P5,CTPS4]
CO 5 Work effectively as an individual and in a group. [PO8,A3,LS3]

BTE3004 Electronics 1
Credit: 4
Prerequisites: None
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 Outcome
CO 1 Illustrate the characteristic and operation of semiconductor diodes and BJT transistor properties in AC and DC condition. [PO1,C3]

CO 2 Analyze the operating condition of various BJT configuration in AC and DC condition. [PO2,C4]

CO 3 Construct the frequency response of various BJT configuration. [PO3,P4,CTPS4]

CO 4 Construct the semiconductor diode and BJT transistor circuit. PO11,P5,CTPS4]

CO 5 Work effectively as an individual and in a group. [PO8,A3,LS3]

BTE3011 Digital Logic Design Laboratory
Credit: 1
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 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 Outcome
CO 1 Explain the various techniques for digital logic simplification [PO1, P2]

CO 2 Shows the basic gates, flip flops and MSI in digital circuit [PO2, P2]

CO 3 Measures the logic system, counter, decoder and multiplexer [PO2, P4]

CO 4 Construct logic circuit and counter [PO3, P5, CTPS3]

CO 5 Work in a team and communicate effectively [PO5,A3,TS2]
BTE3014
Digital Logic Design
Credit: 4
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 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 Outcome

CO 1 Apply various techniques for digital logic simplification [PO1, C3]
CO 2 Apply basic gates, flip flops and MSI in digital circuit [PO2, C3]
CO 3 Analyze logic system, counter, decoder and multiplexer [PO2, C4]
CO 4 Construct logic circuit and counter [PO3, P5, CTPS3]
CO 5 Work in a team and communicate effectively [PO5, A3, TS2]

BTE3021
Electrical Machines and Transformers Laboratory
Credit: 1
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 (PO2, P1).
CO 2 Displays the transformer and machines equivalent circuits and the operating conditions for electrical machines under steady state conditions (PO2, P4).
CO 3 Construct driver circuit for DC and AC motor (PO3, P4, CTPS3)
CO 4 Justify the importance of electrical machines and impacts to the environment (PO9, A3, TS3)
CO 5 Measure, Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines. (PO11, P4, CTPS3)
BTE3024
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 Attribute the basic principles of selected electrical machines (PO1, C3).
CO 2 Analyze the transformer and machines equivalent circuits and the operating conditions for electrical machines under steady state conditions (PO2, C4).
CO 3 Construct driver circuit for DC and AC motor (PO3, P4, CTPS3)
CO 4 Justify the importance of electrical machines and impacts to the environment. (PO9, A3, TS3)
CO 5 Measure, Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines. (PO11, P4, CTPS3)

BTE3031
Communication System Design Laboratory
Credit: 3
Prerequisites: None

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 Outcome
CO 1 Shows differentiate various type of modulation and demodulation techniques [PO2, P2]
CO 2 Manipulates the concepts to practical applications in telecommunication [PO2, P4]
CO 3 Measure the parameters for various type of modulation and demodulation [PO3, P4, CTPS5]
CO 4 Work in a team effectively as an individual and in a group [PO8, A3, TS4]
CO 5 Shows ability to communicate effectively [PO7, P2, CS4]
**BTE3034**  
**Communication System Design 1**  
**Credit:** 4  
**Prerequisites:** None

**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 Outcome**

CO 1 Analyze and differentiate various type of modulation and demodulation techniques [PO1, C4]  
CO 2 Analyze the concepts to practical applications in telecommunication. [PO2, C4]  
CO 3 Measure the parameters for various type of modulation and demodulation [PO3, P4, CTPS5]  
CO 4 Work in a team effectively as an individual and in a group [PO8, A3, TS4]  
CO 5 Shows ability to communicate effectively [PO7, P2, CS4]

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**BTE3041**  
**Electronics II Laboratory**  
**Credit:** 1  
**Prerequisites:** Electronic I Lab & Electronic I

**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 Outcome**

CO 1 Practice the fundamental operation of FET and op-amp in AC and DC condition [PO1, C1]  
CO 2 Identify and analyze various FET and op-amp configuration in AC and DC condition [PO2, P2, CTPS3]  
CO 3 Design for various type of FET configuration and active filters [PO2, P6, CTPS3]  
CO 4 Asemble and analyze FET and op-amp circuits [PO3, P4, CTPS3]  
CO 5 Work effectively as individual, and as a member/leader in a team [PO8, A3, TS3]
BTE3044
Electronics II
Credit: 4
Prerequisites: Electronic I Lab & Electronic I

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 Outcome
CO 1 Describe the characteristic and understand the operation of FET and op-amp in AC and DC condition [PO1, C1]
CO 2 Identify and analyze various FET and op-amp configuration in AC and DC condition [PO1, C2]
CO 3 Design for various type of FET configuration and active filters [PO2, C4, CTPS3]
CO 4 Asemble and analyze FET and op-amp circuits [PO3, P4, CTPS3]
CO 5 Work effectively as individual, and as a member/leader in a team [PO8, A3, TS3]

BTE3051
Microprocessor and Interfacing Laboratory
Credit: 1
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 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]

BTE3054
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]

BTE3061
Control System Laboratory
Credit: 1
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.

BTE3064
Control System
Credit: 4
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.
BTE3923
Engineering Technology Senior Design
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

BTE4806
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 and cited latest publications on the subject

BTM3074
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.

**BTE4909**  
**Industrial Training**  
**Credit:** 9  
**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 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 an 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**

**BTE4213**  
Control System II  
Credit:3  
Prerequisites: Control System & Control System Lab

**Synopsis**

This course introduce students the basic concept of state space approaches in control system and provide a basic understanding of the state space representation to control, analysis and design. With this basic overview students enable to design controllers and observers using state variable feedback and optimal control.

**Course Outcome**

CO 1 To use and apply the basic concept of state space approaches in control system [PO1,C3]

Co 2 To differentiate the various forms of state space representation [PO10,C4,LL3]

CO 3 To design controllers and observers using state variable feedback and optimal control methods [PO3,C5,CTPS4]

CO 4 Assemble modern computational techniques and tools for solving the control system problems in state space. [PO11,P4,CTPS4]

CO 5 Justify the role of individual in the team in order to complete the task given [PO8,A3,LS3]

**BTE4913**  
Industrial Training Report  
Credit:3  
Prerequisites: Industrial Training

**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 Arrange and display data and relevant information with a systematic approach. [PO6,A4,EM3]

CO 2 Explain and organize the industrial training experience through written communication. [PO7,P5,C S4]
BTE4703  
Digital Control System  
Credit:3  
Prerequisites: 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 Outcome  
CO 1 Discover the principles of signal conversion in digital control systems, sampling/reconstruction process, and mathematical modeling of discrete time domain.  
CO 2 Analyze and Construct various method of discretization of analog transfer function into discrete-time in Z-domain.  
CO 3 Traces the realization of Digital Filters and Controllers, and the quantization effect due to truncation or rounding propagation. [P03,P3,CTPS3]  
CO 4 Use and apply modern computational techniques and tools for solving computer controllers system problems. [PO11,P4,CTPS4]  
CO 5 Differentiate the role of individual in the team to achieve task completion [PO8,A3,TS3,LS3]

BTE4723  
Power Electronic  
Credit:3  
Prerequisites: 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 Outcome  
CO 1 Investigate switching characteristics of basic solid state power devices, operating principles, advantages and disadvantages of basic power electronic converter topologies [PO1, C4]  
CO 2 Design power electronic converters using commercially available simulation tools [PO4, C5]  
CO 3 Construct power electronic converters to meet
functional objectives (P11, P4, CTPS4)

CO 4 Work effectively in team [P08, A3, LS2]

CO 5 Construct electrical drives using electronic converter [PO4, C3]
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COURSE STRUCTURE

CORE FACULTY

BTU1001
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

BTU1004
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

BTU1011
Chemistry Lab
Credit:1
Prerequisites: None

Synopsis
In chemistry laboratory the students are responsible to conduct the basic physical, organic and analytical chemistry experimentsuch 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

BTU1013
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  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.

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.

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
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.

CO 4 Relate and applied the concepts and methods studied into other courses.

CORE PROGRAM

BTM1003
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.
BTM1004
Computer-Aided Design
Credit: 4
Prerequisites: None

Synopsis
This subject is designed to introduce to the students the principle of computer-aided design. Topics include: Drafting Overview, Drawing Set-up, Basic CAD Commands, Geometric Construction, Orthographic Projection, Basic Drawing, Tools, Pictorial Drawings, Sectional Views, Advanced 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.

BTM1024
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.
BTE1004
Electric & Electronics Fundamentals
Credit: 4
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 electronic fundamentals

BTE1011
Electrics & Electronics Fundamentals Laboratory
Credit: 1
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 electronic fundamentals

BTM2023
Engineering Mechanics
Credit: 3
Prerequisites: None

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.

BTM2013
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.

BTM2014
Manufacturing Computer Application
Credit:4
Prerequisites: Trigonometry and Elementary Functions

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.

BTU2043
Basic 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

BTV3014
Facilities Management Technology
Credit:3
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**

**BTV3073**  
**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  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 for technology management function including human management factors.

CO 4  Identify the need and relevency of information system and smart management system.

CO 5  Analyze the cost estimation and project evaluation

**BTM3004**  
**Fluid Mechanics**  
**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
BTM3003
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.

BTM3013
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.

BTM3014
Geometric Design and Tolerencing
Credit:4
Prerequisites: None

Synopsis
Dimensioning techniques using CAD, limits and fits, material condition modifiers, tolerance stacks, and dimensioning standards. Geometric dimensioning and tolerancing

Course Outcome

CO 1  apply the principles of geometric tolerancing
CO 2  apply the tolerancing of cone
CO 3  apply positional tolerancing
CO 4  substitute geometric elements
CO 5  recognize and apply the maximum, envelope and least material requirements
BTV3003
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.

BTV3083
Energy Management
Credit: 3
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. The 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 Outcome
CO 1 Understand 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 Understand 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 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 Understand 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.
BTM4743
Manufacturing System
Credit:3
Prerequisites: None

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

BTM3044
Manufacturing Component Design
Credit:3
Prerequisites: Trigonometry and Elementary Functions

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

BTM3053
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 (SACADA) 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.

**BTM3063**  
**Numerical Control Systems**  
**Prerequisites:** None

**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.

**BTE3923**  
**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

BTM3074
Computerized 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.

BTE4806
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

BTM4909
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

BTV4713
Occupational Epidemiology & Disease
Credit:3
Prerequisites: None

Synopsis

This course will expose the students to basic principles of epidemiology necessary to understand scientific literature, monitor data in industry, and/or to conduct scientific investigations or surveillance activities. This course will emphasize on aspects of disease transmission and causation, 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 learn how
to review a number of published articles related to epidemiologic issues.

**Course Outcome**

**CO 1** Understand the basic concepts, nomenclature, and importance of epidemiology in discovering causes, measuring risks and determining priorities for intervention and evaluation.

**CO 2** Demonstrate the knowledge of measuring health and disease occurrence

**CO 3** Differentiate the main types of study design and calculate basic ratios and rates in epidemiologic studies.

**CO 4** Differentiate the communicable and non-communicable diseases

**CO 5** Apply the epidemiology concepts and methods to current environmental and occupational health problems

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**BTM4723**

**Production Control System**

**Credit:** 3

**Prerequisites:** None

**Synopsis**

The topics covered in the course are production and operations strategy, forecasting techniques, deterministic inventory planning and control, stochastic inventory planning and control, aggregate production planning, and master production scheduling.

**Course Outcome**

**CO 1** Analyze the fundamental problem areas of production systems as well as the relationship between production planning and control activities.

**CO 2** Justify different strategies employed in manufacturing and service industries to plan production and control inventory.

**CO 3** Analyze the planning problems and use the appropriate analytical skills and tools to solve these problems.

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**BTM4733**

**Automated Manufacturing Systems**

**Credit:** 3

**Prerequisites:** None

**Synopsis**

Study of automated manufacturing systems utilized by industry, including robotics, computer-aided manufacturing, computer-aided design, computer-aided inspection, and system integration using PLC’s, sensors, and other automation components. Emphasis on laboratory experiences with automation components.

**Course Outcome**

**CO 1** Explain various automation techniques currently used in industry and list components of an assembly process

**CO 2** Classify and select sensors and their applications for inspection, measurement and
control of manufacturing and assembly processes.

CO 3 Model enterprise manufacturing and automation strategies that respond to national and global manufacturing demands.

CO 4 Design and implement an automation project.
YEAR

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BTV2013 Environmental Laws, Policy
and Economics
BTV2023
Green Technology

BTE1011 Electrics &
Electronics Fundamentals Lab
BTM1004 Computer Aided
Design
BTU1031 Calculus I
Laboratory

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BTV3923 Engineering Technology
Senior Design Project 1

BTV3083 Energy Management

BTV3064 Energy Audit

BTV3054 Disaster Preparedness

BTV3073 Engineering Economy

BTV3034 Biobased Fuels and
Alternative Energy Applications

BTV3024 Heating, Ventilating and
Air Conditioning Technology

BTV3014 Design for Energy
Efficiency and Green Materials

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BTV4913 Industrial Training
Report

BTV4909 Industrial Training

BTV4733
Air Pollution Control Technology

# BTV4723 Industrial Toxicology

FOURTH
BTM3074 Computer Integrated
Manufacturing
BTV4806 Engineering
Technology Senior Design
Project II
# BTV4713 Occupational
Epidemiology & Disease

University Courses : Co-Curriculum I, Co-Curriculum II, Technopreneurship, Islamic & Asean Civilization, Ethnic Relations, Islamic Institutions,
Total Unit for Graduation

BTV1003 Map and Mapping
28
27

BTM2014 Manufacturing Computer
Application

BTE1004 Electric &
Electronics Fundamentals

BTU1033 Calculus I

BTM1024 Machine Production
Processes

BTV1024 Introduction Geographic
Information System
BTV2003 Pollution, Pstilence,
Prevention and the Cost of Doing
Business

BTU1023 Trigonometry &
Elementary Functions

BTU1013
Chemistry

BTU1011 Chemistry Lab

BTV3004 Facilities Management
Technology

BTM1003 Basic Manufacturing
Processes

BTU1004 Physics

THIRD
BTV3003 Industrial Quality Control

SECOND
BTU2043 Basic Statistics

FIRST

BTU1001 Physics Laboratory

# Elective Subjects: Environmental Management and Sustainability, Organizational Behavior, Project Management, Change Management, Islamic Institution

140

18

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FACULTY AND PROGRAM COURSES

CURRICULUM STRUCTURE
Bachelor of Engineering Technology (Energy and Environmental) With Honors

UNDERGRADUATE PROSPECTUS 2014/2015


COURSE STRUCTURE

CORE FACULTY

BTU1001  
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

BTU1004  
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

BTU1011  
Chemistry Lab  
Credit: 3  
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

BTU1013
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 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.
BTU2043
Basic 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

CORE PROGRAM

BTE1004
Electric & Electronics 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

BTE1011
Electrics & Electronics Fundamentals Lab
Credit: 1
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
BTM1004
Computer-Aided Design
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.

BTV1003
Maps & Mapping
Credit: 3
Prerequisites: None

Synopsis
Introduction to maps as models of our earth, tools of visualization, and forms of graphic communication. Use of satellite and aerial imagery, land surveying, and geographic information systems in map production. Thematic maps and how they are used. Map design for informational and persuasive purposes.

Course Outcome
CO 1 Understand the role of human perception in map use and map design.
CO 2 Be able to manipulate coordinates, data, symbols, and map projections to produce maps for problem-solving.
CO 3 become familiar with the use of drawing software to produce thematic maps

BTM1003
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.

BTV1024
Introduction Geographic Information System
Credit:4
Prerequisites: PRQ: GEOG 256 or consent of department

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.

BTV2003
Pollution, Pestilences, Prevention and the Cost of Doing Business
Credit:2
Prerequisites: PRQ: GEOG 256 or consent of department

Synopsis
Study of environmental and occupational issues with an impact on the safety and health of employees and the general population. Analysis of case studies to evaluate potentially adverse outcomes (injury, illness, environmental impact, etc.) in relation to existing legislation (EPA, OSHA, HSA) and the existing public policies. Economic impact of adverse environmental and safety issues in the private sector.

Course Outcome

CO 1 Develop a multi-disciplinary perspective, embracing science, engineering and social and economic policy,
and to understanding of how standards are set

CO 2 Evaluate or support the health, safety and environmental issues, developing an emergency plan or needing basic risk assessment skills

CO 3 Analyze the economic impacts of adverse environmental and safety issue in Malaysia

CO 4 Understand and presenting the concept of environmental, health and safety issues

BTV1024 Machine Production Processes
Credit:3
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.

BTM2014 Manufacturing Computer Application
Credit:4
Prerequisites: Trigonometry and Elementary Functions

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.
BTV2013
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

BTV2023
Green Technology
Credit: 3
Prerequisites: None

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
BTV3003
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.

BTV3004
Facilities Management Technology
Credit: 3
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 for technology management function including human management factors.

CO 4 Identify the need and relevency of information system and smart management system.

BTV3014
Design for Energy Efficiency and Green Materials
Credit: 4
Prerequisites: None

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.

**BTV3024**

**Heating, Ventilating and Air Conditioning Technology**

*Credit: 4*

**Prerequisites:** PRQ: MATH 155 with a C or better, and PHYS 150A or PHYS 210.

**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 systems.
BTV3034
Biobased Fuels and Alternative Energy Applications
Credit:3
Prerequisites: None

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

BTV3073
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

BTV3054
Disaster Preparedness
Credit:4
Prerequisites: None

Synopsis
Organization for survival from natural and human-made disasters. Includes topics such as emergency response procedures, communications, training, and abatement as they relate to hazardous waste operations, chemical spills, hazardous materials recognition, risk assessment, site
control, monitoring, and personal protective equipment use.

Course Outcome

CO 1 Describe the role of public health before, during, and after public health emergencies

CO 2 Describe the major public health threats from natural, accidental, and intentional causes

CO 3 Describe the essentials of public health preparedness and response, including infectious diseases, outbreak investigation, environmental health, mental health, special needs and vulnerable populations, and emergency operations planning and exercises

CO 4 Describe the essential components of public health emergency project management

BTV3064 Energy Auditing
Credit: 3
Prerequisites: None

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.

BTV3083
Energy Management
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. The 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 Outcome

CO 1 Understand 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 Understand 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 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 Understand 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.

BTV3923
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

**BTM3074**  
**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.

**BTV4713**  
**Occupational Epidemiology & Disease**  
Credit: 3  
**Prerequisites:** None

**Synopsis**

This course will expose the students to basic principles of epidemiology necessary to understand scientific literature, monitor data in industry, and/or to conduct scientific investigations or surveillance activities. This course will emphasize on aspects of disease transmission and causation, 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 learn how to review a number of published articles related to epidemiologic issues.

Course Outcome

CO 1 Understand the basic concepts, nomenclature, and importance of epidemiology in discovering causes, measuring risks and determining priorities for intervention and evaluation.

CO 2 Demonstrate the knowledge of measuring health and disease occurrence

CO 3 Differentiate the main types of study design and calculate basic ratios and rates in epidemiologic studies.

CO 4 Differentiate the communicable and non-communicable diseases

CO 5 Apply the epidemiology concepts and methods to current environmental and occupational health problem

BTV4723
Industrial Toxicology
Credit:3
Prerequisites: None

Synopsis
This course provides students with a basic understanding and appreciation of the principles of the 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 Outcome

CO 1 Explain the 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 Describe the types of responses or toxic effects that can result from exposure to a substance

CO 4 List and discuss several types of toxic chemicals available in the occupational environment

CO 5 Apply the principles of chemical safety management in the workplace
BTV4733
Air Pollution Control Technology
Credit: 3
Prerequisites: None

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.

BTV4806
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 and cited latest publications on the subject

BTV4909
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 (Infrastructure Management) With Honors

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<td>Problem Solving and Analysis</td>
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PROGRAM EDUCATIONAL OBJECTIVES (PEO)
Program educational objectives are student achievement measurement that will be indicate after five year service at the industries. PEO for this program are as follows:

PEO 1 : To produce a knowledgeable graduate in field of engineering and technology through academic program

PEO 2 : To produce competent and aplicable graduate in latest technology

PEO 3 : To produce graduate with high value and ethic

PROGRAM AIM

The aim of Engineering Technology (Infrastructure Management) is to develop in each student, the degree of technical competency that would allow the graduate to be employed as an engineering technologist expert in related to infrastructure management involving in design, construction, operation, maintenance and supervision.

PROGRAM LEARNING OUTCOMES

At the end of the programme, graduates should be able to (adapted from the Sydney Accord):

1. apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies;
2. solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization;
3. 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;
4. plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources;
5. select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations;
6. function effectively as individuals, and as members or leaders in diverse technical teams;
7. communicate effectively with the engineering community and society at large;
8. demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities;
9. demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices;
10. demonstrate an awareness of management, business practices and entrepreneurship;
11. demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development; and
12. recognise the need for professional development and to engage in independent and lifelong learning.
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1) Program Aims:

To support the development of Pharmaceutical Industries in Malaysia as follows:

1. To cater the needs of the Malaysian pharmaceutical manufacturing sector to fill in the existing lacunae of the manpower in the pharmaceutical manufacturing industrial scenario.

2. Currently Chemical & Mechanical engineers are recruited which has to be replaced by pharmaceutical technologists whereby the initial training period is reduced thereby gaining in terms of revenues and manpower hours of operation.

3. Render experts in managerial skills for pharmaceutical trading and supply chain industries astute in technopreneurship with innovative new drug development

2) Programme Objectives:

To produce a graduate who has mastered the needed expertises in pharmaceutical manufacturing industries as follow:

- **PO 1**: To produce graduates who excel in their pharmaceutical technologist positions in pharmaceutical industries within the area of drug development, plant operation, safety and environment

- **PO 2**: To produce graduates who apply and develop advanced technology through R&D and who are keen to pursue post graduate studies

- **PO 3**: To produce graduates who display leadership qualities to the companies that employ them

- **PO 4**: To produce graduates who demonstrate strong professional values and responsibilities towards society and environment
## Bachelor of Project Management with Honors

### Curriculum Structure

#### First Year
- **BP1113** Principles of Management
- **BP1213** Principles of Economics
- **BP1123** Industrial Psychology

#### Second Year
- **BP2113** Research Methodology
- **BP2213** Introduction to Finance
- **BP2313** Management Information System
- **BP2123** Mathematics for Management
- **BP2133** OSH Fundamentals
- **BP2143** Project Planning and Control
- **BP2223** Project Cost & Budget Management
- **BP2233** Management of Technology
- **BP2323** Mathematics for Management

#### Third Year
- **BP3113** Managing Human Capital
- **BP3133** Contract and Procurement Management
- **BP3213** Project Management Tools
- **BP3223** Project Portfolio Management
- **BP3132** OSH Management System
- **BP3143** Project Risk Management
- **BP3153** Industrial Training
- **BP3142** Applied Statistics

#### Fourth Year
- **BP4113** Project Communication & Negotiation
- **BP4123** Contract Law
- **BP4133** Change Management
- **BP4213** Contract and Procurement Management
- **BP4223** Project Cost & Budget Management
- **BP4313** Project Management Tools
- **BP4323** Project Cost & Budget Management
- **BP4343** Project Management Tools
- **BP4413** Contract Law
- **BP4513** Final Year Project I
- **BP4524** Final Year Project II
- **BP4534** Industrial Training Report
- **BP4536** Industrial Training
- **BP4538** Industrial Training

### Elective Courses
- **Elective Course 1**
- **Elective Course 2**
- **Elective Course 3**

### University Courses:
- Core Curriculum I
- Core Curriculum II
- Technopreneurship
- Islamic & Asean Civilization
- Ethnic Relations
- Foreign Language Level 1
- Foreign Language Level 2
- Fundamentals of English Language
- English for Academic Communication
- English for Professional Communication
- English for Technical Communication
- Soft Skill I
- Soft Skill II

**Total Credit for Graduation:** 120
Elective course to be offer in Bachelor of Applied Science (Honours) – Industrial Chemistry

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CORE STRUCTURE

CORE FACULTY COURSES

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.

BPF1113
Principles of Management
Credit : 3
Prerequisite: None

Synopsis
This course aims 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 known as POLC: 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 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.

BPF1213
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 at the national and international levels. This course is primarily concerned with Malaysian economy and will help them understand how economy works.

Course Outcomes

CO 1 Understand the basic microeconomics and macroeconomics concepts.

CO 2 Explain the usage of economics concept for business management.

CO 3 Interpret the economics data and graphs to explain the business trend.

BPF1223
Introduction to Cost Accounting
Credit : 3
Prerequisite: None

Synopsis
This course is 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 Explain the principles of accounting and identify the four basic financial statements.

CO 2 Calculate cost for business using the principles of costing systems.

CO 3 Solve accounting problem by applying the accounting method in a business setting.

BPF1123
Industrial Psychology
Credit : 3
Prerequisite: None

Synopsis
This 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 of 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 students develop as an effective organizational member or manager.

**Course Outcomes**

CO 1 Know major applications of industrial psychology.

CO 2 Describe the importance of 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.

**BPF2413 Management Information System**

**Credit**: 3

**Prerequisite**: None

**Synopsis**

This course aims to provide firm understanding on the significant role of information systems in today's organization particularly in managing organizational most valuable assets - its data and information. The discussion sessions shall cover 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 covered in lab sessions.

**Course Outcomes**

CO 1 Describe information systems' roles in modern organization and its functions in obtaining organizational competitive advantages.

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.

**BPF2213 Introduction to Finance**

**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. This course enables students to appreciate and understand the financial issues faced by an organization management and the activities undertaken by the organization to have an effective financial management. 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 Define and explain the concept and key driver in financial management.

CO 2 Calculate and relate financial formula to particular area in financial management.

CO 3 Examine and analyze financial management problems by using all concepts in financial management.

BPF2113 Research Methodology
Credit : 3
Prerequisite: None

Synopsis

This course is intended to give an understanding and knowledge on the methodology of research and its application when conducting research projects. The topics to be covered are: Introduction to Research; Research Topic, Research Question and Research Design; Reviewing the Literature; Sampling and Measurement; Observation; Research Instruments; Analyzing Data, Completing the Research Project.

Course Outcomes

CO 1 Define and explain the concept and key driver in financial management.

CO 2 Calculate and relate financial formula to particular area in financial management.

CO 3 Examine and analyze financial management problems by using all concepts in financial management.

BPF2123 Quality Management System
Credit : 3
Prerequisite: None

Synopsis

This course intends to provide an 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 concepts, locally and internationally.

Course Outcomes

CO 1 Define and explain the fundamental concepts and definition of total quality management.

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
integrate fundamental aspects of quality management.

BUM2413
Applied Statistics
Credit: 3
Prerequisite: 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 Outcomes
CO 1 Analyse data using statistical theory and methodology, and recommend a conclusion or suggestion based on analysed data.

CO 2 Perform statistical data analysis by using appropriate statistical software and scientific calculator.

CO 3 Apply statistical concepts and methods learned to solve any related problems in various disciplines.

Managing Human Capital
Credit: 3
Prerequisite: 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 organization 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 selection, management, development, and retention of human capital.

CO 2 Identify and explain the employment law issues relevant to managing human capital.

CO 3 Assess the likely efficacy of different approaches to managing human capital.

CO 4 Develop problem-solving skills relevant to managing human capital.

CO 5 Demonstrate abilities in managing human resource functions at the workplace.

CORE PROGRAMME

BPP1113
Project Management
Credit: 3
Prerequisite: None
Synopsis

This course provides foundation and conceptual framework of project management. Students will be exposed to various body of knowledge and institutions in promoting project management in particular Project Management Institute (PMI). Throughout the 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 will also have the opportunity to explore various methods and approaches of project documentation and project management softwares.

Course Outcomes

CO 1 Describe core concepts of project management according to selected body of knowledge, project manager and project team's roles and organizational influence towards project management success.

CO 2 Describe project initiation activities and develop project charter.

CO 3 Describe project scope management.

CO 4 Evaluate factors in selecting best-fit project management software to the organization.

BPS1113
Occupational Safety and Health (OSH) Fundamentals
Credit : 3

Prerequisite: None

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 will also be discussed as a foundation for the next subjects. Some common safety and health hazards will be emphasized for better understanding.

Course Outcomes

CO 1 Understand the importance of occupational safety and health at the workplace in any organization and Occupational Safety and Health Act introduced in 1994 and aware of the person's rights at work including the responsibilities of employees and employers.

CO 2 Identify the risk, safety and health factors at the workplace in order to take action effectively and efficiently.

CO 3 Practice the application and reduction of the risk, hazard and loss impact due to unhealthy practices at the workplace.
BPP2113
Project Planning and Control
Credit : 3
Prerequisite: None

Synopsis
The aim of this course is to expose students to frameworks and processes that are useful in project planning and control. At the end of this course students will be able to apply SMART principles to a project. They will be aware of the wider issues of planning and control in relation to project management.

Course Outcomes

CO 1 Identify planning and control tools and how to use them.

CO 2 Demonstrate the way project managers carry out planning and control responsibilities.

CO 3 Apply hands-on experience in the use of these planning and control tools.

CO 3 Relate planning and control to the entire life cycle including acquisition of new business.

This course will expose the students 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 in the organization.

Course Outcomes

CO 1 Explain the principles and interrelation of loss prevention, risk management and OSH-MS.

CO 2 Apply the the PDCA cycle and OSH-MS models based on recognized standards.

CO 3 Analyze and execute OSH-MS planning phase; policy, hazard and risk analysis, compliance of legal and other requirements, objectives and programmes.

CO 4 Analyze and execute OSH-MS implementation phase; organization structure, competency, communication, control of documentation, operational control, management of change and emergency planning.

CO 5 Analyze and execute OSH-MS evaluation phase; performance measurement, incident and nonconformity management, audit and review.

BPS2113
Occupational Safety & Health (OSH) Management System
Credit : 3
Prerequisite: BPS1113 OSH FUNDAMENTALS

Synopsis
**BPP2223**  
**Project Cost & Budget Management**  
**Credit : 3**  
**Prerequisite: None**  

**Synopsis**  
This course is intended to introduce students the first step in successfully managing a project's costs which is to have a project budget that realistically reflects the costs for executing the project. It addresses the identification, elaboration, planning, development and management of the project budget. The students will learn how to develop a project cost estimate, project budget and the project budget baseline. In addition, the students will practice the preparation of a spending profile that supports variance analysis and corrective action using earned value management (EVM). The students will also gain an effective skill set for developing and controlling the project budget baseline.

**Course Outcomes**  
**CO 1** Define and explain the concepts of project planning and organization, budgeting and control, and project life cycles.  
**CO 2** Apply tools and techniques to make accurate cost decisions to make project success.  
**CO 3** Analyze the key project budgeting principles and identify the common mistakes people make when building a project budget.

**BPP2123**  

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**Project Portfolio Management**  
**Credit : 3**  
**Prerequisite: None**  

**Synopsis**  
This course aims to provide a bird-eye's view in managing all projects within the organization. Students will have opportunity to obtain firm understanding on project portfolio management (PPM). Improving resource utilization and planning, and making right decision at the right time about adding new projects or continue with the current one are the key topics. Establishing proper methods in evaluating, selecting and prioritizing organizational resources to the projects shall be 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** Describe project portfolio perspective and its relationship with organizational strategies and return on investment goals.  
**CO 2** Describe and apply methods and strategies in evaluating, selecting and prioritizing organizational resources to projects.  
**CO 3** Apply proper tools and techniques in project evaluation.  
**CO 4** Analyze issues, challenges and future
trends in portfolio management.

BPP3413
Project Management Tools
Credit : 3
Prerequisite: BPP1113 Project Management

Synopsis

Project Management Tools (PMT) course aims to endow students with knowledge as well as practical experiences in managing a project using selected project management software. The ultimate goal of this course is to show how elements of project management can be made more predictable and scientific through the use of structured system and integrated tools. Selected project management tools/software will be introduced during the lab sessions to grant students with necessary knowledge and skills in dealing with stages of the project life cycle, how to work within organizational and cost constraints, and manage resources and project team effectively.

Course Outcomes

CO 1 Apply the ability to use Project Management software in managing a project.

CO 2 Identify three types of resources in a project and how to assign those resources to tasks.

CO 3 Employ different methods in fine tuning the project planning as well as tracking the progress.

CO 4 Detect the problems of a project.

BPP3213
Project Estimation & Scheduling
Credit : 3
Prerequisite: None

Synopsis

This course attempts to explain the importance of estimation and scheduling process in project planning. It will focus on approaches and strategies in developing viable schedules and cost estimation which influence the business success projects, products and organizations. The 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.

Course Outcomes

CO 1 Understand the importance of scheduling and estimation in ensuring the successful of project.

CO 2 Apply Precedence Diagram Method (PDM) in determining relationship between tasks.

CO 3 Use appropriate techniques for resources estimation for a project planning.

BPP3113
Change Management
Credit : 3
Prerequisite: None

Synopsis
In this course, the students will identify ways to solve problems related to change on the job, including recognizing, anticipating, and effectively managing changes. The students will also define change management, identify change management strategies, define the psychological process of moving through changes, identify ways of preparing for changes, and explore ways to embrace changes on an ongoing basis.

Course Outcomes

CO 1 Understand the steps involved to effectively manage organizational changes in a variety of contexts and settings.

CO 2 Identify the nature and significance of various impediments to organizational changes.

CO 3 Explain, articulate, and disseminate information and knowledge concerning organizational changes to others through dialogue and critique.

BPT3113 Management Of Technology
Credit : 3
Prerequisite: None

Synopsis

This course 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 and definition used in the management of technology.

CO 2 Explain the role of technology management in the development, operation and marketing of goods and/or services.

CO 3 Manipulate the impact of contextual forces on technology policies and strategies within and between organizations.

CO 4 Apply decision making techniques in the management of technology to address problems in the range of sectors.

BPP3133 Contract and Procurement Management
Credit : 3
Prerequisite: None

Synopsis

This course develops an understanding on the concepts and practices in contract and procurement management. It involved strategies applied during procurement processes and contract negotiations as one of the project management activities. Procurement solution options, procurement decision model, problem solving approach by considering project objectives, risk
allocation and responsibility will be discussed during the class sessions. At the end of the course, students will be equipped with the skills and necessary knowledge in negotiating and successfully managing the contract and procurement processes for a project.

**Course Outcomes**

CO 1 Understand the six major areas of procurement processes from the PMBoK.

CO 2 Develop effective plan, anticipate the risk, undertake proper measures and control to successfully manage the contract and avoid any legal pitfalls.

CO 3 Apply the best strategies and methods of costing, budgets, cash flow forecast and evaluate the best purchasing strategy.

CO 4 Develop proper mechanism to manage conflicts that anticipated to be arose from contract and procurement processes and apply appropriate methods to resolve conflicts.

**Synopsis**

This course develops student with necessary knowledge and skills in managing risks and in becoming a good project manager. Project managers are required to possess a wide range of knowledge and skills, including time management, budget analysis, interpersonal and communication skills as well as risk management competencies. In this course, students will be exposed to the Project Life Cycle in assessing risk management processes. The discussion will cover input and output from risk identification, quantification, response development as well as risk control.

**Course Outcomes**

CO 1 Understand and identify key project risks.

CO 2 Analyze, estimate and characterize the impacts of risks to a project in order to finalized the best mitigation strategies to be employed.

CO 3 Develop proper plan to track, update and control the risk.

CO 4 Execute risk management plan.

**BPP3522**

**Final Year Project I**

**Credit : 3**

**Prerequisites: All core faculty and core programme courses from Semester 1 to Semester 5**

**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 studies. The covered areas are: (i) problem background (ii) problem statement (iii) research objective (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.

BPP4113
Project Communication & Negotiation
Credit : 3
Prerequisite: None

Synopsis
This course is intended to introduce to the students the communication and negotiation skills in project management. It focuses on project communication management, documentation, performance reporting, information distribution, administration closure, project management bottleneck, communication plan, managing conflict and negotiation in project, and negotiation ethics.

Course Outcomes
CO 1 Explain the components in project communication management.

CO 2 Describe the needs of communication power to find balance in a negotiation.

CO 3 Develop a negotiation plan for distributive and integrative negotiations in project management scenarios.

CO 4 Apply negotiation skills in problem solving situations in project management.

BPP4123
Contract Law
Credit : 3
Prerequisite: None

Synopsis
This course will provide students and future project managers with essential understanding and knowledge of principles, techniques and requirements for effective project contract management. Students will be given opportunity to analyze various contract law definitions and implications, what types of contract exists and the effect of statutory law on any contractual agreements. In addition, this course will also inculcate the crucial elements in preparing a good contract, tips for understanding contractual material as well as traps and pitfalls of contract drafting. On top of that, contract law also scrutinize the “exit door” when things does not go well, offering options for assessing damages and remedies for contract breach as well as contractual implication.

Course Outcomes
CO 1 Understand the principles and legal terms that guide the operation and formation of a contract.
CO 2 Understand contractual rights and liabilities following terms of contracts.

CO 3 Differentiate void and voidable contracts, and comprehend how contracts can be discharged.

CO 4 Analyze and determine the proper remedies for breach of contracts.

BPP4133 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 Describe the strategic management concepts and techniques.
CO 2 Apply the strategic management concepts and techniques in business environment.
CO 3 Analyze internal and external environment and formulate strategy choice for implementation.

Credit : 3
Prerequisite: Final Year Project I (BPP3522)

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 are: (i) development of research instruments for data collection (ii) carrying out data collection (iii) analysing data collected (iv) interpreting data, and (v) writing reports.

Course Outcomes
CO 1 Develop research instruments.
CO 2 Analyze data collected using research instruments developed.
CO 3 Prepare Final Year Project report comprising research problem, ROs, RQs, literature review, research methods, data analysis and conclusions.

BPP4538 Industrial Training
Credit : 3
Prerequisites: All core faculty and core programme courses from Semester 1 to Semester 7

Synopsis
This course aims to give chances for the students to practise and apply their knowledge and skills gained during their studies. During the placement, it is expected for the students to keep a log book, in which they make a regular entries.
describing the work they are undertaking. Students are supervised by industrial and faculty supervisors to guide and ensure they can do their work as good as possible and achieve the objectives for this course.

**Course Outcomes**

CO 1 Adapt working culture and regulation of host industry or agency.

CO 2 Solve problem in the host industry or agency by applying the theory or methodology as learned previously.

CO 3 Work effectively with others in the host organization as a team.

CO 4 Practise interpersonal skills and professional ethics in host organization.

CO 5 Perform assigned task as required by host industry or agency training supervisor.

BPP4534
**Industrial Training Report**
Prerequisites: All core faculty and core programme courses from Semester 1 to Semester 7

**Synopsis**

During the placement, it is expected for students 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 placements. The industrial training reports need to be handed in to the faculty supervisors. 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 Apply technical writing skill in preparing the final industrial training report.

CO 3 Submit binded final industrial training reports complying with faculty academic standards and industrial training regulations.

CO 4 Present industrial training experience to faculty.

ELECTIVE COURSES

BPP2613
**Environmental Management And Sustainability**
Credit: 3
Prerequisite: None

**Synopsis**

During the placement, it is expected for students 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 placements. The industrial training reports need to be handed in to the faculty supervisors. Students need to do final presentation for assessment.
This course will cover the principles and concepts about ecology and ecosystems, weather and human impacts on the environment and its management and pollution, natural renewable and non-renewable resources and its management, current issues on the environment, including economics, global view and ethics. The topics that will be discussed include issues related to trade, environment and development and roles that are played by the consumer, community, industry and government towards sustainable development. The students will also be introduced to the ISO 14000 series of Environmental Management Standards.

**Course Outcomes**

CO 1 Understand the terminologies, theories and principles of environmental management and sustainable development.

CO 2 Understand the current environmental issues and the appropriate solutions.

CO 3 Understand the local and international environmental legislations and standards.

CO 4 Identify and apply environmental management tools in solving environmental problems.

CO 5 Implement environmental management system to achieve sustainability.

**Prerequisite:** None

**Synopsis**

Business is about how customers, suppliers, employees, financiers (stockholders, bondholders, bank etc.), communities, the media and managers interact and create value. In this subject, concrete principles and practical techniques for managing stakeholder relationships in order to ensure a firm’s survival, reputation and success will be learnt.

**Course Outcomes**

CO 1 Understand the possible influence of stakeholder so that project managers could establish strong mechanism in managing stakeholder team’s roles and organizational influence towards project management success.

CO 2 Develop proper communication channel to ensure that all stakeholders understand the process and benefits of the project.

CO 3 Apply appropriate communication strategy at various level particularly involving stakeholder.

CO 4 Analyze and anticipate people’s reaction to the project activities which may affect progress of a project.
Prerequisite: None

Synopsis

This course provides students with the opportunity to understand the importance of technology assessment in corporate strategic planning, understand the critical elements of technology assessment, and learn and apply the tools and techniques related to technology scanning, technology impacts, strategic technology analysis, technology road mapping, technology forecasting, and measuring technology performance.

Course Outcomes

CO 1 Describe the role of technology assessment and its benefits.

CO 2 Apply a systematic approach to conduct assessment of technology fitness of a company.

CO 3 Apply appropriate techniques and tools to assess the present technology portfolio and measure technology performance.
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**CURRICULUM STRUCTURE**

Bachelor of Industrial Technology Management with Honours

**Faculty and Program Courses**

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COURSE STRUCTURE

CORE FACULTY

BUM1123  
Mathematics for Management  
Credit : 3  
Prerequisites: None  

Synopsis  
This subject introduce the use of mathematical technique in the field of business administration and management. The topics introduce to 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 the methods and concept of mathematics to solve any related financial management problems.  
CO 3 Apply the mathematical concepts and the usage of the mathematical technique in business administration and management.

BPF1113  
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 known as POLC: Planning, Organizing, Leading and Controlling.

Course Outcomes  
CO 1 Understand the basic Macro & Micro economic concepts.  
CO 2 Explain the usage of economics concept for business management.  
CO 3 Interpret the economics data and graphs to explain the business trend.

BPF1213  
Principles of Economics  
Credit : 3  
Prerequisites: None  

Synopsis  
This course is designed to introduce students to key concepts used in micro and macroeconomics, and facilitate a basic understanding of economic phenomena. The goal is to help student to understand fundamental concepts and tools so that student can use it to analyse various economic issues at the national and international levels. It is primarily concerned with Malaysian economy and will help to understand how economy works.

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.
BPF1222
Introduction to Cost Accounting
Credit : 3
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 Explain the principles of accounting and identify the four basic financial statements.
CO 2 Calculate cost for business using the principles of costing systems.
CO 3 Solve accounting problem by applying the accounting method in a business setting.

BPF1123
Industrial Psychology
Credit : 3
Prerequisites: None

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

BPF2413
Management Information System
Credit : 3
Prerequisites: None

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 covered 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.

**BPF2213 Introduction to Finance**  
Credit : 3  
Prerequisites: None

**Synopsis**

With recent spate of companies experiencing financial difficulties, the issue of sound financial management is now more important than ever. This course enable students to appreciate and understand the financial issues faced by an organisation’s management and the activities undertaken by the organisation to have effective financial management. It examines relevant issues including financial strategy, debt and equity management, the key drivers of shareholders value, risk and return concept in investment, capital budgeting as vehicles to evaluate investment choice.

**Course Outcomes**

**CO 1** Define and explain the concept and key driven in financial management

**CO 2** To calculate and relate financial formula to particular area in financial management

**CO 3** Examine and analyze financial management problems by using all concepts in financial management

**BPF 2113 Research Methodology**  
Credit : 3  
Prerequisites: None

**Synopsis**

This subject is intended to give an understanding and knowledge on the methodology of research and its application when conducting research projects. The topics to be covered are: Introduction to Research; Research Topic, Research Question and Research Design; Reviewing the Literature; Sampling and Measurement; Observation; Research Instruments; Analyzing Data, Completing the Research Project.

**Course Outcomes**

**CO 1** Define and identify research methods

**CO 2** Relate research methods in developing research proposals

**CO 3** Design research proposals.

**BPF2123 Quality Management System**  
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.

**BUM2413**  
**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 Outcomes**

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 and scientific calculator.

CO 3 Apply statistical concepts and methods learned to solve any related problems in various disciplines.

**BPF 3113**  
**Managing Human Capital**  
Credit : 3  
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 selection, management, development and retention of human capital

CO 2 Identify and explain the employment law issues relevant to managing human capital

CO 3 Assess the likely efficacy of different approaches to managing human capital

CO 4 Develop problem-solving skills relevant to managing human capital

CO 5 Demonstrate abilities in managing human resource functions at the work place
CORE PROGRAM

BPS1113
Occupational Safety and Health Fundamentals
Credit : 3
Prerequisites: None

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 Understand the importance of occupational safety and health at the workplace in any organization and Occupational Safety and Health Act introduced in 1994 and aware of the person's rights at work including the responsibilities of employees and employers

CO 2 Identify the risk, safety and health factors at the workplace in order to take action effectively and efficiently

CO 3 Practice the application and reduction of the risk, hazard and loss impact due to unhealthy practices at the workplace

BPT 1113
Operation & Production in Industrial Management
Credit : 3
Prerequisites: 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 Outcomes

CO 1 Explain operation and production in terms of inputs, processes, outputs, information flows, suppliers and customers relationship

CO 2 Calculate production and operation parameters such as productivity, capacity, break-even point and cycle time.

CO 3 Solve various operation and production problems such as capacity planning, layout, location, process selection and line balancing.

BPT2413
Principles of CAD/CAM
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) and manufacturing. 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 Describe product design and development, Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM).
CO 2 Apply selected CAD/CAM software for performing basic design work and product development functions.

CO 3 Solve various design and product development problems using suitable computer software and production application tools.

BPT2113
Legal and Ethical Issues
Credit : 3
Prerequisites: None

Synopsis
This course is intended to introduce the legal and ethical issues pertaining to business and organization. Students examine such issues as personnel law and obligations; negotiations; contract management; constitutional rights of individuals; legal liability of professionals and organizations; legal compliance and ethical standards.

Course Outcomes
CO 1 Understand the business law and ethical issues.
CO 2 Identify the law that involves in a particular business.
CO 3 Apply the knowledge of law in decision making for business and organization.

BPT2243
Statistical Process Control
Credit : 3
Prerequisites: None

Synopsis
The subject is designed to introduce methods for data collection, control chart construction and interpretation, and statistical diagnosis for process improvement. The course blends statistical process control (SPC) and principles of statistics for quality control and process improvement purpose. It also covers forecasting techniques and acceptance sampling methods.

Course Outcomes
CO 1 Utilise statistics principles in data analysis for forecasting and quality control calculation
CO 2 Analyse results of forecasting, statistical process control and acceptance sampling output
CO 3 Apply forecasting, statistical process control and acceptance sampling techniques in solving industrial quality and process improvement problems

BPT2123
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
BPT3113
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, The Role of Technology in the Creation of Wealth, Critical Factors in Managing Technology, Technology Life Cycles, The Process of Technological Innovation, Competitiveness, Business Strategy and Technology Strategy, Technology Planning and Technology Transfer.

Course Outcomes
CO 1 Recognise the general principles, terms and definition used in the management of technology.
CO 2 Explain the role of technology management in the development, operation and marketing of goods and/or services.
CO 3 Manipulate the impact of contextual forces on technology policies and strategies within and between organizations.
CO 4 Apply decision making techniques in the management of technology to address problems in the range of sectors.

BPT3413
Optimization Method
Credit : 3
Prerequisites: None

Synopsis
The course will expose and develop skills in the theory, algorithms and application of optimization techniques. Optimization methodologies include linear programming, network optimization, integer programming, decision trees and dynamics programming. The methods have application to logistics, manufacturing, marketing transportation, project management and finance.

Course Outcomes
CO 1 Explain the strategic importance of optimization and methods in industrial operations
CO 2 Analyse industrial optimization problems in business operation management
CO 3 Solve optimization problems in industry using appropriate management science technique

BPT3123
Industrial 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 strategic importance of logistics and appropriate logistic approach in industrial operation
CO 2 Analyse industrial logistic problems in industrial operation management
CO 3 Solve industrial logistics problems in industry using appropriate operation management technique.

BPT3133
Procurement in Industrial Management
Credit : 3
Prerequisites: None

Synopsis
This subject is aimed to provide the understanding of procurement management in industrial sector. It focuses on the Management of the Procurement, Purchasing Procedures and Systems Contracting, Order Management, Supplier Selection and Evaluation, Price / Cost Analysis and Negotiation Strategies, Relationship Management, E-Procurement and Special Purchasing Applications.

Course Outcomes

CO 1 Explain ethical and unethical behaviors in managing procurement process.

CO 2 Describe how to select and evaluate supplier.

CO 3 Analyze price cost relationship for procurement decision making.

CO 4 Apply technical knowledge in problem solving situation in procurement.

BPT3153
Creativity & Innovation
Credit : 3
Prerequisites: None

Synopsis
This subject is intended to help students develop or enhance their own creativity, to understand the relationship between creativity and innovation, and finally, to explore how business organizations foster and inhibit creativity for competitiveness and commercialization.

Course Outcomes

CO 1 Elaborate core concepts of creativity and innovation in industrial organization

CO 2 Perform appropriate management approach in developing creative and innovative ideas for business or organization implementation

CO 3 Evaluate creative and innovative ideas and make reasoned recommendations for business and industrial commercialization

BPT3423
Production Planning and Control
Credit : 3
Prerequisites: None

Synopsis
The subject covers planning and controlling of production in production and operation management; concepts of JIT, MRP, MRPII, ERP, production system design, analytical techniques and concepts of production and process control in industrial management.

Course Outcomes

CO 1 Explain the importance of industrial planning and control and its activities

CO 2 Analyze industrial production planning and control problems

CO 3 Apply production planning and control methods for solving industrial operation problems

BPT3512
Final Year Project 1
Credit : 2
Prerequisites: All the first and second year subjects

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

BPT4113
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 Describe the strategic management concepts and techniques.

CO 2 Apply the strategic management concepts and techniques in business environment.

CO 3 Analyze internal and external environment and formulate strategy choice for implementation

BPT4413
Manufacturing Technology
Credit : 3
Prerequisites: None

Synopsis

The 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 manufacturing automation which focuses on mechanization of parts handling; parts feeding and transfer mechanisms; automated production and assembly; industrial robotics; introduction to machine vision; and economic justification of automation.

Course Outcomes

CO 1 Explain the fundamentals of manufacturing technology applicable to industrial production processes

CO 2 Determine the compatibility of manufacturing technology alternative with product specification for industrial production processes.

CO 3 Perform basic manufacturing work as practiced by production industries
BPT4423
Manufacturing Design
Credit : 3
Prerequisites: None

Synopsis
The subject is intended to give an in-depth understanding of the entire process of new product development, as it should operate within a modern manufacturing company which encompassing both the design and development, 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 Explain about the systematic approach to new product development and market-focus as required throughout the product development process.
CO 2 Apply technical knowledge in problem solving using appropriate software and management techniques in manufacturing design.
CO 3 Design products for both manual and automatic assembly by applying appropriate techniques for stimulating creativity and coming up with more innovative solutions to design problems.

BPT4514
Final Year Project II
Credit : 4
Prerequisites: 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 and (v) writing reports.

Course Outcomes
CO 1 Develop research instruments
CO 2 Analyze data collected using research instruments developed
CO 3 Prepare Final Year Project report comprising research problem, ROS, RQs, literature review, research methods, data analysis and conclusions

BPT4538
Industrial Training
Credit : 3
Prerequisites: All Courses

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 in project, consultant, manufacturer and any related industry
CO 2 Construct solution by applying the theory learned to solve real problem in organization
CO 3 Work effectively with others in organization to perform task given
C0 4 Practice interpersonal skills and professional ethics in organization

C0 5 Practice the related theory in the community and prepare for the better career opportunity in business or industry area

BPT4534
Industrial Training Report
Credit : 4
Prerequisites: Industrial Training

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 Outcomes
CO 1 Organize the industrial training knowledge, experience and skill in the preparation of the industrial training report

CO 2 Apply technical writing skill in preparing the final industrial training report

CO 3 Submit binded final industrial training reports complying with faculty academic standards and industrial training regulations.

CO 4 Present industrial training experience to faculty

ELECTIVE

BPS2613
Environmental Management & Sustainability
Credit : 3
Prerequisites : None

Synopsis
This course will cover principles and concepts about ecology and ecosystems, weather and human impacts on the environment and its management and pollution. Natural renewable and non-renewable resources and its management, current issues on the environment, including economics, global view and ethics comprise the materials of the course. The topics that will be discussed include issues related to trade, environment and development and roles that are played by the consumer, community, industry and government towards sustainable development. The students will be also introduced to the ISO 14000 series of Environmental Management Standards.

Course Outcomes
CO 1 Understand the terminologies, theories and principle of environmental management and sustainable development.

CO 2 Understand the current environmental issues and the appropriate solutions.

CO 3 Understand the local and international environmental legislations and standards.

CO 4 Identify and apply environmental management tools in solving environmental problems.

CO 5 Implement environmental management system to achieve sustainability.
BPT3613
Technology Assessment
Credit : 3
Prerequisites: None

Synopsis

This course provides students with the opportunity to understand the importance of technology assessment in corporate strategic planning, understand the critical elements of technology assessment, and learn and apply tools and techniques related to technology scanning, technology impacts, strategic technology analysis, technology road mapping, technology forecasting, and measuring technology performance.

Course Outcomes

CO 1 Describe the role of technology assessment and its benefits

CO 2 Apply a systematic approach to conduct assessment of technology fitness of a company.

CO 3 Apply appropriate techniques and tools to assess the present technology portfolio and measure technology performance
# CURRICULUM STRUCTURE

**Bachelor of Business Engineering with Honours**

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BACHELOR OF BUSINESS ENGINEERING WITH HONOURS

Programme AIM
Nurturing students with knowledge, leadership skills and professional values in business and engineering domains.

Programme EDUCATIONAL OBJECTIVE
1. Integrators: Integrate business and engineering knowledge into organizational practices
2. Leaders: Leaders in business and engineering
3. Professional Values: Having high professionalism, ethical responsibility and concern for environment and society

Programme LEARNING OUTCOME
At the end of the program, graduates must have:
1. The ability to acquire and analyse knowledge in business and engineering disciplines. (Knowledge)
2. Acquired practical and technical competence in business and engineering domains. (Technical Skills)
3. The ability to identify potential problems, formulate alternatives, and propose the best solution from an integrated business and engineering perspective. (Critical Thinking)
4. The ability to express complex and sophisticated ideas fluently to comprehend issues within technical and commercial aspects. (Communication Skills)
5. The ability to function effectively as an individual and in a group with the capacity to be a leader or manager. (Social Skills)
6. The ability to recognise the need to undertake life-long learning, and acquiring the capacity to do so. (Life Long Learning)
7. The ability to adopt entrepreneurial mind set and demonstrate managerial skills. (Entrepreneurial)
8. The ability to appreciate professional and ethical values in dealing with business, cultural and environmental issues globally and locally. (Ethics)
9. The ability to acquire leadership skills in coordinating relevant tasks and programs. (Leadership)

COURSE STRUCTURE

CORE PROGRAMME

BPN1012 PRINCIPLES OF MANAGEMENT
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.

References:

BPN1022 BUSINESS LAW
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.

References:

BPN1032 ACCOUNTING I: FINANCIAL ACCOUNTING
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.

References:

BPN1043 COMPUTER SCIENCE FOR ENGINEERS
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.

References:

BPN1053 MATHEMATICS I
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.

References:

BPN1062 FUNDAMENTALS OF PROJECT MANAGEMENT
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 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.

References:

BPN1093 TECHNICAL DESIGN CAD
This subject is designed to introduce to the students the principle of computer-aided design. Topics include 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.

References:

BPN1103 Mathematics II
Calculus is a mathematical subject that plays an important role in the understanding of science, engineering and economics. This introductory calculus course covers differentiation and integration of functions of one variable, with applications in science and engineering.

References:

BPN2013 QUALITY MANAGEMENT
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.

References:

BPN2023 INDUSTRIAL ENGINEERING
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.

References:

BPN2032 FUNDAMENTALS OF MARKETING
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.

References:

BPN2043 FUNDAMENTALS OF ELECTRICAL ENGINEERING
Fundamentals of DC and AC circuits, network laws and theorems, passive circuit components, semiconductors, electric machines, and digital systems

References:

BPN2053 ERP SYSTEMS
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.

References:
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.

References:

BPN2103 CROSS-MODULE SEMINAR I
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.

References:

BPN2113 SUPPLY CHAIN MANAGEMENT
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.

References:

BPN2062 STATISTICS
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.

References:

BPN2073 INDIVIDUAL FIELD PROJECT - ENGINEERING
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 situation, no theoretical task).

BPN2083 INDIVIDUAL FIELD PROJECT - BUSINESS
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 situation, no theoretical task).

BPN2092 CORPORATE SOCIAL RESPONSIBILITY (CSR) PROJECT
This course 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.

References:

BPN3022 OPERATIONS RESEARCH
This course introduces students to the application of quantitative methods and techniques for effective decision making in solving business problems. 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.

References:

BPN3044 INDUSTRIAL TRAINING -REPORT
During their industrial training phase students should gain practical experiences and skills from the field of work of industrial engineers. They actively deal with tasks that involve business as well as technical aspects of work and also learn how to take into account ecological, ethical and technical safety aspects of work.

BPN4003 CROSS-MODULE SEMINAR II
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.

References:

BPE4143 LEAN MANAGEMENT
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.

References:

BPE4153 TECHNICAL PLANNING CASE
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.

References:
BPE4153 SIMULATION GAME
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

References:
1. “Handbuch TopSim General Management” of the Business Simulation Game

BPE4233 INTRA LOGISTICS
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.

References:

BPE4223 DISTRIBUTION LOGISTICS
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, warehouser, retailer etc.

References:

BPE4233 INTERNATIONAL LOGISTICS
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.

References:

BPE4243 WAREHOUSE & DISTRIBUTION PLANNING
The subject is intended to introduce the role of warehouse and logistics planning.

References:
3. Muller, M (2011) Essentials of Inventory Management. 2nd ed. AMACOM

BPE4112 INNOVATION & TECHNOLOGY MANAGEMENT
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.

References:

BPE4122 HR MANAGEMENT
This course provides an overview of many issues related to managing human capital in organisations. 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.

References:

BPE4132 INTERNATIONAL BUSINESS ENVIRONMENT
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.

References:

BPE4212 DATABASE SYSTEMS
This course covers fundamentals of database architecture, database management systems, and database systems. Students learn 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).

References:

BPE4222 SUSTAINABILITY/ENERGY EFFICIENCY/ENERGY MANAGEMENT
This subject is designed to introduce the students the importance of energy in people’s life and in national as well as global economic development. Students 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.

References:
References:

BPE4423 TECHNICAL APPLICATION AND MACHINES
Introduction to the techniques, and equipments of Industrial manufacturing. Emphasis on technical application such as machining, welding, casting, and forming operations.

References:

BPE4433 MATERIALS SCIENCE
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.

References:

BPE4443 PRODUCT ENGINEERING
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.

References:

BPE4453 ELECTRICAL DRIVES
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.

References:

3. Elective Subjects:
4. Elective Set 1
6. Elective (Business) III - Choose one (2 credits):
7. BPE4112 Innovation & Technology Management, BPE4122 HR Management, BPE4132 International Business Environment

8. Elective (Engineering) I, II, IV - Choose three (9 credits): BPE4213 Intra-Logistics, BPE4223 Distribution Logistics, BPE4233 International Transport Logistics, BPE4243 Warehouse & Inventory Planning

9. Elective (Engineering) III - Choose one (2 credits): BPE4212 Database Systems, BPE4222 Sustainability/Energy Efficiency, BPE4232 Power Management (Electrical Grids)

10. Elective (Business) III - Choose one (2 credits): BPE4212 Database Systems, BPE4222 Sustainability/Energy Efficiency, BPE4232 Power Management (Electrical Grids)


12. Elective (Business) III - Choose one (2 credits): BPE4112 Innovation & Technology Management,
BPE4122 HR Management, BPE4132 International Business Environment

17. Elective (Engineering) I, II, IV - Choose three (9 credits): BPE4413 Production Planning & Methods, BPE4423 Technical Applications & Machines, BPE4433 Materials Science, BPE4443 Product Engineering, BPE4453 Electrical Drives

19. Elective (Engineering) III - Choose one (2 credits): BPE4212 Database Systems, BPE4222 Sustainability/Energy Efficiency, BPE4232 Power Management (Electrical Grids)
Bachelor of Engineering Technology (Pharmaceutical)

1) Program Aims: To support the development of Pharmaceutical Industries in Malaysia as follows:

1. To cater the needs of the Malaysian pharmaceutical manufacturing sector to fill in the existing lacunae of the manpower in the pharmaceutical manufacturing industrial scenario.
2. Currently Chemical & Mechanical engineers are recruited which has to be replaced by pharmaceutical technologists whereby the initial training period is reduced thereby gaining in terms of revenues and manpower hours of operation.
3. Render experts in managerial skills for pharmaceutical trading and supply chain industries astute in technopreneurship with innovative new drug development

2) Programme Objectives: To produce a graduate who has mastered the needed expertises in pharmaceutical manufacturing industries as follow:

PO 1 To produce graduates who excel in their pharmaceutical technologist positions in pharmaceutical industries within the area of drug development, plant operation, safety and environment
PO 2 To produce graduates who apply and develop advanced technology through R&D and who are keen to pursue postgraduate studies
PO 3 To produce graduates who display leadership qualities to the companies that employ them
PO 4 To produce graduates who demonstrate strong professional values and responsibilities towards society and environment

3) Programme Learning outcomes:

PLO 1 Ability to apply knowledge of mathematics, science, engineering fundamentals and pharmaceutical engineering technology principles to define and applied pharmaceutical engineering technology procedures, processes, systems or methodologies.
PLO 2 Ability to solve broadly-defined pharmaceutical engineering technology problems systematically to reach substantiated conclusions by using appropriate tools and techniques.
PLO 3 Ability to design solutions for broadly-defined pharmaceutical 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.
PLO 4 Ability to plan and conduct experimental investigations of broadly-defined pharmaceutical engineering technology problems by using data from relevant sources.
PLO 5 Ability to select and apply appropriate techniques, resources and modern pharmaceutical engineering technology tools, with an understanding of their limitations.
PLO 6 Ability to function effectively as individuals, and as members or leaders in diverse technical teams.
PLO 7 Ability to communicate effectively with the pharmaceutical engineering technology community and society at large.
PLO 8 Ability to demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PLO 9 Ability to demonstrate an understanding of professional ethics, responsibilities and norms of pharmaceutical engineering technology practices.
PLO 10 Ability to demonstrate an awareness of management, business practices and entrepreneurship in the field of pharmaceutical engineering technology.
PLO 11  Ability to demonstrate an understanding of the impact of pharmaceutical engineering technology practices, taking into account the need for sustainable development.

PLO 12  Ability to recognize the need for professional development and to engage in independent and lifelong learning in the field of pharmaceutical engineering technology.
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SYLLABUS

Organic Chemistry
Synopsis:
This module aims to give students a strong foundation in the fundamental principles and theories used to interpret the different properties of common Organic chemical groups. The laboratory course aims to provide students with a practical understanding of the techniques to perform chemical preparations of organic molecules together with purification techniques.

Course Outcome:
1. Demonstrate knowledge of the effect of chemical bonding on the properties and reactivity of different organic compounds and their functional groups.
2. Apply the individual properties of the functional groups in organic synthesis.
3. Write simple organic reaction mechanisms.
4. Describe the theory behind and factors affecting organic acid & base strengths.
5. Explain the criteria for optical activity in organic molecules

References:

Biology for Engineers
Synopsis:
This module aims to provide the student with knowledge of the structure of mammalian and microbial cells and the biomolecules they are made from. The basics principles of microbiology, including organisms, growth and their importance to industry.

Course Outcome:
1. Identify a material from its physical and mechanical properties.
2. Explain how a material’s properties are influenced by the manufacturing method.
3. Describe the tensile testing, hardness testing and impact testing of materials to determine the material’s properties.
4. Describe the failure modes including fatigue, creep & testing of materials to determine these material properties.
5. Describe how metals can be shaped into a variety of forms by machining processes; turning, milling, drilling.
6. Describe how polymers thermoplastics & thermosets can be shaped into a variety of forms using common manufacturing processes; Blow moulding, injection moulding, extrusion & compression moulding,
7. Explain how material structure influences manufacturing processes; Blow moulding, injection moulding, extrusion & compression moulding, & effects of temperature on mechanical properties.
8. Explain how material structure influences manufacturing processes and the application of the material.
9. Analyse the manufacturing process and materials of a product including concepts of reusing and recycling.

References:

Engineering Science
Synopsis:
This subject is an introduction to the basic principles of physics and aims to provide student with skills necessary to apply concepts in the areas of mechanics, heat and waves and light to future applications in Electronic Engineering.

Computer Programming for Engineers
Synopsis:
The aim of this subject is to teach the student how to implement an algorithm in Java source code. Furthermore, the student will learn how to encapsulate the code into methods.

Course Outcome:
1. Write simple Java programs from flowcharts or description.
2. Write simple Java methods from specifications provided.
3. Use standard language constructs for selection (if-switch) and iteration (for-while-do).
4. Team Work – work in teams on a Java application.

References:

Material & Process
Synopsis:
This module provides the student with fundamental knowledge in materials and manufacturing processes for both metals and plastics. 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 materials and manufacturing process selection through the analysis of design requirements. The student will expand their knowledge of the environmental aspects of manufacturing processes.

Course Outcome:
1. Identify a material from its physical and mechanical properties.
2. Explain how a material’s properties are influenced by the manufacturing method.
3. Describe the tensile testing, hardness testing and impact testing of materials to determine the material’s properties.
4. Describe the failure modes including fatigue, creep & testing of materials to determine these material properties.
5. Describe how metals can be shaped into a variety of forms by machining processes; turning, milling, drilling.
6. Describe how polymers thermoplastics & thermosets can be shaped into a variety of forms using common manufacturing processes; Blow moulding, injection moulding, extrusion & compression moulding, & effects of temperature on mechanical properties.
7. Explain how material structure influences manufacturing processes and the application of the material.
8. Analyse the manufacturing process and materials of a product including concepts of reusing and recycling.

References:
4. Paula Yurkanis Bruce 2011, Organic chemistry, Pearson Education Upper Saddle River
8. Paula Yurkanis Bruce 2011, Organic chemistry, Pearson Education Upper Saddle River

References:
Course Outcome:
1. Explain fundamental principles of kinematics, dynamics, heat, waves, light and atomic physics.
2. Use scientific notation and convert physical quantities from one set of units to another.
3. Solve numerical problems in kinematics, dynamics, pressure, heat, waves, light and atomic physics.
4. Gather and analyse experimental data and write a short laboratory report.

References:

Process Chem & Pharma Engineering

Synopsis:
This module aims to provide the student with a knowledge and understanding of processes involved in the chemical / pharmaceutical industry

Course Outcome:
1. Apply chemistry reactions to pharmaceutical synthesis.
2. Adjust parameters to optimise synthetic pathways.
3. Apply phase separation to purification processes.
4. Apply thermodynamic principles to chemical processes in reaction vessels and purification systems.

References:
1. Baseline guide for API processing, ISPE.

Introduction to Pharmaceutical Science

Synopsis:
This module aims to provide the student with an understanding of the stepwise manufacture of tablets and some other pharmaceutical dosage forms.

Course Outcome:
1. Differentiate between different classes of pharmaceuticals.
2. Understand the mechanism of action of some common pharmaceutical agents.
3. Explain the unit operations involved in the manufacture of a drug formulation.
4. Prepare granulates, formulate tablets and analyse the final formulations.
5. Differentiate between different types of packaging, closure systems and labels/leaflets used in pharmaceutical manufacturing environments.
6. Understand the significance of labels and leaflets.

References:
4. MJ Mycek, RA Harvey, PC Champe 1997, Pharmacology, Lippincott- Ravan, USA.

Manufacturing Process Technology

Synopsis:
This module aims to provide the student with an understanding of the equipment and unit processes used in pharmaceutical industry.

Course Outcome:
1. Describe the steps normally used in a typical drug development process from discovery to market.
2. Describe the organisation of a pharmaceutical plant and the functions of each department.
3. Explain the basic operations involved in the synthesis and purification of chemicals on a large scale.
4. Demonstrate a detailed knowledge of the equipment used in a bulk pharmaceutical plant and its operation.
5. Describe the basic issues associated with scale up, yield optimisation and process safety.
6. Describe the basic operations of a Waste Treatment Plant.
7. Describe how to record data during the manufacturing process.

References:

Environmental Technology

Synopsis:
This module aims to familiarise the student with the primary sources of pollution. The module introduces the student to the techniques for the testing and analysis of waste streams.

Course Outcome:
1. Identify the different types of pollution. List the most common pollutant and the most toxic pollutants. Describe the different techniques of pollution testing.
2. Describe the techniques used in industry to minimise waste generation in manufacturing plants. List and outline the suitability material types for recyclability and waste treatment.
3. Describe the processes used for municipal and industrial waste water treatment.
4. Describe the processes used for Air pollution detection and treatment. Describe the process of incineration and discuss the factors affecting its suitability for use with particular waste streams.
5. Describe the construction of a modern engineered landfill facility. List and describe the engineering controls incorporated in a modern landfill facility to minimise environmental risk.
6. List and describe the process of an environmental audit. Describe the typical engineering controls that can be used to mitigate environmental risks.

References:

Electrical Fundamentals

Synopsis:
The module will familiarise the student with the principles of energy storage and transport in electrical and magnetic circuits. The module will provide the knowledge and skills required to safely build electrical circuits, and to measure and analyse the currents, voltage and power in the circuit.

Course Outcome:
1. Explain the flow of power in electrical systems and common components.
3. Calculate circuit parameters of three phase Star and Delta circuits.
5. Measure power/power factor and voltage/current on simple installations adhering to safety procedures.

References:

Protein Biochemistry & Biotechnology
Synopsis:
The module aims to provide the student with the theoretical and practical fundamentals of the technology in biopharmaceutical production. The module focuses on providing an understanding of how proteins are made and how they can be genetically engineered, and on key areas of the immune system. These biological systems are then applied to upstream processes of biopharmaceutical production. The module also aims to provide the student with the theoretical and practical fundamentals of protein structure, isolation and purification.

Course Outcome:
1. Demonstrate a detailed knowledge of protein chemistry.
2. Separate cells used for production of proteins and partially purify the protein produced.
3. Interpret the significance of Biotechnology on Biopharmaceutical production.
4. Demonstrate a detailed knowledge of therapeutic agents of microbial origin and their production.
5. Demonstrate knowledge of cell culture systems to express therapeutic proteins and optimise the requirements for their industrial scale production.

References:

Fluid Mechanics
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. To enable the student to develop the knowledge and analytical skills to solve practical problems in fluid mechanics, through applications to system design and performance studies.

Course Outcome:
1. Apply Bernoulli’s and continuity equation to steady flow of fluids in pipelines.
2. Use manometric principles to calculate the pressure at a point in a fluid.
3. Explain the difference between laminar and turbulent flow in pipelines.
4. Calculate pressure drop due to fluid friction and torque.
5. Explain the impact of fluid viscosity on viscous force and torque.
6. Demonstrate and/or perform calculations on fluid principles, bernoulli equation, continuity equation, fluid properties and various applications.
7. Perform calculations on open channel flow systems.
8. Identify the function and characteristics of fluid machines and carry out a basic analysis of rotodynamic machines.
9. Select pumps/fans for specified applications.
10. Perform calculations on systems incorporating pumps/fans, pipes/ducts, valves, dampers utilizing design tools.

References:

Electrical Power System
Synopsis:
This module aims to familiarise the student with the operating characteristics of common electrical components and devices. The student will be able to analyse the performance of, select and specify a range of motors, generators, drives and knowledge and skills to enable the student to select and specify the components of a domestic/light industrial electrical installation incorporating some local renewable electricity generation. This module also imparts knowledge and skills to enable the student to select and specify the components of an electrical installation within a potentially explosive atmosphere. The module also introduces some aspects of large scale electrical distribution systems.

Course Outcome:
1. Describe the operation of small 3 phase and single phase induction motors, and perform power, slip Torque and current rating calculations.
2. Describe the operation of various DC motor configurations and compare their characteristics with induction motors.
3. Explain the function of various types of electrical power converters.
4. Describe the operating characteristics of synchronous generators, alternators and permanent magnet generators.
5. Select and specify protection devices for small drives and power supplies.
6. Safely construct and perform electrical measurements on AC electrical systems containing motors and drives.
7. Describe and specify the components and construction of Low Voltage domestic and industrial electrical distribution systems.
8. Describe the components and construction and protection of the service providers LV distribution.
9. Explain and analyse the control of small generators and converters.
10. Specify the hardware needed to integrate small scale generation equipment with a local installation: cabling, protection, batteries, controllers, inverters, switchgear.
11. Explain the technical and legal requirements for an electrical installation in explosive atmospheres.

References:

Contamination Control & Cleanroom
Pharmaceutical Formulation Methods

Synopsis: This module aims to provide the student with an in-depth understanding of the methods of manufacture of some of the most common dosage forms.

Course Outcome:
1. Demonstrate a detailed knowledge of the formulation of pharmaceutical liquid dosage forms.
2. Describe the limitations of each of the dosage forms and the limitations in their manufacture.
3. Describe the specific conditions associated with the production of sustained release products.
4. Know the component parts and the importance of the MDI applications.
5. Have a detailed knowledge of the production of Topical dosage forms.
6. Determine correct excipients for each formulation.
7. Select correct primary packaging for MDIs and topical products.

References:

Thermodynamics

Synopsis: This subject introduces and develops basic thermodynamic principles and focuses on industrial applications.

Course Outcome:
1. Use the ideal gas laws and associated relationships to calculate properties of thermodynamic systems.
2. Use steam tables to evaluate thermodynamic properties for use in thermal plant analysis.
3. Apply the 1st law of thermodynamics to open steady flow systems.
5. Describe operation of internal combustion engine and carry out simple analysis.
6. Analyse thermal resistance networks for simple heat transfer applications.
7. Describe types of heat exchangers and evaluate heat transfer rates.

References:

Energy Control Systems

Synopsis: This module introduces the measurement and manipulation of process signals. The operation of analogue and digital sensors, and actuators is addressed. Programmable logic controllers are introduced. The module provides the tools to analyze and design systems to control process plant and the consumption of energy in various systems.

Course Outcome:
1. Use a variety of analog sensors and meters (thermal, position, speed, flow, power) to acquire process information
2. Use, describe, and explain signal conditioning circuits to modify/interface sensor data.
3. Describe the operation of on/off and proportional closed loop control systems.
4. Calculate the error performance and speed of response of simple closed loop control systems.
5. Implement simple control schemes using PLCs.
6. Explain control requirements, and describe the types of control system encountered in thermal and electromechanical energy systems.
7. Measure and evaluate the error performance and transient response of thermal, electrical and electromechanical systems.
8. Use control engineering techniques to analyse and modify system performance.
9. Implement control of batch or sequence type problems.
10. Implement closed loop control of process variables (temperature, level, voltage, current, torque) in sample systems.

References:

Industrial Network

Synopsis: This module aims to equip the student with the skills necessary to understand various different network topologies and protocols which are 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:
1. Construct a basic single office LAN.
2. Define key network configurations.
3. Describe the concept of Network Protocols.
4. Describe basic network components and their functions and uses in relation to the specific network.
5. Demonstrate typical industrial networking protocols.
6. Describe the key principles of wireless communications.
7. Assemble the essential elements of a SCADA system.

References:
1. N.P. Mahalik (Editor) 2003, Fieldbus Technology, 1st Ed., Springer USA.

Numerical Methods & Optimization
Synopsis:
Course Outcome:
References:

Electrical System & Network
Synopsis:
This module demonstrates to the student where the basic principles of electro-magnetism translate into industrial actuators such as DC motors, AC motors and Stepper motors. This module will apply knowledge of the National Rules for Electrical Installations to allow the graduate to work safely with electrical panels. Finally the module aims to equip students with the ability to read and understand drawings of electrical installations and hence communicate with other professional engineers.

Course Outcome:
1. Explain the application of Malaysian Standards for Electrical Installation to the design of electrical panels for the supply of electrical motors, the use and operation of safety systems.
2. Use the working principles of DC/AC Motors and the various methods of speed control for DC/AC Motors.
3. Analyze the working principle of stepper and the requirements for sizing a motor for an application.
4. Describe the principles of field bus systems.
5. Use the applications of some of the main field bus systems.

References:
2. Electrical Motor Maintenance and Troubleshooting Augie Hand, McGraw Hill.

GMP & QA
Synopsis:
This module aims to provide the student with: The necessary information to comply with the requirements of European Guidelines with respect to GMP and knowledge of the requirements of Malaysia with respect to GMP in the US.

Course Outcome:
1. Outline the necessity and function of GMP within industry.
2. Write a simple Standard Operating Procedure.
3. Describe the role of audits, corrective actions and change control etc. in a manufacturing environment.
4. Understand the role and function of Quality Control and Quality Assurance.
5. Understand the role of the employee in delivering products, which meet specification.
6. Interpretation and use of quality specifications.

References:
1. PIC/S guideline
2. ICH guidelines

Automation
Synopsis:
The aim of this subject is to develop an understanding and provide practical experience of fluid power and PLC control systems as used in industrial environments. This subject forms the basis for student project work and further study in third year.

Course Outcome:
1. Describe the function and operation of pneumatic and hydraulic components.
2. Design and build manual and electrically controlled fluid power circuits.
3. Describe the maintenance requirements of fluid power systems.
4. Calculate the forces applied by actuators and the speed of actuator movement.
5. Identify safety issues and hazards in automated systems.
6. Write Boolean expressions and draw truth tables for basic logic functions.
7. Draw ladder diagrams for fluid power applications.
8. Describe the operation of timers and counters in PLCs.
9. Write and test PLC programs using basic logic functions, timers and counters.

References:

Process Biotechnology Techniques
Synopsis:
This module aims to provide the student with the theoretical and practical fundamentals of protein structure, isolation, purification and characterisation and their application to downstream processes in the biopharmaceutical industry.

Course Outcome:
1. Explain in detail, the structure and physicochemical properties of proteins and how they are exploited in downstream purification.
2. Compare and contrast the different chromatographic methods for protein purification, capture, polishing and viral clearance.
3. Describe the stages involved in scale-up of chromatography, CIP & SIP, and the qualification of columns.
4. Understand the operation and limitations of the protein separation and concentration techniques required for lab scale and industrial processing.
5. Perform and report on laboratory methods for the purification and concentration of proteins.

References:
Facilities Management System

Synopsis:
This module will describe and outline the requirements of facilities management as defined by EN 15221 series of standards. This module will equip the student with the skills required to analyse failure data with a view to selecting appropriate management strategy to address typical failure distributions that occur in industrial facilities. This will also include “BREEAM, environmental assessment method and rating system for buildings”.

Course Outcome:
1. Describe and outline the requirements of facilities management as defined by EN 15221 series of standards.
2. Interpret failure rates and prediction confidences.
3. Outline strategies to achieve reliability targets.
4. Describe in detail the functions of and the components that make up a Building Management System.
5. Describe the background and requirements for “BREEAM, the environmental assessment method and rating system for buildings” certification.

References:

Regulatory Affairs and Validation for Engineers

Synopsis:
This module aims to provide the student with a detailed understanding of the requirements of the GMPs, MA’s, MA compliance and clinical trials.

Course Outcome:
1. Analyse and interpret the GMP guidelines and the legislation governing the manufacture of medicinal products in the EU/US/Malaysia.
2. Describe and design both compliance and systems audits in a pharmaceutical industrial environment.
3. Interpret the key legislation regarding the preparation of a marketing authorisation application.
4. Describe how a marketing authorisation is prepared, submitted and assessed.

References:
1. EC Guidelines.
5. Rick Ng 2009, Drugs from Discovery to approval, 2nd Ed., Wiley.

Measurement and Control

Synopsis:
This subject introduces the key building blocks and concepts of Instrumentation and measurement systems. The importance of considering the whole system is emphasised. Techniques for analysis of measurement system performance are introduced. The specific system and transducer types covered can vary, as can the signal conditioning, recording and analysis instruments used.

Course Outcome:
1. Select the appropriate information acquisition and management software.
2. Characterize and construct simple computerized measurement systems.
3. Compare techniques for measuring flow, level, temperature, pressure, pH and evaluate the advantages and disadvantages of each technique.
4. Define the fundamental elements of a process control system.
5. Define and manage appropriate pneumatic and vacuum technology.
6. Evaluate the effect of feedback on linearity, noise, disturbances and error performance.

References:

Automation Systems

Synopsis:
This module equips graduates to work with automated technologies by providing them with knowledge, understanding and practical experience in PLCs, sensors, robotics, pharmaceutical automation and machine vision. Safety strategies in both the design and implementation of automated systems are emphasized. The practical work is designed to develop team working skills.

Course Outcome:
1. Design and test PLC programs using the most appropriate technique.
2. Describe PLC architecture and the types of I/O interfaces.
3. Select a PLC for a particular task.
4. Interface a PLC with electro-pneumatic equipment.
5. Identify suitable applications for PLC’s, robots, machine vision and other automation equipment.
6. Describe the classification, operation and applications of industrial robots.
7. Write and test interactive robot control programs.
8. Describe and apply the principles of image acquisition, analysis and interpretation.
9. Describe the overall architecture used to implement pharmaceutical automation.
10. Describe and select various components used in such automation.

References:
1. W. Bolton, Programmable logic controllers.

Technology Transfer

Synopsis:
This module aims to provide the student with an understanding of the requirements and possible problem areas in technology transfer and through the knowledge provided possible ways to overcome the difficulties.

Course Outcome:
1. Design a scale up protocol from bench top to large pilot scale.
2. Troubleshoot a scale up procedure.
3. Write and execute a technology transfer protocol for a pharmaceutical finished product.
4. Design a cleaning validation protocol and carry out the cleaning validation necessary for technology transfer.
5. Compare raw material sources and assess their chemical and physical comparability.
6. Write and execute validation documents.

References:

Process Chem & Pharma Engineering 2
Synopsis:
This module aims to provide the student with the theoretical and practical fundamentals of scale up and process development issues and their in processes in the pharmaceutical industry.

Course Outcome:
1. Recognise the significance of the Pre-scale up research, be able to problem solve some scale-up problems and know the limitations of pre-scale research.
2. Apply the elements of process development.
3. Play an effective role in a HAZOP study.
4. Solve impurity problems systematically.

References:
2. Stan Lee and Graham Robinson, Process development

Contemporary Trends in Pharma Industry
Synopsis:
The module is a vehicle to present critical new developments in business organisation, regulatory and new technical applications relevant to the pharmaceutical industry for the global market.

Course Outcome:
1. Interpret and apply new regulatory requirements to a pharmaceutical manufacturing environment.
2. Apply new technical guides to manufacturing plant and equipment design.
3. Interpretation of effectiveness/relevance of new management systems to pharmaceutical manufacturing.

References:
1. ISPE 2007, Active Pharmaceutical Ingredients, Baseline Guide.
4. ISPE 2001, Commissioning and Qualification, Baseline Guide.
5. 2003, Technology Transfer, Good Practice Guide.

Manufacturing Systems Lean Six Sigma
Synopsis:
The manufacturing philosophies of Lean and Six Sigma have become central to most competitive manufacturing and service organisations. This module aims to expand the students’ understanding and competence in their aims and techniques. The module also develops insight into legal and project management issues that impact in a commercial way from the work of a professional engineer.

Course Outcome:
1. Demonstrate a thorough understanding of the fundamentals of Lean Operations and Six Sigma, and communicate their key elements.
2. Use the Lean and Six Sigma approaches to analyse a manufacturing or service operation, identify the problems/challenges therein, and use Lean/Six Sigma tools and techniques to design improvements.
3. Conduct a piece of individual research based on the literature.
4. Disseminate their work to a panel of their peers and society at large through oral and poster presentations.
5. Outline the legal options and constraints that an engineer must deal with in case study situations.
6. Compare alternative courses of action for slippage in a typical engineering project plan given the conflicting issues of budget, timetable and scope.

References:

Tech Inno for Pharma Eng
Synopsis:
To formally induct students into research theory and the methodologies and techniques they may require in order to carry out independent research. Also, to expose students to a range of ad hoc and structured approaches to problem solving and expose students to innovative approaches to help create a competitive edge.

Course Outcome:
1. Identify relevant and feasible areas of research for the purpose of investigation.
2. Select, develop and apply appropriate literature search strategies using relevant literature resources and ICT for purposes of literature review in order to identify the current state of knowledge and key issues in a research.
3. Employ appropriate data analysis techniques for specific sets of data.
4. Select a topic from the course and/or one’s own experience which will provide suitable scope for research in a project dissertation and prepare a detailed realistic research proposal supported by a preliminary review of the relevant literature.
5. Brainstorm and organise questions related to complex problems and apply a range of problem-solving techniques to “fuzzily” defined problems and generate potential solutions.
6. Develop and justify strategies to employ appropriate problem-solving techniques to solve problems.
7. Discuss the role of innovation within an organisation and demonstrate an appreciation of different models of innovation.
8. Explain how individuals and teams act as innovators and demonstrate a range of team-building skills.

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9. Demonstrate an ability to employ ethics in the area of problem solving and innovation and demonstrate an awareness of the ethical.

References:

**Process Control**

Synopsis:
This subject gives students knowledge and skills and an understanding of a system for designing, analyzing, and controlling manufacturing processes using on-line measurements of important quality and performance attributes of raw and in-process materials and processes with the goal of ensuring final product quality and compliance with the regulatory standards.

Course Outcome:
1. Source and interpret key regulations relevant to process engineering.
2. Discuss sampling and instrumental issues in relation to presenting process material for common measurements and analysis.
3. Use fundamental process control theory to monitor and control engineering processes.
4. Analyse the functionality of data collection and management in automation system of a selected industry using real time inline monitoring.
5. Propose typical PAT applications and investigate associated capabilities of sensors.
6. Critically assess relevant scientific literature and communicate effectively using appropriate information and communication tools.

References:

**Bio and Pharma Analytical Techniques**

Synopsis:
This module will provide the theoretical foundation for analytical techniques used in material characterization, formulation design and PAT applications.

Course Outcome:
1. Apply NIR to material and process control.
2. Apply Raman spectroscopy to mapping material concentrations on tablet surfaces.
3. Apply acoustic sensors to monitor fermentations.
4. Apply powder rheology to material characterisation and process design.
5. Apply DSC to polymorphic analysis and excipient characterisation.

References:

**System Validation**

Synopsis:
This module aims to provide the student with knowledge and practical skills involved in systems validation.

Course Outcome:
1. Define validation systems and associated regulatory requirements.
2. Generate validation plans, protocols and reports.
3. Validate selected pharmaceutical and biopharmaceutical, medical device manufacturing equipment and utilities.
4. Validate active, finished product and medical device manufacturing processes.
5. Draft a cleaning validation study for pharmaceutical equipment.
6. Devise regulatory requirements for the validation of automation systems.
7. Devise and complete an analytical method validation study.
8. Draft a technology transfer protocol.

References:
1. Directorate for the Quality of Medicines of the Council of Europe (EDQM) 2004, European pharmacopoeia, 5th Ed.

**Industrial Statistics for Pharmaceutical Engineers**

Synopsis:
To provide the student with statistical tools for designing experiments, evaluating processes and predicting responses.

Course Outcome:
1. Design experiments involving a number of factors.
2. Analyse experimental data with the help of software.
3. Communicate findings in a variety of formats.
4. Evaluate the performance of a process.
5. Explore relationships between variables or attributes.
6. Select a suitable model from among a number of alternatives.

References:

**Pharma Project**

Synopsis:
The Project is largely a self-learning process and students are expected to use the knowledge they have gained during their attendance at lectures, labs and tutorials. The project supervisor is
expected to provide support and advice for the project student during allocated time. The main role of the supervisor is to “guide” the project on a weekly basis and students are strongly advised to use project meetings in an effective manner by outlining problems, presenting experimental results and prepared questions. Students are strongly advised to follow advice from their supervisors and maintain regular contact throughout the project.

Course Outcome:

1. Apply basic project management method in planning and executing the project.
2. Research engineering topics and acquire necessary knowledge and understanding of the project area.
3. Conduct a feasibility study and perform necessary circuit design and/or software design.
4. Demonstrate practical engineering skills such as system construction, quantitative analysis, troubleshooting and testing.
5. Demonstrate ability to agree project milestones, schedules, make deliverables and conduct a satisfactory completion of the project.
6. Resolve problems encountered during the project. Maintain accurate record of project progress and results.
7. Maintain accurate record of project progress and results.
8. Effectively communicate problems and progress to the supervisor in a professional manner.
9. Effectively communicate their understanding and achievements both through an oral presentation and a formal report, taking into account academic and ethical standards.
10. Demonstrate presentation skills through appropriate media.
11. Answer questions relating to the project, such as project planning, decisions made, operation and implementation and the related theory.
12. Discuss the implications of their project and make recommendations for future work.
13. Discuss the possible impact of the project on society and the environment.
14. Produce and present a poster describing the project.

References:

CAREER PROSPECT

BACHELOR OF PROJECT MANAGEMENT WITH HONORS
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. List of potential industries include:

Types of Industries:
Consultancy
ICT
Service
Tourism
Event Management
Research and Development
Multimedia
Construction
Education

Types of Position
Project Manager
Contract & Procurement Administrator/ Manager
Human Resource & Admin Manager
Document Control Manager
Project Risk Consultant
Project Cost Consultant
Work-package Coordinator
Project Administrator
Project Support Officer
Academician
Entrepreneurs
Technology Manager

BACHELOR OF OCCUPATIONAL SAFETY AND HEALTH WITH HONORS
Graduates from Bachelor of Science in Occupational Safety and Health have a broad carrier prospect within the private sectors and industries, government agencies and local authorities plus other constitutional bodies. List of sectors involved such as:
Ergonomist
Executive Safety & Health
Fire Engineer
Industrial Hygienist
Lecturer
Permit-to-Work Coordinator
Process Safety Engineer
Researcher
Risk Assessor
Risk Surveyor
Safety and Health Trainer
SHE Advisor
SHE Auditor
SHE Consultant
SHE Coordinator
SHE Engineer

BACHELOR OF INDUSTRIAL TECHNOLOGY MANAGEMENT WITH HONORS

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 / Superintendent
- Process / Industrial Engineering Executive
- QA / QC Executive
- Information and Document Controller Officer
- Material Controller / Planner
- Production Planning and Control (PPC) Executive
- Procurement / Purchasing Executive
- Logistic Executive / Officer
- Project / Business Development Executive
- Sales & Marketing Executive
- HR / Administrative Executive
- Event Management Executive
- Management Trainee

BACHELOR OF ENGINEERING TECHNOLOGY (ELECTRICAL) WITH HONORS

- computer hardware design
- design of alternative energy systems
- software development
- communications and networking
- energy efficiency engineer
- power systems design and analysis
- microelectronics
- optoelectronics
- robotics
- electrical design

BACHELOR OF ENGINEERING TECHNOLOGY (MANUFACTURING) WITH HONORS

- Engineering Technologist
- Operation/Production Engineer
- Management Trainee
- Quality Engineer
- Applications Engineer
- Senior Technical Associate
- Sales/Procurement Engineer
- Project Engineer
- Business and technology analyst
- Engineering Jobs:
  - Systems engineer
  - Manufacturing engineer
  - Power systems engineer
  - Industrial engineer
  - Operations research analyst
  - Design/development engineer
  - Process engineer
  - Quality engineer
  - Reliability engineer
  - Applications engineer
BACHELOR OF ENGINEERING TECHNOLOGY (ENERGY & ENVIRONMENTAL) WITH HONORS

- Energy Applications Engineer
- Energy Systems Engineer
- Energy Operations Engineer

Employment areas include:
- Environmental
- Energy
- Transportation
- Construction
- Geotechnical
- Power systems structural analysis
- Energy environmental impact

ADDRESS

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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 divided into four departments, which are the Human Sciences Department, the Modern Languages Department, Foreign Languages Department and Soft Skills Department. Apart from providing university core subjects, CMLHS also offers courses to develop students' and staff's competency such as MUET, IELTS and study skills workshop. 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 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

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COURSES OFFERED

The courses offered by CMLHS include:
- Courses offered by Modern Languages Department
- Courses offered by Human Sciences Department
- Courses offered by Foreign Languages Department
- Courses offered by Soft Skills Department
- Elective courses

Modern Languages Courses

Diploma (3 levels) – 2 credit hours
UHL 1412 Foundation English
UHL 1422 English for General Communication
UHL 1432 English for Occupational Communication

Degree (3 levels) – 2 credit hours
UHL 2400 Fundamental of English Language
UHL 2412 English for Academic Communication
UHL 2422 English for Technical Communication
UHL 2432 English for Professional Academic Report Writing

Human Sciences Courses

Degree and Diploma – 2 credit hours
UHR 1012 Islamic & Asian Civilisation 1
UHM 2022 Ethnic Relations

Soft Skills Courses

Degree and Diploma – 1 credit hours
UHS1021 Soft Skills 1
UHS2021 Soft Skills 2

Foreign Languages Courses

Degree

* Degree students are to select one language only and take two levels of foreign language courses.

Beginners Level – 1 credit hours
UHF 1111 Mandarin for Beginners
UHF 1121 German for Beginners
UHF 1131 Japanese for Beginners
UHF 1141 Arabic for Beginners
UHF 1151 Spanish for Beginners
UHF 1161 Malay Language for Beginners

Intermediate Level – 1 credit hours
UHF 2111 Mandarin for Intermediate
UHF 2121 German for Intermediate
UHF 2131 Japanese for Intermediate
UHF 2141 Arabic for Intermediate
UHF 2151 Spanish for Intermediate
UHF 2161 Malay Language for Intermediate

Elective Courses

UHE 3012 Contemporary Leadership in Community
UHE 3022 Critical Thinking Through Literature
UHE 3032 Introduction to Human Behaviour
UHE 3042 Organizational Counseling
UHE 3062 Malaysia: The Impact of Globalization
UHE 3072 Technology for Human Capital Development
UHE 3082 Creative Writing
UHE 3092 English Mechanics
UHE 3112 Language in Society
UHE 3122 Islamic Institutions
UHE 3132 Public Speaking
UHE 3142 Project Based Proposal Writing
UHE 3152 Interpersonal Effectiveness
UHE 3162 Family System in Islam
UHE 3172 English for Science and Technology (EST) – UC Davis
UHE 3182 Malaysian Studies
UHE 3192 Fundamental Ibadah in Islam
UHE 3202 Introduction to Halal Studies

Other courses
UHG1002  Deutsch Sprache 1
UHG1012  Deutsch Sprache 2
UHG2002  Deutsch Sprache 3
UHG2012  Deutsch Sprache 4
LAB FACILITIES AT THE MULTIMEDIA LANGUAGE LAB IN CMLHS

OVERVIEW

In the quest to prepare our students with the demands of tomorrow’s world, the Centre of Modern Languages and Human Sciences has established 17 state-of-the-art Multimedia Language Labs. The physical layout of each language lab gives high priority to students’ comfort and caters to student-centered learning approach practised in UMP. All the language labs are equipped with 31 multimedia-ready computers for lecturers’ and students’ use.

The computers at the labs in Gambang are equipped with the RENET Lab Management System. It is a system developed in Finland. At UMP Pekan Campus, the Multimedia Language Labs are equipped with a lab management system similar to RENET. This system is a modular software called SANAKO Study 500. Both systems can personalize learning and provide support for all students through the monitoring of student screens and the remote control of students’ PCs.

The facilities and services available at CMLHS include:

a) Language Lab Classroom

Language classes are usually conducted in the CMLHS Multimedia Language Labs. The fully carpeted and air-conditioned labs are very comfortable and conducive for effective learning to take place. All multimedia equipment is available for a variety of multi-media presentations and activities to facilitate learning processes. In addition, the labs are also available for internal or external use with a small amount of fees.

b) Language Learning Software

We have a collection of instructional language software for English Language Teaching and Learning and other software for foreign languages such as Japanese, German, Arabic, Spanish and Mandarin.

c) Library of Materials for Teaching and Learning

The CMLHS Multimedia Language Labs offer a collection of foreign language and language instruction oriented videos, audio cassette tapes, compact disks and other media and teaching aids for use in teaching and learning.

d) Recording Studio

CMLHS is proud to own a state-of-the-art Recording Studio which offers audio and video recordings services using high-end and latest technology in Multimedia Audio and Video Recording. This studio is equipped with 4 layers of acoustic sound proofing, Mac, Pro64 bit workstation and other professional grade apparatus. The studio is available for internal or external use with a small amount of fees.

e) Video Recording and Photography Services

The video recording and photography services are accessible for staff who wish to record students’ activities for class discussion, assessment or any events. Our lab technicians will provide assistance upon request.

f) Workshop/ Training

CMLHS staff also organize workshops and trainings on language software and language lab management system for academic staff to equip them with the latest technology in education.

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COURSE SYNOPSIS

Modern Languages Department
Diploma
Course code : UHL1412
Course : FOUNDATION ENGLISH
Prerequisite : None

Synopsis
The course focuses on preparing students for Malaysian University English Test (MUET). It is intended to assist students by exposing them to MUET examination format. 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. They will also be exposed to listening to 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 and thesis-led essays using accurate language, relevant content and correct organisation
CO 5 Demonstrate teamwork skills in group activities

References

Course code : UHL1422
Course : ENGLISH FOR ACADEMIC SKILLS
Prerequisite : UHL1412 Foundation English

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 practising telephoning skills, writing cover letter, resume, recording video resume and attending mock job interview. In addition, students will also collect company profiles through a visit to industry and transfer the information into a report.

Course outcomes
CO 1 Compose various job application documents using accurate language, correct format and relevant content.
CO 2 Present relevant information using accurate language and delivery strategies.

References

Course code : UHL1432
Course : ENGLISH FOR OCCUPATIONAL COMMUNICATION
Prerequisite : UHL1422 English for Academic Skills
CO 3 Communicate in telephone conversation and interview using appropriate language expressions, delivery strategies, and relevant content.

CO 4 Write an informational report using accurate language, correct format and relevant content.

References

Degree Course code : UHL2400

Course : FUNDAMENTALS OF ENGLISH LANGUAGE

Prerequisite : 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 parts of speech.
CO 2 Employ reading comprehension skills in extracting information from reading texts.
CO 3 Write a linear text from a non-linear input using accurate language, correct organization and relevant content.
CO 4 Write an argumentative essay using accurate language, correct organization and relevant content.

References

Course code : UHL2412

Course : English for Academic Communication

Prerequisite : 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 note-making techniques, and active listening skills are also emphasised. Students will also be exposed to thesis-support essays and writing styles and organisation appropriate for their level. Additionally, students will be exposed to group discussions and e-learning platform will also be introduced as part of the course.

Course Outcomes
CO 1 Apply reading skills to extract and transfer specific information from general texts.
CO 2 Write thesis-support essays using accurate language, correct organisation and relevant content of general topics.
CO 3 Justify points of view in small group discussion using accurate language and effective group discussion strategies.
CO 4 Apply appropriate study skills in listening and writing.

References
Course Code : UHL2422
Course : English For Technical Communication
Prerequisite : 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 the course consist of, but not limited to, technical descriptions, 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
1. Determine salient information from listening tasks related to technical information using accurate language
2. Demonstrate presentation skills using relevant content, accurate language and appropriate delivery strategies individually and in groups
3. Apply reading and grammar components to analyse technical reading materials and documents
4. Write technical documents using specific technical language, correct format and relevant content

References

Course code : UHL2432
Course : ENGLISH FOR PROFESSIONAL COMMUNICATION
Prerequisite : 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, writing business correspondence, conducting meetings and writing business documents.

Course Outcomes
CO 1 Present specific information using appropriate word choice, accurate language and effective delivery strategies.
CO 2 Write a job application letter, different types of business letters and documents for meetings using accurate language, appropriate vocabulary and correct format.
CO 3 Construct ideas and opinions orally using accurate language and appropriate delivery strategies in mock job interviews.
CO 4 Role-play effective delivery strategies using appropriate language expressions in meetings.

References

Human Sciences Department
Degree and Diploma
Course code : UHR1012
Course : ISLAMIC & ASIAN CIVILIZATION 1
Prerequisite: none

Synopsis
This course is designed to equip students with a deeper understanding about Islamic and Asian civilizations particularly those civilizations which form the foundation of Malaysia. It concerns about the study of universal values promoted by Islamic and Asian civilizations. The course also discusses Western civilization in terms of its characteristics, philosophy as well as its development and how this impacts Asian civilizations, particularly the Malaysians. In addition, some contemporary civilizational issues are also being discussed. In general, the philosophy of the course is to develop students’ awareness on how Islamic and Asian civilizations have shaped our world today.
Course Outcomes

CO 1 Explain basic concepts, timeline, principles and lessons to civilization studies.

CO 2 Apply the values and principles of civilized individuals in the assessment

CO 3 Analyze contemporary issues related to civilization

References


Course code : UHM2022

Course : ETHNIC RELATIONS

Prerequisite: none

Synopsis

This course discusses basic concepts related to human relations in a multiethnic society. It focuses on managing ethnic relations from political, economic, social and religious perspectives in promoting national integration and unity. Contemporary issues and challenges related to ethnic relations in Malaysia and other countries are also discussed. In general, the aim of this course is to promote and foster national solidarity among students.

Course Outcomes

CO 1 Reflect the history of multiethnic society in Malaysia

CO 2 Define basic concepts and theories related to ethnic relations in multiethnic society

CO 3 Discuss the history, economic, and federal constitution perspectives in promoting national integration

CO 4 Analyze political, religious, integration, and education viewpoints in relation to social cohesiveness.

References


Soft Skills Department

SOFT SKILLS

Course code : UHS1021

Course : SOFT SKILLS 1

Prerequisite: 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 ethics and moral professional, leadership, teamwork, communication, critical thinking and problem solving and life-long learning skills. Students shall develop these skills through course work, problem based learning, group project and assignments. Hence, allowing students to enhance their competency and credentials.

Course Outcomes

CO 1 Identify UMP Soft Skills elements

CO 2 Analyse issues using the Soft Skills elements

CO 3 Evaluate Soft Skills elements to solve problems

References


Course code : UHS2021
Course : SOFT SKILLS 2
Prerequisite: 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 spiritual intelligence, coaching, change management, critical thinking and problem solving and communication skills. In the end, students will be more competent and competitive as preparation before getting into workplace.

Course Outcomes
CO 1 Explain the nature and importance of Soft Skills in the global market
CO 2 Analyse issues at workplace using the Soft Skills elements
CO 3 Demonstrate Soft Skills elements during spoken communication
CO 4 Evaluate Soft Skills elements to solve workplace problems

References

Foreign Languages Department

Degree (students are to select one language only & enrol in two levels)

Beginners Level

Course code : UHF1111
Course: MANDARIN FOR BEGINNERS
Prerequisite: none

Synopsis
This course aims to enable students to speak simple Mandarin in their daily lives. The students will learn basic Chinese Phonoetics (Hanyu Pinyin System), about 180 words, and basic sentence structures. They are also expected to be able to read and write 30 selected Chinese characters. Classroom activities include listening and speaking skill practices. Reading and writing activities are also included to enhance the oral skills. Practices on certain basic grammar are also introduced. The students will be evaluated on all the four language skills-listening, speaking, reading and writing.

Course Outcomes
CO 1 communicate simple Mandarin in selected situations
CO 2 read selected short Mandarin texts
CO 3 write selected Chinese characters
CO 4 construct simple sentences

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

Course code : UHF1121
Course : GERMAN FOR BEGINNERS
Prerequisite : none

Synopsis
This course is designed to give students an exposure to German language and culture of German-speaking countries. The course covers the basic language skills of listening, reading, speaking and writing. Lessons are composed of themes regarding greetings, family, food and drinks and telling time. To enhance the effectiveness of learning the language students are encouraged to participate in group work, role play and other communicative activities.

Course Outcomes
CO 1 locate specific information from texts
CO 2 communicate on selected topics such as describing family, buying food and telling time
CO 3 construct short sentences on familiar topics
CO 4 demonstrate correct language use

References
3. Monika Reimann, Grundstufen-Grammatik für Deutsch als Fremdsprache : Erklärungen und
Course code: UHF1131
Course: JAPANESE FOR BEGINNERS
Prerequisite: 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 competency in the aspects of self-development, knowledge acquisition and social interaction.

Course Outcomes
CO 1 identify Hiragana script and words
CO 2 express words in basic Japanese language in selected situations
CO 3 write simple sentences
CO 4 demonstrate correct language use

References
4. www.learn-hiragana-katakana.com
5. genkijapan.net

Course code: UHF1141
Course: ARABIC FOR BEGINNERS
Prerequisite: 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. 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 Demonstrate Arabic characters in writing
CO 2 Identify Arabic words with correct pronunciation.
CO 3 Construct accurate simple sentences in Arabic

References

Course code: UHF1151
Course: SPANISH FOR BEGINNERS
Prerequisite: 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. To expose students speak simple spanish in selected situation and also read and write in spanish. Classroom activities include listening and speaking, reading and writing. Practice on certain basic grammar is also introduced. The students are evaluated in all four language skills that are listening, speaking, reading and writing.

Course Outcomes
CO 1 Read spanish word with correct pronunciation.
CO 2 Write simple sentences in Spanish.
CO 3 Use simple Spanish language in selected situations such as in the classroom.
CO 4 Demonstrate soft skills

References

Course code: UHF1161
Course: MALAY LANGUAGE FOR BEGINNERS
Prerequisite: none

Synopsis
This course aims to expose students to Basic Malay. They will be introduced to Roman letters based on Malay Phonetic Systems. They will also learn basic Jawi script. Students will be exposed to basic communication in Malay such as introducing oneself, and selling and purchasing,
counting numbers and communicating with the Malay natives.

**Course Outcomes**

CO 1 Pronounce Malay syllable correctly

CO 2 Identify Malay words with correct meaning

CO 3 Illustrate the use of correct vocabularies in simple conversation such as introducing oneself, selling and purchasing and counting numbers

CO 4 Identify similarities and differences between Jawi alphabets and Roman alphabets

CO 5 Demonstrate soft skills

**References**


**Intermediate Level**

**Course code : UHF2111**

**Course : MANDARIN FOR INTERMEDIATE**

**Prerequisite: UHF1111 Mandarin for Beginners**

**Synopsis**

This course aims to enable students to speak Mandarin in selected situations. The students will continue to practice the use of Chinese Phonetics (Hanyu Pinyin System). They will also learn additional 240 selected Chinese characters, common Chinese proverbs and are expected to be able to write simple sentences. Classroom activities will focus on language skills practices—listening, speaking, reading and writing. Chinese characters writing and translation exercises also formed part of the course. Students will be evaluated on the four language skills namely listening, speaking, reading and writing.

**Course Outcomes**

CO 1 Communicate simple Mandarin in selected situations

CO 2 Read selected short Mandarin texts

CO 3 Construct simple sentences

CO 4 Translate English words, phrases and sentences into Mandarin

**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


**Course code : UHF2121**

**Course : GERMAN FOR INTERMEDIATE**

**Prerequisite: UHF1121 German for Beginners**

**Synopsis**

German for Intermediate is a continuation course and intended for students who have successfully completed German for Beginners (UHF 1121). 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, pronounce and read Germany

CO 2 Respond to conversations in daily life situations

CO 3 Produce a sketch of about 3 minute on various daily activities

CO 4 Read Germany words on industrial machine, appliances and signage

**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.


**Course code : UHF2131**

**Course : JAPANESE FOR INTERMEDIATE**

**Prerequisite: UHF1131 Japanese for Beginners**

**Synopsis**

This course aims to enable students to speak Japanese in selected situations. The students will continue to practice the use of Chinese Phonetics (Hanyu Pinyin System). They will also learn additional 240 selected Chinese characters, common Chinese proverbs and are expected to be able to write simple sentences. Classroom activities will focus on language skills practices—listening, speaking, reading and writing. Japanese characters writing and translation exercises also formed part of the course. Students will be evaluated on the four language skills namely listening, speaking, reading and writing.

**Course Outcomes**

CO 1 Communicate simple Japanese in selected situations

CO 2 Read selected short Japanese texts

CO 3 Construct simple sentences

CO 4 Translate English words, phrases and sentences into Japanese

**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.


Synopsis
This course is a continuation of Japanese For Beginners UHF 1131. Learning in the classroom will be based on topics such as introduction to Katakana script, location, places, shopping, vehicle, adjective, particle and etc. Students are evaluated in all four language skills that are learning, speaking, reading and writing.

Course Outcomes
CO 1 identify Katakana script
CO 2 memorize Japanese vocabulary related to the topics given
CO 3 construct simple sentences with the correct Japanese grammar
CO 4 use simple way of expression both in writing and speaking such as location, places, shopping, vehicle, adjective, particle etc

References

Course code : UHF2141

Course : ARABIC FOR INTERMEDIATE
Prerequisite: 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 at the hospital, at the workplace etc., read short passages, and write simple Arabic Language with correct grammar. Classroom activities focus on the four main skills: listening, speaking, reading, and writing. Practises on certain basic grammar are also introduced. Extensive written exercises give students ample opportunity to put into practise the skills they have learned, enabling them to build up confidence in reading and writing vocalised arabic text

Course Outcomes
CO 1 Apply correct usage of Arabic grammar
CO 2 Use Arabic software to enhance their language skills
CO 3 Use the language in various situations such as at the hospital, at the workplace etc
CO 4 Write short essay in certain topics such as home sweet home, my hobby etc

CO 5 Demonstrate soft skills

References
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
Prerequisite: none

Synopsis
The course aims to expose students to speak intermediate Spanish in situations such as travelling, shopping and in the workplace. The students are introduced to Spanish grammar, nouns, verbs, and simple sentences. Classroom activities include listening, speaking, writing and reading. The students are evaluated on all four language skills, in listening, speaking, reading and writing.

Course Outcomes
CO 1 Produce words, phrases, sentences and texts from / to Spanish-English
CO 2 Use appropriate Spanish vocabularies in sentences
CO 3 Construct grammatically correct sentences in Spanish
CO 4 Demonstrate soft skill

References

Course code : UHF2161

Course : MALAY FOR INTERMEDIATE
Prerequisite: none

Synopsis
Students are introduced to simple essay writing in Malay. Their vocabularies are enhanced by practicing conversation in situations such as at the post office and in the classroom. Malay grammar are also introduced at this stage.

Course Outcomes
CO 1 Write simple essays in Malay
CO 2 Translate Malay essays into English and vice versa
CO 3 Use proper Malay grammar in presentation
UNDERGRADUATE PROSPECTUS 2014/2015

References


ELECTIVE COURSES

Course code : UHE3012
Course : CONTEMPORARY LEADERSHIP IN COMMUNITY
Prerequisite : 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 Identify the nature and concept of leadership
CO 2 Explain and demonstrate the prerequisite and characteristics of being a leader
CO 3 Demonstrate and adopt the values and skills of effective leadership
CO 4 Analyse current issues on the conduct of good leadership
References

Course code : UHE3022
Course : INTRODUCTION TO HUMAN BEHAVIOR
Prerequisite : 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 behavior as well as others.
Course Outcomes
CO 1 Describe the concept and issues related to human behavior in human activities
CO 2 Demonstrate the ability to conduct research project related to the human behaviour studies
CO 3 Analyze the concept and issues related to human behavior in human activities
CO 4 Apply the values and principles of psychology in dealing with own self and others

References

Course code : UHE3032
Course : CRITICAL THINKING THROUGH LITERATURE
Prerequisite : 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
CO 1 Interpret issues critically through poem presentation using relevant content, appropriate and language delivery strategies
CO 2 Demonstrate critical understanding of literary elements in a short story.
CO 3 Create a multimedia presentations of themes in pop culture using appropriate content and delivery strategies.
CO 4 Produce a short movie by applying literary components and using appropriate language

References

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Course code : UHE3042
Course : ORGANIZATIONAL COUNSELING
Prerequisite : none

Synopsis
This course discusses the theoretical and application of counselling in the work setting such as the basic framework of counselling, skills, techniques and process of counselling in workplace. This course also discusses problems arise and ways to solve the problem at workplace. In general, the philosophy of this course is to expose students to the knowledge and skills of counselling in the workplace.

Course Outcomes
CO 1 Identifying the concept, principles and issues related to counselling in organization
CO 2 Demonstrate the ability to employ the counselling skills and techniques in helping clients
CO 3 Adopt the values and principles of counselling in dealing with self and others

References

Course code : UHE3062
Course : MALAYSIA: THE IMPACT OF GLOBALIZATION
Prerequisite : 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 globalization 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 Demonstrate and express the causes and effects of globalization phenomena towards the national and international aspect
CO 4 Analyze contemporary issues and challenges of globalization across national and international boundaries

References

Course code : UHE3072
Course : TECHNOLOGY FOR HUMAN CAPITAL DEVELOPMENT
Prerequisite: none

Synopsis
This course is to equip students with process and techniques in human capital development by using technology. They will learn the use of computer, information system and biofeedback devices in human development programs. The course also covers various technologies in human development such as personality profiling, basic qualitative and quantitative analysis, EMG, GSR, HRV Biofeedback Systems and EEG Biofeedback systems. The uses of technology and theory are integrated in providing a hands-on
approach to students in designing and executing human capital development programme.

Course Outcomes

CO 1 Identify the concept and process of human capital development

CO 2 Understand the concept and process in several technologies for human development

CO 3 Analyze and integrate the technology for human capital development

CO 4 Apply the use 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

Course code: UHE3082

Course : CREATIVE WRITING

Prerequisite: none

Synopsis

This Creative Writing course generally aims to foster and bring out the potential and creativity in students by developing descriptive writing using the five senses. This course models a writer's workshop structure which consists of Mini Lessons, Independent Writing, Conferring and Sharing. This course also generates critical thinking skills in students as well as exposes students to the beauty of the written language by having a reader's log. Students will be introduced to the elements of creative fiction and non-fiction writing as well as certain elements of grammar, which will be emphasized in the writing process through language software or online resources. Collaborative editing skills will also be introduced before students publish their writing to the public, online or otherwise.

Course Outcomes

CO 1 Develop critical thinking and self expression in their written and oral activity

CO 2 Generate ideas for writing, organize information, ideas or arguments

CO 3 Demonstrate the system of the language learnt through exploring and reflecting on language in a conscious way i.e., reading to write

References


Course code : UHE3092

Course : ENGLISH MECHANICS

Prerequisite: none

Synopsis

The course primarily aims to develop a greater understanding towards the basic grammar components. Students will be exposed to the use of parts of speech, subject verb agreement and tenses to strengthen their skills in communication. This course is suitable for students who are interested to build their confidence in using language clearly.

Course Outcomes

CO 1 produce a creative video presentation by using accurate language and appropriate content

CO 2 write a descriptive essay using appropriate conventions and accurate language expressions

CO 3 demonstrate understanding of the grammar rules

References

Course code: UHE3112

Course: LANGUAGE IN SOCIETY

Prerequisite: none

Synopsis

This course aims to provide opportunity for students to explore different aspects of the relationship between language and society. Specific topics will include language and social variations, regional and social dialectology, pidgins and creoles, code choice, speech community, language change, language and culture, language and gender and related disciplines. The input will familiarise students with the basic concepts and methods of sociolinguistics, ranging from wider macro social phenomena to micro level analysis of face-to-face interaction. Group discussion and study projects will enable students to apply the theoretical knowledge they gain in lessons into the directed research assigned based on selected theme

Course Outcomes

CO 1 demonstrate understanding of the basic concepts and methods of the various aspects of language and society
CO 2 analyze the types of linguistic variations within society, and the causes and effects of linguistic change and their implications on social variables in language differences
CO 3 write a directed research report on an assigned topic using correct format, appropriate language and relevant contents
CO 4 demonstrate presentation skills on given topics

References


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, maslalah, 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

Course Outcomes

CO 1 Explain the concept and application of Islamic management system in various institutions
CO 2 Report the application of the Islamic management tools in dealing with the management of various institutions
CO 3 Evaluate the principles and values of Islamic management systems

References


Course code: UHE3132

Course: PUBLIC SPEAKING

Prerequisite: 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 creative 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


Course code : UHE3142

Course : PROJECT BASED PROPOSAL WRITING

Prerequisite : 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 appropriate language and delivery styles

References


Course code : UHE3152

Course : INTERPERSONAL EFFECTIVENESS

Prerequisite : none

Synopsis

This course is appropriate for students who want to improve their ability to interact with others in their personal and professional life. 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 such as self-awareness, self-disclosure and trust, and self-management. The final part of the course covers interpersonal topics such as perception, diversity, active listening and feedback, and apprehension and assertiveness. The teaching and learning approach used in this course includes interactive lectures, small group activities, video and case analysis, and role playing.

Course Outcomes

CO 1 Discuss preliminary interpersonal principles related to basics of interpersonal communication and relationships and models of interpersonal effectiveness
CO 2 Identify essential intrapersonal principles related to self-awareness, self-disclosure and trust, and self-management.
CO 3 Apply their understanding of essential interpersonal principles related to perception, diversity, apprehension and assertiveness, and active listening and feedback
CO 4 Demonstrate intrapersonal and interpersonal effectiveness.

References


Course code : UHE3162

Course : FAMILY SYSTEM IN ISLAM

Prerequisite : 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 principles of marriage in Islam.
CO 2 Apply the principles of marriage on ways to overcome obstacles presented in related issues

CO 3 Synthesize the values of Islamic family institution in the tasks given.

References
6. Enakmen syariah negeri Pahang

Course code : UHE3172
Course : FAMILY SYSTEM IN ISLAM
Prerequisite : 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

Course code : UHE3182
Course : MALAYSIAN STUDIES
Prerequisite : none

Synopsis
This course is a study of Malaysia in the aspect of history, geography, economy, politics, society, traditions, cultures and country’s achievements. Students not only learn about Malaysia, they also could apply and exercise their soft skills and Malaysian values in the task given

Course Outcomes
CO 1 Explain Malaysian historical & demographical background.
CO 2 Demonstrate Malaysian values towards mutual understanding and harmonious society.
CO 3 Analyze contemporary issues related to Malaysian politic, economy and social.
CO 4 Apply the elements of soft skills in project and tasks given

References
Course code : UHE 3192
Course : FUNDAMENTAL IBADAH IN ISLAM
Prerequisite: 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 ijtihad (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 Produce the basic worship procedures of taharah, solah and saum in complex situations
CO 3 Analyze the selected contemporary issues based on principles and values of Islamic Jurisprudence
References

Other courses
Course code : UHE 3202
Course : INTRODUCTION TO HALAL STUDIES
Prerequisite: 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 ijtihad (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 principles, theories and Islamic rulings on Halal.
CO 2 Apply the Islamic values and principles in dealing with halal issues
CO 3 Analyze the practice of halal administration in industries
References

Course code : UHG1002
Course : Deutsch Sprache 1
Prerequisite : none
Synopsis
This course enables to students to understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Students will be capable of producing simple connected text on topics which are familiar or of personal interest. Finally they can describe experiences and events, dreams, hopes & ambitions and briefly give reasons and explanations for opinions and plans.
Course Outcomes
CO 1 Use sub-clauses and adjectives accordingly
CO 2 Respond to German language spoken by a native at natural pace
CO 3 Extract key information from a text and paraphrase it
CO 4 Make confident use of vocabulary related to core topics
CO 5 Recognize the particularities of the German culture
References
Course code : UHG1012
Course : Deutsch Sprache 2
Prerequisite: UHG1002 Deutsch Sprache 1

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. Students will achieve the ability to 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 Conduct grammatical transformation comprehensively
CO 2 Respond to complex German language spoken by a native at natural pace
CO 3 Extract key information from a text and paraphrase it grammatically and lexically
CO 4 Produce clear detailed text and clarify a position towards a topic
CO 5 Recognize the particularities of the German culture

References

Course code : UHG2002
Course : Deutsch Sprache 3
Prerequisite : UHG1012 Deutsch Sprache 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 organisational patterns, connectors and cohesive devices.

Course Outcomes
CO 1 Conduct grammatical transformation comprehensively
CO 2 Respond scientific German language spoken at natural pace
CO 3 Extract key information from a text and paraphrase it grammatically and lexically
CO 4 Produce clear and well-structured text by usage of various cohesive devices
CO 5 Recognize the particularities of the German culture

References
1. Roche, Jörg-Matthias: Für für den TestDaF, Hueber, München 2005
5. Luscher, Renate: Landeskunde Deutschland, Aktualisierte Fassung, Hueber, München 2010

Course code : UHG2012
Course : Deutsch Sprache 4
Prerequisite : UHG2002 Deutsch Sprache 3

Synopsis
This course enables the students to understand with ease virtually everything heard or read. They will be able to summarize information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. They will develop skill in expressing him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in the most complex situations.

Course Outcomes
CO 1 To abstract content from a text and compare
CO 2 Respond to complex scientific spoken German language
CO 3 Extract key information from a text and paraphrase it grammatically and lexically
CO 4 Produce precisely structured text fluently
CO 5 Recognize the particularities of the German culture

References
5. Luscher, Renate: Landeskunde Deutschland, Aktualisierte Fassung, Hueber, München 2010
CO-CURRICULUM STRUCTURE
INTRODUCTION

Co-curriculum Centre, Universiti Malaysia Pahang was established on January 16, 2009, in line with the University 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 cultural activities.

OBJECTIVES

• Strengthen and enhance co-curricular courses, supervision of student organizations and cultural 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 Outcome (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

C. Supervise and implement cultural activities
• Oversee the cultural activities organized or participated in by students
• To assist the implementation of cultural activities of the University
• To help develop the potential of cultural skills among students
• Provide recognition in the form of Merit and Certificate for every student involvement
SYNOPSIS OF CREDITED CO-CURRICULUM COURSES

Student of Universiti Malaysia Pahang must take 2 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 8 Soft Skills (i.e. Leadership, Communication, Innovation, Cultural, Volunteerism, Sport, Entrepreneurship, 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, Marine Corps and SISPA, they need to follow this course until commissioning. Meanwhile those who choose Briged Siswa and pass, they have to take any course in the Second Component for them to graduate.

LIST OF CREDITED CO-CURRICULUM COURSES

Component I
1. Briged Siswa UQB1011
2. Kor Sukarelawan Polis Siswa/i (SUKE2 I) UQB1021
3. Kor Sukarelawan Polis Siswa/i (SUKE2 II) UQB2021
4. Kor Sukarelawan Siswa/i Pertahanan Awam (SISPA I) UQB1031
5. Kor Sukarelawan Siswa/i Pertahanan Awam (SISPA II) UQB2031
6. PALAPES Laut I UQB1041
7. PALAPES Laut II UQB2041
8. PALAPES Udara

Component II
1. Kompang UQN2011
2. Nasyid UQN2021
3. Kaunselor Siswa UQP2011
4. Iqra’ UQP2021
5. Kayak UQS2011
6. Trekking UQS2021
7. Silat Olah Raga UQS2031
8. Bola Sepak UQS2041
9. Hoki UQS2051
10. Handball UQS2061
11. Kriket UQS2071
12. Archery UQS2081
13. Fitness UQS2091
14. Mountain Bike UQS2111
15. Paintball UQS2121
16. Basketball
17. Robotic
18. Leadership
19. RC Speed Boat
SYNOPSIS OF STUDENT SOCIETIES & CULTURAL ACTIVITIES

Until April 2012 there were more than 70 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, Entrepreneurship, and Culture. Each student is free to join the Societies by interests and preferences of the individual.

Student involvement in the Societies & Culture is the process of education or training to develop soft skills among students. This agenda in line with the CAPS PSPTN “The Holistic Student Development” and it is a continuation of Co-Curriculum Courses. Recognition through the merit and certificates is an advantage to students of the Universiti Malaysia Pahang compared to other institutions of higher learning

For inquiries:

**Director**
Encik Ramle Abid
Tel: 09-5492566
Faks: 09-5492535
Email: ramle@ump.edu.my

**Co-Curriculum Unit**
Assistant Registrar
Encik Muhammad Faisal bin Mohd Yasin
Tel: 09-549 2566
Faks: 09- 549 2535
Email: faisalmy@ump.edu.my

**Student Society Unit**
Assistant Registrar
Encik Abdul Rahman Bin Ahmad
Tel: 09- 549 2343
Faks: 09-549 2535
Email : rahman@ump.edu.my

**Cultural & Creative Arts Unit**
Cultural Officer
Encik Mohd Zaki Bin Ahmad
Tel: 09 - 549 2581
Faks : 09 - 549 2535
Email: zaki@ump.edu.my
ENTRY REQUIREMENTS
## FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES

### BACHELOR’S DEGREE PROGRAMME

**DIPLOMA HOLDER**

<table>
<thead>
<tr>
<th>NO</th>
<th>(i) Programme of Study</th>
<th>(ii) Code</th>
<th>(iii) Duration of Study</th>
<th>Diploma/Equivalent Minimum Requirements</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>JK01</td>
<td>8 semesters</td>
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</tr>
</tbody>
</table>

**GENERAL UNIVERSITY REQUIREMENTS**

- Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;
- Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate;
- Obtained at least Band 1 in Malaysian University English Test (MUET)
- Submit a certified copy of the following documents to the University:
  - Online Application;
  - Candidate’s Identity Card/MyKad;
  - Candidate’s Birth Certificate, Parents’ Birth Certificates/Letter of Oath (if missing);
  - School Leaving Certificate/Letter of Acknowledgement;
  - Employer’s Acknowledgement (if relevant);
  - STPM/Equivalent Certificate;
  - Complete Academic Transcript (Semester 1 to final semester);
  - Diploma/Certificate (if any);
  - MUET certificate;
  - Study Completion Verification Letter;
  - Bahasa Melayu/July Mathematics Results (if any)

**PROGRAMME SPECIFIC REQUIREMENTS**

- Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50
- Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00
- Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration
- Candidate is not physically disabled which could hinder practical works.

**Note:**
Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.
## BACHELOR’S DEGREE PROGRAMME
### MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
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<tr>
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<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
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<tr>
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<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
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<tr>
<td></td>
<td></td>
<td>Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a <strong>CGPA of 2.00</strong>; and</td>
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<td>Obtained at least Band 1 in Malaysian University English Test (MUET)</td>
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<td><strong>FACULTY OF CIVIL ENGINEERING &amp; EARTH RESOURCES</strong></td>
</tr>
<tr>
<td>1.</td>
<td>Bachelor of Civil Engineering JK01 8 semesters</td>
<td>Fulfills University General Requirements and <strong>PROGRAMME SPECIFIC REQUIREMENTS</strong></td>
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<td>Obtained at least <strong>Grade C (2.00)</strong> at Matriculation/Foundation Studies level in the following subject;</td>
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<td>• Mathematics and</td>
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<td>Obtained at least <strong>Grade C (2.00)</strong> at Matriculation/Foundation Studies level in any two (2) subjects below;</td>
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</tbody>
</table>
|    |                   | • Chemistry / Engineering Chemistry  
|    |                   | • Physics / Engineering Physics  
|    |                   | • Biology with credit in Physics at SPM level and |
|    |                   | Candidate is not physically disabled which could hinder practical works. |
|    |                   | **Note:** Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University. |
### BACHELOR’S DEGREE PROGRAMME

#### STPM HOLDER

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
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<td>GENERAL UNIVERSITY REQUIREMENTS</td>
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<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
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<td>Passed Malaysian Higher School Certificate (STPM) with at least a CGPA of 2.00 and obtained at least:</td>
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<td>• Grade C (Subject Grade Point 2.00) in General Studies subject; and</td>
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<td>• Grade C (Subject Grade Point 2.00) in any two (2) other subjects. and</td>
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<td>Obtained at least Band 1 in Malaysian University English Test (MUET).</td>
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<td>1.</td>
<td>Bachelor of Civil Engineering</td>
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<td>8 semesters</td>
<td>FACULTY OF CIVIL ENGINEERING &amp; EARTH RESOURCES</td>
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<tr>
<td></td>
<td>Fulfills University General Requirements and</td>
<td>PROGRAMME SPECIFIC REQUIREMENTS</td>
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<tr>
<td></td>
<td>Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in the subject below:</td>
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<td>• Mathematics T / Further Mathematics T; and</td>
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<td>Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in any two (2) subjects below;</td>
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<td>• Chemistry</td>
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<td>• Physics</td>
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<td>• Biology with credit in Physics at SPM level and</td>
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<td>Candidate is not physically disabled which could hinder practical works.</td>
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<td>Candidate who did not take Physics at STPM level is required to take Basic Physics subject at University.</td>
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ENGINEERING TECHNOLOGY
DIPLOMA HOLDER

<table>
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<td>• Complete Academic Transcript (Semester 1 to final semester);</td>
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<td>• Diploma/Certificate (If any);</td>
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<td>• MUET certificate;</td>
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<td>• Study Completion Verification Letter; and</td>
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<td>• Bahasa Melayu/ July Mathematics Results (If any).</td>
</tr>
</tbody>
</table>

FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES

1. Bachelor of Engineering Technology (Infrastructure Management) with Honours JY60 8 semesters

Fulfills University General Requirements and
PROGRAMME SPECIFIC REQUIREMENTS

Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50

or

Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00

or

Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration

and

Candidate is not physically disabled which could hinder practical works.

Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.
### ENGINEERING TECHNOLOGY
#### MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Code</th>
<th>Duration of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
</tr>
</thead>
</table>
|    | Bachelor of Engineering Technology (Infrastructure Management) with Honours | JY60 | 8 semesters | Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS  
Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects;  
- Mathematics;  
- Chemistry / Engineering Chemistry /  
- Physics / Engineering Physics /  
- Civil Engineering Studies /  
- Mechanical Engineering Studies /  
- Electric & Electronic Engineering Studies/ Biology with credit in Physics at SPM level  
and  
Candidate is not physically disabled which could hinder practical works.  
Note: Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University. |
### ENGINEERING TECHNOLOGY

**STPM HOLDER**

<table>
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<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Code</th>
<th>Duration of Study</th>
<th>STPM Minimum Requirements</th>
</tr>
</thead>
</table>
| 1. | Bachelor of Engineering Technology (Infrastructure Management) with Honours | JY60 | 8 semesters | Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS  
**GENERAL UNIVERSITY REQUIREMENTS**  
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;  
and  
Passed Malaysian Higher School Certificate (STPM) with at least a **CGPA of 2.00** and obtained at least:  
• Grade C (Subject Grade Point 2.00) in General Studies subject;  
and  
• Grade C (Subject Grade Point 2.00) in any two (2) other subjects.  
and  
Obtained at least Band 1 in Malaysian University English Test (MUET).  
**PROGRAMME SPECIFIC REQUIREMENTS**  
Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in the subjects below:  
• Mathematics T / Further Mathematics T;  
• Chemistry / Physics / Biology with credit in Physics at SPM level  
and  
Candidate is not physically disabled which could hinder practical works.  
**Note:** Candidate who did not take Physics at STPM level is required to take Basic Physics subject at University. |
## DIPLOMA PROGRAMME
### CERTIFICATE HOLDER

<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENT</strong>&lt;br&gt;(FOR ALL PROGRAMMES)</td>
<td></td>
<td>1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least a CREDIT (GRADE C) in Bahasa Melayu.</td>
</tr>
<tr>
<td></td>
<td><strong>SPECIFIC PROGRAMME REQUIREMENTS</strong></td>
<td>J2410</td>
<td>1. Fulfills the GENERAL UNIVERSITY REQUIREMENT.</td>
</tr>
<tr>
<td></td>
<td>2. Passed with a Certificate or equivalent in relevant field from any institution recognised by the University Senate with a CGPA of at least 3.00.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>FACULTY OF CIVIL ENGINEERING &amp; EARTH RESOURCES&lt;br&gt;Diploma of Civil Engineering (5 Semesters + 1 Short Semester)</td>
<td></td>
<td>3. Candidate is not physically disabled which could hinder practical works.</td>
</tr>
</tbody>
</table>
## DIPLOMA PROGRAMME
### SPM HOLDER

<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
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<tbody>
<tr>
<td>1.</td>
<td>FACULTY OF CIVIL ENGINEERING &amp; EARTH RESOURCES</td>
<td>J2410</td>
<td><strong>GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMMES)</strong>&lt;br&gt;1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least 5 CREDITS (GRADE C) including Bahasa Melayu.</td>
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<tr>
<td></td>
<td>Diploma of Civil Engineering (5 Semesters + 1 Short Semester)</td>
<td></td>
<td><strong>SPECIFIC PROGRAMME REQUIREMENTS</strong>&lt;br&gt;1. Fulfills the GENERAL UNIVERSITY REQUIREMENT.&lt;br&gt;2. Obtained at least credit (Grade C) in the following subjects:&lt;br&gt;• Mathematics,&lt;br&gt;• Additional Mathematics,&lt;br&gt;• Physics / Chemistry.&lt;br&gt;3. Obtained at least ONE (1) credit (Grade C) in the following subjects:&lt;br&gt;• Information Technology &amp; Communication&lt;br&gt;• Physics&lt;br&gt;• Chemistry&lt;br&gt;• Invention&lt;br&gt;• Biology&lt;br&gt;• Engineering Technology&lt;br&gt;• Machinery/Mechanical Engineering Studies&lt;br&gt;• Civil Engineering Studies&lt;br&gt;• Electrical &amp; Electronic Engineering Studies&lt;br&gt;• Engineering Drawing&lt;br&gt;4. Obtained at least Pass (GRADE E) in English.&lt;br&gt;5. Candidate is not physically disabled which could hinder practical works.</td>
</tr>
</tbody>
</table>
FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING

BACHELOR’S DEGREE PROGRAMME
DIPLOMA HOLDER

<table>
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<tr>
<th>NO</th>
<th>(i) Programme of Study Code</th>
<th>(ii) Diploma/Equivalent Minimum Requirements</th>
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<td></td>
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<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
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<td>Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate; and</td>
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<td>Obtained at least Band 1 in Malaysian University English Test (MUET) and</td>
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<td>• Study Completion Verification Letter; and</td>
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<td></td>
<td>• Bahasa Melayu/ July Mathematics Results (If any)</td>
</tr>
</tbody>
</table>

FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

1. Bachelor of Electrical Engineering (Elektronics)
   JK02
   8 Semesters
   Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS
   Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50 or
   Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00 or
   Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration and
   Candidate is not colour blind and physically disabled which could hinder practical works.
   Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.

2. Bachelor of Electrical Engineering (Power System)
   JK21
   8 semesters
# BACHELOR’S DEGREE PROGRAMME

## MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
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<tr>
<td></td>
<td>Code</td>
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<tr>
<td></td>
<td>Duration of Study</td>
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</table>

## GENERAL UNIVERSITY REQUIREMENTS
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and
Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 2.00; and
Obtained at least Band 1 in Malaysian University English Test (MUET)

## FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

1. Bachelor of Electrical Engineering (Elektronics) JK02 8 Semesters Fulfills University General Requirements and
PROGRAMME SPECIFIC REQUIREMENTS
Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subject;
- Mathematics

2. Bachelor of Electrical Engineering (Power System) JK21 8 semesters Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in any two (2) subjects below;
- Chemistry / Engineering Chemistry
- Physics / Engineering Physics
- Biology with credit in Physics at SPM level

and
Candidate is not colour blind and physically disabled which could hinder practical works.

**Note:**
Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University.
## BACHELOR’S DEGREE PROGRAMME
### STPM HOLDER

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Code</th>
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<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
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<td>Passed Malaysian Higher School Certificate (STPM) with at least a <strong>CGPA of 2.00</strong> and obtained at least:</td>
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<td>• Grade C (Subject Grade Point 2.00) in General Studies subject; and</td>
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<td>• Grade C (Subject Grade Point 2.00) in any two (2) other subjects. and</td>
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<td>Obtained at least Band 1 in Malaysian University English Test (MUET).</td>
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<td><strong>FACULTY OF ELECTRICAL &amp; ELECTRONICS ENGINEERING</strong></td>
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<td>Bachelor of Electrical Engineering (Elektronics)</td>
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<td>• Physics</td>
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<td>• Biology with credit in Physics at SPM level</td>
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<td>and</td>
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<td>Candidate is not colour blind and physically disabled which could hinder practical works.</td>
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<td><strong>Note:</strong></td>
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<td>Candidate who did not take Physics at STPM level is required to take Basic Physics subject at University.</td>
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**DIPLOMA PROGRAMME**  
**CERTIFICATE HOLDER**

<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
</tr>
</thead>
</table>
| 1.  | FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING                     | J2425| **GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMMES)**  
1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least a CREDIT (GRADE C) in Bahasa Melayu.                                                                 |
|     | Diploma in Electrical Engineering (Industrial Electronics)          |      | **SPECIFIC PROGRAMME REQUIREMENTS**  
1. Fulfills the GENERAL UNIVERSITY REQUIREMENT.                                                                                                                |
|     | (5 Semesters + 1 Short Semester)                                    |      | 2. Passed with a Certificate or equivalent in relevant field from any institution recognised by the University Senate with a CGPA of at least 3.00.                                                                 |
|     |                                                                     |      | 3. Candidate is not color blind and physically disabled which could hinder practical works.                                                                       |
### DIPLOMA PROGRAMME

**SPM HOLDER**

<table>
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<tr>
<th>No.</th>
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</tr>
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</table>
|     | **FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING** | J2425 | **GENERAL UNIVERSITY REQUIREMENT** (FOR ALL PROGRAMMES)  
1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least 5 CREDITS (GRADE C) including Bahasa Melayu. |
|     | Diploma in Electrical Engineering (Industrial Electronics) (5 Semesters + 1 Short Semester) |     | **SPECIFIC PROGRAMME REQUIREMENTS**  
1. Fulfills the GENERAL UNIVERSITY REQUIREMENT.  
2. Obtained at least credit (Grade C) in the following subjects:  
   - Mathematics,  
   - Additional Mathematics,  
   - Physics / Chemistry.  
3. Obtained at least ONE (1) credit (Grade C) in the following subjects:  
   - Information Technology & Communication  
   - Physics  
   - Chemistry  
   - Invention  
   - Biology  
   - Engineering Technology  
   - Mechanical Engineering Studies  
   - Electrical & Electronic Engineering Studies  
   - Engineering Drawing  
4. Obtained at least Pass (GRADE E) in English.  
5. Candidate is not colour blind and physically disabled which could hinder practical works. |
FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

BACHELOR’S DEGREE PROGRAMME
DIPLOMA HOLDER

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<th>No</th>
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<td>Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate; and</td>
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<td></td>
<td>• Bahasa Melayu/ July Mathematics Results (If any)</td>
</tr>
</tbody>
</table>

FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

1. Bachelor of Chemical Engineering
   JK03
   8 Semesters
   Fulfills University General Requirements and
   PROGRAMME SPECIFIC REQUIREMENTS
   Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50
   or
   Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration
   and
   Candidate is not physically disabled which could hinder practical works.

   Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.

2. Bachelor of Chemical Engineering (Gas Technology)
   JK30
   8 semesters

3. Bachelor of Chemical Engineering (Biotechnology)
   JK48
   8 semesters
## BACHELOR’S DEGREE PROGRAMME
### MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Code</th>
<th>Duration of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
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<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
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<td>Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 2.70; and</td>
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<td>Obtained at least Band 1 in Malaysian University English Test (MUET)</td>
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</table>

### FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

1. Bachelor of Chemical Engineering JK03 8 Semesters

   **Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS**
   
   Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects;
   
   - Mathematics
   - Chemistry / Engineering Chemistry ; and
   - Physics / Engineering Physics / Biology with credit in Physics at SPM level

   and

   Candidate is not physically disabled which could hinder practical works.

   **Note:**

   1. Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University.
   2. For Programme JK48, candidate who did not take Biology at Matriculation/Foundation Studies is required to take Basic Biology at University.

2. Bachelor of Chemical Engineering (Gas Technology) JK30 8 semesters

3. Bachelor of Chemical Engineering (Biotechnology) JK48 8 semesters
## BACHELOR’S DEGREE PROGRAMME
### STPM HOLDER

<table>
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### GENERAL UNIVERSITY REQUIREMENTS
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;
and
Passed Malaysian Higher School Certificate (STPM) with at least a **CGPA of 2.70** and obtained at least:

- Grade C (Subject Grade Point 2.00) in General Studies subject;
and
- Grade C (Subject Grade Point 2.00) in any two (2) other subjects.

and
Obtained at least Band 1 in Malaysian University English Test (MUET).

### FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

1. **Bachelor of Chemical Engineering**
   - JK03
   - 8 Semesters
   - Fulfills University General Requirements and
   - **PROGRAMME SPECIFIC REQUIREMENTS**

2. **Bachelor of Chemical Engineering (Gas Technology)**
   - JK30
   - 8 semesters
   - Obtained at least **Grade C (Subject Grade Point 2.00)** at STPM level in the subjects below:
     - Mathematics T / Further Mathematics T;
     - Chemistry; and
     - Physics / Biology with credit in Physics at SPM level
   and
   Candidate is not physically disabled which could hinder practical works.

3. **Bachelor of Chemical Engineering (Biotechnology)**
   - JK48
   - 8 semesters

**Note:**
1. Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University.
2. For Programme JK48, candidate who did not take Biology at Matriculation/Foundation Studies is required to take Basic Biology at University.
## BACHELOR’S DEGREE PROGRAMME
ENGINEERING TECHNOLOGY
DIPLOMA HOLDER

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code</th>
<th>Diploma/Equivalent Minimum Requirements</th>
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### GENERAL UNIVERSITY REQUIREMENTS
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and
Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate; and
Obtained at least Band 1 in Malaysian University English Test (MUET) and
Submit a certified copy of the following documents to the University:
- Online Application;
- Candidate’s Identity Card/MyKad;
- Candidate’s Birth Certificate, Parents’ Birth Certificates/ Letter of Oath (If missing)
- School Leaving Certificate/Letter of Acknowledgement;
- Employer’s Acknowledgement (If relevant);  
- STPM/Equivalent Certificate; and
- Complete Academic Transcript (Semester 1 to final semester);
- Diploma/Certificate (If any)
- MUET certificate;
- Study Completion Verification Letter; and
- Bahasa Melayu/ July Mathematics Results (If any)

### FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

1. Bachelor of Engineering Technology (Pharmaceutical) with Honours JY70 8 semesters

Fulfills University General Requirements and
PROGRAMME SPECIFIC REQUIREMENTS
Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50 or
Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00 or
Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration and
Candidate is not physically disabled which could hinder practical works.

Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.
# BACHELOR’S DEGREE PROGRAMME
## ENGINEERING TECHNOLOGY
### MATRICULATION STUDENT

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<th>NO</th>
<th>Programme of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirement</th>
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<tr>
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<td>(ii) Duration of Study</td>
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<tr>
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<td>(ii)</td>
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</tbody>
</table>
| 1. | Bachelor of Engineering Technology (Pharmaceutical) with Honours JY70 8 semesters | Fulfills University General Requirements and \n**PROGRAMME SPECIFIC REQUIREMENTS** 

Obtained at least a **CGPA of (3.00)** and **Grade B (3.00)** at Matriculation/ Foundation Studies level and in the following subjects; 

• Mathematics  
• Biology;  
• Chemistry  

and  

Candidate is not colour blind and physically disabled which could hinder practical works.  

**GENERAL UNIVERSITY REQUIREMENTS**  

Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;  

and  

Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a **CGPA of 2.00**;  

and  

Obtained at least Band 1 in Malaysian University English Test (MUET)
# UNDERGRADUATE PROSPECTUS 2014/2015

## FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

### Bachelor’s Degree Programme

**Engineering Technology**

**STPM Holder**

<table>
<thead>
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<th>NO</th>
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<tbody>
<tr>
<td>1.</td>
<td>Bachelor of Engineering Technology (Pharmaceutical) with Honours</td>
<td>JY70</td>
<td>8 semesters</td>
<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong>&lt;br&gt;Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and &lt;br&gt;Passed Malaysian Higher School Certificate (STPM) with at least a CGPA of 2.00 and obtained at least:&lt;br&gt;• Grade C (Subject Grade Point 2.00) in General Studies subject; and &lt;br&gt;• Grade C (Subject Grade Point 2.00) in any two (2) other subjects. and&lt;br&gt;Obtained at least Band 1 in Malaysian University English Test (MUET).</td>
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**FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING**

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<th>Code</th>
<th>Duration of Study</th>
<th>STPM Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bachelor of Engineering Technology (Pharmaceutical) with Honours</td>
<td>JY70</td>
<td>8 semesters</td>
<td><strong>Fulfills University General Requirements and</strong>&lt;br&gt;<strong>PROGRAMME SPECIFIC REQUIREMENTS</strong>&lt;br&gt;Obtained at least a CGPA of 3.00 and Grade B (Subject Grade Point 3.00) at STPM level in the subjects below:&lt;br&gt;• Mathematics T / Further Mathematics T;&lt;br&gt;• Biology&lt;br&gt;• Chemistry and&lt;br&gt;Candidate is not colour blind and physically disabled which could hinder practical works.</td>
</tr>
</tbody>
</table>
## DIPLOMA PROGRAMME

### FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING

<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
</tr>
</thead>
</table>
| 1.  | Diploma in Chemical Engineering (Process Plant) (5 Semesters + 1 Short Semester) | J2441 | **GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMMES)**  
1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least a **CREDIT (GRADE C)** in Bahasa Melayu.  

**SPECIFIC PROGRAMME REQUIREMENTS**  
1. Fulfills the **GENERAL UNIVERSITY REQUIREMENT**.  
2. Passed with a Certificate or equivalent in relevant field from any institution recognised by the University Senate with a **CGPA of at least 3.00**.  
3. Candidate is not physically disabled which could hinder practical works. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENT</strong> (FOR ALL PROGRAMMES)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least 5 CREDITS (GRADE C) including Bahasa Melayu.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J2441</td>
<td><strong>SPECIFIC PROGRAMME REQUIREMENTS</strong></td>
</tr>
</tbody>
</table>
| 1.  | **FACULTY OF CHEMICAL & NATURAL RESOURCES ENGINEERING**  
Diploma in Chemical Engineering (Process Plant)  
(5 Semesters + 1 Short Semester) |      | 1. Fulfills the GENERAL UNIVERSITY REQUIREMENT.  
2. Obtained at least credit (Grade C) in the following subjects:  
   - Mathematics,  
   - Additional Mathematics,  
   - Physics / Chemistry.  
3. Obtained at least ONE (1) credit (Grade C) in the following subjects:  
   - Information Technology & Communication  
   - Physics  
   - Chemistry  
   - Invention  
   - Biology  
   - Engineering Technology  
   - Mechanical Engineering Studies  
   - Electrical & Electronic Engineering Studies  
   - Engineering Drawing  
4. Obtained at least Pass (GRADE E) in English.  
5. Candidate is not physically disabled which could hinder practical works. |
### FACULTY OF MECHANICAL ENGINEERING

#### BACHELOR’S DEGREE PROGRAMME

**DIPLOMA HOLDER**

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Duration of Study</th>
<th>Diploma/Equivalent Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(i)</td>
<td>(ii)</td>
<td>(iii)</td>
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</tr>
</tbody>
</table>

**FACULTY OF MECHANICAL ENGINEERING**

1. **Bachelor of Mechanical Engineering**
   - JK08
   - 8 semesters
   - Fulfills University General Requirements
   - and
   - PROGRAMME SPECIFIC REQUIREMENTS
     - Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50
     - or
     - Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00
     - or
     - Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration
     - and
     - Candidate is not physically disabled which could hinder practical works.
   - Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.

2. **Bachelor of Mechanical Engineering with Automotive Engineering**
   - JK40
   - 8 semesters

---

**GENERAL UNIVERSITY REQUIREMENTS**

Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;

and

Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate;

and

Obtained at least Band 1 in Malaysian University English Test (MUET)

and

Submit a certified copy of the following documents to the University :-

- Online Application;
- Candidate’s Identity Card/MyKad;
- Candidate’s Birth Certificate, Parents’ Birth Certificates/ Letter of Oath (If missing)
- School Leaving Certificate/Letter of Acknowledgement;
- Employer’s Acknowledgement (If relevant);
- Complete Academic Transcript (Semester 1 to final semester);
- Diploma/Certificate (If any)
- MUET certificate;
- Study Completion Verification Letter; and
- Bahasa Melayu/July Mathematics Results (If any)
## BACHELOR'S DEGREE PROGRAMME
### MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Code</th>
<th>Duration of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GENERAL UNIVERSITY REQUIREMENTS</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 2.00; and</td>
</tr>
<tr>
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<td></td>
<td>Obtained at least Band 1 in Malaysian University English Test (MUET)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>FACULTY OF MECHANICAL ENGINEERING</td>
</tr>
<tr>
<td>1.</td>
<td>Bachelor of Mechanical Engineering</td>
<td>JK08</td>
<td>8 semesters</td>
<td>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subject;</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>• Mathematics and</td>
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<td></td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in any two (2) of the following subjects;</td>
</tr>
<tr>
<td></td>
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<td>• Chemistry / Engineering Chemistry</td>
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<tr>
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<td></td>
<td>• Physics / Engineering Physics</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>• Biology with credit in Physics at SPM level and</td>
</tr>
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<td></td>
<td>Candidate is not physically disabled which could hinder practical works.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Note: Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University.</td>
</tr>
<tr>
<td>2.</td>
<td>Bachelor of Mechanical Engineering with Automotive Engineering</td>
<td>JK40</td>
<td>8 semesters</td>
<td>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subject;</td>
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<tr>
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<td>• Mathematics and</td>
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<td></td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in any two (2) of the following subjects;</td>
</tr>
<tr>
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<td></td>
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<td></td>
<td>• Chemistry / Engineering Chemistry</td>
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<td></td>
<td>• Physics / Engineering Physics</td>
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<td></td>
<td>• Biology with credit in Physics at SPM level and</td>
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<td>Candidate is not physically disabled which could hinder practical works.</td>
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<td>Note: Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University.</td>
</tr>
</tbody>
</table>
# Bachelor's Degree Programme

## STPM Holder

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>STPM Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(i)</td>
<td>(ii)</td>
</tr>
<tr>
<td>1.</td>
<td>Bachelor of Mechanical Engineering JK08</td>
<td>Fulfill University General Requirements and</td>
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</tbody>
</table>

## General University Requirements

- Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;

- Passed Malaysian Higher School Certificate (STPM) with at least a **CGPA of 2.00** and obtained at least:
  - **Grade C (Subject Grade Point 2.00)** in General Studies subject;
  - and
  - **Grade C (Subject Grade Point 2.00)** in any two (2) other subjects.

- Obtained at least Band 1 in Malaysian University English Test (MUET).
## DIPLOMA PROGRAMME
### CERTIFICATE HOLDER

<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMMES)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least a <strong>CREDIT (GRADE C)</strong> in Bahasa Melayu.</td>
</tr>
<tr>
<td></td>
<td><strong>FACULTY OF MECHANICAL ENGINEERING</strong></td>
<td></td>
<td><strong>SPECIFIC PROGRAMME REQUIREMENTS</strong></td>
</tr>
<tr>
<td>1.</td>
<td>Diploma in Mechanical Engineering (5 Semester + 1 Short Semester)</td>
<td>J2430</td>
<td>1. Fulfills the <strong>GENERAL UNIVERSITY REQUIREMENT.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Passed with a Certificate or equivalent in relevant field from any institution recognised by the University Senate with a <strong>CGPA of at least 3.00.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Candidate is not physically disabled which could hinder practical works.</td>
</tr>
</tbody>
</table>
### DIPLOMA PROGRAMME
#### SPM HOLDER

<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
</tr>
</thead>
</table>
|     | **FACULTY OF MECHANICAL ENGINEERING**                                                            | J2430| **GENERAL UNIVERSITY REQUIREMENT**  
1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least 5 CREDITS (GRADE C) including Bahasa Melayu.                                                                 |

|     | **SPECIFIC PROGRAMME REQUIREMENTS**                                                            |      | **1.** Fulfills the GENERAL UNIVERSITY REQUIREMENT.                                                                                                                                                                    |
|     |                                                                                               |      | **2.** Obtained at least **credit** (Grade C) in the following subjects:                                                                                                                                             |
|     |                                                                                               |      |   • Mathematics,  
   • Additional Mathematics,  
   • Physics / Chemistry.                                                                                                                                                                                               |
|     |                                                                                               |      | **3.** Obtained at least **ONE (1)** credit (Grade C) in the following subjects:                                                                                                                                        |
|     |                                                                                               |      |   • Information Technology & Communication  
   • Physics  
   • Chemistry  
   • Invention  
   • Biology  
   • Engineering Technology  
   • Mechanical Engineering Studies  
   • Civil Engineering Studies  
   • Electrical & Electronic Engineering Studies  
   • Engineering Drawing                                                                                                                                                                                                 |
|     |                                                                                               |      | **4.** Obtained at least **Pass** (GRADE E) in English.                                                                                                                                                              |
|     |                                                                                               |      | **5.** Candidate is not physically disabled which could hinder practical works.                                                                                                                                      |
## Dualdegree Programme
### A-Level Student

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>A-Level Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a <strong>credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper</strong>; and</td>
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<tr>
<td></td>
<td></td>
<td>Passed A-Level Examination with at least level 10. and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obtained at least Band 1 in Malaysian University English Test (MUET) or equivalent.</td>
</tr>
</tbody>
</table>

### Faculty of Mechanical Engineering

1. Bachelor of Automotive Engineering (Joint Programme of UMP with HsKA, Germany) JK71 9 Semesters

Fulfills University General Requirements and

**PROGRAMME SPECIFIC REQUIREMENTS**

Obtained at least **Grade C (Point 3)** in A-Level in the following subjects:

- Mathematics
- Chemistry
- Physics

and

Candidate is not physically disabled which could hinder practical works.
DIPLOMA PROGRAMME
DIPLOMA HOLDER

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code</th>
<th>Programme of Study Duration of Study</th>
<th>Diploma/Equivalent Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>GENERAL UNIVERSITY REQUIREMENTS</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/ Bahasa Malaysia July Paper; and</td>
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<tr>
<td></td>
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<td></td>
<td>Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate; and</td>
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<td></td>
<td>Obtained at least Band 1 in Malaysian University English Test (MUET) and</td>
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<td></td>
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<td></td>
<td>Submit a certified copy of the following documents to the University :-</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>• Online Application;</td>
</tr>
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<td></td>
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<td></td>
<td>• Candidate's Identity Card/MyKad;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Candidate’s Birth Certificate, Parents’ Birth Certificates/ Letter of Oath (if missing)</td>
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<tr>
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<td>• School Leaving Certificate/Letter of Acknowledgement;</td>
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<td>• Employer’s Acknowledgement (if relevant);</td>
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<td>• STPM/Equivalent Certificate; and</td>
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<td>• Complete Academic Transcript (Semester 1 to final semester);</td>
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<td>• Diploma/Certificate (if any)</td>
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<td></td>
<td>• Study Completion Verification Letter; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Bahasa Melayu/ July Mathematics Results (if any)</td>
</tr>
</tbody>
</table>

FACULTY OF MECHANICAL ENGINEERING

1. Bachelor of Automotive Engineering (Joint Programme of UMP with HsKA, Germany) JK71 9 Semesters

Fulfills University General Requirements and
PROGRAMME SPECIFIC REQUIREMENTS

Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) / Private Institution of Higher Learning (IPTS) / Politechnic / equivalent which is recognized and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.50 and

Candidate is not physically disabled which could hinder practical works.

Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.
## DUALDEGREE PROGRAMME
### MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code Duration of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 3.50; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obtained at least Band 1 in Malaysian University English Test (MUET)</td>
</tr>
</tbody>
</table>

### FACULTY OF MECHANICAL ENGINEERING

| 1. | Bachelor of Automotive Engineering (Joint Programme of UMP with HsKA,Germany) JK71 9 Semesters | **Fulfills University General Requirements and** **PROGRAMME SPECIFIC REQUIREMENTS** |
|    |                                              | Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects; |
|    |                                              | • Mathematics  
• Chemistry / Engineering Chemistry ;  
• Physics / Engineering Physics.  
|    |                                              | and |
|    |                                              | Candidate is not physically disabled which could hinder practical works. |
## DUAL DEGREE PROGRAMME

**STPM HOLDER**

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code</th>
<th>STPM Minimum Requirements</th>
</tr>
</thead>
</table>
|    | (i)                      | GENERAL UNIVERSITY REQUIREMENTS |Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and Passed Malaysian Higher School Certificate (STPM) with at least a **CGPA of 3.50** and obtained at least:  
• Grade C (Subject Grade Point 2.00) in General Studies subject; and  
• Grade C (Subject Grade Point 2.00) in any two (2) other subjects. and  
Obtained at least Band 1 in Malaysian University English Test (MUET). |

### FACULTY OF MECHANICAL ENGINEERING

1. Bachelor of Automotive Engineering (Joint Programme of UMP with HsKA, Germany) JK71 9 Semesters  
Fulfills University General Requirements and  
PROGRAMME SPECIFIC REQUIREMENTS  
Obtained at least **Grade C (Subject Grade Point 2.00)** at STPM level in the subjects below:  
• Mathematics T / Further Mathematics T;  
• Chemistry; and  
• Physics  
and  
Candidate is not physically disabled which could hinder practical works.
# FACULTY OF MANUFACTURING ENGINEERING

## BACHELOR’S DEGREE PROGRAMME

### DIPLOMA HOLDER

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code</th>
<th>Programme of Study</th>
<th>Diploma/Equivalent Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>JK09</td>
<td>Bachelor of Manufacturing Engineering</td>
<td>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
</tr>
<tr>
<td></td>
<td>JK24</td>
<td>Bachelor of Mechatronic Engineering</td>
<td></td>
</tr>
</tbody>
</table>

### GENERAL UNIVERSITY REQUIREMENTS

- Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/ Bahasa Malaysia July Paper;
- Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate;
- Obtained at least Band 1 in Malaysian University English Test (MUET) and
- Submit a certified copy of the following documents to the University: -
  - Online Application;
  - Candidate’s Identity Card/MyKad;
  - Candidate’s Birth Certificate, Parents’ Birth Certificates/ Letter of Oath (If missing);
  - School Leaving Certificate/Letter of Acknowledgement;
  - Employer’s Acknowledgement (If relevant);
  - STPM/Equivalent Certificate; and
  - Complete Academic Transcript (Semester 1 to final semester);
  - Diploma/Certificate (If any);
  - MUET certificate;
  - Study Completion Verification Letter; and
  - Bahasa Melayu/July Mathematics Results (If any)

### FACULTY OF MANUFACTURING ENGINEERING

1. Bachelor of Manufacturing Engineering
   - JK09 8 Semesters
   - Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50 or
   - Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00 or
   - Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration and
   - Candidate is not physically disabled which could hinder practical works.

Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.
## Bachelor’s Degree Programme
### Matriculation Student

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Code</th>
<th>Duration of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 2.00; and Obtained at least Band 1 in Malaysian University English Test (MUET).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>FACULTY OF MANUFACTURING ENGINEERING</strong></td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>1.</td>
<td>Bachelor of Manufacturing Engineering</td>
<td>JK09</td>
<td>8 Semesters</td>
<td>Fulfills University General Requirements and <strong>PROGRAMME SPECIFIC REQUIREMENTS</strong></td>
</tr>
<tr>
<td>2.</td>
<td>Bachelor of Mechatronic Engineering</td>
<td>JK24</td>
<td>8 Semesters</td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subject; • Mathematics and Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in any two (2) of the following subjects; • Chemistry / Engineering Chemistry • Physics / Engineering Physics • Biology with credit in Physics at SPM level and Candidate is not colour blind and physically disabled which could hinder practical works.</td>
</tr>
</tbody>
</table>

Note: Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University.
# Bachelor’s Degree Programme
## STPM Holder

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>STPM Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Code</td>
<td>Duration of Study</td>
</tr>
</tbody>
</table>
| | JK09 | 8 Semesters | Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and Passed Malaysian Higher School Certificate (STPM) with at least a CGPA of 2.00 and obtained at least:  
- Grade C (Subject Grade Point 2.00) in General Studies subject; and  
- Grade C (Subject Grade Point 2.00) in any two (2) other subjects. and Obtained at least Band 1 in Malaysian University English Test (MUET). |
| (ii) | | | Faculty of Manufacturing Engineering |
| | Bachelor of Manufacturing Engineering | Fulfills University General Requirements and Programme Specific Requirements |
| (iii) | JK24 | 8 Semesters | Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in the subject below:  
- Mathematics T / Further Mathematics T; and Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in any two (2) subjects below:  
- Chemistry  
- Physics  
- Biology with credit in Physics at SPM level and Candidate is not colour blind and physically disabled which could hinder practical works.  
Note: Candidate who did not take Physics at STPM level is required to take Basic Physics subject at University. |
## DUAL DEGREE PROGRAMME
### A-LEVEL STUDENT

<table>
<thead>
<tr>
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<th>Programme of Study</th>
<th>A-Level Minimum Requirements</th>
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<tbody>
<tr>
<td></td>
<td><strong>Code</strong></td>
<td><strong>General University Requirements</strong>&lt;br&gt;Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and&lt;br&gt;Passed A-Level Examination with at least level 10. and&lt;br&gt;Obtained at least Band 1 in Malaysian University English Test (MUET) or equivalent.</td>
</tr>
<tr>
<td></td>
<td><strong>Duration of Study</strong></td>
<td><strong>Faculty of Manufacturing Engineering</strong></td>
</tr>
<tr>
<td></td>
<td>9 Semesters</td>
<td>1. Bachelor of Mechantronic Engineering (Joint Programme of UMP with HsKA, Germany) JK25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fulfills University General Requirements and Programme Specific Requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obtained at least Grade C (Point 3) in A-Level in the following subjects:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mathematics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chemistry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Physics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and Candidate is not physically disabled which could hinder practical works.</td>
</tr>
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</table>
# DUAL DEGREE PROGRAMME
## DIPLOMA HOLDER

<table>
<thead>
<tr>
<th>NO</th>
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<th>Duration of Study</th>
<th>Diploma/Equivalent Minimum Requirements</th>
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<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
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<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate; and Obtained at least Band 1 in Malaysian University English Test (MUET) and Submit a certified copy of the following documents to the University: - Online Application; - Candidate’s Identity Card/MyKad; - Candidate’s Birth Certificate, Parents’ Birth Certificates/ Letter of Oath (If missing) - School Leaving Certificate/Letter of Acknowledgement; - Employer’s Acknowledgement (If relevant); - STPM/Equivalent Certificate; and - Complete Academic Transcript (Semester 1 to final semester); - Diploma/Certificate (If any) - MUET certificate; - Study Completion Verification Letter; and - Bahasa Melayu/ July Mathematics Results (If any)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td><strong>FACULTY OF MANUFACTURING ENGINEERING</strong></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Mechantronic Engineering (Joint Programme of UMP with HsKA, Germany) JK25 9 Semesters</td>
<td>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) / Private Institution of Higher Learning (IPITS) / Politechnic / equivalent which is recognized and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.50 and Candidate is not colour blind and physically disabled which could hinder practical works. <strong>Note:</strong> Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.</td>
</tr>
<tr>
<td>NO</td>
<td>Programme of Study</td>
<td>KPM Matriculation/Foundation Studies Minimum Requirements</td>
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<tr>
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<td>(iii)</td>
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</table>

**GENERAL UNIVERSITY REQUIREMENTS**
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/ Bahasa Malaysia July Paper; and
Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a **CGPA of 3.50**; and
Obtained at least Band 1 in Malaysian University English Test (MUET).

**FACULTY OF MANUFACTURING ENGINEERING**

1. Bachelor of Mechatronic Engineering (Joint Programme of UMP with HsKA,Germany) JK25 9 Semesters

<table>
<thead>
<tr>
<th></th>
<th>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</th>
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<tbody>
<tr>
<td></td>
<td>Obtained at least <strong>Grade C (2.00)</strong> at Matriculation/Foundation Studies level in the following subjects;</td>
</tr>
<tr>
<td></td>
<td>• Mathematics</td>
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<tr>
<td></td>
<td>• Chemistry / Engineering Chemistry ;</td>
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<td></td>
<td>• Physics / Engineering Physics.</td>
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<td></td>
<td>and</td>
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<tr>
<td></td>
<td>Candidate is not colour blind and physically disabled which could hinder practical works.</td>
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</table>
**DUAL DEGREE PROGRAMME**  
**STPM HOLDER**

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>Code</th>
<th>Duration of Study</th>
<th>STPM Minimum Requirements</th>
</tr>
</thead>
</table>
| 1. | Bachelor of Mechantronic Engineering (Joint Programme of UMP with HeKA, Germany) | JK25 | 9 Semesters | Fulfills University General Requirements and Programme Specific Requirements  
Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in the subjects below:  
• Mathematics T / Further Mathematics T;  
• Chemistry; and  
• Physics  
and  
Candidate is not colour blind and physically disabled which could hinder practical works. |

**GENERAL UNIVERSITY REQUIREMENTS**  
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/ Bahasa Malaysia July Paper;  
and  
Passed Malaysian Higher School Certificate (STPM) with at least a CGPA of 3.50 and obtained at least:  
• Grade C (Subject Grade Point 2.00) in General Studies subject;  
and  
• Grade C (Subject Grade Point 2.00) in any two (2) other subjects.  
and  
Obtained at least Band 1 in Malaysian University English Test (MUET).
**FACULTY OF MANUFACTURING ENGINEERING**

**BACHELOR’S DEGREE PROGRAMME**
**DIPLOMA HOLDER**

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code</th>
<th>Diploma/Equivalent Minimum Requirements</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(in) Programme of Study Code Duration of Study</td>
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</tr>
<tr>
<td></td>
<td>JC10 8 semesters</td>
<td>GENERAL UNIVERSITY REQUIREMENTS</td>
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<tr>
<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Possesses a Diploma or other qualification which is recognized by the Government of Malaysia and approved by the University Senate; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obtained at least Band 1 in Malaysian University English Test (MUET) and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Submit a certified copy of the following documents to the University:- • Online Application; • Candidate’s Identity Card/MyKad; • Candidate’s Birth Certificate, Parents’ Birth Certificates/ Letter of Oath (If missing) • School Leaving Certificate/Letter of Acknowledgement; • Employer’s Acknowledgement (If relevant) ; • STPM/Equivalent Certificate; and • Complete Academic Transcript (Semester 1 to final semester); • Diploma/Certificate (If any) • MUET certificate; • Study Completion Verification Letter;and • Bahasa Melayu/ July Mathematics Results (If any)</td>
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<td>JC11 8 semesters</td>
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**FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING**

<table>
<thead>
<tr>
<th></th>
<th>Bachelor of Science Computer (Software Engineering) with Honours JC10 8 semesters</th>
<th>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50 or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00 or</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Bachelor of Science Computer (Computer System &amp; Network) with Honours JC11 8 semesters</td>
<td>Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration and</td>
</tr>
<tr>
<td></td>
<td>Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to Programme JC24)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Bachelor of Science Computer (Graphic Technology &amp; Multimedia) with Honours JC24 8 semesters</td>
<td>Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.</td>
</tr>
</tbody>
</table>

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## BACHELOR’S DEGREE PROGRAMME
### MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code</th>
<th>Duration of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
</tr>
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<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
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<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 2.00; and Obtained at least Band 1 in Malaysian University English Test (MUET)</td>
</tr>
<tr>
<td>1.</td>
<td>Bachelor of Science Computer (Software Engineering) with Honours JC10 8 semesters</td>
<td>Fulfill University General Requirement and <strong>PROGRAMME SPECIFIC REQUIREMENTS</strong></td>
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<tr>
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<td></td>
<td><strong>SCIENCE/TECHNICAL STREAM</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subject: • Mathematics / Computer Science; OR • Obtained at least Grade B in Additional Mathematics at SPM level. and Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to Programme JC24)</td>
</tr>
<tr>
<td>2.</td>
<td>Bachelor of Science Computer (Computer System &amp; Network) with Honours JC11 8 semesters</td>
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</tr>
<tr>
<td>3.</td>
<td>Bachelor of Science Computer (Graphic Technology &amp; Multimedia) with Honours JC24 8 semesters</td>
<td><strong>ACCOUNTING STREAM</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subject: • Mathematics OR • Obtained at least Grade B in Additional Mathematics at SPM level. and Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to Programme JC24)</td>
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<tr>
<td></td>
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<td></td>
<td><strong>LAW STREAM</strong></td>
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<tr>
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<td></td>
<td>Obtained at least Grade B in Additional Mathematics at SPM level. and Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to Programme JC24)</td>
</tr>
</tbody>
</table>
# BACHELOR’S DEGREE PROGRAMME
## STAM HOLDER

<table>
<thead>
<tr>
<th>No</th>
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<th>Code</th>
<th>Duration of Study</th>
<th>STAM Minimum Requirements</th>
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</table>

**GENERAL UNIVERSITY REQUIREMENTS**

- Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and
- Obtained at least a Jayyid Jiddan Rank in Peperiksaan Sijil Tinggi Agama Malaysia (STAM); and
- Obtained at least Band 1 in Malaysian University English Test (MUET)

### FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING

1. Bachelor of Science Computer (Software Engineering) with Honours
   - Code: JC10
   - Duration: 8 semesters
   - **Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS**

2. Bachelor of Science Computer (Computer System & Network) with Honours
   - Code: JC11
   - Duration: 8 semesters
   - Possesses Sijil Tinggi Agama Malaysia (STAM) with at least a Jayyid Jiddan Rank.
   - and
   - Obtained at least Grade B in Additional Mathematics at SPM level.

3. Bachelor of Science Computer (Graphic Technology & Multimedia) with Honours
   - Code: JC24
   - Duration: 8 semesters
   - Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to Programme JC24)
# BACHELOR’S DEGREE PROGRAMME

## STPM HOLDER

<table>
<thead>
<tr>
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<th>Programme of Study</th>
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<td></td>
<td></td>
<td>GENERAL UNIVERSITY REQUIREMENTS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
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<td></td>
<td></td>
<td>Passed Malaysian Higher School Certificate (STPM) with at least a CGPA of 2.00 and obtained at least:</td>
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<td></td>
<td>• Grade C (Subject Grade Point 2.00) in General Studies subject; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Grade C (Subject Grade Point 2.00) in any two (2) other subjects. and</td>
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<tr>
<td></td>
<td></td>
<td>Obtained at least Band 1 in Malaysian University English Test (MUET).</td>
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<tr>
<td></td>
<td></td>
<td>FACULTY OF COMPUTER SYSTEM &amp; SOFTWARE ENGINEERING</td>
</tr>
<tr>
<td>1.</td>
<td>Bachelor of Science Computer (Software Engineering) with Honours JC10 8 semesters</td>
<td>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in the subject below:</td>
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<td></td>
<td></td>
<td>• Mathematics T / Further Mathematics T / Mathematics S / Computering OR</td>
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<td></td>
<td>• Obtained at least Grade B in Additional Mathematics at SPM level. and</td>
</tr>
<tr>
<td>2.</td>
<td>Bachelor of Science Computer (Computer System &amp; Network) with Honours JC11 8 semesters</td>
<td>Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to Programme JC24)</td>
</tr>
<tr>
<td>3.</td>
<td>Bachelor of Science Computer (Graphic Technology &amp; Multimedia) with Honours JC24 8 semesters</td>
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## DIPLOMA PROGRAMME
### CERTIFICATE HOLDER

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<th>Code</th>
<th>Minimum Requirement(s)</th>
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<tbody>
<tr>
<td></td>
<td><strong>FACULTY OF COMPUTER SYSTEM &amp; SOFTWARE ENGINEERING</strong></td>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENT (FOR ALL PROGRAMMES)</strong></td>
</tr>
<tr>
<td>1.</td>
<td>Diploma in Science Computer (5 Semester + 1 Semester Pendek)</td>
<td>J2810</td>
<td>1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least a <strong>CREDIT (GRADE C)</strong> in Bahasa Melayu.</td>
</tr>
<tr>
<td></td>
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<td><strong>SPECIFIC PROGRAMME REQUIREMENTS</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Fulfills the <strong>GENERAL UNIVERSITY REQUIREMENT</strong>.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>2. Passed with a Certificate or equivalent in relevant field from any institution recognised by the University Senate with a <strong>CGPA of at least 3.00.</strong></td>
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<td>3. Obtained at least (Grade C) in Mathematics at SPM level.</td>
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<td>4. Candidate is not physically disabled which could hinder practical works.</td>
</tr>
</tbody>
</table>
## DIPLOMA PROGRAMME
### SPM HOLDER

<table>
<thead>
<tr>
<th>No.</th>
<th>Programme and Duration of Study</th>
<th>Code</th>
<th>Minimum Requirement(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENT</strong> (FOR ALL PROGRAMMES)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Passed Sijil Pelajaran Malaysia (Malaysian Certificate of Education) or equivalent with at least 5 CREDITS (GRADE C) including Bahasa Melayu.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td><strong>FACULTY OF COMPUTER SYSTEM &amp; SOFTWARE ENGINEERING</strong></td>
<td>J2810</td>
<td>1. Fulfills the GENERAL UNIVERSITY REQUIREMENT.</td>
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<tr>
<td></td>
<td>Diploma in Science Computer (5 Semesters + 1 Short Semester)</td>
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<td>2. Obtained at least credit (Grade C) in Mathematics.</td>
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<td>3. Obtained at least THREE (3) credits (Grade C) in any subjects.</td>
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<td>4. <strong>ONE (1) of the THREE (3) credits (Grade C)</strong> above should be in any of the following subjects:</td>
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<td>• Information Technology &amp; Communication</td>
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<td>• Fundamentals of Programming</td>
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<td>• Programming &amp; Development Tools</td>
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<td>• Automotive Technology</td>
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<td>• Building Construction Technology</td>
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<td>• Electric Technology</td>
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<td>5. Obtained at least Pass (GRADE E) in English.</td>
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<td>6. Candidate is not physically disabled which could hinder practical works.</td>
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# FACULTY OF INDUSTRIAL SCIENCE & TECHNOLOGY

## BACHELOR’S DEGREE PROGRAMME

**DIPLOMA HOLDER**

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<td></td>
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<td>• Bahasa Melayu/ July Mathematics Results (If any)</td>
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### FACULTY OF SCIENCE AND INDUSTRIAL TECHNOLOGY

1. **Bachelor of Applied Science (Honours) Industrial Chemistry**  
   JG04  
   8 Semesters  
   Fulfills University General Requirements and  
   **PROGRAMME SPECIFIC REQUIREMENTS**  
   Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50  
   or  
   Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Polytechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00  
   or  
   Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration  
   and  
   Candidate is not physically disabled which could hinder practical works.  
   **Note:**  
   Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.

2. **Bachelor of Applied Science (Honours) Industrial Biotechnology**  
   JG44  
   8 Semesters

3. **Bachelor of Applied Science (Honours) Material Technology**  
   JG47  
   8 Semesters
# BACHELOR’S DEGREE PROGRAMME

## MATRICULATION STUDENT

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<td>Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 2.70; and</td>
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</table>

### FACULTY OF SCIENCE AND INDUSTRIAL TECHNOLOGY

1. Bachelor in Applied Science (Honours) Industrial Chemistry JG04 8 Semesters

   - Fulfills University General Requirement and PROGRAMME SPECIFIC REQUIREMENTS
   - Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects:
     - Mathematics
     - Chemistry / Engineering Chemistry; OR
     - Obtained at least Grade B in Chemistry at SPM level
     - Physics / Engineering Physics / Biology and
   - Candidate is not colour blind and physically disabled which could hinder practical works.

2. Bachelor in Applied Science (Honours) Industrial Biotechnology JG44 8 Semesters

   - Fulfills University General Requirement and PROGRAMME SPECIFIC REQUIREMENTS
   - Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects:
     - Mathematics
     - Biology; OR
     - Obtained at least Grade B in Biology at SPM level
     - Physics / Engineering Physics / Chemistry / Engineering Chemistry and
   - Candidate is not colour blind and physically disabled which could hinder practical works.

3. Bachelor in Applied Science (Honours) Material Technology JG47 8 Semesters

   - Fulfills University General Requirement and PROGRAMME SPECIFIC REQUIREMENTS
   - Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects:
     - Mathematics
     - Physics / Engineering Physics; OR
     - Obtained at least Grade B in Physics at SPM level
     - Chemistry / Engineering Chemistry / Biology and
   - Candidate is not colour blind and physically disabled which could hinder practical works.
BACHELOR’S DEGREE PROGRAMME
STPM HOLDER

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<td></td>
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<td>Passed Malaysian Higher School Certificate (STPM) with at least a CGPA of 2.00 and obtained at least:</td>
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<td>• Grade C (Subject Grade Point 2.00) in General Studies subject; and</td>
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<td>• Grade C (Subject Grade Point 2.00) in any two (2) other subjects. and</td>
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<td>FACULTY OF SCIENCE AND INDUSTRIAL TECHNOLOGY</td>
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<tr>
<td>1.</td>
<td>Bachelor of Applied Science (Honours) Industrial Chemistry JG04 8 Semesters</td>
<td>Fulfils University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
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<td>• Mathematics T / Further Mathematics T;</td>
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<td>• Chemistry OR Obtained at least Grade B in Chemistry at SPM level; and</td>
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<td>• Physics / Biology and</td>
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<td></td>
<td>Candidate is not colour blind and physically disabled which could hinder practical works.</td>
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<td>2.</td>
<td>Bachelor of Applied Science (Honours) Industrial Biotechnology JG44 8 Semesters</td>
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<td>• Biology OR Obtained at least Grade B in Biology at SPM level; and</td>
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<td>• Physics / Chemistry and</td>
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<td>Candidate is not colour blind and physically disabled which could hinder practical works.</td>
</tr>
<tr>
<td>3.</td>
<td>Bachelor of Applied Science (Honours) Material Technology JG47 8 Semesters</td>
<td>Fulfils University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
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<td>Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in the subjects below:</td>
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<td>• Physics OR Obtained at least Grade B in Physics at SPM level; and</td>
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<td>• Chemistry / Biology and</td>
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<td></td>
<td>Candidate is not colour blind and physically disabled which could hinder practical works.</td>
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</table>
FACULTY OF TECHNOLOGY

ENGINEERING TECHNOLOGY DEPARTMENT

DIPLOMA HOLDER

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<tr>
<th>NO</th>
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</tbody>
</table>

FACULTY OF TECHNOLOGY

1. Bachelor of Engineering Technology (Energy & Environment) with Honours JY56 8 Semesters Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS

2. Bachelor of Engineering Technology (Manufacturing) with Honours JY90 8 semesters

3. Bachelor of Engineering Technology (Electrical) with Honours JY30 8 semesters

Note: Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.
### FACULTY OF TECHNOLOGY

<table>
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### FACULTY OF TECHNOLOGY

<table>
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<th>1.</th>
<th>Bachelor in Engineering Technology (Energy &amp; Surrounding) with Honours</th>
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<tbody>
<tr>
<td>JY56</td>
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<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects:</td>
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<td>• Mathematics;</td>
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<td>• Chemistry / Engineering Chemistry / Physics / Engineering Physics / Biology / Civil Engineering Studies / Mechanical Engineering Studies / Electrical &amp; Electronic Engineering Studies</td>
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<td>Candidate who fulfills the requirement in Biology at Matriculation/ Foundation Studies level should have obtained at least credit in Physics at SPM level.</td>
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<td>Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to programme no.3)</td>
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<td>Note:</td>
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<td>Candidate who did not take Physics at Matriculation/Foundation Studies level is required to take Basic Physics subject at University.</td>
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<td>JY90</td>
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### NOKPM Matriculation/Foundation Studies Minimum Requirements

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# ENGINEERING TECHNOLOGY DEPARTMENT

## STPM HOLDER

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## TECHNOLOGY MANAGEMENT DEPARTMENT

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<td>Submit a certified copy of the following documents to the University :-</td>
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<td>• Online Application;</td>
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<td>• Candidate’s Identity Card/MyKad;</td>
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<td>• Candidate’s Birth Certificate, Parents’ Birth Certificates/ Letter of Oath (If missing)</td>
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<td>• School Leaving Certificate/Letter of Acknowledgement;</td>
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<td>• Employer’s Acknowledgement (If relevant) ;</td>
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<td></td>
<td>• STPM/Equivalent Certificate; and</td>
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<td>• Complete Academic Transcript (Semester 1 to final semester);</td>
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<td>• Diploma/Certificate (If any)</td>
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<td>• MUET certificate;</td>
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<td>• Study Completion Verification Letter;and</td>
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<td></td>
<td>• Bahasa Melayu/ July Mathematics Results (If any)</td>
</tr>
</tbody>
</table>

### FACULTY OF TECHNOLOGY

#### 1. Bachelor of Project Management with Honours

- Code: JP45
- Duration: 8 Semesters

- Fulfills University General Requirements

- **PROGRAMME SPECIFIC REQUIREMENTS**

- Possesses a Diploma in relevant field from Public Institution of Higher Learning (IPTA) with at least a Cumulative Grade Point Average (CGPA) of 2.50

- or

- Possesses a Diploma in relevant field from Private Institution of Higher Learning (IPTS) / Politechnic / equivalent and endorsed by the University Senate with at least a Cumulative Grade Point Average (CGPA) of 3.00

- or

- Candidates who do not fulfill the requirement of CGPA above but obtained at least a CGPA of 2.30 and possess working experience of at least 2 years in relevant field will be taken into consideration

- and

- Candidate is not colour blind and physically disabled which could hinder practical works. (Requirement for colour blindness only applies to programme JP46)

**Note:**

Year of admission and the real duration of study are subject to credit exemption which is approved by the Faculty.
### TECHNOLOGY MANAGEMENT DEPARTMENT
#### MATRICULATION STUDENT

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study Code</th>
<th>Duration of Study</th>
<th>KPM Matriculation/Foundation Studies Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>GENERAL UNIVERSITY REQUIREMENTS</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper; and</td>
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<td></td>
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<td></td>
<td>Passed KPM Matriculation/UM Foundation Studies/UiTM Foundation Studies with at least a CGPA of 2.00; and</td>
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<td></td>
<td>Obtained at least Band 1 in Malaysian University English Test (MUET).</td>
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<td>FAKULTY OF TECHNOLOGY</td>
</tr>
<tr>
<td>1.</td>
<td>Bachelor in Occupational Safety and Health with Honours JP46 8 semesters</td>
<td></td>
<td>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
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<tr>
<td></td>
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<td></td>
<td>Obtained at least Grade C (2.00) at Matriculation/Foundation Studies level in the following subjects:</td>
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<td>• Mathematics ; and</td>
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<td></td>
<td>• Chemistry / Physics / Biology</td>
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<td>and</td>
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<td>Obtained at least credit (Grade C) in the following subjects at SPM level.</td>
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<td>• Physics; and</td>
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<td></td>
<td>• Chemistry / Biology</td>
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<td>and</td>
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<td>Obtained at least Pass (Grade E) in English at SPM level.</td>
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<td>and</td>
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<td></td>
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<td></td>
<td>Candidate is not colour blind and physically disabled which could hinder practical works.</td>
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<tr>
<td>2.</td>
<td>Bachelor in Project Management with Honours JP45 8 Semesters</td>
<td></td>
<td>Fulfills University General Requirements and PROGRAMME SPECIFIC REQUIREMENTS</td>
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<td></td>
<td></td>
<td></td>
<td>Obtained at least credit (Grade C) in Mathematics at SPM level.</td>
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<td>st Pass (Grade E) in English at SPM level.</td>
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<td>ts at SPM level.</td>
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<td></td>
<td>Obtained at least Pass (Grade E) in English at SPM level.</td>
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<td></td>
<td>Candidate is not physically disabled which could hinder practical works.</td>
</tr>
<tr>
<td>3.</td>
<td>Bachelor in Industrial Technology Management with Honours JP47 8 Semesters</td>
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</tbody>
</table>

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## TECHNOLOGY MANAGEMENT DEPARTMENT

### STAM HOLDER

<table>
<thead>
<tr>
<th>No</th>
<th>Programme of Study</th>
<th>STAM Minimum Requirements</th>
</tr>
</thead>
</table>
| (i) | Bachelor of Project Management with Honours JP45 8 Semesters | **GENERAL UNIVERSITY REQUIREMENTS**  
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;  
and  
Obtained at least a Jayyid Jiddan Rank in Peperiksaan Sijil Tinggi Agama Malaysia (STAM);  
and  
Obtained at least Band 1 in Malaysian University English Test (MUET)  

**PROGRAMME SPECIFIC REQUIREMENTS**  
Possesses Sijil Tinggi Agama Malaysia (STAM) with at least a Jayyid Jiddan Rank.  
and  
Obtained at least credit (Grade C) in Mathematics at SPM level.  
and  
Obtained at least pass (Grade E) in English at SPM level.  
and  
Candidate is not physically disabled which could hinder practical works. |
| (ii) | Bachelor of Industrial Technology Management with Honours JP47 8 Semesters | **GENERAL UNIVERSITY REQUIREMENTS**  
Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/Bahasa Malaysia July Paper;  
and  
Obtained at least a Jayyid Jiddan Rank in Peperiksaan Sijil Tinggi Agama Malaysia (STAM);  
and  
Obtained at least Band 1 in Malaysian University English Test (MUET)  

**PROGRAMME SPECIFIC REQUIREMENTS**  
Possesses Sijil Tinggi Agama Malaysia (STAM) with at least a Jayyid Jiddan Rank.  
and  
Obtained at least credit (Grade C) in Mathematics at SPM level.  
and  
Obtained at least pass (Grade E) in English at SPM level.  
and  
Candidate is not physically disabled which could hinder practical works. |
## TECHNOLOGY MANAGEMENT DEPARTMENT
### STPM HOLDER

<table>
<thead>
<tr>
<th>NO</th>
<th>Programme of Study</th>
<th>STPM Minimum Requirements</th>
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<tr>
<td></td>
<td></td>
<td><strong>GENERAL UNIVERSITY REQUIREMENTS</strong></td>
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<td></td>
<td></td>
<td>Passed Sijil Pelajaran Malaysia (SPM)/Equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a Credit in Bahasa Melayu/ Bahasa Malaysia July Paper; and</td>
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<tr>
<td></td>
<td></td>
<td>Passed Malaysian Higher School Certificate (STPM) with at least a CGPA of 2.00 and obtained at least:</td>
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<td></td>
<td></td>
<td>Grade C (Subject Grade Point 2.00) in General Studies subject;</td>
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<td>Grade C (Subject Grade Point 2.00) in any two (2) other subjects.</td>
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<td>Fulfills University General Requirements and <strong>PROGRAMME SPECIFIC REQUIREMENTS</strong></td>
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<td></td>
<td></td>
<td>Obtained at least Grade C (Subject Grade Point 2.00) at STPM level in the subjects below:</td>
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<td>• Mathematics T / Further Mathematics T ;</td>
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<td></td>
<td>• Chemistry / Physics / Biology and</td>
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<td>Obtained at least credit (Grade C) at SPM level in the subjects below:</td>
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<td>Candidate is not colour blind and physically disabled which could hinder practical works.</td>
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<td>Fulfills University General Requirements and <strong>PROGRAMME SPECIFIC REQUIREMENTS</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obtained at least credit (Grade C) at SPM level in Mathematics. and</td>
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<tr>
<td></td>
<td></td>
<td>Obtained at least pass (Grade E) in English at SPM level.</td>
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<td>3.</td>
<td>Bachelor of Project Management with Honours JP45 8 Semesters</td>
<td>Candidate is not physically disabled which could hinder practical works.</td>
</tr>
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</table>