



UNIVERSITI  
TEKNOLOGI  
PETRONAS



Undergraduate Student Handbook

# THE CURRICULUM

2023 / 2024

# UNDERGRADUATE PROGRAMME

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## A GUIDE TO UNIVERSITY ACADEMIC CURRICULUM

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## **PART B**

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# **Chapter I: Undergraduate Degree Program**

# **Programme Information**

**Bachelor of Chemical Engineering  
with Honours**

## 1.0 Introduction

Chemical Engineering focuses on the application of engineering principles to the design, construction and operation of industrial processing plants. A chemical engineer generally works at any industrial processing plant such as those dealing with petrochemicals, chemicals, pharmaceuticals, semiconductors, food processing and other related industries. The job involves supervision of plant operation and maintenance, troubleshooting operational problems related to process, and undertaking plant modification work for process operability and safety improvement.

The Bachelor of Chemical Engineering with Honours programme stresses the need for a strong foundation in Mathematics, Physics and Chemistry, followed by a thorough coverage of basic engineering courses such as Fluid Mechanics, Thermodynamics and Mass & Heat Transfer. In the later years of study, students are exposed to Unit Operations, Reaction Engineering, Safety & Environment, Process Control and Process Design. In addition to the above, at the end of their studies a student will have the opportunity to take special topics in one of these selected areas of interest:

- **Environment and Sustainable Engineering**
- **Process System Engineering**
- **Processing Industry**
- **Process Plant Safety**
- **Integrated Programme Leading to MSc in Process Safety**
- **Renewable Energy**

## 1.1 Programme Educational Objectives

- Engineers who are competent with the potential to become leaders in chemical process and related industries.
- Engineers who are involved towards sustainable development in chemical process and related industries for the betterment of the society.

## 1.2 Programme Outcomes

To produce graduates with the following outcomes:

- Apply knowledge of mathematics, natural science, engineering fundamentals and engineering specialisation to the solution of complex engineering problems.
- Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 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.
- Conduct investigation of complex engineering 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.
- Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to evaluate complex engineering problems, with an understanding of the limitations.
- Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
- Evaluate sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.
- Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- Communicate effectively on complex engineering activities with the engineering community and society.

- xi. Demonstrate knowledge and understanding of engineering management principles, economic decision making and entrepreneurial skills to manage projects in multidisciplinary environments.
- xii. 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.

### 1.3 Graduation Requirements

In order to graduate with the Bachelor of Chemical Engineering with Honours degree, students are required to obtain a minimum of **144 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC – Core Common	24
CD – Core Discipline	72
CI – Core Industrial Internship	14
CSp – Core Specialisation	9
<b>TOTAL</b>	<b>144</b>



SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
CFB3013	Environmental Chemical Engineering	3	CD								
CFB3023	Process Plant Design	3	CD								
CFB3032	Analytical Instrumentation	2	CD								
CFB3043	Process Instrumentation & Control	3	CD								
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>7</b>		<b>Credit Hours</b>		<b>7</b>	
SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
VFB3102	Project Management	2	CC	PFB4102	Engineering Economics	2	CC	EFB4073	Engineers in Society	3	CC
CFB4013	Reaction Engineering II	3	CD	CFB4053	Transport Phenomena	3	CD	CFB4084	Final Year Project II	4	CD
CFB4022	Material Science for Chemical Engineering	2	CD	CFB4062	Final Year Project I	2	CD	CFB4xx3	Core Specialisation II	3	CSp
CFB4033	Plant Design Project I	3	CD	CFB4073	Plant Design Project II	3	CD	CFB4xx3	Core Specialisation III	3	CSp
CFB4042	Chemical Engineering Lab III	2	CD	CFB4xx3	Core Specialisation I	3	CSp				
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>13</b>	
<b>Total Credit Hours: 144</b>											

### 3.0 Core Specialisation (CSp) Courses

Students are required to choose any of the following sets of Core Specialisation's areas (set A, B, C, D, E or F) as Core Specialisation I, II and III.

\* For this Core Specialisation, students are required to choose 3 out of 4 courses as Core Specialisation I, II and III.

A. Environment and Sustainable Engineering				
No	Code	Course Name	Cr	G
1	CFB4213	Air Pollution Engineering	3	CSp
2	CFB4223	Industrial Effluent Engineering	3	CSp
3	CFB4233	Sustainable Process Engineering	3	CSp

B. Process System Engineering				
No	Code	Course Name	Cr	G
1	CFB4313	Process Integration	3	CSp
2	CFB4323	Process Optimisation	3	CSp
3	CFB4333	Advanced Process Control	3	CSp

C. Processing Industry				
No	Code	Course Name	Cr	G
1	CFB4413	Gas and Petrochemical Processes	3	CSp
2	CFB4423	Polymer Processing	3	CSp
3	CFB4433	Biochemical Processing	3	CSp

D. Process Plant Safety				
No	Code	Course Name	Cr	G
1	CFB4513	Human Factors for Process Safety	3	CSp
2	CFB4523	Design for Process Safety	3	CSp
3	CFB4533	Technical Management for Process Safety	3	CSp

E. * Integrated Program Leading to MSc in Process Safety				
No	Code	Course Name	Cr	G
1	CBM5113	Principles of Process Safety Management	3	CSp
2	CBM5123	Principles of Hazard Analysis and Risk Management	3	CSp
3	CBM5143	Safe Design and Operation	3	CSp
4	CBM5153	Human Factors	3	CSp

F. Renewable Energy				
No	Code	Course Name	Cr	G
1	MFB4123	Energy Management & Environment	3	CSp
2	MFB4513	Renewable Energy I	3	CSp
3	MFB4523	Renewable Energy II	3	CSp

Note:

Any Core (set A, B, C, D, E or F) which has student enrolment of less than 10 will not be offered.

## 4.1 Minor (EM) Courses

Engineering students who are interested to enhance their knowledge in computer and information systems or finance, accounting, and business will have the options to complete courses offered under a Minor. There are two (2) Minor packages available for Engineering students as below:

- i. Minor in Data Science
- ii. Minor in Accounting and Finance

In order to be eligible for Minor, students are required to pass and complete all the courses under the same package (15 credits). Results obtained from courses under Minor will be counted into GPA/CGPA calculation. Students are reminded that the option to complete Minor courses is at the students' discretion and are **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **144 credit hours**.

Minor in Data Science					
A No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

Minor in Accounting and Finance					
B No	Code	Course Name	Cr	G	Semester
1	GFB2013	Business Accounting	3	EM	Students can take these courses in any semester
2	GFB2153	Business Law	3	EM	
3	GFB2283	Business and Financial Technology	3	EM	
4	GFB2293	Management Accounting	3	EM	
5	GFB2303	Assurance	3	EM	
Total Credit Hours			15		

**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.

## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : CFB1023  
**COURSE** : Physical Chemistry  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is a required component of Body of Knowledge (BoK) in Chemical Engineering profession. It is designed to equip engineers with knowledge of physical chemistry. This course will help engineers to understand the underlying concept of thermodynamics, kinetics, solution phase behaviour, catalyst, and electrochemical systems.

**COURSE CODE** : CFB1032  
**COURSE** : Health, Safety & Environment  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers aspects of HSE relating to the workplace environment. The roles of management and non-management personnel in the development and implementation of a successful health and safety programme are addressed. The course also covers the recognition of industrial hazards, the OSHAct, and other various Malaysian regulations relating to the man-machine interface in the workplace. The course focuses on the principles of occupational HSE, specifically the following major components: management, hazard impact and identification, control and prevention.

**COURSE CODE** : CFB1043  
**COURSE** : Principles of Chemical Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is a required component of Body of Knowledge (BoK) in Chemical Engineering profession. It is designed to equip students with the fundamentals of chemical engineering such as introduction to the chemical industry, introduction to chemical engineering calculations, techniques of problem solving, material balance and energy balance for various systems, combined material, and energy balance. This course will help students to take up challenges in designing and evaluating the future needs of chemical engineering processes.

**COURSE CODE** : CFB1053  
**COURSE** : Chemical Engineering Fluid Mechanics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is a required component as a major course in Chemical Engineering. This course introduces students to fluid properties, fluid static, fluid dynamics, flow of incompressible and compressible fluids, fluidisation, agitation and mixing and fluid transportation. It is designed to equip students with the fundamentals of fluid mechanics as part of their preparation in Chemical Engineering Lab I.

**COURSE CODE** : CFB1063  
**COURSE** : Process Heat Transfer  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is a required component of Body of Knowledge (BoK) in Chemical Engineering profession. It is designed to equip students with the fundamental of process heat transfer. This course will help students to take up challenges in designing new processes, equipment and to operate. Emphasis will be given on the physical principles underlying heat flow by conduction, convection, and radiation mechanisms. Application of this knowledge can solve problems relevant to the design of chemical engineering systems, especially heat exchangers. It will also help to develop important problem solving and critical thinking skills.

**COURSE CODE** : CFB1072  
**COURSE** : Chemical Engineering Thermodynamics I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

Upon completion of this course, students should be able to describe and analyse the fundamental principles and laws of thermodynamics, perform related calculations and apply them in various engineering systems and their interrelationship for energy conversion to improve performance and reduce environmental impact.

**COURSE CODE** : CFB2013  
**COURSE** : Separation Process I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Principles of Chemical Engineering

This course is a required component of Body of Knowledge (BoK) in Chemical Engineering profession. It is designed to equip students with the fundamentals of chemical engineering such as Mass Transfer Principles, Equilibrium Stage Operations such as Distillation, Absorption, Liquid-Liquid Extraction and Leaching. This course will help students to take up challenges in design, simulation and evaluate separation process equipment.

**COURSE CODE** : CFB2023  
**COURSE** : Chemical Engineering Thermodynamics II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Chemical Engineering Thermodynamics I

This course will equip students with the knowledge of application of thermodynamic laws, thermodynamic properties of fluid, phase equilibria and chemical reaction equilibria to solve various engineering problems involving separation and reaction processes.

**COURSE CODE** : CFB2032  
**COURSE** : Chemical Engineering Lab I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Chemical Engineering Fluid Mechanics, Process Heat Transfer

This course is a required component of the Body of Knowledge (BoK) in the Chemical Engineering profession. It is designed to equip students with practical experience in conducting Chemical Engineering unit operation equipment relating theory into the industrial application. Students will perform selected experiments in a combination of fluid mechanics and process heat transfer modules and present their findings.

**COURSE CODE** : CFB2043  
**COURSE** : Organic Chemistry  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is a required component of Body of Knowledge (BoK) in Chemical Engineering profession. This course introduces students to the reaction mechanisms of alkanes, alkenes, alkynes, alkyl halides, alcohols, amines, and aromatic compounds.

**COURSE CODE** : CFB2053  
**COURSE** : Reaction Engineering I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course prepares students with the fundamental knowledge on reaction engineering including evaluation of reaction kinetics, ideal reactors, choosing the reactor and sizing for a reaction, design for multiple reactions, temperature & pressure effects for single reactions, and solving reaction engineering problems.

**COURSE CODE** : CFB2063  
**COURSE** : Separation Process II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is a required component of Body of Knowledge (BoK) in Chemical Engineering profession. This course covers the theories, concepts, and application of separation processes. This includes mass transfer, separation techniques and the design criteria of processes such as adsorption, ion exchange, evaporation, drying, crystallization, and membrane processes.

**COURSE CODE** : CFB2073  
**COURSE** : Process Safety and Loss Prevention  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course is about explaining the fundamentals of process safety and its application to processing industries. The course covers topics on regulatory and standard requirement on process safety, source modelling for leakage rates, dispersion models for toxic release, fire and explosion impact analysis. The course will also include the identification of hazards, estimation of probability of failure, assessment of risk and propose prevention and mitigation techniques to enhance process safety in processing industries.

**COURSE CODE** : CFB2083  
**COURSE** : Process Modelling & Simulation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to equip students with the knowledge on developing mathematical models of process systems and solving them using appropriate numerical methods to understand the steady-state and dynamic behaviour of the actual processes.

**COURSE CODE** : CFB2092  
**COURSE** : Chemical Engineering Lab II  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Separation Process I, Separation Process II, Reaction Engineering I

This course is a required component of Chemical Engineering profession. It is designed to equip engineers with the practical skills and the understanding of knowledge of chemical engineering unit operations focusing on application of mass transfer, separation, and reaction system. Students will perform selected experiments that involve separation processes such as distillation, absorption, adsorption and evaporation; as well as reaction engineering which include stirred tank and tubular flow system.

**COURSE CODE** : CFB3013  
**COURSE** : Environmental Chemical Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on introduction to environmental engineering; relevant regulation requirement; current environmental issues; identification, characterisation and treatment of waste generated in industries from wastewater, air and solid waste and environmental sustainability.

**COURSE CODE** : CFB3023  
**COURSE** : Process Plant Design  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is to consolidate and link the knowledge of all unit operations for designing a chemical process plant. It deals with the general design considerations for a process plant based on heuristics. This includes understanding the need for product, general plant design considerations, process alternatives, equipment selection, preparing PFD and P&ID, heat integration and environmental considerations.

**COURSE CODE** : CFB3032  
**COURSE** : Analytical Instrumentation  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course is a required component of core discipline in Chemical Engineering profession. It is designed to equip students with the fundamentals of analytical chemistry. This course will help students to take up challenges in analysing and evaluating samples in chemical industries. It also covers topics such as introduction to basic method and various types of analytical instrument.

**COURSE CODE** : CFB3043  
**COURSE** : Process Instrumentation & Control  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will introduce the fundamentals of process instrumentation, process dynamics and control that includes dynamic and steady state modelling of processes, design and analysis of feedback control systems, stability analysis, tuning of feedback control systems and process instruments. It also includes selection of process control instruments and drawing and reading of piping and instrumentation (P&ID) diagrams.

**COURSE CODE** : CFB4013  
**COURSE** : Reaction Engineering II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces students to the fundamentals of catalyst, its materials and properties, the concept of solid catalysed reaction, fluid-particle reaction, catalyst deactivation and reactor design.

**COURSE CODE** : CFB4033  
**COURSE** : Plant Design Project I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

In this first of a two-part capstone project, final year students shall develop an innovative approach to a process design problem. Beginning at the project initiation stage, the students shall identify opportunity or reason for the project, which include assigning a project team, gathering project information, identifying the business case, and incorporating health, safety, and environmental principles of the project. The students then begin to develop a concept design and select appropriate process subsystems. The students shall evolve the initial concept design into several competing design flowsheets and be able to identify key design decisions for the screening of process design alternatives. Developing original concept design is emphasised rather than imitating proven technologies. The students shall also run process simulation, produce material and energy balance, and develop PFD (process flow diagram) using standard design codes. The students shall undertake a more rigorous engineering approach during the second part of the Plant Design project.

**COURSE CODE** : CFB4042  
**COURSE** : Chemical Engineering Lab III  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Process Instrumentation & Control

This is a practical course which is a required component of Body of Knowledge (BoK) in Chemical Engineering profession. It is designed to equip future engineers with the ability to conduct study of the dynamic behaviour of process and instrumentation, to analyse and tune control systems and to evaluate their performance. This practical course requires several groups of 4 or 5 students perform experiments related to process instrumentation, dynamics, and control. Students are required to analyse data, write reports, and present their findings.

**COURSE CODE** : CFB4053  
**COURSE** : Transport Phenomena  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is an important aspect in Chemical Engineering field. It is designed to equip engineers with the advanced knowledge of fluid mechanics, energy and mass transferred. This course will help engineers to assess flow system by integrating fundamental knowledge with numerical method. This subject exposed the engineers to the utilisation of modern tools to investigate flow behaviour in a system. The course entails the underlying physical processes involved in transport of momentum, energy and mass. This information would support the empirical models for transport parameters widely used in many unit operations analysis.

**COURSE CODE** : CFB4022  
**COURSE** : Material Science for Chemical Engineering  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course prepares students with the fundamental knowledge on materials science and engineering including advance materials, phase diagrams, selection of materials for chemical process and characterization of materials. This course also presents a broad multidisciplinary approach to understanding and manipulating the mechanical, thermal, electrical, optical and magnetic properties of materials.

**COURSE CODE** : CFB4073  
**COURSE** : Plant Design Project II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Plant Design Project I

In this project, students have to integrate their chemical engineering skills to perform detailed economic analysis and equipment design for the process plant considering environmental and safety aspects.

**COURSE CODE** : CFB4084  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is a continuation from Final Year Project I (FYP I) where the students are expected to carry out the research projects themselves as stipulated in their earlier proposal (FYP I). At the end, the students should present their research outputs in the form of both oral presentation and thesis.

**COURSE CODE** : CFB4062  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

This is an individual project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematic analysis, experimental tests, computer simulation, hardware and/or software development, or device fabrication.

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Environment and Sustainable Engineering

<b>COURSE CODE</b>	: CFB4213
<b>COURSE</b>	: Air Pollution Engineering
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

This course provides environmental and engineering issue perspectives to strengthen and broaden student's knowledge through provision of an understanding of the sources and effects of air pollutants with respect to the associated control legislations. It also provides fundamental theories and practices of various devices for major air pollutant control treatment system design.

<b>COURSE CODE</b>	: CFB4223
<b>COURSE</b>	: Industrial Effluent Engineering
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

Strengthen and broaden students' knowledge in environmental and engineering issues with respect to wastewater and hazardous wastes including their mitigation measures and treatment technology through the provision of an understanding of the industrial sources. Inculcate the fundamental theories of wastewater flow, parameters, and stages of treatment technologies for waste minimisation and design.

<b>COURSE CODE</b>	: CFB4233
<b>COURSE</b>	: Sustainable Process Engineering
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

This course provides the global perspective of sustainability and sustainable engineering and their social, economic and environmental impacts. It also provides the awareness to apply sustainability concepts into complex engineering designs and applications to the process industry emphasising on clean technologies, green processes that include environmentally, green chemistry and circular economy approach. It is aimed to introduce current and future processing technologies integrating sustainable processing and practices in industries.

### 5.2.2 Process System Engineering

**COURSE CODE** : CFB4313  
**COURSE** : Process Integration  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course assists students to further develop their process design skills in applying Pinch Analysis to produce integrated chemical processes. The course covers the introduction to Process Integration, heat utility targeting, heat exchanger network design, combined heat and power integration, mass utility targeting, mass exchanger network design and software application for process integration.

**COURSE CODE** : CFB4323  
**COURSE** : Process Optimisation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers objective function and model development, constraints, unconstrained (single and multivariable) optimisation, and constrained (single and multivariable) optimisation that includes lagrange multiplier, linear programming, integer programming, nonlinear programming.

**COURSE CODE** : CFB4333  
**COURSE** : Advanced Process Control  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces enhanced control strategies like feed forward control, ratio control, cascade control, split range control, override control, etc. In addition, design of controllers including model predictive control for multivariable systems and analysing the control system performance is taught.

### 5.2.3 Processing Industry

**COURSE CODE** : CFB4413  
**COURSE** : Gas and Petrochemical Processes  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers the introduction to petroleum and natural gas (NG) as a source of energy & petrochemicals. Petroleum refinery will be introduced first by highlighting important processes (catalytic cracking, naphtha reforming and hydrocracking) and petroleum products. NG processing will be covered from the transportation pipeline to the gas processing facilities for physical and chemical separation. At the end of this course, specialty chemical processes will be introduced.

**COURSE CODE** : CFB4423  
**COURSE** : Polymer Processing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides fundamental and principle of polymer process engineering covering polymer classification, molecular weight and molecular weight distribution, properties of polymers, polymer reactions, polymer blend and composite as well as polymer processing techniques.

**COURSE CODE** : CFB4433  
**COURSE** : Biochemical Processing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Biochemical Processing course is designed to expose the students to the application of biological principles in engineering processes. Engineers working in the process industries are making increased use of biological systems, in particular microbial systems for products generation and environmental management. To optimise these processes, engineers must understand the fundamentals of biological organisms, processes and their applications.

#### 5.2.4 Process Plant Safety

**COURSE CODE** : CFB4513  
**COURSE** : Human Factors for Process Safety  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course explains how human factor influence human behaviour in a way which can affect process safety performance at all levels of an organisation. The course covers topics on human factors' key issues, factors affecting human performance and systematic approaches in predicting and reducing human error. The course will also include case studies to assess human error in process industry and propose human error prevention techniques to enhance process safety. The course is hence to strengthen and broaden student knowledge in process safety with respect to human factor aspect.

**COURSE CODE** : CFB4523  
**COURSE** : Design for Process Safety  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course is about explaining how to integrate process safety aspects in process design to prevent or minimise major accidents. This course is a critical element of body of knowledge in process safety. The course is hence to strengthen and broaden student knowledge in process safety with respect to design aspects. This course is aimed to enhance students' knowledge on designs for process safety and its regulatory requirement, inherent safety principles and strategies for inherently safer design. The course also covers topics on the implementation of ISD using suitable methods at all plant lifecycle of stages. The designs to prevent fire and explosion and runaway reaction will also be discussed.

**COURSE CODE** : CFB4533  
**COURSE** : Technical Management for Process Safety  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This subject introduces the concept of management system for enhancing process safety performances of organisation or facilities. The subject provides understanding on the importance of Process Safety Management (PSM) and the related regulatory requirements. It enables students to identify approaches to apply PSM elements that are required in process industry and assess the performance of process safety using established techniques.

## 5.2.5 Integrated Program Leading to MSc in Process Safety

**COURSE CODE** : CBM5113  
**COURSE** : Principles of Process Safety Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course provides information about Process Safety Management (PSM) in the workplace. The course covers topics on learning from incidents, need to manage safety, regulations on PSM, PSM elements, planning and implementing. The course will also include the measure audit and review, safety management systems in major hazards, process safety performance measurement and safety leadership to enhance PSM in processing industries.

**COURSE CODE** : CBM5123  
**COURSE** : Principles of Hazard Analysis & Risk Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course explains about hazard analysis and risk assessment and its application to processing industries. The course covers topics on hazards, risk, risk analysis probability and reliability, hazard analysis and awareness, PHA tools (HAZOP, HAZID, FMEA etc), bow tie diagrams, principle of risk management. The course will also include the consequence analysis, risk contributors, risk values, risks communication and safety culture to enhance process safety in processing industries.

**COURSE CODE** : CBM5143  
**COURSE** : Safe Design and Operation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is aimed to enhance students' knowledge on designs for process safety strategies, layer of protection and inherently safer design strategies. The course also covers topics on the pressure relief system and sizing and relief piping and disposal system. The designs to prevent fire and explosion, dust explosion and runaway reaction will also be discussed.

**COURSE CODE** : CBM5153  
**COURSE** : Human Factors  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course explains how human factors influence human behaviour in a way which can affect process safety performance at all levels of an organisation. The course covers topics on human factors' key issues, factors affecting human performance and systematic approaches in predicting and reducing human error. The course will also include case studies to assess human error in process industry and propose human error prevention techniques to enhance process safety.

## 5.2.6 Renewable Energy

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies – Energy conservation strategies, energy management system requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4513  
**COURSE** : Renewable Energy I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on wind power, simple theory of the wind turbine's performance & present Developments, Hydroelectric and pumped storage systems, Solar thermal power: Direct solar power, Design of low temperature solar heaters for domestic use, Performance characteristics and Description of solar systems for power generation.

**COURSE CODE** : MFB4523  
**COURSE** : Renewable Energy II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the wave & tidal energy - physical principles of wave energy, various types of wave energy converters and the environmental impacts and economics; fuel cell - principles of fuel cell and hydrogen production; geothermal energy - the physics of geothermal resources, technologies for geothermal resource exploitation and the environmental implications. Biomass energy including introduction to biomass types and resources, biomass as a fuel, energy crops, environmental benefits and economics of biomass.

# **Programme Information**

**Bachelor of Civil Engineering  
with Honours**

## 1.0 Introduction

Civil Engineering, a people serving profession, involves the application of engineering principles and applied sciences to the design, construction, operation, and maintenance of capital projects in a typical asset life cycle. This includes buildings, roads, bridges, dams, airports, water and wastewater treatment plants, oil and gas production facilities, special purpose structures and any engineered structures for the comfort of mankind.

Students are exposed to courses in computer aided design, surveying, transportation engineering, environmental engineering, geotechnical engineering, structural engineering, pavement and materials engineering, construction and project management, steel and concrete design, water and wastewater engineering.

In addition to the above courses, students are given the opportunity to major in one of these selected areas in the final year of their study namely:

- **Environmental Engineering**
- **Sustainability**
- **Renewable Energy**
- **Offshore Engineering**

## 1.1 Programme Educational Objectives

- Engineers who are competent with the potential to become leaders of Civil Engineering industries.
- Engineers who are involved towards sustainable development in Civil Engineering and related industries for the betterment of the society.

## 1.2 Programme Outcomes

To produce graduates with the following outcomes:

- Apply knowledge of mathematics, natural science, engineering fundamentals and engineering specialisation to the solution of complex engineering problems.
- Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 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.
- Conduct investigation of complex engineering 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.
- Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to evaluate complex engineering problems, with an understanding of the limitations.
- Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
- Evaluate sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.
- Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- Communicate effectively on complex engineering activities with the engineering community and society.

- xi. Demonstrate knowledge and understanding of engineering management principles, economic decision making and entrepreneurial skills to manage projects in multidisciplinary environments.
- xii. 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.

### 1.3 Graduation Requirements

In order to graduate with the Bachelor of Civil Engineering with Honours degree, students are required to obtain a minimum of **144 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Core Common	22
CD - Core Discipline	74
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
<b>TOTAL</b>	<b>144</b>

## 2.0 Programme Curriculum Structure: Bachelor of Civil Engineering with Honours

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika & Peradaban (Local) BM Komunikasi 2 (International)	2	NR	MPU3192	Falsafah & Isu Semasa (Local & International)	2	NR	LFB1042	Academic Writing	2	UR
MPU3142				FFM1023	Engineering Mathematics II	3	CC	HFB1022	Scientific Inquiry	2	UR
PFP1012	Introduction to Oil & Gas Industry and Sustainable Development	2	UR	CFB1032	Health, Safety & Environment	2	CC	FFM1063	Statistics and Application	3	CC
HFB2152	Ethics and Integrity	2	UR	VFB1033	Mechanics of Solids	3	CD	VFB1052	Civil Engineering Fluid Mechanics	2	CD
FFM1013	Engineering Mathematics I	3	CC	VFB1043	Geomatics	3	CD	VFB1063	Theory of Structures	3	CD
VFB1012	Civil Engineering Drawing	2	CD	KXXxxx1	Co Curriculum I	1	UR	VFB1072	Traffic Engineering	2	CD
VFB1023	Engineering Mechanics	3	CD								
<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>14</b>	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
HFB2033	Professional Communication Skills	3	UR	MPU 2	One (1) MPU2 Course	2	NR	MPU 4/ HFB1012	Community Engagement Project	2	NR
VFB2012	Sustainable Concrete Technology	2	CD	FFM2063	Data Analytics	3	CC	MFB2062	Engineering Team Project II	2	CC
VFB2023	Soil Mechanics	3	CD	GFB2102	Entrepreneurship	2	UR	VFB2073	Highway Engineering	3	CD
VFB2033	Structural Analysis	3	CD	MFB2061	Engineering Team Project I	1	CC	VFB2082	Design of Steel Structures	2	CD
VFB2043	Hydraulics	3	CD	VFB2052	Civil Engineering Laboratory I	2	CD	VFB2092	Civil Engineering Laboratory II	2	CD
				VFB2063	Hydrology	3	CD	VFB2102	Water Supply Engineering	2	CD
<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>13</b>	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
KXXXXX1	CoCurriculum II	1	UR								
VFB3012	Civil Engineering Laboratory III	2	CD								
VFB3022	Design of Reinforced Concrete Structures I	2	CD								
VFB3033	Wastewater Engineering	3	CD								
VFB3042	Design of Foundation	2	CD								
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>7</b>		<b>Credit Hours</b>		<b>7</b>	

SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
VFB4013	Construction Project Management	3	CD	PFB4102	Engineering Economics	2	CC	EFB4073	Engineers in Society	3	CC
VFB4022	Design of Reinforced Concrete Structures II	2	CD	VFB4063	Civil Engineering Design II	3	CD	VFB4094	Final Year Project II	4	CD
VFB4032	Building Information Modelling	2	CD	VFB4072	Final Year Project I	2	CD	VFB4XX3	Core Specialisation II	3	CSp
VFB4042	Civil Engineering Design I	2	CD	VFB4082	Computational Method for Civil Engineers	2	CD	VFB4XX3	Core Specialisation III	3	CSp
VFB4052	Design of Earth Retaining Structure	2	CD	VFB4XX3	Core Specialisation I	3	CSp				
<b>Credit Hours</b>		<b>11</b>		<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>13</b>	

**Total Credit Hours : 144**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets of Core Specialisation areas (set A, B, C or D) for Core Specialisation I, II and III.

A. Offshore Engineering				
No	Code	Course Name	Cr	G
1	VFB4113	Fixed Offshore Structures	3	CSp
2	VFB4123	Wave Hydrodynamics	3	CSp
3	VFB4133	Offshore Project Management	3	CSp

B. Environmental Engineering				
No	Code	Course Name	Cr	G
1	VFB4213	Sludge Management and Disposal	3	CSp
2	VFB4223	Advanced Physical-Chemical Treatment Technologies	3	CSp
3	VFB4233	Air Pollution Prevention and Control	3	CSp

C. Sustainability				
No	Code	Course Name	Cr	G
1	VFB4413	Construction Materials and Sustainability	3	CSp
2	VFB4423	Low Carbon Building Design and Construction	3	CSp
3	VFB4433	Sustainable Transport Infrastructure Engineering	3	CSp

D. Renewable Energy				
No	Code	Course Name	Cr	G
1	MFB4123	Energy Management and Environment	3	CSp
2	MFB4513	Renewable Energy I	3	CSp
3	MFB4523	Renewable Energy II	3	CSp

## 4.1 Minor (EM) Courses

Engineering students who are interested to enhance their knowledge in computer and information systems or finance, accounting, and business will have the options to complete courses offered under a Minor. There are two (2) Minor packages available for Engineering students as below:

- i. Minor in Data Science
- ii. Minor in Accounting and Finance

In order to be eligible for Minor, students are required to pass and complete all the courses under the same package (15 credits). Results obtained from courses under Minor will be counted into GPA/CGPA calculation. Students are reminded that the option to complete Minor courses are at the students' discretion and are **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **144 credit hours**.

Minor in Data Science					
A No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

Minor in Accounting and Finance					
B No	Code	Course Name	Cr	G	Semester
1	GFB2013	Business Accounting	3	EM	Students can take these courses in any semester
2	GFB2153	Business Law	3	EM	
3	GFB2283	Business and Financial Technology	3	EM	
4	GFB2293	Management Accounting	3	EM	
5	GFB2303	Assurance	3	EM	
Total Credit Hours			15		

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**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

<b>COURSE CODE</b>	: VFB1012
<b>COURSE</b>	: Civil Engineering Drawing
<b>NO. OF CREDITS</b>	: 2 credits
<b>PRE-REQUISITE</b>	: None

This course introduces to engineering drawing basic principles in CAD such as objects, sketch, text and visualisation techniques, etc.; as the methods in developing 2D and 3D drawings. It also provides the ability to understand architectural, civil and structural drawings in a typical civil engineering project.

<b>COURSE CODE</b>	: VFB1023
<b>COURSE</b>	: Engineering Mechanics
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

Engineering Mechanics is the first mechanics course in the civil engineering programme. This course deals with rigid-body mechanics and consists of two parts: Statics that deals with the equilibrium of bodies that are either at rest or move with a constant velocity and dynamics that deals with bodies in motion.

<b>COURSE CODE</b>	: VFB1033
<b>COURSE</b>	: Mechanics of Solids
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: Engineering Mechanics

This course will cover the fundamental concepts of solid mechanics covering various structural elements such as beams, columns, shaft and thin-walled structures. The course deals with the various types of stress and strain due to axial loads, bending, torsion and combinations.

<b>COURSE CODE</b>	: VFB1043
<b>COURSE</b>	: Geomatics
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

This course will cover relevant geomatics topics applicable for civil engineering applications such as analysis of terrestrial base measurement for control in engineering survey, satellite-based positioning for offshore application and GIS for decision making.

<b>COURSE CODE</b>	: VFB1052
<b>COURSE</b>	: Civil Engineering Fluid Mechanics
<b>NO. OF CREDITS</b>	: 2 credits
<b>PRE-REQUISITE</b>	: Engineering Mechanics

This course covers fluid characteristics, hydrostatics, fluid motion (hydrodynamics) and pipe flow. Students will be introduced to basic principles and equations of fluid mechanics in the context of civil engineering. They should be able to analyse the physical processes that govern the behaviour of fluids at rest and in motion and to analyse the flow in pipes upon completion of this course. The students will also be introduced to the use of common CFD software to solve the problems associated with civil engineering.

**COURSE CODE** : VFB1063  
**COURSE** : Theory of Structures  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mechanics of Solids

This course covers the fundamental concepts of analysis of determinate structures including frames, cables & three-hinged arches. The course introduces the students to influence lines, deflections of 2D skeletal structures using various methods and buckling using Euler-Bernoulli beam theory.

**COURSE CODE** : VFB1072  
**COURSE** : Traffic Engineering  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

To introduce the fundamental of traffic engineering that includes Civil engineering & transportation system, principle of traffic flow & traffic engineering studies, capacity studies, road intersection analysis, transport planning and modelling, traffic impact assessment (TIA), traffic management system.

**COURSE CODE** : VFB2012  
**COURSE** : Sustainable Concrete Technology  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course focusses on the nature and performance as well as the physical and mechanical properties of concrete technology materials which include cement and aggregates. Ordinary cement concrete mix design is introduced to meet the construction industry needs, coupled by other cement replacement materials and technologies in enhancing service life performance of concrete.

**COURSE CODE** : VFB2023  
**COURSE** : Soil Mechanics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mechanics of Solids

Soil in engineering, formation of soil, description and classification, physical index properties of soil, soil in water, permeability, capillarity and seepage, stresses in soil, soil compaction, soil consolidation and shear strength.

**COURSE CODE** : VFB2033  
**COURSE** : Structural Analysis  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Theory of Structures

This course deals with structural analysis of indeterminate structures. Four methods are emphasised namely force method, slope displacement method, moment distribution method and stiffness method. Also included are two-hinged arch, plastic collapse analysis and introduction to principles of dynamics of structures.

**COURSE CODE** : VFB2043  
**COURSE** : Hydraulics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Civil Engineering Fluid Mechanics

This course emphasises the use of the fundamentals of open channel flows in the design of hydraulic structures such as weirs, culverts, concrete gravity dams, spillways and energy dissipation structures. Determination of water surface profiles and sediment transport of rivers using computer tools will also be incorporated in this course. Fundamentals on the physical modelling aspects will be introduced through the dimensional analysis.

**COURSE CODE** : VFB2052  
**COURSE** : Civil Engineering Laboratory I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Sustainable Concrete Technology, Soil Mechanics and Theory of Structure

To introduce laboratory experimental works and investigation in geotechnics, materials and structure. To develop the techniques of conducting measurements, data analysis and interpret results in written report, and to enhance the ability to participate effectively in a laboratory environment and be able to work as a part of a team.

**COURSE CODE** : VFB2063  
**COURSE** : Hydrology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Statistics and Application

This course introduces the fundamental concepts of hydrology within a watershed. It gives an overview of the fundamentals of hydrologic cycle through the usage of water budget, and other related equations. The course focuses on precipitation and streamflow, runoff and hydrograph, flood estimation and flood control, and flood routing. Theories of groundwater flow and sedimentation are also covered. Hydrologic modelling and application of software in hydrologic simulation are introduced.

**COURSE CODE** : VFB2073  
**COURSE** : Highway Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course covers introduction to the fundamental of highway engineering that includes highway materials & mix design, pavement design, geometric design, highway construction, highway maintenance and environmental impact of highway project.

**COURSE CODE** : VFB2082  
**COURSE** : Design of Steel Structures  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Structural Analysis

This course will cover the concept and design philosophy, the analysing techniques and design methods associated with the design of steel structures following a specific design code of practice. Introduction to design software is also included.

**COURSE CODE** : VFB2092  
**COURSE** : Civil Engineering Laboratory II  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Civil Engineering Fluid Mechanics, Hydraulics and Hydrology

To introduce laboratory experimental works and investigation in hydrology, hydraulics and fluid mechanics, to develop the techniques of conducting measurements, data analysis and interpret results in written report, and to enhance the ability to participate effectively in a laboratory environment and be able to work as a part of a team.

**COURSE CODE** : VFB2102  
**COURSE** : Water Supply Engineering  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course introduces the fundamentals of water treatment analysis, principles of water quality and water treatment processes. The course also covers the design of water treatment units for a water treatment plant and its water distribution network. Added content on water security and sustainable water treatment processes. At the end of the course, the students will be able to evaluate various water sources and design the suitable water treatment processes to meet the drinking water quality standards.

**COURSE CODE** : VFB3012  
**COURSE** : Civil Engineering Laboratory III  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Highway Engineering

To introduce laboratory experimental works and investigation in highway, environmental and wastewater engineering, to develop the techniques of conducting measurements, data analysis and interpret results in written report, and to enhance the ability to participate effectively in a laboratory environment and be able to work as a part of a team.

**COURSE CODE** : VFB3022  
**COURSE** : Design of Reinforced Concrete Structures I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Structural Analysis

This course introduces the principles and methods of limit state design for concrete structures. It provides an understanding of the basic theory and guide to design procedures according to the Eurocode 2. The design and detailing of beam, slab, short column and pad footing are covered. Introduction to design software is also included.

**COURSE CODE** : VFB3033  
**COURSE** : Wastewater Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers wastewater engineering topics which includes sources, characteristics, reaction kinetics of wastewater and design of sewerage reticulation network. The course also covers design of various processes of aerobic and anaerobic wastewater treatment for suspended and attached growth systems. Added content on sustainable wastewater treatment processes is included. At the end of the course the students should be able to evaluate various wastewater systems as well as design the appropriate wastewater treatment systems to meet required wastewater effluent discharge standards.

**COURSE CODE** : VFB3042  
**COURSE** : Design of Foundation  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Soil Mechanics

Foundation system is an important part of civil infrastructures. Good foundation design must be achieved in order to ensure optimum level of service of the infrastructures. In order to be able to design the foundation system, students will be provided with knowledge of basic geotechnical behaviour of soil relevant to foundation design, and current practice and methods of foundation design.

**COURSE CODE** : VFB4013  
**COURSE** : **Construction Project Management**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides insight about practice in managing construction projects. It analyses issues faced by construction industry and strategy to reengineer its current practice regarding work process flow and procurement system. The course covers the overview of the construction industry in Malaysia and the main players and provides the knowledge for managing the construction of engineering projects successfully. Added focus on digitalization/IoT and planning tool is provided in this course.

**COURSE CODE** : VFB4022  
**COURSE** : **Design of Reinforced Concrete Structures II**  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : **Structural Analysis**

This course will cover the fundamental concept of design of RC slender column, staircase, combined and pile cap foundations. The design and detailing of members are according to the Eurocode 2. Also, introduction to Pre-Stressed Concrete (principles and methods) are covered. Introduction to design software is also included.

**COURSE CODE** : VFB4032  
**COURSE** : **Building Information Modelling**  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course on Introduction Building Information Modelling (BIM) is designed to create knowledge on the principles, methods and applications in the building lifecycle with a focus on the design process; includes computer-aided design, parametric modelling, databases, web technologies, design performance simulation and visualisation.

**COURSE CODE** : VFB4082  
**COURSE** : **Computational Methods for Civil Engineers**  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

Civil engineering practice involves a lot with approximate solutions due to the complexity of the problems. The approximate solutions, on the other hand, are usually obtained by numerical methods thus making the knowledge as pertinent to all civil engineers. This course will draw examples from all the civil engineering disciplines.

**COURSE CODE** : VFB4052  
**COURSE** : **Design of Earth Retaining Structure**  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : **Design of Foundation**

This course will provide working knowledge to analyse and design earth retaining structures.

**COURSE CODE** : VFB4072  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

In the final year project, students will apply and put into practice all the skills and technical knowledge gained throughout the Civil & Engineering programme to design and implement a solution to a research or practical problem.

**COURSE CODE** : VFB4094  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project in connection with a special engineering problem and under the guidance of faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

**COURSE CODE** : VFB4042  
**COURSE** : Civil Engineering Design I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

This course addresses key issues related to the initial conceptual planning stage and development of capital project. Students will integrate all acquired academic knowledge from prior classes. Students will be prepared to enter the real-life design and implementation practice. Students will be exposed to standard contract terms, procurement standards and requirements, interpretation of concept design into actual design, preparation of traffic and environmental impact assessment. Client brief and architectural initial plan will be used to subject the capital project for economical design. Financial assessment and feasibility study will be introduced from quantity surveying activity. Project life cycle for a sustainable design, implementation, and operation will be also introduced. External experts from industry will be invited for assessment of students works.

**COURSE CODE** : VFB4063  
**COURSE** : Civil Engineering Design II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Civil Engineering Design I

This course requires students to undergo detailed analysis and design for the developed conceptual design, documentation of the design calculations and submission process requirements from local authorities. Students will have a full understanding on how a project is integrated together within the various branches of civil engineering and other engineering services such as mechanical engineering, electrical engineering, specialist engineering works and the role of architect. Adjunct lectures will be provided from practicing professionals in the field.

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Offshore Engineering

<b>COURSE CODE</b>	: VFB4113
<b>COURSE</b>	: Fixed Offshore Structures
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: Structural Analysis, Student Industrial Internship Programme

This course covers introduction to Jacket platforms, Gravity Based Structures (GBS) & Jack-up platforms, various steps in the structural design of offshore platform components, overall design of fixed platforms using software, solutions for industry requirements and preparation of working drawings at various stages of design.

<b>COURSE CODE</b>	: VFB4133
<b>COURSE</b>	: Offshore Project Management
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: Student Industrial Internship Programme

Project Management in offshore applications is an important area in which a successful offshore project is dependent on. This course provides integration of project management and engineering knowledge in oil and gas. The course deals with all aspects of project management in offshore environments. It combines theory and practice to develop and improve the project management skills where the work scope includes oil and gas projects.

<b>COURSE CODE</b>	: VFB4123
<b>COURSE</b>	: Wave Hydrodynamics
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: Student Industrial Internship Programme

Wave loading consists of the largest contribution to the loading of offshore structures. Therefore, a good understanding of wave hydrodynamics is essential for the design of any offshore structure. This course covers wave theories, wave mechanics, forces on marine structures, numerical and physical modelling.

### 5.2.2 Environmental Engineering

<b>COURSE CODE</b>	: VFB4213
<b>COURSE</b>	: Sludge Management and Disposal
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: Student Industrial Internship Programme

This course is designed to expose students to various processing and treatment of sludges. And disposal of sludge are major factors in design and operations of all wastewater treatment plants. In addition, biosolid processing, resource recovery and beneficial use of sludge is also covered in this subject. The knowledge of sludge management and disposal is crucial to understand the final stage of treatment in a wastewater treatment plant and to handle the sludge disposal in an appropriate manner.

<b>COURSE CODE</b>	: VFB4223
<b>COURSE</b>	: Advanced Physical-Chemical Treatment Technologies
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: Student Industrial Internship Programme

Overview of the physical and chemical process to treat industrial wastewater as well as sludge. The focused processes include chemical precipitation, coagulation-flocculation, filtration, adsorption, disinfection, ion exchange, membrane process, and chemical oxidation.

**COURSE CODE** : VFB4233  
**COURSE** : Air Pollution Prevention and Control  
**NO. OF CREDIT** : 3 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

This course will discuss the basic chemical processes occurring in each region of the atmosphere and the difference between primary and secondary air pollutants and determine the dominant effect of air and list effects on human health. Introduction of air pollution model based on their advantages and disadvantages will explain why a clear and correct understanding of atmospheric science is critical for formulating effective air quality policy.

### 5.2.3 Sustainability

**COURSE CODE** : VFB4413  
**COURSE** : Construction Materials and Sustainability  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

This course deals with the physical and mechanical properties of major construction materials and their impacts to sustainability. At the end of this course, the students will be able to effectively evaluate, select and apply the knowledge on the materials to improve the sustainability of construction practices.

**COURSE CODE** : VFB4423  
**COURSE** : Low Carbon Building Design and Construction  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

This course develops the competencies and skills for low carbon buildings design and construction to evaluate the performance of low carbon buildings and the integration of low carbon energy systems, with the specific aim of reducing design and construction business risk. This greater attention to low carbon has revealed that greenhouse gas (GHG) emissions associated with materials used in buildings design and construction.

**COURSE CODE** : VFB4433  
**COURSE** : Sustainable Transport Infrastructure Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

This course introduces the basic concepts of transport infrastructure and describe the methods of planning and evaluation of sustainable transport infrastructure. Methods to design travelways are also explained. Safety and intelligence aspects of transportation systems are also elaborated. At the end of this course, students will be able to plan and evaluate the design and construction of sustainable transport infrastructure with consideration for sustainability, safety and intelligence aspects through the adoption of information technology.

#### 5.2.4 Renewable Energy

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4th Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies– Energy conservation strategies, energy management system’s requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4513  
**COURSE** : Renewable Energy I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4th Year Standing

This course covers topics on wind power, simple theory of the wind turbine’s performance & present developments. Hydroelectric and pumped storage systems. Solar thermal power: Direct solar power. Design of low temperature solar heaters for domestic use. Performance characteristics. Description of solar systems for power generation.

**COURSE CODE** : MFB4523  
**COURSE** : Renewable Energy II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4th Year Standing

This course covers topics on the wave & tidal energy - physical principles of wave energy, various types of wave energy converters and the environmental impacts and economics; fuel cell - principles of fuel cell and hydrogen production; geothermal energy - the physics of geothermal resources, technologies for geothermal resource exploitation and the environmental implications. Biomass energy including introduction to biomass types and resources, biomass as a fuel, energy crops, environmental benefits and economics of biomass.

## **Programme Information**

**Bachelor of Computer Engineering  
with Honours**

## 1.0 Introduction

Computer Engineering (CoE) is an engineering discipline that is growing rapidly and in importance in the age of computing platform. Computer platforms are terms used to define the eras of computer and its applications. The computer era started in the 1950's with mainframe computers which were then replaced with servers in the 1980's. The current computing platform that we live in had started in the 2010's is defined as an interaction between mobile computing, social media, cloud computing, big data analytics and Internet-of-Things. In the current computing era, Computer Engineering contribution is not limited to areas with applications such as computer systems and telecommunication system, but it can also be extended into areas of applications such as in mobile computing, manufacturing, medicine, information technology and many more. Unlike other engineering disciplines, Computer Engineering is very dynamic and becoming more pervasive in the world.

Computer engineers are involved in the design, building, testing and development of high technology devices ranging from the most powerful supercomputers to the smallest, most energy efficient microprocessors and microcontrollers used in systems with applications in areas such as social media search engines, data farms, cloud computing systems, virtual reality systems, massively parallel online systems which are used in gaming systems and large data processing systems. In addition to the previously mentioned application areas, Computer engineers also contribute to the automation for electromechanical systems and electronic control systems applied in process plants, automotive industry, aerospace, and even maintenance through new technologies such as Internet-of-Things and robotics. In other words, Computer engineers are in high demand in various fields in the current and future workplace.

The Bachelor of Computer Engineering with Honours programme at Universiti Teknologi PETRONAS (UTP) emphasises on a strong foundation in physics, mathematics, and programming skills, followed by a thorough coverage of basic electrical and electronic engineering courses such as electrical technology, analogue electronic, digital electronic, microprocessor, and computer architectures. At higher levels, students are exposed to data and computer networking, operating systems, embedded systems, big data analytics and parallel and distributed computing. In the final year, students have the opportunity to major in one of these selected areas of their interest:

- **Intelligent Vision System**
- **Next Generation Communication System**
- **Intelligent Robotics**
- **Renewable Energy**

## 1.1 Programme Educational Objectives

- Engineers who are competent with the potential to become leaders in Computer Engineering and related industries.
- Engineers who are involved towards sustainable development in Computer Engineering and related industries for betterment of the society.

## 1.2 Programme Outcomes

To produce graduates with the following outcomes:

- Apply knowledge of mathematics, natural science, engineering fundamentals and engineering specialisation to the solution of complex engineering problems.
- Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 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.

- iv. Conduct investigation of complex engineering 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.
- v. Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to evaluate complex engineering problems, with an understanding of the limitations.
- vi. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
- vii. Evaluate sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.
- viii. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- ix. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- x. Communicate effectively on complex engineering activities with the engineering community and society.
- xi. Demonstrate knowledge and understanding of engineering management principles, economic decision making and entrepreneurial skills to manage projects in multidisciplinary environments.
- xii. 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.

### 1.3 Graduation Requirements

To graduate with the Bachelor of Computer Engineering with Honours, students are required to obtain a minimum of **144 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group(G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Core Common	21
CD - Core Discipline	75
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
<b>TOTAL</b>	<b>144</b>

## 2.0 Programme Curriculum Structure: Bachelor of Computer Engineering with Honours

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika dan Peradaban (Local)	2	NR	MPU3192	Falsafah dan Isu Semasa (Local and International)	2	NR	MPU2	One (1) MPU2 Course	2	NR
MPU3142	BM Komunikasi 2 (International)										
PFB1012	Introduction to Oil & Gas Industry & Sustainable Development	2	UR	CFB1032	Health, Safety & Environment	2	CC	LFB1042	Academic Writing	2	UR
HFB2152	Ethics & Integrity	2	UR	FFM1023	Engineering Mathematics II	3	CC	HFB1023	Scientific Inquiry	2	UR
FFM1013	Engineering Mathematics I	3	CC	TFB1033	Object Oriented Programming	3	CD	TFB1103	Software Engineering	3	CD
EFB1023	Structured Programming and Interfacing	3	CD	EFB1054	Digital Electronic	4	CD	TFB1113	Discrete Mathematics	3	CD
EFB1013	Circuit Theory	3	CD					KXXXXX1	Co Curriculum I	1	UR
<b>Credit Hours</b>		<b>15</b>		<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>13</b>	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	FFM2063	Data Analytics	3	CC	MPU 4/ HFB1012	Community Engagement Project	2	NR
HFB2033	Professional Communication Skills	3	UR	MFB2061	Engineering Team Project I	1	CC	KXXXXX1	Co Curriculum II	1	UR
EFB1043	Signals and Systems	3	CD	RBB2042	Linear Algebra and Matrix Method	2	CD	RBB3013	Instrumentation and Control	3	CD
TFB2023	Algorithm and Data Structure	3	CD	GFB2102	Entrepreneurship	2	UR	MFB2062	Engineering Team Project II	2	CC
TFB2013	Operating Systems	3	CD	EFB2043	Communication Systems	3	CD	EFB2073	Microprocessor and Computer Architecture	3	CD
								RBB2013	Digital Twin	3	CD
<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>11</b>		<b>Credit Hours</b>		<b>14</b>	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
RBB3023	Embedded and IOT Systems	3	CD	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
EFB4133	Digital System Design	3	CD								
EFB3043	Data & Computer Network	3	CD								
RBB3033	Cloud System Technologies	3	CD								
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>7</b>		<b>Credit Hours</b>		<b>7</b>	
SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
VEB3102	Project Management	2	CC	GFB3022	Engineering Economics	2	CC	EFB4073	Engineers in Society	3	CC
EFB4033	Probability and Random Process	3	CD	EFB4063	Artificial Intelligence & Applications	3	CD	RBB4044	Final Year Project II	4	CD
RBB4013	System Integrated Design Project	3	CD	RBB4032	Final Year Project I	2	CD	RBB4603	Distributed and Parallel Processing	3	CD
RBB4XX3	Core Specialisation I	3	CSp	RBB4XX3	Core Specialisation II	3	CSp	RBB4XX3	Core Specialisation III	3	CSp
TEB2093	Computer Security	3	CD								
<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>10</b>		<b>Credit Hours</b>		<b>13</b>	
<b>Total Credit Hours : 144</b>											

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets (set A, B, C or D) of Core Specialisations areas for Core Specialisation I, II and III.

A. Intelligent Vision System				
No	Code	Course Name	Cr	G
1	RBB4613	Intelligent Systems	3	CSp
2	RBB4623	Image Processing and Machine Vision	3	CSp
3	RBB4633	Next Generation Cybersecurity	3	CSp

B. Next Generation Communication System				
No	Code	Course Name	Cr	G
1	RBB4713	Next Generation Communications and Networks	3	CSp
2	RBB4723	Wireless Sensor Networks	3	CSp
3	RBB4733	Digital Communications	3	CSp

C. Intelligent Robotics				
No	Code	Course Name	Cr	G
1	RBB4813	Robotics and Automation	3	CSp
2	RBB4823	Autonomous Robot Systems	3	CSp
3	RBB4623	Image Processing and Machine Vision	3	CSp

D. Renewable Energy				
No	Code	Course Name	Cr	G
1	MFB4123	Energy Management and Environment	3	CSp
2	MFB4513	Renewable Energy I	3	CSp
3	MFB4523	Renewable Energy II	3	CSp

## 4.0 Minor (EM) Courses

Minor in Management is made available to all students who are interested to enhance their knowledge in management and business. However, the option to do the Minor in Management is at the students' discretion and is **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **128 credit hours**.

Minor in Management					
No	Code	Course Name	Cr	G	Semester
1	GDB1033	Management & Organisational Behaviour	3	EM	Students can take these courses in any semester
2	GDB2013	Business Accounting	3	EM	
3	GDB2053	Principles of Finance	3	EM	
4	GDB2043	Principles of Marketing	3	EM	
5	GDB3013	Small Business and Entrepreneurship	3	EM	
Total Credit Hours			15		

Students have to complete and pass all of listed courses to get Minor in Management. All results will be counted in the GPA/CGPA calculation.

### Note:

<b>Code A</b>	:	Please refer to Materials Engineering Programme for Course Synopsis.
<b>Code C</b>	:	Please refer to Chemical Engineering Programme for Course Synopsis.
<b>Code E</b>	:	Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.
<b>Code F, Y, Z</b>	:	Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis
<b>Code K</b>	:	Please refer to Credited Co-Curriculum Programme for Course Synopsis.
<b>Code M</b>	:	Please refer to Mechanical Engineering Programme for Course Synopsis.
<b>Code P</b>	:	Please refer to Petroleum Engineering Programme for Course Synopsis.
<b>Code Q</b>	:	Please refer to Petroleum Geoscience Programme for Course Synopsis.
<b>Code T</b>	:	Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.
<b>Code V</b>	:	Please refer to Civil Engineering Programme for Course Synopsis.
<b>Code L, G, H, MPU</b>	:	Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.

## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : EFB1023  
**COURSE** : Structured Programming and Interfacing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This programming course is designed to allow electrical and electronic students to design and develop computer programmes to solve electronic systems problems. The course will adopt a lecture/hands-on approach. Using this approach, students will explore a structured programming language. Students will be required to design and develop computer programmes to control external devices via the PC.

**COURSE CODE** : EFB1013  
**COURSE** : Circuit Theory  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the fundamental concepts related to the principles of electrical engineering, the quantities, units, symbols, definitions in the field of electrical engineering, the passive components RLC, the techniques of analysing electrical circuits, the concepts of power, the two and three phases' circuits. In addition, the course will also cover fundamental operation of operational amplifiers and their application.

**COURSE CODE** : TFB1033  
**COURSE** : Object Oriented Programming  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Structured Programming and Interfacing

This course introduces fundamental concepts of object-oriented programming such as encapsulation, inheritance, and polymorphism. Students will apply the concepts to build software system that are highly reusable and extensible.

**COURSE CODE** : EFB1054  
**COURSE** : Digital Electronic  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This course covers topic related to the principles and techniques of designing of digital logic circuit. It introduces the binary number system, Boolean algebra, digital circuits for performing digital arithmetic operations. On more advanced topics, it covers the design of sequential circuits which includes state assignment, state minimization, and detection and elimination of hazards that exist in digital circuits.

**COURSE CODE** : TFB1103  
**COURSE** : Software Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Software Engineering addresses the theory and methodology of programming of enormous and heterogeneous computer software. The course covers project planning and management, requirements identification, analysis, and management, development tools and methods, UML, software architecture and design, detailed design, implementation, and testing. Special emphasis is given to planning and estimating and to quality development practices such as product inspections and testing and an in-depth understanding of why computers are essential components in the business world and society in general. The courses will also focus on the computer as a valuable productivity tool and recognition of the personal computer's position as the backbone of the computer industry. The course would also highlight on the importance of computers utility as a standalone and/or within networked devices

**COURSE CODE** : EFB1043  
**COURSE** : Signals and Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Circuit Theory

This course covers topics related to theoretical mathematical foundation of signals and systems. The focuses are on mathematics and practical issues of signals in continuous and discrete time, linear time-invariant systems, convolution, Fourier transforms and Laplace transforms. MATLAB is used as a learning tool.

**COURSE CODE** : TFB2023  
**COURSE** : Algorithm and Data Structure  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course examines various data structures for storing and accessing data, and algorithms for efficiently finding solutions to problems involving the data. It emphasises the ability to solve a programming problem by first designing appropriate data structures and deriving provably effective and efficient algorithms. Students learn to theoretically analyse algorithms and to empirically measure their implementations.

**COURSE CODE** : TFB2013  
**COURSE** : Operating Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This module is intended to provide students with a sound understanding of the concepts relating to the design and implementation of the computer operating systems.

**COURSE CODE** : RBB2042  
**COURSE** : Linear Algebra and Matrix Methods  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers System of Linear Equations, Vector Spaces, Matrix, Determinants, Matrix Bases, Eigenvalues and Eigenvectors, System of Differential Equations, Orthogonality Projections, Matrix Decomposition and programming using software tools.

**COURSE CODE** : EFB2043  
**COURSE** : Communication Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Signal and Systems

This course serves as an introduction to familiarize students with fast expanding market of communication systems. Emphasis is given to digital modulation schemes comprising a multiplexer/transmitter, a communication channel and its associated noise, interference and distortion effects, and a demultiplexer/receiver.

**COURSE CODE** : TFB1113  
**COURSE** : Discrete Mathematics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the fundamental concepts of Discrete Mathematics such as sets, functions, counting principles, logic, proof techniques, mathematical induction, graphs, directed graphs, trees, relations and Boolean algebra. Students will be exposed to problem-solving skills by applying the theoretical concepts of Discrete Mathematics.

**COURSE CODE** : EFB2073  
**COURSE** : Microprocessor and Computer Architecture  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Digital Electronic

This course covers topics related to microprocessor technology which include the principle architecture of a microprocessor/microcontroller, the instruction set architecture and machine codes, the system hardware design, and the programming tasks.

**COURSE CODE** : RBB2013  
**COURSE** : Digital Twin  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will introduce two key areas which is matrix computing and physics-based numerical models which are important to develop digital twin models. Students will learn about random variables, apply concepts of linear algebra which covers vector spaces and matrix methods in computing solutions to finite element and finite difference models with practical examples applied to physics-based systems. Students will also learn how to use R or Python for numerical modelling of digital twin models.

**COURSE CODE** : RBB3023  
**COURSE** : Embedded and IOT Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Microprocessor and Computer Architecture

This course explores practical application of microcontrollers and design of embedded systems for advanced applications. It also covers concept real-time operating systems and their practical applications.

**COURSE CODE** : EFB4133  
**COURSE** : Digital System Design  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Microprocessor and Computer Architecture

This course covers design, validation, and testing techniques for digital. Students will learn how to design both individual building blocks as well as assemble digital systems from combinations of these blocks and analyse digital systems.

**COURSE CODE** : EFB3043  
**COURSE** : Data and Computer Network  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Communication Systems

This course introduces and explains the protocols, services and standards used in multimedia networks, which is actually the integration of voice/data communications, and computer networks. It covers topics on data communications principles and techniques such as data communications model, physical layer interfaces, and data link protocols for error detection and correction. It also covers topics on networking such as concept of layered TCP/IP and OSI protocols, local area networks (Ethernet, token ring, etc) and wide area networks.

**COURSE CODE** : RBB3013  
**COURSE** : Instrumentation and Control  
**NO. OF CREDITS** : 3  
**PRE-REQUISITE** : Circuit Theory

This course is designed to equip computer engineers with the fundamental of instrumentation and measurement systems and introduces the concept of digital control system. Knowledge and familiarity in sensors, signal conditioning and processing and the associated feedback control for which the implementation is performed using digital computers are the important elements of this course.

**COURSE CODE** : EFB4033  
**COURSE** : Probability and Random Processes  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the students to the concept and statistical properties of random variables – both discrete and continuous - for several types of distributions. Students will then analyse the significance of correlation and covariance between two random variables. The course also considers properties and problem solutions of stationary and random processes.

**COURSE CODE** : RBB4013  
**COURSE** : System Integrated Design Project  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The System Integrated Design Project (SIDP) integrates current and previous knowledge and skills in engineering, project management, and business disciplines. The course emphasises practical, hands-on experience, and integrates analytical and design skills. Students will develop skills in problem solving, creative thinking, project planning, and teamwork. Significant experience in developing, designing, prototyping, proving, and verifying their design will also be attained by the students. Engineering communication, such as reports, and oral presentations are also covered.

In SIDP, students work in teams under the direction and guidance of a faculty advisor to tackle a challengingly complex prototype-based project.

**COURSE CODE** : EFB4063  
**COURSE** : Artificial Intelligence and Applications  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The students will be introduced with the basic concepts of the topics. The students will be guided to program the algorithms and apply on case studies.

**COURSE CODE** : RBB4032  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

In the final year project, students will apply and put into practice all the skills and technical knowledge gained throughout the Electrical and Electronic Engineering program to design and implement a solution to a research or practical problem.

**COURSE CODE** : RBB4044  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. For both FYP I and II, each student prepares a comprehensive engineering report, present and demonstrate findings and results of the project work.

**COURSE CODE** : RBB3033  
**COURSE** : Cloud System Technologies  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This is a course that exposes students to the setup, configuration and administration of the fundamental networking system that enable students to create a network and subnetwork for large data storage and data access. In addition to development of networks, students will also be introduced to scaling up, optimizing, and measuring the operations of cloud storage systems. This will be supplemented with tools and methodologies for visually extracting and analysing the performance of these cloud systems.

**COURSE CODE** : RBB4603  
**COURSE** : Distributed and Parallel Processing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Microprocessor and Computer Architecture

In this course, students will learn how to analyse a programming task and design parallel programs to execute this task. The course will cover the different models of data access in parallel and distributed computing systems. Students will study the common computation patterns in large datasets, strategies for parallelizing these computations and software design patterns commonly used to engineer parallel programs. Students will also learn how to use measurement and debugging tools for parallel programs.

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Intelligent Vision System

**COURSE CODE** : RBB4613  
**COURSE** : Intelligent Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course provides a coverage of the principles and techniques in deep neural network artificial intelligence. Students will learn the principles of deep neural network artificial intelligence and build deep neural network applications. Students will also learn to describe model performance and datasets in a complete manner and be able to assess energy and memory resource requirements. Finally, students will consider security and privacy issues surrounding deep neural networks.

**COURSE CODE** : RBB4623  
**COURSE** : Image Processing and Machine Vision  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course deals with theory, principles and techniques of image processing and computer vision, which includes pre-processing images to improve image quality, image filtering and restoration, image feature descriptors, image analysis and transforms. The practical aspects of the course would cover the problem solving and application of algorithms to practical problems.

**COURSE CODE** : RBB4633  
**COURSE** : Next Generation Cybersecurity  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers advance topics related to computing security and current trends in relation to computing security. This course is an extension of computing security which provide fundamental knowledge on network security. The course will cover advanced topics in computer networks such as vulnerabilities in different types of networks, detection methods, and “state-of-the-art” techniques to prevent them. The course would also cover computer traffic analysis and network devices/tools used in security technology. Finally, the course would also cover next generation topics in the field of cybersecurity, including advances cryptography, networking, cyber defence etc.

### 5.2.2 Next Generation Communication System

**COURSE CODE** : RBB4713  
**COURSE** : Next Generation Communications and Networks  
**NO. OF CREDIT** : 3 credits  
**PRE-REQUISITE** : None

This course provides an introductory concept of Wireless Communication and Networks. While focus is to give a broad overview of emerging topics of Wireless Communication and Networks, it also provides some theme examples that enhance students' knowledge in the areas of the Next Generation Communication Systems.

**COURSE CODE** : RBB4723  
**COURSE** : Wireless Sensor Networks  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Recent advances in wireless communications and electronic have enabled the development of low-cost, low power, multifunctional sensor nodes that are small in size and these nodes communicate untethered in short distances. There are tiny sensor nodes, which consist of sensing, data processing, and communication components, leverage the idea of sensor networks. The sensor networks can be used for various application areas, example in health, military, home etc.

**COURSE CODE** : RBB4733  
**COURSE** : Digital Communications  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is a formal introduction to the main concepts of digital communication. Topics covered include; baseband pulse transmission, passband digital transmission, signal-space representation and information theory such as channel coding, source coding and capacity. Applications are drawn from the access network parts of the telephone networks.

### 5.2.3 Intelligent Robotics

**COURSE CODE** : RBB4813  
**COURSE** : Robotics and Automation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will give an introduction to the world and knowledge of robotics which covers the areas of robot dynamics, PLC, sensors and actuators that will be used for automation of systems.

**COURSE CODE** : RBB4823  
**COURSE** : Autonomous Robot Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will introduce the utilisation and implementation of autonomous movement and navigation of robots which could be autonomous ground or aerial robots.

**COURSE CODE** : RBB4623  
**COURSE** : Image Processing and Machine Vision  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course deals with the theory, principles and techniques of image processing and computer vision, which includes pre-processing images to improve image quality, image filtering and restoration, image feature descriptors, image analysis and transforms. The practical aspects of the course would cover the problem solving and application of algorithms to practical problems.

### 5.2.4 Renewable Energy

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies – Energy conservation strategies, energy management system requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4513  
**COURSE** : Renewable Energy I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on wind power, simple theory of the wind turbine's performance & present Developments, Hydroelectric and pumped storage systems, Solar thermal power: Direct solar power, Design of low temperature solar heaters for domestic use, Performance characteristics and Description of solar systems for power generation.

**COURSE CODE** : MFB4523  
**COURSE** : Renewable Energy II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the wave & tidal energy - physical principles of wave energy, various types of wave energy converters and the environmental impacts and economics; fuel cell - principles of fuel cell and hydrogen production; geothermal energy - the physics of geothermal resources, technologies for geothermal resource exploitation and the environmental implications. Biomass energy including introduction to biomass types and resources, biomass as a fuel, energy crops, environmental benefits and economics of biomass.

# **Programme Information**

**Bachelor of Electrical and  
Electronics Engineering  
with Honours**

## Bachelor of Electrical Engineering with Honours

### 1.0 Introduction

Electrical & Electronic Engineering (EE) has always been one of the important engineering disciplines within the engineering society. EE contributions are not limited to areas such as telecommunications, computer systems, and power engineering but are also extended into areas of applications such as manufacturing, information technology, and many more. Unlike other engineering disciplines, EE is very dynamic and sensitive to technological advancement in the world. In fact, most technological revolutions start from Electrical and Electronic Engineering.

Electrical & Electronic engineers are involved in the design and development of modern high-technology applications, such as automation for electromechanical systems, computer systems, embedded systems, or electronic control systems applied in process plants, renewable energy, automotive industry, aerospace, and even maintenance. In other words, Electrical & Electronic engineers are in high demand in various fields. Graduates in this EE are highly sought after by potential employers.

The Bachelor of Electrical and Electronic Engineering with Honours programme at UTP emphasises a strong foundation in physics, mathematics, and chemistry, followed by a thorough coverage of basic electrical and electronic engineering courses such as circuit theory, analogue electronic, digital electronic, microprocessor, and signals & systems. At higher levels, students are exposed to data and computer networking, digital signal processing, electrical machines, power systems, control systems, communication systems, instrumentation, and power electronic. In the final year, students have the opportunity to major in one of these areas of interest:

- **Computer and Communication**
- **Instrumentation and Control**
- **Power Systems Engineering**
- **Electronic & Devices**
- **Renewable Energy**

### 1.1 Programme Educational Objectives

- i. Engineers who are competent with the potential to become leaders in Electrical and Electronic Engineering and related industries.
- ii. Engineers who are involved towards sustainable development in Electrical and Electronic Engineering and related industries for the betterment of society.

### 1.2 Programme Outcomes

To produce graduates with the following outcomes:

- i. Apply knowledge of mathematics, natural science, engineering fundamentals and engineering specialisation to the solution of complex engineering problems.
- ii. Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- iii. 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.
- iv. Conduct investigation of complex engineering 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.
- v. Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to evaluate complex engineering problems, with an understanding of the limitations.

- vi. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
- vii. Evaluate sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.
- viii. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- ix. Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
- x. Communicate effectively on complex engineering activities with the engineering community and society.
- xi. Demonstrate knowledge and understanding of engineering management principles, economic decision making and entrepreneurial skills to manage projects in multidisciplinary environments.
- xii. 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.

### 1.3 Graduation Requirements

To graduate with the Bachelor of Electrical and Electronic Engineering with Honours, students are required to obtain a minimum of **144 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Core Common	21
CD - Core Discipline	75
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
<b>TOTAL</b>	<b>144</b>

## 2.0 Programme Curriculum Structure: Bachelor of Electrical & Electronic Engineering with Honours

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika dan Peradaban (Local)	2	NR	MPU3192	Falsafah dan Isu Semasa (Local & International)	2	NR	MPU2	One (1) MPU2 Course	2	NR
MPU3142	BM Komunikasi 2 (International)										
PFB1012	Introduction to Oil & Gas Industry & Sustainable Development	2	UR	CFB1032	Health, Safety & Environment	2	CC	LFB1042	Academic Writing	2	UR
HFB2152	Ethics & Integrity	2	UR	FFM1023	Engineering Mathematics II	3	CC	HFB1023	Scientific Inquiry	2	UR
FFM1013	Engineering Mathematics I	3	CC	EFB1031	Electrical Circuit Analysis Lab	1	CD	KXXXXX1	Co Curriculum I	1	UR
EFB1023	Structured Programming and Interfacing	3	CD	EFB1043	Signals & Systems	3	CD	EFB1063	Network Analysis	3	CD
EFB1013	Circuit Theory	3	CD	EFB1054	Digital Electronic	4	CD	EFB1074	Microelectronic Physics & Devices	4	CD
<b>Credit Hours</b>		<b>15</b>		<b>Credit Hours</b>		<b>15</b>		<b>Credit Hours</b>		<b>14</b>	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	MFB2061	Engineering Team Project I	1	CC	MPU4/ HFB1012	Community Engagement Project	2	NR
HFB2033	Professional Communication Skills	3	UR	FMM2063	Data Analytics	3	CC	KXXXXX1	Co Curriculum II	1	UR
GFB2102	Entrepreneurship	2	UR	EFB2031	Mixed Signal System Lab	1	CD	MFB2102	Engineering Team Project II	2	CC
EFB2013	Analogue Electronic	3	CD	EFB2043	Communication Systems	3	CD	EFB2063	Instrumentation and Measurement	3	CD
EFB2023	Electromagnetic Theory	3	CD	EFB2053	Microelectronic Circuits	3	CD	EFB2073	Microprocessor & Computer Architecture	3	CD
								EFB2083	Electrical Machines	3	CD
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>11</b>		<b>Credit Hours</b>		<b>14</b>	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
EFB3013	Power Systems	3	CD	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
EFB3023	Control Systems	3	CD								
EFB3033	Power Electronic	3	CD								
EFB3043	Data and Computer Network	3	CD								
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>7</b>		<b>Credit Hours</b>		<b>7</b>	

SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
VFB3102	Project Management	2	CC	GFB3022	Engineering Economics	2	CC	EFB4073	Engineers in Society	3	CC
EFB4012	Integrated System Design Project I	2	CD	EFB4042	Final Year Project 1	2	CD	EFB4084	Final Year Project II	4	CD
EFB4023	Digital Signal Processing	3	CD	EFB4053	Integrated System Design Project II	3	CD	EFB4XX3	Core Specialisation III	3	CSp
EFB4033	Probability and Random Processes	3	CD	EFB4063	Artificial Intelligence & Applications	3	CD				
EFB4XX3	Core Specialisation I	3	CD	EFB4XX3	Core Specialisation II	3	CSp				
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>10</b>	

**Total Credit Hours : 144**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets of Core Specialisations areas (set A, B, C, D or E) for Core Specialisation I, II and III.

A. Computer and Communication				
No	Code	Course Name	Cr	G
1	EFB4113	Advanced Communication Systems	3	CSp
2	EFB4123	Real-Time Microcontroller Systems	3	CSp
3	EFB4133	Digital System Design	3	CSp

B. Instrumentation and Control				
No	Code	Course Name	Cr	G
1	EFB4213	Modern Control Engineering	3	CSp
2	EFB4223	Industrial Automation Systems	3	CSp
3	EFB4233	Plant Process Control Systems	3	CSp

C. Power Systems Engineering				
No	Code	Course Name	Cr	G
1	EFB4313	Design & Analysis of Electrical Machines	3	CSp
2	EFB4323	Power Electronic & Electrical Drives	3	CSp
3	EFB4333	Power System Analysis & Protection	3	CSp

D. Electronic & Devices				
No	Code	Course Name	Cr	G
1	EFB4413	Analogue Integrated Circuit Design	3	CSp
2	EFB4423	Sensors & Transducers Design	3	CSp
3	EFB4433	System On-Chip Design	3	CSp

E. Renewable Energy				
No	Code	Course Name	Cr	G
1	MFB4123	Energy Management and Environment	3	CSp
2	MFB4513	Renewable Energy I	3	CSp
3	MFB4523	Renewable Energy II	3	CSp

#### 4.1 Minor (EM) Courses

Engineering students who are interested to enhance their knowledge in computer and information systems or finance, accounting, and business will have the options to complete courses offered under a Minor. There are two (2) Minor packages available for Engineering students as below:

- i. Minor in Data Science
- ii. Minor in Accounting and Finance

To be eligible for a Minor, students are required to pass and complete all the courses under the package (15 credits). Results obtained from courses under Minor will be counted in the GPA/CGPA calculation. Students are reminded that the option to complete Minor courses is at the student's discretion and is **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **144 credit hours**.

Minor in Data Science					
A No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

Minor in Accounting and Finance					
B No	Code	Course Name	Cr	G	Semester
1	GFB2013	Business Accounting	3	EM	Students can take these courses in any semester
2	GFB2153	Business Law	3	EM	
3	GFB2283	Business and Financial Technology	3	EM	
4	GFB2293	Management Accounting	3	EM	
5	GFB2303	Assurance	3	EM	
Total Credit Hours			15		

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**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to the Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme, and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems, and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : EFB1013  
**COURSE** : Circuit Theory  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the fundamental concepts related to the principles of electrical engineering, the quantities, units, symbols, and definitions in the field of electrical engineering, the passive components RLC, the techniques of analysing electrical circuits, the concepts of power, and the two- and three-phase circuits. In addition, the course will also cover the fundamental operation of operational amplifiers and their application.

**COURSE CODE** : EFB1023  
**COURSE** : Structured Programming and Interfacing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This programming course is designed to allow electrical and electronic students to design and develop computer programmes to solve electronic systems problems. The course will adopt a lecture/hands-on approach. Using this approach, students will explore a structured programming language. Students will be required to design and develop computer programmes to control external devices via the PC.

**COURSE CODE** : EFB1031  
**COURSE** : Electrical Circuit Analysis Lab  
**NO. OF CREDITS** : 1 credit  
**PRE-REQUISITE** : Circuit Theory

This course covers the electrical engineering laboratory experiments on topics selected from the prerequisite courses - Circuit Theory. Attention is given to how to use electrical and electronic measurement meters and simulation software. Students will be exposed to the usage of electrical and electronic measurement appliances. They will be required to construct electronic circuits mainly on a breadboard. They will also learn the design process of Printed Circuit Boards (PCB) and assemble the circuit on the PCB.

**COURSE CODE** : EFB1043  
**COURSE** : Signals and Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Circuit Theory

This course covers topics related to the theoretical mathematical foundation of signals and systems. The focus is on mathematics and practical issues of signals in continuous and discrete time, linear time-invariant systems, convolution, Fourier transforms and Laplace transforms. MATLAB is used as a learning tool.

**COURSE CODE** : EFB1054  
**COURSE** : Digital Electronic  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This course covers topics related to the principles and techniques of designing digital logic circuits. It introduces the binary number system, Boolean algebra, and digital circuits for performing digital arithmetic operations. On more advanced topics, it covers the design of sequential circuits which includes state assignment, state minimization, and detection and elimination of hazards that exist in digital circuits.

**COURSE CODE** : EFB1063  
**COURSE** : Network Analysis  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Signal and System

This course covers topics on principles of electrical circuit analysis with emphasis on linear circuit analysis using Laplace Transform and Fourier Series/Transforms.

**COURSE CODE** : EFB2013  
**COURSE** : Analogue Electronic  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Microelectronic Physics & Devices

This course is an introductory course in analogue design. With basic knowledge from the Microelectronic Physics and Devices course, students are expected to learn fundamental circuit design and analytical techniques using DC and small signal models. This course covers topics related to the theory, design, and analysis of electronic circuits consisting of R, L, and C, diodes, transistors, and their applications.

**COURSE CODE** : EFB2023  
**COURSE** : Electromagnetic Theory  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Engineering Mathematics 1

At the end of the course, students should be able to appreciate the basic concepts of the EM field in free space and material media and apply the basic laws and techniques used in calculating the EM field. Maxwell's equations are used to analyse the propagation of EM plane waves. Students are also expected to be able to explain and analyse transmission lines response and make use of Smith charts to determine load impedance, admittance, VSWR, and other parameter associated with transmission lines analysis and finally do the impedance matching using lumped elements and transmission lines such as shorted and opened circuit stubs.

**COURSE CODE** : EFB2031  
**COURSE** : Mixed Signal System Lab  
**NO. OF CREDITS** : 1 credit  
**PRE-REQUISITE** : Analogue Electronic

The course focuses on the basics of MOS analogue integrated circuits design such as circuit analysis (small signal circuit analysis, frequency compensation, etc.), building blocks (current mirrors, amplifiers, feedback, oscillators, IC power amplifiers, voltage regulators, etc.)

**COURSE CODE** : EFB2043  
**COURSE** : Communication System  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Signal and System

This course serves as an introduction to familiarize students with the fast-expanding market of communication systems. Emphasis is given to digital modulation schemes comprising a multiplexer/transmitter, a communication channel and its associated noise, interference and distortion effects, and a demultiplexer/receiver.

**COURSE CODE** : EFB1074  
**COURSE** : Microelectronic Physics & Devices  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This course covers topics related to the physics and devices of microelectronic. It begins with solid-state physics concepts such as energy-band theory, carrier concentration, drift, and diffusion. This is followed by the introduction of fundamental devices namely PN junction diode, BJT and MOSFET.

**COURSE CODE** : EFB2053  
**COURSE** : **Microelectronic Circuits**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : **Analogue Electronic**

This course covers topics related to the theory and techniques in analysing and designing of sub-system analogue electronic circuits, in relation to the gain, frequency response, cascade, multi-stage, feedback and stability. It also includes the design of oscillators, IC power amplifiers and voltage regulators.

**COURSE CODE** : EFB2063  
**COURSE** : **Instrumentation and Measurement**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : **Circuit Theory**

This course introduces the fundamental concepts of measurement and instrumentation systems, errors and uncertainty, and system accuracy. The course will cover the important elements in measurement systems, sensors, signal conditioning and processing, through to display. A range of physical sensors and transducers will be introduced, and the accompanying signal conditioning circuitry will be discussed, followed by examples of practical measurement applications.

**COURSE CODE** : EFB2073  
**COURSE** : **Microprocessor and Computer Architecture**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : **Digital Electronic**

This course covers topics related to microprocessor technology which include the principle architecture of a microprocessor/microcontroller, the instruction set architecture and machine codes, the system hardware design, and the programming tasks.

**COURSE CODE** : EFB2083  
**COURSE** : **Electrical Machines**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : **Network Analysis**

This course covers topics related to the theory and basic principles of power systems and electrical machines. It covers the mechanical and electrical principles common to all types of machinery. Focus will be given to DC machines, induction motors and synchronous generators as they are widely used in the industry. Lab sessions are conducted for hands-on experience with electrical machinery and to expose students to the safety aspects of machines.

**COURSE CODE** : EFB3013  
**COURSE** : **Power Systems**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : **Electrical Machines**

This course covers topics related to the theory and basic principles of power systems. It covers the three-phase system, per unit representation, power system element and configurations, transmission system representation and performance, high voltage, load flow studies and fault studies. Focus is given to the distribution and utilisation of electrical power. Lab sessions are conducted to provide hands-on exercises on power systems.

**COURSE CODE** : EFB3023  
**COURSE** : **Control Systems**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : **Network Analysis**

This course covers topics related to the analysis and design of control systems involving different areas of applications including aircraft and spacecraft, robotics, and process control systems.

**COURSE CODE** : EFB3033  
**COURSE** : Power Electronic  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Analogue Electronic

This course covers topics related to power electronic devices and their applications in power control and electrical machines control, and the circuit topologies and the techniques involves in analysing the circuits.

**COURSE CODE** : EFB4012  
**COURSE** : Integrated System Design Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The Integrated System Design Project (capstone course) consists of two one-semester courses, namely Integrated Systems Design Project I (ISDP I) in Semester 7 and Integrated Systems Design Project II (ISDP II) in Semester 8.

**COURSE CODE** : EFB4023  
**COURSE** : Digital Signal Processing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Signal and Systems

This course covers topics related to discrete-time systems analysis and their design. Both the theoretical and practical aspects of digital signal processing will be covered, and students will be able to implement digital signal processing systems. Students will be introduced to fundamental digital signal processing concepts and tools such as time and frequency domain representation of discrete-time signals and systems, A-to-D and D-to-A conversions, and z-transforms. These are then applied to the most common application of DSP i.e., designing digital filters.

**COURSE CODE** : EFB4033  
**COURSE** : Probability and Random Processes  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the students to the concept and statistical properties of random variables – both discrete and continuous - for several types of distributions. Students will then analyse the significance of correlation and covariance between two random variables. The course also considers properties and problem solutions of stationary and random processes.

**COURSE CODE** : EFB4042  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

In the final year project, students will apply and put into practice all the skills and technical knowledge gained throughout the Electrical and Electronic Engineering program to design and implement a solution to a research or practical problem.

**COURSE CODE** : EFB4084  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, and device fabrication. For both FYP I and II, each student prepares a comprehensive engineering report, then presents and demonstrates the findings and results of the project work.

**COURSE CODE** : EFB3043  
**COURSE** : Data and Computer Network  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Communication Systems

This course introduces and explains the protocols, services and standards used in multimedia networks, which is actually the integration of voice/data communications, and computer networks. It covers topics on data communications principles and techniques such as data communications model, physical layer interfaces, and data link protocols for error detection and correction. It also covers topics on networking such as concept of layered TCP/IP and OSI protocols, local area networks (Ethernet, token ring, etc) and wide area networks.

**COURSE CODE** : EFB4053  
**COURSE** : Integrated System Design Project II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Integrated System Design Project I

The Integrated System Design Project (capstone course) consists of two one-semester courses, namely Integrated Systems Design Project I (ISDP I) in Semester 7 and Integrated Systems Design Project II (ISDP II) in Semester 8. ISDP I consists of project work allowing students to focus on project planning and paper-based designs.

**COURSE CODE** : EFB4063  
**COURSE** : Artificial Intelligence and Applications  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The students will be introduced with the basic concepts of the topics. The students will be guided to program the algorithms and apply on case studies

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Computer and Communication

**COURSE CODE** : EFB4113  
**COURSE** : Advanced Communication Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Communication Systems

This course is an introduction to the main concepts of digital communications. Topics include the fundamental parameters of digital communication systems, various digital modulation techniques (baseband, passband) and their performance in terms of bandwidth efficiency and error probability (BER, bit error rate); information theory such as source coding, channel coding, efficient signalling with the coded waveform and channel capacity.

**COURSE CODE** : EFB4123  
**COURSE** : Real-Time Microcontroller Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Microprocessor & Computer Architecture

This course introduces the fundamental concepts related to the principles of Instruction System Architecture, single-cycle processor, pipeline architecture, memory system architecture and multicore systems.

**COURSE CODE** : EFB4133  
**COURSE** : Digital Systems Design  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Microprocessor & Computer Architecture

This course covers design, validation, and testing techniques for digital. Students will learn how to design both individual building blocks as well as assemble digital systems from combinations of these blocks and analyse digital systems.

### 5.2.2 Instrumentation and Control

**COURSE CODE** : EFB4213  
**COURSE** : Modern Control Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Control Systems

This course covers topics related to the theory of digital and modern control systems design. The coverage includes state-space representation of dynamic systems, state feedback-based control system, observer design, and quadratic optimal control solution using the Riccati equation.

**COURSE CODE** : EFB4223  
**COURSE** : Industrial Automation & Control System  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Control Systems

This course covers topics related to the implementation of computer control in industrial automation. These include a study on industrial sensors and actuators, industrial controllers such as computer-based control, programmable logic controller (PLC), distributed control systems (DCS), and interfacing. Current trends in Industrial and Factory automation will also be covered. The emphasis will be on the control systems aspects for FMS/plant control, the communication and system networking (e.g., fieldbus), and the FMS/plant systems components.

**COURSE CODE** : EFB4233  
**COURSE** : Plant Process Control Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Control Systems

This course covers topics related to the analysis and design strategy of industrial process control systems. It exposes the students to various process control strategies and schemes, advanced regulatory strategies and synthesis of single and multivariable control schemes. Lab exercises will include hands-on operation of process control DCS; students will observe the effect of PID control strategies and evaluate the strengths and weaknesses of several feedback controller tuning techniques.

### 5.2.3 Power Systems Engineering

**COURSE CODE** : EFB4313  
**COURSE** : Design and Analysis of Electrical Machines  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Electrical Machines

This course develops the fundamental principles of designing electrical machines such as synchronous machines, induction motors and linear motors that are commonly used in Industry.

**COURSE CODE** : EFB4323  
**COURSE** : Power Electronic and Electrical Drives  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Power Electronic

This course covers topics related to power electronic devices and their applications in power control and electrical machines control, and the circuit topologies and the techniques involve in analysing the circuits. To equip engineers for the real world, power electronic technologies and applications are significant topics to be introduced especially in controlling AC and DC motors.

<b>COURSE CODE</b>	: EFB4333
<b>COURSE</b>	: <b>Power System Analysis and Protection</b>
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: <b>Power Systems</b>

This course covers topic related to the theory and advanced principles of power systems. Topics covered include power flow solution and fault analysis. Power system protection and power quality are the advanced topics. Attention is given to solve practical power system networks. Focus is given on the simulation exercise on power systems.

#### 5.2.4 Electronic & Devices

<b>COURSE CODE</b>	: EFB4413
<b>COURSE</b>	: <b>Analogue Integrated Circuit Design</b>
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: <b>Microelectronic Circuits</b>

It focuses on the basics of MOS analogue integrated circuits design such as circuit analysis (small signal circuit analysis, frequency compensation, etc.) and building blocks (current mirrors, amplifiers, comparators, references, etc.). Extensive use of available EDA tools for simulations.

<b>COURSE CODE</b>	: EFB4423
<b>COURSE</b>	: <b>Sensors &amp; Transducers Design</b>
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: <b>None</b>

The goal of the course is to provide Undergraduate Engineers with knowledge of modern sensor technologies. The course offers an overview of the basic sensor technology areas with examples drawn from existing products and includes a series of laboratory exercises using finite element analysis (FEA) software.

<b>COURSE CODE</b>	: EFB4433
<b>COURSE</b>	: <b>System-On-Chip Design</b>
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: <b>Microelectronic Circuits</b>

System-On-Chip (SOC) designer integrates various system components into a single chip module. An important enabler for the design of SOCs is the availability of semiconductor intellectual property (IP), which allows an SOC designer to include predefined circuitries, cutting the development cycle while increasing product functionality, performance and quality. The implementation of these systems of both hardware and software components and the interaction between hardware and software is an essential part of the design. This course will cover SOC topics on the design process, modelling and analysis, design methodology and platform, hardware/software co-design, behavioural synthesis, embedded software, verification, and design space exploration. With a focus on learning of the current SOC design and research topics, students are given opportunities to carry out class projects based on their own interests where students will be able to explore and prototype, test, and evaluate their SOC designs. This is the 'front end' of the design automation toolchain. (Back-end material, such as the design of individual gates, layout, routing and fabrication of silicon chips is not covered.)

### 5.2.5 Renewable Energy

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies – Energy conservation strategies, energy management system requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4513  
**COURSE** : Renewable Energy I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on wind power, simple theory of the wind turbine's performance & present Developments, Hydroelectric and pumped storage systems, Solar thermal power: Direct solar power, Design of low temperature solar heaters for domestic use, Performance characteristics and Description of solar systems for power generation.

**COURSE CODE** : MFB4523  
**COURSE** : Renewable Energy II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the wave & tidal energy - physical principles of wave energy, various types of wave energy converters and the environmental impacts and economics; fuel cell - principles of fuel cell and hydrogen production; geothermal energy - the physics of geothermal resources, technologies for geothermal resource exploitation and the environmental implications. Biomass energy including introduction to biomass types and resources, biomass as a fuel, energy crops, environmental benefits and economics of biomass.

**Bachelor of Materials Engineering  
with Honours**

## Bachelor of Materials Engineering with Honours

### 1.1 Introduction

Materials Engineering involves investigating the relationships that exist between the structures and properties of materials. Based on these structure-property correlations, a Materials Engineer will be able to design or engineer the structure of a material to produce a predetermined set of properties. Ultimately the role of a Materials Engineer is called upon to create new products or systems using existing materials and/or to develop techniques for processing materials.

Materials Engineering is a broad-based engineering programme that emphasises strong fundamentals in Mathematics and Engineering principles.

This programme prepares graduates for industry specific needs through specialisation elective packages offered in the final year, as well as lifelong learning and independent study skills through design courses, final year projects and adjunct lecture series.

Students will be exposed to team-based and practical problem solving through Engineering Team Project (ETP), Final Year Projects (FYP I & II), Engineering Design Projects (MECP I & II) and our unique 7-month Student Industrial Internship Programme (SIT & SIP).

Students of this programme will also be aware of environmental, social, political, ethical, and economic constraints through humanities, management and social science electives.

In addition to the above courses, students may further develop their engineering knowledge through one of the Core Specialisations as follows:

- **Advanced Computational and Modelling of Materials**
- **Degradation and Failure of Materials**
- **Renewable Energy**

### 1.2 Programme Educational Objectives

- i. To produce technically qualified Materials Engineers with the potential to become leaders in Materials Engineering industries.
- ii. To produce Materials Engineers who are committed to sustainable development of Materials Engineering industries for the betterment of society.

### 1.3 Programme Outcomes

- i. Acquire and apply engineering fundamentals to complex Materials Engineering problems.
- ii. Identify, formulate, and solve complex Materials Engineering problems using creativity and innovativeness.
- iii. Design and develop solutions for complex Materials Engineering problems.
- iv. Investigate complex Materials Engineering problems using research-based knowledge and methods.
- v. Utilise modern tools to evaluate complex Materials Engineering activities.
- vi. Demonstrate the understanding of the legal health & safety, social and cultural responsibilities of a professional engineer.
- vii. Demonstrate the principles of entrepreneurship, sustainable design and development.
- viii. Apply professional ethics and responsibilities in Materials Engineering practice.

- ix. Communicate effectively with all levels of industry and society on complex Materials Engineering activities.
- x. Perform effectively in multi-disciplinary setting as an individual and in team with the capacity to be a leader or manager.
- xi. Demonstrate and apply engineering management and economic principles in multidisciplinary environments as an individual or as a leader in a team.
- xii. Recognise, acquire and undertaken an independent and lifelong learning in continual technological development.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Materials Engineering with Honours, students are required to obtain a minimum of **143 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	14
CC - Core Common	26
CD - Core Discipline	70
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
<b>TOTAL</b>	<b>143</b>



SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU4/ HFB1012	Community Engagement Project	2	NR	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
FM2063	Data Analytics	3	CC								
AAB3013	Joining of Metals and Non-Metals	3	CD								
AAB3022	Quality Control	2	CD								
AAB3033	Corrosion and Degradation of Materials	3	CD								
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>7</b>		<b>Credit Hours</b>		<b>7</b>	
SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
VFB3102	Project Management	2	CC	AAB4042	Materials Engineering Capstone Project I	2	CD	EFB4073	Engineers in Society	3	CC
PFB4102	Engineering Economics	2	CC	AAB4052	Final Year Project I	2	CD	AAB4073	Materials Engineering Capstone Project II	3	CD
AAB4013	Materials Selection	3	CD	AAB4062	Green Composites	2	CD	AAB4084	Final Year Project II	4	CD
AAB4022	Life Cycle Assessment of Engineering Materials	2	CD	AAB4XX3	Core Specialisation I	3	CSp	AAB4XX3	Core Specialisation III	3	CSp
AAB4033	Smart and Functional Materials	3	CD	AAB4XX3	Core Specialisation II	3	CSp				
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>13</b>	
<b>Total Credit Hours : 143</b>											

### 3.0 Core Specialisation (CSp) Courses

Choose any three (3) courses under the same group (A, B or C) to be eligible for a Core Specialisation I, II and III.

A. Advanced Computing and Modelling of Materials				
No	Code	Course Name	Cr	G
1	AAB4113	Molecular Dynamics Simulation	3	CSp
2	AAB4123	Structural Modelling for Materials (Ansys, Abaqus)	3	CSp
3	AAB4133	Materials Processing Simulation	3	CSp

B. Degradation and Failure of Materials				
No	Code	Course Name	Cr	G
1	AAB4213	Corrosion Control and Management System.	3	CSp
2	AAB4223	Degradation Mechanism and Prevention	3	CSp
3	AAB4233	Advances Surface Coating	3	CSp

C. Renewable Energy				
No	Code	Course Name	Cr	G
1	MFB4123	Energy Management and Environment	3	CSp
2	MFB4513	Renewable Energy I	3	CSp
3	MFB4523	Renewable Energy II	3	CSp

#### 4.1 Minor (EM) Courses

Engineering students who are interested to enhance their knowledge in computer and information systems or finance, accounting, and business will have the options to complete courses offered under a Minor. There are two (2) Minor packages available for Engineering students as below:

- i. Minor in Data Science
- ii. Minor in Accounting and Finance

In order to be eligible for Minor, students are required to pass and complete all the courses under the same package (15 credits). Results obtained from courses under Minor will be counted into GPA/CGPA calculation. Students are reminded that the option to complete Minor courses are at the students' discretion and are **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **143 credit hours**.

Minor in Data Science					
A No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

Minor in Accounting and Finance					
B No	Code	Course Name	Cr	G	Semester
1	GFB2013	Business Accounting	3	EM	Students can take these courses in any semester
2	GFB2153	Business Law	3	EM	
3	GFB2283	Business and Financial Technology	3	EM	
4	GFB2293	Management Accounting	3	EM	
5	GFB2303	Assurance	3	EM	
Total Credit Hours			15		

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**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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### 5.3 Programme Courses Synopsis

#### 5.4 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : AAB1013  
**COURSE** : Physical Chemistry for Materials  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will expose students to application of the methods of physics and chemical fundamental which can be organised into thermodynamic, reaction kinetics and physical equilibria. This course encompasses the structure of matter at equilibrium and also the process of chemical change. The thermodynamic section is primarily concerned with the position of chemical equilibrium, with the direction of chemical change, and with the associated changes in energy.

**COURSE CODE** : AAB1022  
**COURSE** : Engineering Drawing  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on Engineering Graphics Fundamentals, units, measurements and scales, Sketching – isometric, oblique & orthographic, Introduction to CAD, Management of drawings & drawing aids, Plotting of drawing, Section & Auxiliary Views, Solid Modelling, Dimensioning & Tolerance, Boolean Operation, Screws, Threads & Fasteners.

**COURSE CODE** : AAB1032  
**COURSE** : Statics and Dynamics  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on General principle of mechanics, Force vectors, Equilibrium of a particle, Force systems resultants, Equilibrium of a rigid body, Structural analysis, Internal forces, Friction, Centres of gravity and centroids, Kinetics of a particle, Force & Acceleration and Impulse & Momentum.

**COURSE CODE** : AAB1043  
**COURSE** : Metals and Alloys  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Different methods of classification of steels, Various phases and reactions in steel: ferrite reaction, Bainite reaction, Martensite formation. Alloy steels; effects of alloying elements. Stainless steels: ferritic, martensitic, austenitic, precipitation-hardening. HSLA steels, maraging steels, dual-phase steels and tool steels. Corrosion of stainless steels, Aluminium alloys, Magnesium alloys, Titanium alloys, Nickel-base superalloys, Nickel-iron-base superalloys and Cobalt-base superalloys.

**COURSE CODE** : AAB1052  
**COURSE** : Strength of Materials  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on Stress and strain concepts, Axial load, Statically indeterminate Axially loaded members, Thermal stress, Torsion, angle of twist, Statically indeterminate torque-loaded members, Bending, Eccentric axial loading of beams, Transverse shear, Shear flow in build-up members, Combined loadings, Stress and strain transformation, Deflection of beams and shafts, Statically indeterminate beams and shafts.

**COURSE CODE** : AAB1063  
**COURSE** : Materials Processing I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction to manufacturing, Measurement and quality assurance, Material removal processes, Joining processes, Metal casting and workshop practices. The workshop practices cover practical works on metrology, turning, milling, gas welding, arc welding, CNC turning and CNC milling.

**COURSE CODE** : AAB1072  
**COURSE** : Materials Lab I (Physical and Mechanics)  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course covers the technique of preparing micro-sections for metallographic examinations. Metallography is the study of the structures and constitution of metals and alloys using metallurgical microscope so that the physical and mechanical properties of an alloy can be related to its observed microstructure. This course imparts the necessary problem-solving skills and knowledge required by material engineers in the area of material characterisation and analytical technique. It forms part of the core requirements by professional accreditation bodies in terms of practical skills, analysis, application of engineering knowledge and team working.

**COURSE CODE** : AAB2012  
**COURSE** : Materials Characterisation & Analytical Technique  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course covers the analytical technique of determining the physical, thermal and chemical properties of the materials. It involves investigating the relationship that exist between the structures and the properties of materials. This course imparts the necessary problem-solving skills and knowledge required by material engineers in the area of material characterisation and analytical technique. It forms part of the core requirements by professional accreditation bodies in terms of practical skills, analysis, application of engineering knowledge and team working.

**COURSE CODE** : AAB2022  
**COURSE** : Thermodynamics and Heat Transfer for Materials  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers fundamental topics on the thermodynamics and heat transfer. The first part covers the laws of thermodynamics and their applications to material system, criteria for equilibrium, reaction equilibria. The second part covers the basic concepts for heat transfer, conduction, convection, radiation, heat flow and heat balance.

**COURSE CODE** : AAB2033  
**COURSE** : Materials Processing II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Die components, Die processes, Mould components, Rolling, Forging, Extrusion and drawings, Sheet metal forming, Processing of metals, Forming and shaping of plastics, glass and composite materials, Surface treatment and finishing, design of experiment methods, quality control and inspection, manufacturing system performance, reliability and maintenance.

**COURSE CODE** : AAB2053  
**COURSE** : Materials Computational and Modelling  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on introduction to computational materials and methods, introduction to molecular dynamics and its application in modelling properties of various metals, alloys and composites. Student will also learn on the First principle method, density function theory (DFT) and its functions, DFT extension, Discrete Fourier Transform exercises with VASP code, treating solid via different practical approaches such as Pseudo-potential (PP) Approach, Reducing the Calculation Size, Bloch Theorem, Plane-wave (PW) Expansions, Some Practical Topics and Practical Algorithms for DFT Runs.

**COURSE CODE** : AAB2063  
**COURSE** : Engineering Ceramics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Bonding in ceramics; Structure of ceramics; Effect of chemical forces on physical properties; Thermodynamics and kinetic; Defects in ceramics; Diffusion and electrical conductivity; Phase equilibria; Formation, structure and properties of glasses, Sintering and mechanical properties. Fracture, creep and fatigue. Thermal properties; dielectric properties; magnetic and nonlinear dielectric properties, optical properties.

**COURSE CODE** : AAB2073  
**COURSE** : Failure Analysis & NDE  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on the Introduction to Failure Analysis, Failure Modes & Characterisation; Failure Characterisation Methods (SEM, XRD, XRF, Fracture Mechanics, metallography); Introduction to NDE; Radiography; Principles of Ultrasonic Testing; Die Penetrant Testing; Magnetic Particles.

**COURSE CODE** : AAB2083  
**COURSE** : Engineering Composites  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Composite material constituents and their properties, Manufacturing methods and processes, Micromechanical analysis of composite strength and stiffness, Elastic properties of the unidirectional lamina, Analysis of laminated composites, Failure theories and strength of unidirectional lamina and Design of components.

**COURSE CODE** : AAB2043  
**COURSE** : Engineering Polymers  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on the Control and design of the structure and molecular weight. Determination of molecular weight. Step growth process. Chain polymerization. Copolymerization. Stereoregularity of polymers, Polymerization processes, Morphology and Properties. Polymer testing. Polymer structure and stability. Hydrogels and dendrimers.

**COURSE CODE** : AAB3013  
**COURSE** : Joining of Metals and Non-Metals  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers the topic on Joining. Joining is an all-inclusive term covering processes such as welding, brazing, soldering, adhesive bonding, diffusion bonding, solid state bonding and mechanical fastening. These processes are an essential and important aspect of manufacturing and assembly operations.

**COURSE CODE** : AAB3022  
**COURSE** : Quality Control  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on the basic principle and concept of quality including statistical method in controlling products quality or services. This course also emphasises on the application of Control Chart and Quality Control tools. In addition, this course also explains the importance of International Standard of Quality Assurance Standard, ISO 9000 for an organisation.

**COURSE CODE** : AAB3033  
**COURSE** : Corrosion and Degradation of Materials  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on the Basic electrochemistry in corrosion in metals and degradation mechanisms in non-metals (polymers and ceramics). The different forms of corrosion, the causes and the methods by which corrosion is identified, measured, monitored and controlled. Similarly, how non-metals degrades and specific mitigation of controlling it, will be studied.

**COURSE CODE** : AAB4013  
**COURSE** : Materials Selection  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on the overview of material selection including the relationship between material types, their manufacturing, structural aspects and properties; design stages and material selection methods which prepare graduates the skills/tools to make the most appropriate material choices that will be fit for purpose for a given product and the design constraint. This allows for the development of a more progressive understanding of the importance of materials selection in the design process.

**COURSE CODE** : AAB2092  
**COURSE** : Phase Transformations in Metallic Materials  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on Free energy of single and binary solutions, Equilibrium conditions, Modelling of solid and liquid systems, Kinetics of phase transformations, Interstitial and substitutional diffusion, Relationship between macroscopic diffusion and atomic mechanisms, Free energy of interfaces, Grain boundaries and interphase interfaces, Coherent and incoherent interfaces, Grain growth, Nucleation in pure metals, Growth of a pure solid and alloy solidification, Diffusional transformation and Diffusionless transformations.

**COURSE CODE** : AAB4033  
**COURSE** : Smart and Functional Materials  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will provide the students with state-of-the-art knowledge on smart materials and smart systems. Particular emphasis will be placed on the application of these materials in the industry. Smart structures are a new emerging materials system that combines contemporary materials science with information science. The smart system is composed of sensing, processing, actuating, feedback, self-diagnosing, and self-recovering subsystems. The system uses the functional properties of advanced materials to achieve high performances with capabilities of recognition, discrimination, and justification in response to a change of its environment. Each component of this system must-have functionality and the entire system is integrated to perform a self-controlled smart action, similar to a living creature who can “think”, judge, and act.

**COURSE CODE** : AAB4042  
**COURSE** : Materials Engineering Capstone Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This is a part one of Integrated Design course for Materials Engineering programme. This is a team-based project on the design and development of mechanical equipment under the guidance of faculty members. Each team shall have a maximum of 5 students.

**COURSE CODE** : AAB4052  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This is a part one of an individual research project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. For FYP I, the student will be required to submit an Interim Report consisting of an abstract of the study, identification of problem statement, objective and scope of the study, literature review and the methodology to be used in the study.

**COURSE CODE** : AAB4062  
**COURSE** : Green Composites  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on the Introduction of Green Composites as sustainable and environmentally friendly materials, Advantages and Disadvantages of Green Composites, Lamina stress-strain relationships, Effective moduli of a continuous fibre-reinforced lamina, Strength of continuous fibre-reinforced lamina, Analysis of lamina hygrothermal behaviour, Analysis of discontinuously reinforced lamina, Analysis of laminates, Design of a composite structure and present.

**COURSE CODE** : AAB4022  
**COURSE** : Life Cycle Assessment of Engineering Materials  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on the Life-cycle assessment (LCA). LCA is the framework for evaluation of the environmental consequences of products, services and energy systems. In this course, the assessment will be focusing on engineering materials. LCA allows for consistent comparisons of different selection of engineering materials with respect to their environmental impact performance. This involves the assessment of multiple environmental impact categories from climate change through greenhouse gases to toxic impacts among others.

**COURSE CODE** : AAB4073  
**COURSE** : Materials Engineering Capstone Project II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This is a part two of Integrated Design course for Materials Engineering programme. This is a team-based project on the design and development of mechanical equipment under the guidance of faculty members. Each team shall have a maximum of 5 students.

**COURSE CODE** : AAB4084  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is a part two of an individual research project in connection with a special engineering problem and under the guidance of a faculty member. For FYP II, the student will be required to submit a Technical Paper to explain in writing about the contents of the project and its significance, the problem statement, objectives, scope, literature review, methodology, results, conclusions and recommendations.

## 5.5 Core Specialisation (CSp) Courses Synopsis

### 5.5.1 Advanced Computing and Modelling of Materials

**COURSE CODE** : AAB4113  
**COURSE** : Molecular Dynamics Simulation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will expose students with modelling and simulation covering continuum methods, atomistic and molecular simulation, and quantum mechanics. These techniques will provide students an understanding of the methods, capabilities, and limitations of molecular simulation.

**COURSE CODE** : AAB4123  
**COURSE** : Structural Modelling for Materials (Ansys, Abaqus)  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will expose students to fundamental theories and application of structural models. This should enable the students to recognise the general principles of structural models and understand the key assumptions that underlie these models and methods.

**COURSE CODE** : AAB4133  
**COURSE** : Materials Processing Simulation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course consists of simulation work on continuum methods, atomistic simulation and quantum mechanics which involves the investigation and analysis in the area of mechanics and material science. These techniques allow and improves the design materials and structures from the bottom up to predict the functional material process properties (e.g. mechanical strength, thermal properties and physical properties).

### 5.5.2 Degradation and Failure of Materials

**COURSE CODE** : AAB4213  
**COURSE** : Corrosion Control and Management System  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on integrated design, manufacture for components with the goals of reducing manufacturing cost and quality. Assembling for complex equipment with the goals to reduce the number of components and assembly cost. Design of minimal use of materials and energy for components. Design for disassembly for complex equipment. Design for maintainability for complex equipment.

**COURSE CODE** : AAB4223  
**COURSE** : Degradation Mechanism and Prevention  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will expose the students to the knowledge of degradation mechanism of materials when they are interacting with the environment. This course also imparts the necessary problem-solving skills and knowledge required by material engineers to prevent the degradation process in certain environment.

**COURSE CODE** : AAB4233  
**COURSE** : Advances Surface Coating  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course imparts the necessary problem-solving skills and knowledge required by material engineers in the area surface coating technology. The course deals with the methods that are used to produce relatively thin surface layers such that the substrate and coating combine to provide a tribological performance which neither can achieve on its own. The course also offers the students an understanding and exposure about surface treatments, coatings and cleaning in a wide range of engineering applications. It forms part of the core requirements by professional accreditation bodies in terms of practical skills, analysis, application of engineering knowledge and team working.

### 5.5.3 Renewable Energy

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies – Energy conservation strategies, energy management system requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4513  
**COURSE** : Renewable Energy I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on wind power, simple theory of the wind turbine's performance & present Developments, Hydroelectric and pumped storage systems, Solar thermal power: Direct solar power, Design of low temperature solar heaters for domestic use, Performance characteristics and Description of solar systems for power generation.

**COURSE CODE** : MFB4523  
**COURSE** : Renewable Energy II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the wave & tidal energy - physical principles of wave energy, various types of wave energy converters and the environmental impacts and economics; fuel cell - principles of fuel cell and hydrogen production; geothermal energy - the physics of geothermal resources, technologies for geothermal resource exploitation and the environmental implications. Biomass energy including introduction to biomass types and resources, biomass as a fuel, energy crops, environmental benefits and economics of biomass.

## **Programme Information**

**Bachelor of Mechanical  
Engineering with Honours**

# Bachelor of Mechanical Engineering with Honours

## 1.1 Introduction

Mechanical Engineering is the application of engineering principles to the design, development and manufacturing of mechanical devices and systems.

The programme stresses on a strong foundation in Mathematics, Sciences and Engineering. In the first year, students will be introduced to engineering fundamentals through courses such as Introduction to Material Science, Electrical Power and Machines, Manufacturing Technology I, Statics, Dynamics and Engineering Drawing.

In the second year, students' engineering knowledge are further developed with courses such as Solid Mechanics, Engineering Materials, Fluid Mechanics and Thermodynamics.

In the third year of study, students are exposed to courses such as Heat Transfer, Mechanical Engineering Design and Vibrations.

In the final year of study, students are required to undertake Computer Aided Engineering, Mechatronics, Manufacturing Technology II, Integrated Design Project and Final Year Project.

In addition to the above courses, students may further develop their engineering knowledge through one of the **Core Specialisations** as follows:

- **Energy Systems**
- **Advanced Manufacturing**
- **Asset Integrity and Reliability**
- **Robotics and System Automation**
- **Renewable Energy**

Mechanical engineers are normally employed in automotive sector; producing automobiles and its supporting industries, manufacturing industries; industrial machines and components. The job involves designing of mechanical components and devices, supervising and maintaining the production operation. Mechanical engineers are also in demand in the oil and gas sector and energy related sector.

## 1.2 Programme Educational Objectives

- Engineers who are competent with the potential to become leaders in Mechanical Engineering and related Industries.
- Engineers who are involved towards sustainable development in Mechanical Engineering and related industries for the betterment of the society.

## 1.3 Programme Outcomes

- Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problems.
- Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

- iii. 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.
- iv. Conduct investigation of complex engineering 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.
- v. Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
- vi. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
- vii. Evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.
- viii. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- ix. Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
- x. Communicate effectively on complex engineering activities with the engineering community and with society.
- xi. Demonstrate knowledge and understanding of engineering management principles, economic decision making and entrepreneurial skills to manage projects in multidisciplinary environments.
- xii. 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.

#### 1.4 Graduation Requirements

Students are required to obtain a minimum of **144 credit hours** and a minimum CGPA of 2.00 to be conferred a degree of Bachelor of Mechanical Engineering with Honours.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Core Common	24
CD - Core Discipline	72
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
<b>TOTAL</b>	<b>144</b>

## 2.0 Programme Curriculum Structure: Bachelor of Mechanical Engineering with Honours

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika dan Peradaban (Local)	2	NR	MPU3192	Falsafah dan Isu Semasa (Local & International)	2	NR	LFB1042	Academic Writing	2	UR
MPU3142	BM Komunikasi 2 (International)										
PFB1012	Introduction to Oil & Gas Industry & Sustainable Development	2	UR	CFB1032	Health, Safety & Environment	2	CC	HFB1022	Scientific Inquiry	2	UR
HFB2152	Ethics and Integrity	2	UR	FFM1023	Engineering Mathematics II	3	CC	KXXXXX1	Co Curriculum I	1	UR
FFM1013	Engineering Mathematics I	3	CC	MFB1033	Manufacturing Technology I	3	CD	FFM1063	Statistics and Application	3	CC
MFB1012	Introduction to Material Science	2	CD	MFB1043	Statics	3	CD	MFB1053	Dynamics	3	CD
MFB1023	Engineering Drawing	3	CD					MFB1063	Electrical Power and Machines	3	CD
<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>14</b>	

SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU2	One (1) MPU2 Course	2	NR	MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	MPU 4/ HFB1012	Community Engagement Project	2	NR
HFB2033	Professional Communication Skills	3	UR	GFB2102	Entrepreneurship	2	UR	KXXXXX1	Co Curriculum II	1	UR
MFB2012	Structured Programming & System Interfacing	2	CD	FFM2063	Data Analytics	3	CC	MFB2062	Engineering Team Project II	2	CC
MFB2033	Materials Characterization & Analytical Technique	2	CD	MFB2043	Fluid Mechanics I	3	CD	MFB2073	Fluid Mechanics II	3	CD
MFB2033	Engineering Materials	3	CD	MFB2053	ME Thermodynamics I	3	CD	MFB2083	ME Thermodynamics II	3	CD
MFB2024	Solid Mechanics	4	CD	MFB2061	Engineering Team Project I	1	CC	MFB2093	Mechanics of Machines	3	CD
<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>14</b>	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MFB3013	Heat Transfer	3	CD	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
MFB3023	ME Design	3	CD								
MFB3033	Vibrations	3	CD								
MFB3043	Manufacturing Technology II	3	CD								
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>7</b>		<b>Credit Hours</b>		<b>7</b>	

SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
VFB3102	Project Management	2	CC	PFB4102	Engineering Economics	2	CC	EFB4073	Engineers in Society	3	CC
MFB4013	Computer Aided Engineering	3	CD	MFB4042	Final Year Project I	2	CD	MFB4074	Final Year Project II	4	CD
MFB4023	Control Systems	3	CD	MFB4052	Mechatronics	2	CD	MFB4xx3	Core Specialisation III	3	CSP
MFB4032	Mechanical Systems Design I	2	CD	MFB4063	Mechanical Systems Design II	3	CD				
MFB4xx3	Core Specialisation I	3	CSp	MFB4xx3	Core Specialisation II	3	CSP				
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>10</b>	

**Total Credit Hours : 144**

### 3.0 Core Specialisation (CSp) Courses

Choose any five (5) courses under the same group (A, B, C, D, or E) to be eligible for Core Specialisation I, II or III.

A. Energy Systems				
No	Code	Course Name	Cr	G
1	MFB4113	Building Air-Conditioning Systems	3	CSp
2	MFB4123	Energy Management & Environment	3	CSp
3	MFB4133	Hybrid and Electric Vehicles	3	CSp

B. Advanced Manufacturing				
No	Code	Course Name	Cr	G
1	MFB4213	Design for Sustainable Manufacturing	3	CSp
2	MFB4223	Additive Manufacturing System	3	CSp
3	MFB4233	Production Quality	3	CSp

C. Asset Integrity and Reliability				
No	Code	Course Name	Cr	G
1	MFB4013	Asset Integrity & Risk Management	3	CSp
2	MFB4323	Asset Reliability, Availability and Maintainability (RAM)	3	CSp
3	MFB4333	Asset Performance Assessment & Maintenance	3	CSp

D. Robotics and System Automation				
No	Code	Course Name	Cr	G
1	MFB4413	Robotic	3	CSp
2	MFB4423	Mechatronics Systems Design	3	CSp
3	EFB4223	Industrial Automation Systems	3	CSp

E. Renewable Energy				
No	Code	Course Name	Cr	G
1	MFB4123	Energy Management & Environment	3	CSp
2	MFB4513	Renewable Energy I	3	CSp
3	MFB4523	Renewable Energy II	3	CSp

#### 4.1 Minor (EM) Courses

Engineering students who are interested to enhance their knowledge in computer and information systems or finance, accounting, and business will have the options to complete courses offered under a Minor. There are two (2) Minor packages available for Engineering students as below:

- i. Minor in Data Science
- ii. Minor in Accounting and Finance

To be eligible for a Minor, students are required to pass and complete all the courses under the package (15 credits). Results obtained from courses under Minor will be counted in the GPA/CGPA calculation. Students are reminded that the option to complete Minor courses is at the student's discretion and is **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **144 credit hours**.

Minor in Data Science					
A No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

Minor in Accounting and Finance					
B No	Code	Course Name	Cr	G	Semester
1	GFB2013	Business Accounting	3	EM	Students can take these courses in any semester
2	GFB2153	Business Law	3	EM	
3	GFB2283	Business and Financial Technology	3	EM	
4	GFB2293	Management Accounting	3	EM	
5	GFB2303	Assurance	3	EM	
Total Credit Hours			15		

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**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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## 5.6 Programme Courses Synopsis

### 5.7 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : MFB1012  
**COURSE** : Introduction to Material Science  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction to Materials & Atomic Bonding; The Structure of Crystalline Solids; Imperfection in Solids and Diffusion; Mechanical Properties of Materials; Dislocation & Strengthening of Mechanisms; Phase Diagrams & Phase Transformations; Engineering Materials.

**COURSE CODE** : MFB1023  
**COURSE** : Engineering Drawing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Engineering Graphics Fundamentals; Geometrical Drawing; Management of Drawing; Machine Component Drawing; Advanced CAD and application.

**COURSE CODE** : MFB1033  
**COURSE** : Manufacturing Technology I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction to Manufacturing; Measurement and Quality Assurance; Machining Processes; Metal Casting and Joining Processes.

**COURSE CODE** : MFB1043  
**COURSE** : Statics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction to Statics; Force Vectors; Equilibrium of a Particle; Force System Resultants; Equilibrium of a Rigid Body; Analysis of Structure; Internal Forces; Friction; Centre of Gravity and Centroid; Moments of Inertia.

**COURSE CODE** : MFB1053  
**COURSE** : Dynamics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Statics

This course covers topics on Kinematics and Kinetics of Particles; Planar Kinematics and Planar Kinetics of Rigid Bodies.

**COURSE CODE** : MFB1063  
**COURSE** : Electrical Power and Machines  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Single and Three Phase Circuit; Power; Power Factor; AC Motors; Three Phase Motors; Generators and Transformer.

**COURSE CODE** : MFB2024  
**COURSE** : Solid Mechanics  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This course covers topics on Review of Statics & Introduction; Stress; Strain; Mechanical Properties of Materials; Axial Load; Torsion; Bending; Transverse Shear; Combined Loadings; Stress & Strain Transformation; Design of Beam and Shafts; Buckling and Columns.

**COURSE CODE** : MFB2033  
**COURSE** : Engineering Materials  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on The Importance of Engineering Materials; The Role of Chemical, Physical and Mechanical Properties in Engineering Materials; Testing, Standard and Inspection; Fatigue Analysis; The Role of Tribology in Engineering Materials; The Role of Corrosion in Engineering Materials; Metals and Alloys; Polymers; Ceramics, Cermets, Glass and Carbon Products and Material Selection.

**COURSE CODE** : MFB2043  
**COURSE** : Fluid Mechanics I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction to Fluid Mechanics; Fluid Statics; Elementary Fluid Dynamics; Fluid Kinematics; Finite Control Volume Analysis; Dimensional Analysis and Modelling; Viscous Flow In Pipes.

**COURSE CODE** : MFB2053  
**COURSE** : Mechanical Engineering (ME) Thermodynamics I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Basic Concept of Thermodynamics; Properties of Substance; Energy Transfer by Heat, Work and Mass; The First Law of Thermodynamics; The Second Law of Thermodynamics, Entropy and Exergy.

**COURSE CODE** : MFB2061  
**COURSE** : Engineering Team Project I  
**NO. OF CREDITS** : 1 credit  
**PRE-REQUISITE** : Semester 6 Standing

The course is designed to ensure that students will acquire the knowledge in conducting project on real problem and solution development by working in a team. This includes conducting literature research, preparing project proposal, performing preliminary design concepts, simulation, and evaluation for the best concept and designing / prototyping the selected concept.

**COURSE CODE** : MFB2012  
**COURSE** : Structured programming & System Interfacing  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This programming course is designed to allow electrical and electronic students to design and develop computer programs to solve electronic systems problems. The course will adopt a lecture/hands-on approach. Using this approach, students will explore a structured programming language. Students will be required to design and develop computer programs to control external devices via the PC.

**COURSE CODE** : MFB2083  
**COURSE** : Mechanical Engineering (ME) Thermodynamics II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Gas Power Cycles; Vapour and Combined Power Cycles; Refrigeration Cycles; Gas Mixtures; Gas-Vapour Mixtures and Air-Conditioning; Chemical Reactions and Combustion.

**COURSE CODE** : MFB2093  
**COURSE** : Mechanics of Machines  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction to Mechanisms; Position Analysis of Mechanism; Velocity Analysis of Mechanisms; Acceleration Analysis of Mechanisms; Design of Mechanism; Cam-Kinematics & Design; Gears-Kinematics & Design; Static Force of Analysis; Dynamic Force Analysis of Mechanisms and Computer-Aided Modelling & Simulation.

**COURSE CODE** : MFB2102  
**COURSE** : Engineering Team Project II  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Semester 6 Standing

The second phase of the Engineering Team Project (ETP) revolves around the creation of a design solution to tackle engineering challenges. Students are also anticipated to demonstrate proficiency in effective communication, presentation, and entrepreneurial skills. This stage includes the evaluation of sustainability and the assessment of the impact of professional engineering efforts in addressing problems. Furthermore, students must showcase their capability to engage in independent and lifelong learning. Emphasizing active collaboration within a multidisciplinary team-based project work environment remains a key focus throughout this program stage.

**COURSE CODE** : MFB3013  
**COURSE** : Heat Transfer  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers the fundamental concepts of heat transfer on conduction (1-dimensional and 2-dimensional), transient and heat transfer coefficient, convection (forced and natural convection of plates and tubes), radiation (view factors and coefficient) and heat exchangers (combination of internal and external flow in the tubes).

**COURSE CODE** : MFB3023  
**COURSE** : Mechanical Engineering (ME) Design  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Flexible Mechanical Power Transmission Components; Rigid Mechanical Power Transmission Components; Mechanical Components; Rolling Elements; Modelling and Simulation; Materials Selection and Materials in Design; Materials Processing and Design; Risk Reliability and Safety.

**COURSE CODE** : MFB2073  
**COURSE** : Fluid Mechanics II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Review of Fundamentals; Introduction to Navier-Stokes Equations and Resistance to Fluid Motion; Boundary Layer Concept; External Viscous Flow; Compressible Fluid Flow and Turbo Machines.

**COURSE CODE** : MFB4013  
**COURSE** : Computer Aided Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction to CAE; Introduction and General Steps of finite Element Method; Direct Stiffness Method; Modelling of 2-D Elements for FEA; 2-D Cantilever and Plane Problems; Introduction to Computational Fluid Dynamics and Heat Transfer; Analysis of Steady 1-D and 2-D Heat Transfer; Analysis of Un-Steady 1-D Heat Transfer.

**COURSE CODE** : MFB4023  
**COURSE** : Control Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction and Review of Mathematical Foundation, Transfer Function, Block Diagram and Signal Flow Graphs; Mathematical Modelling of Physical Systems; Time-domain Analysis and Design of Control Systems; Stability of Linear Control Systems; Root-locus Techniques; Frequency-domain Analysis & Design of Control Systems.

**COURSE CODE** : MFB3043  
**COURSE** : Manufacturing Technology II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction; Machining Processes; Advanced Machining Processes; Casting, Forming and Shaping of Metals; Forming and Shaping of Plastics, Ceramics and Composite Materials; Surface Technology and Selection of Manufacturing Processes and Machinery.

**COURSE CODE** : MFB4042  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This is a part one of an individual research project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication. For FYP I, students will be required to submit an Interim Report consisting of an abstract of the study, identification of problem statement, objective and scope of study, literature review and the methodology to be used in the study.

**COURSE CODE** : MFB3033  
**COURSE** : Vibrations  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction and Fundamentals of Vibrations; Free and Force Vibration of Single Degree of freedom System; Vibration under General Forcing Conditions; Multi Degree of Freedom Systems; Introduction of Vibration Suppression; Vibration of Continuous System; Vibration Measuring Instrumentation & Techniques.

**COURSE CODE** : MFB4063  
**COURSE** : Mechanical Systems Design II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mechanical Systems Design I

This is a part two of Integrated Design course for Mechanical Engineering programme. This is a team-based project on design and development of mechanical equipment under the guidance of faculty members. Each team shall have a maximum of 5 students.

**COURSE CODE** : MFB4074  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is a part two of an individual research project in connection with a special engineering problem and under the guidance of a faculty member. For FYP II, students will be required to submit a Technical Paper to explain in writing about the contents of the project and its significance, the problem statement, objectives, scope, literature review, methodology, results, conclusions and recommendations.

**COURSE CODE** : MFB4052  
**COURSE** : Mechatronics  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers topics on Introduction of Mechatronics; Sensors and Transducers; Signal Conditioning; Pneumatic and Hydraulic Actuation System; Mechanical Actuation System; Electrical Actuation System; Digital Logic and Programmable Logic Controller.

## 5.8 Core Specialisation (CSp) Courses Synopsis

### 5.8.1 Energy Systems

**COURSE CODE** : MFB4113  
**COURSE** : Building Air-Conditioning Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on conventional air conditioning systems, psychrometry, electric chillers, solar absorption chillers, gas district cooling, Design of hydronic piping system, Cooling load calculation, Ventilation system, Design of ducts and sizing, AHU, FCU and Cooling towers.

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies – Energy conservation strategies, energy management system’s requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4133  
**COURSE** : Hybrid and Electric Vehicle  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on Wind power-Simple theory of the wind turbine’s performance & present developments. Wave & tidal power: Description of existing and proposed systems. Hydroelectric and pumped storage systems. Solar power: Direct solar power. Design of low temperature solar heaters for domestic use. Performance characteristics. Description of solar systems for power generation. Geothermal Energy: Geo. Resources and their usage for heating and power. Biomass: Basic science & technologies i.e. Processes; Sources of biomass, agricultural residues, energy from refuse and energy crops. Fuel Cell, Hydrogen Production.

## 5.8.2 Advanced Manufacturing

**COURSE CODE** : MFB4213  
**COURSE** : Design for Sustainable Manufacturing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on integrated design, manufacture for components with the goals of reducing manufacturing cost and quality. Assembling for complex equipment with the goals to reduce the number of components and assembly cost. Design of minimal use of materials and energy for components. Design for disassembly for complex equipment. Design for maintainability for complex equipment.

**COURSE CODE** : MFB4223  
**COURSE** : Additive Manufacturing System  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the importance of additive manufacturing and its huge role in global product development and innovation. This course will develop a rich knowledge of 3D printing technologies, devices, capabilities, materials and applications. Trade-offs between various 3D printing processes and technologies, along with the various software tools, processes and techniques enabling personal fabrication, such as 3D scanning. Latest trends and opportunities in 3D printing such as “personal” 3D printing, localised services, production parts, mass customisation and how to commercialise your ideas.

**COURSE CODE** : MFB4233  
**COURSE** : Production Quality  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the need for quality, evolution of quality, definitions of quality, dimensions of product quality, basic concepts of quality framework, costs of quality.

### 5.8.3 Asset Integrity and Reliability

**COURSE CODE** : MFB4313  
**COURSE** : Asset Integrity & Risk Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on basic elements of asset integrity management and explore the latest industry methodologies, techniques and tools. Emphasising the mandatory compliance with the requirement of HSE. Familiarising the precipitant with proactive integrity management of the equipment used in downstream and upstream Oil and Gas industry based on fitness for purpose assessment and risk-based inspection (RBI). Principles, the benefits and limitations of risk-based inspection employed in Oil and Gas industry asset management. Strategic inspection practices to manage the risks for safe and reliable operation of the asset.

**COURSE CODE** : MFB4323  
**COURSE** : Asset Reliability, Availability and Maintainability (RAM)  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on introduction to the theories and application of reliability, availability and maintainability (RAM) analysis and modelling. The applications are based on actual case studies to appraise reliability and maintainability issues and challenges, analyse and interpret data in the context of RAM, assess current industrial practices and forecast future trends and advancement in RAM analysis and modelling.

**COURSE CODE** : MFB4333  
**COURSE** : Asset Performance Assessment & Maintenance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on introduction to the theories and application of asset performance management and maintenance. The applications are based on actual case studies to appraise asset performance measures, analyse and interpret data, assess current industrial practices and forecast future trends and advancement in Asset performance management.

## 5.8.4 Robotics and System Automation

**COURSE CODE** : MFB4413  
**COURSE** : Robotics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on automation and robotics, which include the basics of machine perception, vectors, algebra, 3-dimensional kinematics as well as mobility and inertial navigation.

**COURSE CODE** : MFB4423  
**COURSE** : Mechatronics System Design  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on Mechatronic systems, Modelling and simulation of Physical systems, system control and logics methods, Study the process in design of a mechatronic system that includes component selection, compatibility, interfacing, HMI, ergonomic, aesthetic and safety in designing a typical mechatronic product. Design approaches and integration of elements in mechatronic system such as sensor, microcontroller, drive and actuation, control system, mechanics and structures. Case studies.

**COURSE CODE** : EFB4223  
**COURSE** : Industrial Automation Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course cover topics related to the implementation of computer control in industrial automation. These include a study on industrial sensors and actuators, industrial controllers such as computer-based control, programmable logic controller (PLC), distributed control systems (DCS), and interfacing. Current trends in Industrial and Factory automation will also be covered. The emphasized will be on the control systems aspects for FMS/plant control, the communication and system networking (e.g. fieldbus), and the FMS/plant systems components.

### 5.8.5 Renewable Energy

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies – Energy conservation strategies, energy management system requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4513  
**COURSE** : Renewable Energy I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on wind power, simple theory of the wind turbine's performance & present Developments, Hydroelectric and pumped storage systems, Solar thermal power: Direct solar power, Design of low temperature solar heaters for domestic use, Performance characteristics and Description of solar systems for power generation.

**COURSE CODE** : MFB4523  
**COURSE** : Renewable Energy II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the wave & tidal energy - physical principles of wave energy, various types of wave energy converters and the environmental impacts and economics; fuel cell - principles of fuel cell and hydrogen production; geothermal energy - the physics of geothermal resources, technologies for geothermal resource exploitation and the environmental implications. Biomass energy including introduction to biomass types and resources, biomass as a fuel, energy crops, environmental benefits and economics of biomass.

## **Programme Information**

**Bachelor of Petroleum Engineering  
with Honours**

# Bachelor of Petroleum Engineering with Honours

## 1.1 Introduction

Petroleum Engineering is an engineering field involving activities related to exploring and producing hydrocarbons from a specific reservoir. The Petroleum Engineering curriculum is developed to prepare students to design solutions for complex petroleum engineering problems and design systems within the upstream sector in the oil and gas industry.

The programme stresses the development of strong fundamentals in mathematics, sciences, and engineering, followed by thorough coverage of fundamental petroleum engineering courses based on the four domains recognised by SPE: Petroleum Exploration and formation evaluation, Reservoir engineering, Production engineering, and Drilling engineering. These courses illustrate the application of the engineering principles to the type of problems and solution methods used in the petroleum industry. In addition, students must enrol in different general courses categorised as national and university requirements to enhance students' soft skills and capabilities. Co Curriculum as well as Ethics & Integrity are also part of the curriculum.

In the final later years of study, students will have the opportunity to specialise in one of these selected areas:

- **Reservoir Engineering**
- **Drilling Engineering**
- **Production Engineering**
- **Renewable Energy**

Before completing the study, students are required to complete various project-based courses ranging from engineering design, field development project (FDP), and individual project based on relevant industrial problems.

## 1.2 Programme Educational Objectives

- Engineers who are competent with the potential to become leaders in Oil and Gas, and related industries.
- Engineers who are involved towards sustainable development in Oil and Gas, and related industries for the betterment of the society.

## 1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- Apply knowledge of mathematics, natural sciences, engineering fundamentals and engineering specialisation to the solution of complex engineering problems.
- Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 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.
- Conduct investigation of complex engineering 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.
- Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to evaluate complex engineering problems, with an understanding of the limitations.
- Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.

- vii. Evaluate sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.
- viii. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- ix. Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
- x. Communicate effectively on complex engineering activities with the engineering community and society.
- xi. Demonstrate knowledge and understanding of management principles, economic decision making and entrepreneurial skills to manage projects in multidisciplinary environments.
- xii. 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.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Petroleum Engineering with Honours degree, students are required to obtain a minimum of **144 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Core Common	25
CD - Core Discipline	71
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
<b>TOTAL</b>	<b>144</b>

## 2.0 Programme Curriculum Structure: Bachelor of Petroleum Engineering with Honours

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika dan Peradaban (Local)	2	NR	MPU3192	Falsafah dan Isu Semasa (Local & International)	2	NR	LFB1042	Academic Writing	2	UR
MPU3142	BM Komunikasi 2 (International)										
PFB1012	Introduction to Oil & Gas Industry & Sustainable Development	2	UR	CFB1032	Health, Safety & Environment	2	CC	HFB1022	Scientific Inquiry	2	UR
HFB2152	Ethics and Integrity	2	UR	FFM1023	Engineering Mathematics II	3	CC	KXXXXX1	Co Curriculum I	1	UR
FFM1013	Engineering Mathematics I	3	CC	PFB1043	Reservoir Rock Properties	3	CD	FFM1063	Statistics and Application	3	CC
PFB1023	Petroleum Engineering Thermodynamics	3	CD	PFB1053	Reservoir Fluid Properties	3	CD	FFB1073	Computational Method	3	CC
PFB1033	Fundamental of Petroleum Exploration Engineering	3	CD	PFB1061	Reservoir Rock and Fluid Properties Lab	1	CD	PFB1073	Statics and Dynamics	3	CD
<b>Credit Hours</b>		<b>15</b>		<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>14</b>	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
HFB2033	Professional Communication Skills	3	NR	FFM2063	Data Analytics	3	CC	MPU 2	One (1) MPU2 Course	2	NR
PFB2013	Fluid Mechanics	3	CD	MFB2061	Engineering Team Project I	1	CC	MFB2102	Engineering Team Project II	2	CC
PFB2024	Well Logging and Formation Evaluation	4	CD	GFB2102	Entrepreneurship	2	UR	PFB2054	Drilling Engineering I	4	CD
PFB2033	Reservoir Engineering I	3	CD	MFB2024	Solid Mechanics	4	CD	PFB2063	Production Engineering I	3	CD
				PFB2043	Reservoir Engineering II	3	CD	PFB2073	Well Test Analysis	3	CD
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>14</b>	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU4/ HFB1012	Community Engagement Project	2	NR	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
KXXXXX1	Co Curriculum II	1	UR								
PFB3013	Drilling Engineering II	3	CD								
PFB3023	Production Engineering II	3	CD								
PFB3034	Reservoir Modelling and Simulation	4	CD								
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>7</b>		<b>Credit Hours</b>		<b>7</b>	

SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	PFB4032	Petroleum Economics	2	CD	EFB4073	Engineers in Society	3	CC
VFB3012	Project Management	2	CC	PFB4044	Final Year Project II	4	CD	PFB4064	Field Development Project II	4	CD
PFB4013	Gas Field Engineering	3	CD	PFB4053	Field Development Project I	3	CD	MFB4xx3	Core Specialisation III	3	CSP
PFB4XX3	Core Specialisation I	3	CSp	PFB4XX3	Core Specialisation II	3	CSp				
PFB4022	Final Year Project I	2	CD								
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>10</b>	

**Total Credit Hours: 144**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets of Core Specialisation areas (set A, B, C or D) for Core Specialisation I, II and III.

A. Reservoir Engineering				
No	Code	Course Name	Cr	G
1	PFB4113	Enhanced Oil Recovery	3	CSp
2	PFB4123	Advanced Well Test Analysis	3	CSp
3	PFB4133	Advanced Reservoir Simulation	3	CSp

B. Drilling Engineering				
No	Code	Course Name	Cr	G
1	PFB4213	Drilling Fluids and Cementing	3	CSp
2	PFB4223	Well Engineering	3	CSp
3	PFB4233	Drilling Hydraulics	3	CSp

C. Production Engineering				
No	Code	Course Name	Cr	G
1	PFB4313	Production System Optimisation	3	CSp
2	PFB4323	Well Stimulation Techniques	3	CSp
3	PFB4333	Flow Assurance	3	CSp

D. Renewable Energy				
No	Code	Course Name	Cr	G
1	MFB4123	Energy Management and Environment	3	CSp
2	MFB4513	Renewable Energy I	3	CSp
3	MFB4523	Renewable Energy II	3	CSp

#### 4.1 Minor (EM) Courses

Engineering students who are interested to enhance their knowledge in computer and information systems or finance, accounting, and business will have the options to complete courses offered under a Minor. There are two (2) Minor packages available for Engineering students as below:

- i. Minor in Data Science
- ii. Minor in Accounting and Finance

To be eligible for a Minor, students are required to pass and complete all the courses under the package (15 credits). Results obtained from courses under Minor will be counted in the GPA/CGPA calculation. Students are reminded that the option to complete Minor courses is at the student's discretion and is **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **144 credit hours**.

Minor in Data Science					
A No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

Minor in Accounting and Finance					
B No	Code	Course Name	Cr	G	Semester
1	GFB2013	Business Accounting	3	EM	Students can take these courses in any semester
2	GFB2153	Business Law	3	EM	
3	GFB2283	Business and Financial Technology	3	EM	
4	GFB2293	Management Accounting	3	EM	
5	GFB2303	Assurance	3	EM	
Total Credit Hours			15		

**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.

## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : PFB1012  
**COURSE** : Introduction to Oil & Gas Industry and Sustainable Development  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course aims to introduce the various aspects of the oil and gas industry and sustainability throughout the life cycle of the industry. The topics covered are oil and gas search and discovery, production, processing. For downstream, oil and gas refining into petroleum and petrochemical products and feedstocks are introduced. Finally, the course also focuses on principles of sustainable development and Net Zero Carbon Emissions as well as the aspects of renewable energy for a sustainable future.

**COURSE CODE** : PFB1023  
**COURSE** : Petroleum Engineering Thermodynamics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides a basic grounding in the principles and methods of Classical Thermodynamics. The First and Second laws of thermodynamics are introduced, along with the concepts of temperature, pressure, internal energy, heat and entropy. Applications of thermodynamic concepts to topics such as heat engines, the expansion of gases and changes of phase complete the course.

**COURSE CODE** : PFB1033  
**COURSE** : Fundamental of Petroleum Exploration Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course covers different methods of petroleum and gas exploration, integrated geological and geophysical approaches with engineering data to characterise reservoirs and estimate reserve. Followed by discussion about case studies on the integration of geology and reservoir engineering aspects. The course explains basics of applied physical geology, earth rock types, tectonics events, depositional environment, geological structure with mechanical deformation and stratigraphy based on sediment transport and deposition which causes an impact to the formation of petroleum system in the sedimentary basin. A basic quicklook analysis are incorporated to estimate reserve. Lectures and lab will discuss examples of rock types in petroleum system, petroleum traps, reservoir pore spaces and permeability, origin of hydrocarbons, migration and accumulation of hydrocarbon, analyse quicklook and hydrocarbon reserve estimation. It covers laboratory description of rocks & minerals specimen and subsurface mapping techniques to prepare different types of subsurface maps. This course will provide experience to field development plan on geology and engineering data interpretation based on the Petroleum Resources Management System (PRMS) developed by The Society of Petroleum Engineers/World Petroleum Congress (SPE/WPC).

**COURSE CODE** : PFB1043  
**COURSE** : Reservoir Rock Properties  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Fundamental of Petroleum Exploration Engineering

The course is designed to developed student's understanding in petrophysical properties of reservoir rock. The course will introduce an overview of petroleum accumulation and the various reservoir rocks before focusing in greater detail on concepts, factors contributed, measurement methods, of porosity, saturation, wettability, permeability, capillary pressure, resistivity and some other petrophysical rock properties.

**COURSE CODE** : PFB1061  
**COURSE** : Reservoir Rock and Fluid Properties Laboratory  
**NO. OF CREDITS** : 1 credit  
**PRE-REQUISITE** : Fundamental of Petroleum Exploration Engineering

The laboratory starts with cohesive introduction to safety rules (the five rules of safety), followed with viscosity and density measurements (Hydrometer, Pycnometer), rock sample preparation and saturation determination, porosity by liquid saturation method and helium porosimeter, permeability from Benchtop (liquid), permeability by using poroperm (gas), relative permeability, surface tension, capillary pressure, contact angle and wettability, vapor pressure of a pure liquid, GOR, relative volume, and residual oil gravity.

**COURSE CODE** : PFB1073  
**COURSE** : Statics and Dynamics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides the students with fundamental principles of the basic engineering principles governing the statics, kinematics and dynamics of rigid bodies as applied to mechanical components and tools. It includes stationary structures (statics) and structures in motion (dynamics). Statics: definition of force and moment, static equilibrium of rigid bodies, statical equivalence of systems of forces, centre of mass, centroid, centre of pressure, frictional forces. Kinematics: linear and angular motion, motion in a plane, relative displacement, velocity and acceleration. Dynamics: equations of motion for rigid body, work and energy, impulse and momentum, strain energy.

**COURSE CODE** : PFB2013  
**COURSE** : Fluid Mechanics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course introduces the fundamentals of fluid mechanics and covers Fluid Properties, Fluid Statics, Elementary Fluid Dynamics, Finite Control Volume Analysis, Dimensional Analysis and Flow in Pipes.

**COURSE CODE** : PFB1053  
**COURSE** : Reservoir Fluid Properties  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Petroleum Engineering Thermodynamics

The course will give fundamental understanding of phase behavior of reservoir fluids, starting with single component system and continued with binary and ternary system. This is followed by discussion of properties relevant to reservoir gases before continuing with properties of reservoir oils. Based on understanding of the previous materials, the course will then develop fundamental understanding of vapor-liquid equilibria (VLE) and equation of state (EOS) which is next used to analyze PVT tests performed for reservoir fluid samples. The course concludes with overview of plus fractions characterizations using pseudo-components, which will give a headstart for the learner to learn advance topics in later courses.

**COURSE CODE** : PFB2033  
**COURSE** : Reservoir Engineering I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : i. Reservoir Rock Properties  
 ii. Reservoir Fluid Properties

This course covers introduction to reservoir engineering which includes volumetric calculation and fluid pressure regime. Coverage also includes analysis of flow through porous media under steady-state condition and application of relative permeability concepts. Evaluation of drive mechanisms based on reservoir performance will be discussed. The course also covers PVT analysis through application of equation of state and fluids study report.

**COURSE CODE** : PFB2043  
**COURSE** : Reservoir Engineering II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Reservoir Engineering I

This course covers flow through porous media (unsteady state), which comprises the development of the radial diffusivity equation and its solutions. Application of the general material balance equation to oil and gas reservoirs and is covered to estimate HHP and to evaluate performance of reservoirs under various drive mechanisms. Various water influx models will be applied to estimate aquifer performance. The concept of decline curve analysis will be used to forecast oil and gas production. Principles of fractional flow and the Buckley-Leverett frontal advance theory will be used to estimate recovery under immiscible displacement using the Welge method.

**COURSE CODE** : PFB2054  
**COURSE** : Drilling Engineering I  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Well Logging and Formation Evaluation

Apart from reservoir and production, drilling engineering holds its own importance as a part of petroleum engineering. The course begins with an overview of drilling operations. Then, the students will be introduced to drilling equipment and accessories; rig components, drill string, drilling bits and drilling fluids, also their design and selection. The course also covers concepts of formation & fracture pressures estimation, drilling fluid & cementing design and calculation.

**COURSE CODE** : PFB2024  
**COURSE** : Well Logging and Formation Evaluation  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Fundamental of Petroleum Exploration Engineering

This course begins with an introduction to petrophysics, petrophysical logs, wireline logging tools and techniques used in oil and gas reservoir formations understanding. Having understanding of logs, tracks, API scales, wireline logs application for particular type of rock identification, which can act as reservoirs rock are covered. Then, the course discusses practical understanding of logs interpretation for open and some cased hole log analysis methods for the determination of porosity, fluid content identification, gross reservoir thickness, reservoir, pay and finally net pay. These log interpretations are both qualitative (Quick Look) and quantitative analyses and methods are covered in class-lectures and tutorials. An overview of dipmeter logs, measurement while drilling (MWD) Logging while Drilling(LWD) and some cased hole logs is also given.

**COURSE CODE** : PFB2073  
**COURSE** : Well Test Analysis  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Reservoir Engineering II

This course reviews fluid flow in porous media and examines the analytical solutions to the diffusivity equation. It then takes the analytical solutions relevant to well testing and develops the classical solutions, examines their limitations and shows examples of their use. The course examines the use of pressure and flow measurements in reservoir management. The course also includes transient testing, drawdown testing and semi-log analysis, build-up testing and the Horner plot, linear discontinuities (sealing faults). The course discusses the well test analysis by using type-curves and pressure derivatives. Gas well testing is covered as well.

**COURSE CODE** : PFB3013  
**COURSE** : Drilling Engineering II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Drilling Engineering I

This is the continuation from Drilling Engineering I where the student will cover another basic principle in drilling engineering namely, directional drilling, hydraulics, well control and wellbore stability. The course begins with directional drilling and continue with drilling hydraulics and well control. Later, the students will be exposed to fundamentals of wellbore stability and drilling practices.

**COURSE CODE** : PFB3023  
**COURSE** : Production Engineering II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Production Engineering I

The enhanced level of oil and gas surface production processes starting from wellheads and ending at pipeline terminals/refineries. The course covers topics including field development concepts, offshore structures, oil and gas production processes, transportation, measurement of produced liquids and gas, production operations issues as well as techniques for produced water treatment and disposal.

**COURSE CODE** : PFB3034  
**COURSE** : Reservoir Modelling and Simulation  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Reservoir Engineering II

Reservoir modelling and simulation course introduces the concept of fluid flow in porous media to perform reservoir simulation. It introduces finite difference method to discretize partial differential equations and solve them in time and spatial domain using matrix solvers. The course also covers input data preparation for integrated reservoir modelling and simulation as well as interpreting the results.

**COURSE CODE** : PFB2063  
**COURSE** : Production Engineering I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Fluids Mechanics

The production operations and processes require close monitoring for adequate optimization of oil and gas production. The course covers well performance and nodal analysis for natural flow and artificial lifted wells. The course also introduces the concept of well completions and perforation techniques.

**COURSE CODE** : PFB4022  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : 3rd Year Standing

This is an individual research project in connection with engineering problems under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, and device fabrication. For FYP-I, each student prepares a comprehensive engineering report, present the research problem with literature review and propose a feasible methodology to deliver the project effectively.

**COURSE CODE** : PFB4032  
**COURSE** : Petroleum Economics  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course begins with a review on the fundamentals of general economic principles. The course also includes topics relating to upstream petroleum economics and introduces students to exploration and production (E&P) projects. Students will also be exposed to overview of E&P project economic evaluation, risks & uncertainty and various economic representations.

**COURSE CODE** : PFB4044  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, and device fabrication. For both FYP-I and FYP-II, each student prepares a comprehensive engineering report, present and demonstrate findings and results of the project work.

**COURSE CODE** : PFB4053  
**COURSE** : Field Development Project I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 3rd Year Standing

The module integrates the learning outcomes of the taught courses. The main aim is to produce a field development plan based on real data. The main learning outcomes are expected to enhance cognitive and core skills: team working, developing problem solving strategies etc.

**COURSE CODE** : PFB4064  
**COURSE** : Field Development Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Field Development Project I

The module integrates the learning outcomes of the taught courses. The main aim is to produce a field development plan based on real data. The main learning outcomes are expected to enhance cognitive and core skills: team working, developing problem solving strategies etc.

**COURSE CODE** : PFB4013  
**COURSE** : Gas Field Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course begins with a review of gas production and reservoir engineering and continues with concepts of gas field development planning. The course will also cover gas well deliverability tests, static and bottom hole pressure determination, gas volume measurement, gas reserves estimations and the necessary production facilities.

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Reservoir Engineering

**COURSE CODE** : PFB4113  
**COURSE** : Enhanced Oil Recovery  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course introduces the background knowledge in enhanced oil recovery (EOR) techniques to enable selection, design and management of EOR projects that are often considered along with the secondary recovery techniques. Fundamentals and theories of miscible and immiscible fluid Injection processes, chemical flooding processes and thermal recovery processes are introduced. The first-pass screening and field experience for each technique is also discussed.

**COURSE CODE** : PFB4123  
**COURSE** : Advanced Well Test Analysis  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing, Well Test Analysis

This course covers part of the contents in Well test Analysis in greater detail with more concentration on log-log derivate plots. It should also cover various boundary systems such as close-system, fault-systems, etc. Well test analysis of naturally fractured reservoirs and hydraulic fractured wells should also be considered. An introduction to wireline formation tester (RFT & MDT) data (pressure versus depth data) should also be presented.

**COURSE CODE** : PFB4133  
**COURSE** : Advanced Reservoir Simulation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing, Reservoir Modelling and Simulation

In this course, students will be able to construct simulation model and initialise it under a given reservoir condition. History matching of a reservoir model with reasonableness and accuracy is covered in the course. This is preceded by identification of proper rock and fluid property data, which are responsible for discrepancies in model and observed field data. This process is also covered in detail in relation to the analysis of parameters' impact on simulation output by sensitivity and uncertainty analysis.

### 5.2.2 Drilling Engineering

**COURSE CODE** : PFB4213  
**COURSE** : Drilling Fluids and Cementing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing / Drilling Engineering II

The course begins with evaluating the drilling performance and continue with clay chemistry and inhibition, polymer chemistry, filtration properties, Completion, Reservoir Drill-in, Workover and Packer Fluid and drilling waste management. Later, the student will be exposed to cementing, including the cement additives, cement job, cement evaluation and horizontal cementing.

**COURSE CODE** : PFB4223  
**COURSE** : Well Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing / Drilling Engineering II

This course introduces students to the advancement in drilling technology. The beginning of the course will cover the advanced directional drilling and wellbore surveying technology. Then, students will learn on the different types of managed pressure drilling (MPD) which comprises of underbalanced drilling operation (UBD), mud cap drilling (MCD), and dual gradient drilling (DGG).

**COURSE CODE** : PFB4233  
**COURSE** : Drilling Hydraulics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing / Drilling Engineering II

The course begins with a flow patterns and Reynolds Number. Then, the students will be introduced to Rheological models, Frictional Pressure drop for laminar and turbulent flow in Pipes and Annuli and also frictional pressure drop across a bit. Students will also be exposed to optimisation of hydraulics and Particle slip velocity design. Methods to estimate additional pressure drop due to surge and swab will be discussed in detail.

### 5.2.3 Production Engineering

**COURSE CODE** : PFB4313  
**COURSE** : Production System and Optimisation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

Production optimisation is one of the core responsibilities of Production Technologist as to maximise The value of the asset. Students are also exposed to the knowledge on how to use production optimisation software as per industry practice.

**COURSE CODE** : PFB4323  
**COURSE** : Well Stimulation Techniques  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

Stimulation is required in both conventional and unconventional reservoirs. Conventional reservoir requires wellbore stimulation treatment to overcome formation damage. Unconventional reservoir requires hydraulic fracturing to achieve economic recovery. This course covers the topics of formation damage characterisation, basics of matrix and hydraulic fracturing stimulation design, operations and evaluation.

**COURSE CODE** : PFB4333  
**COURSE** : Flow Assurance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

Flow assurance is the most critical task during deep-water petroleum production at high pressures and low temperature conditions. The subsequent financial loss from production interruption or asset damage can be astronomical. Furthermore, these solid deposits can interact with each other to further complicate production operations leading to catastrophic blockage in pipelines and flow assurance failure. Thus, adequate knowledge of flow challenges and appropriate mitigation strategies are essential for effective and smooth oil and gas delivery.

## 5.2.4 Renewable Energy

**COURSE CODE** : MFB4123  
**COURSE** : Energy Management & Environment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on energy auditing – site survey, data acquisition, analysis and reporting, Strategies – Energy conservation strategies, energy management system’s requirements, demand site management, etc. Environmental issues – Carbon dioxide emission, Green House Gases, Carbon trading, etc. Project Investment – costs, payback period, net present value method, life cycle analysis, etc.

**COURSE CODE** : MFB4513  
**COURSE** : Renewable Energy I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on wind power, simple theory of the wind turbine’s performance & present developments. Hydroelectric and pumped storage systems. Solar thermal power: Direct solar power. Design of low temperature solar heaters for domestic use. Performance characteristics. Description of solar systems for power generation.

**COURSE CODE** : MFB4523  
**COURSE** : Renewable Energy II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : 4<sup>th</sup> Year Standing

This course covers topics on the wave & tidal energy - physical principles of wave energy, various types of wave energy converters and the environmental impacts and economics; fuel cell - principles of fuel cell and hydrogen production; geothermal energy - the physics of geothermal resources, technologies for geothermal resource exploitation and the environmental implications. Biomass energy including introduction to biomass types and resources, biomass as a fuel, energy crops, environmental benefits and economics of biomass.

## **Programme Information**

**Bachelor in Business Management  
(Hons)**

## Bachelor in Business Management (Hons)

### 1.1 Introduction

This programme provides students with fundamental knowledge and practical skills of business management especially in core business area and business analytics. Throughout the programme, students will develop a business mind-set and analytical skills to make informed decisions in data-driven organisations through synthesising data for sound business solutions. All students of Bachelor in Business Management (Hons) will undergo a 7-month internship during their final year which will enhance their employability.

Students will acquire Business Analytics which is the combination of skills, technologies, applications, and processes used by businesses. In the current data-driven business landscape, companies generate real-time data to predict future trends for better decision-making and business strategies. Business Analytics will provide cutting edge expertise and skills to unlock values for improved business solutions.

### 1.2 Programme Educational Objective

To produce business professionals and leaders in various sectors globally.

### 1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Apply the knowledge of business management to various sectors.
- ii. Create and develop innovative business management solutions using scientific approaches, best practices and standards in meeting stakeholders' needs.
- iii. Operate and function effectively in multi-disciplinary teams to accomplish a common goal.
- iv. Function and communicate effectively in a variety of professional contexts as an individual or as a member of a group.
- v. Integrate and implement business management solutions in relevant environments.
- vi. Engage in life-long learning and professional development.
- vii. Demonstrate entrepreneurial skills and business acumen.
- viii. Demonstrate understanding of professional, ethical, moral, legal and social issues toward society & environment.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor in Business Management (Hons), students are required to obtain a minimum of **122 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	14
CC – Core Common	8
CD – Core Discipline	28
CI – Core Industrial Internship	14
CSp – Core Specialisation	30
P – Project	6
E – Electives	12
<b>TOTAL</b>	<b>122</b>



SEMESTER 7			
Code	Courses	Cr	G
IFB3047	Student Industrial Project (SIP)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 8			
Code	Courses	Cr	G
GEB2102	Entrepreneurship	2	UR
GEB2083	Business Team Project	3	CC
GEB3073	Human Resource Management	3	CD
XXXxxx3	Elective IV	3	E
GEB3203	Strategic Business Analytics	3	CSp
<b>Credit Hours</b>		<b>14</b>	

SEMESTER 9			
Code	Courses	Cr	G
GEB3093	Strategic Management	3	CD
GEB3082	Final Year Project I	2	P
GEB3263	Decision-Making and Scenarios	3	CSp
GEB3213	Forecasting Methods for Management	3	CSp
GEB3193	Supply Chain Analytics	3	CSp
<b>Credit Hours</b>		<b>14</b>	

SEMESTER 10			
Code	Courses	Cr	G
GEB4104	Final Year Project II	4	P
GEB3233	Enterprise Risk Management	3	CSp
GEB3233	Customer Behaviour and Analysis	3	CSp
GEB3243	Law and Ethics of Business Analytics	3	CSp
<b>Credit Hours</b>		<b>13</b>	

**Total Credit Hours : 122**

### 3.0 Core Specialisation (CSp) Courses

Business Analytics				
No	Code	Course Name	Cr	G
1	GEB1183	Business Statistics	3	CSp
2	GEB1253	Business Mathematics	3	CSp
3	GEB2173	Introduction to Data Mining for Business	3	CSp
4	GEB3193	Supply Chain Analytics	3	CSp
5	GEB3203	Strategic Business Analytics	3	CSp
6	GEB3213	Forecasting Methods for Management	3	CSp
7	GEB3223	Customer Behaviour and Analysis	3	CSp
8	GEB3233	Enterprise Risk Management	3	CSp
9	GEB3243	Law and Ethics of Business Analytics	3	CSp
10	GEB3263	Decision-Making and Scenarios	3	CSp

## 4.0 Electives (E) Courses

Choose any of four (4) of the following courses for Elective I, II, III and IV.

No	Code	Courses	Cr	G
1	GEB3273	Operations Management	3	E
2	TEB1073	Enterprise Resource Planning	3	E
3	TEB1213	Knowledge Discovery	3	E
4	TEB2213	Introduction to Cyber Security	3	E
5	TEB3043	IS Strategy Planning	3	E

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### Note:

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.
  - Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.
  - Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.
  - Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis
  - Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.
  - Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.
  - Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.
  - Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.
  - Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.
  - Code V** : Please refer to Civil Engineering Programme for Course Synopsis.
  - Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : GEB1023  
**COURSE** : Economics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This subject exposes the students to both the microeconomics and macroeconomics concepts and models. In microeconomics, students will be exposed to the use of the supply and demand analyses, consumer choices, production and market structures (households and firms) while in macroeconomics, students will be exposed to the interaction of goods and services markets, labour and money at an aggregate level, and the role of government policies; locally, nationally and internationally.

**COURSE CODE** : GEB1032  
**COURSE** : Management and Organisational Behaviour  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The dynamicity of changes in the current world business environment is affecting all aspects of people's behaviours in organisations. The increasing globalisation of business and diversity of the workforce, the proliferation of ethical controversies and scandals in organisations, have enforced reasons for managers today to master the many different aspects of organisational behaviour. Thus, it is imperative for managers to be fully equipped and capable of managing people to ensure they perform their jobs, play their roles as effective and ethical members of the organisation that will contribute to the success of the organisations. This course will cover topics such as personality and behaviour; performance and stress; decision-making skills; power and leadership; politics and conflict; team and group dynamics; interpersonal and group communication; culture and organisational development.

**COURSE CODE** : GEB2013  
**COURSE** : Business Accounting  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides students with an introductory level orientation to basic accounting principles and their applications to a business organisation. It aims to provide students with a good grounding in and an appreciation of the business accounting essentials that any manager or business professional should possess.

**COURSE CODE** : GEB2033  
**COURSE** : Financial Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces students to the theories and concepts of financial management. Students will be equipped with the understanding of the fundamentals of finance that are applied in the real business world. In essence, this course provides a practical basis for financial decision-making in achieving the goal of a firm. Three key financial decisions will be covered; 1. Investment decision 2. Financing decision and 3. Financial planning & analysis. In addition, students will be exposed to valuation models, risk-return trade, dividend policy, cash & working capital management, etc. with regard to firm's value maximization. Students are expected to gain a solid foundation of the financial theories and application as well as real-life scenarios & examples, case studies and practical dilemmas faced in finance.

**COURSE CODE** : GEB2153  
**COURSE** : Business Law  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Throughout the course, students will be encouraged to develop analytical and presentation skills and demonstrate the ability to integrate different fields of knowledge in the analysis of legal and business issues. On completion of the course, students should be able to apply and to critique the legal rules relating to global business.

**COURSE CODE** : GEB2163  
**COURSE** : Management Science  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course deals with decision making situations, that includes the discussions of problem definitions, objectives, constraints, model construction and verification, development of solutions, analysis and interpretation.

**COURSE CODE** : GEB3073  
**COURSE** : Human Resource Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course aims to provide a broad introduction to the theoretical and practical knowledge of human resource management (HRM) in organisations. It provides students with an understanding of the issues involved in staffing (job analysis, recruitment and selection), training and development, performance appraisal and compensation (salary, incentives and benefits). It also exposes students to current trends, issues and research publications relating to human resource aspects and practices in organisations.

**COURSE CODE** : GEB3083  
**COURSE** : International Business  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course exposes students to international business management and its importance. It highlights the structure and environment of business operations at the international level. This knowledge will prepare students for the job requirements with companies/firms with international market operations. The course also discusses the influence of other factors such as politics, culture, technology and geography on business functions.

**COURSE CODE** : GEB2042  
**COURSE** : Principles of Marketing  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This introduction course of marketing will demonstrate on how modern marketing practices may contribute towards firm's profitability. It develops understanding on the importance of marketing concepts and activities tailored to the customers' needs and satisfaction in the marketplace. The subject introduces the use of basic concept in marketing, marketing strategy and marketing process for more added values and building profitable relationship with customers. The focus will be on the application of the marketing principles of 4 P's that are product, place, price and promotion into real situations.

**COURSE CODE** : GEB3093  
**COURSE** : Strategic Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to prepare student to make a smooth transition from the academic program into the business world. It focuses on the analytical and decision-making processes involved in formulating, implementing and evaluation management strategies. Students will be exposed on three central questions in thinking strategically about the company's present circumstances and prospects: What's the company's present situation? Where does the company need to go from here? How should it get there? It is also based on the belief that organizations should continually monitor internal and external events and trends so that timely changes can be made as needed for example changing market conditions, competitive moves, shifting buyer needs, emerging market opportunities, and globalization. It is aimed at allowing organizations to adapt effectively to change over the long run. It also exposes students to draw up a clear vision and mission statements that can be resulting in documenting the directions and management strategy.

## 5.2 Core Common (CC) Courses Synopsis

**COURSE CODE** : GEB2083  
**COURSE** : Business Team Project  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The capstone project is an action-based leadership project that provides students with an opportunity to demonstrate integrated knowledge and growth in the field of Business Management. The capstone paves ways for students to integrate and apply knowledge from their academic studies through the lens of analytics for evaluation of core areas of finance and accounting, economics, marketing, operations, management, human resource, and all related fields. The course will assess the students' cognitive and intellectual growth in their specialised areas and also in the overall academic learning experience.

## 5.3 Project (P) Courses Synopsis

**COURSE CODE** : GEB3082  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Semester 6/3<sup>rd</sup> Year Standing

This is an individual research project in connection with business and management issues, and under the guidance of a faculty member. The project undertaken may fall under any of the areas within core management or specialisation. Students are expected to conduct literature review and propose a feasible project with suitable implementation strategies, conceptual framework, and appropriate methodology.

**COURSE CODE** : GEB4104  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project as a continuation from Final Year Project I (FYP I). Students will undertake investigations of a research project based on the proposed methodology and requirements as presented in FYP I. Students are expected to analyse and interpret data using appropriate techniques / tools to solve the identified problem with understanding of its limitation.

## 5.4 Core Specialisation (CSp) Courses Synopsis

### 5.4.1 Business Analytics

**COURSE CODE** : GEB1183  
**COURSE** : Business Statistics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The main aim of this course is to provide students the knowledge of the business statistics and the use of latest tools and applications for drawing analytical inferences for business decisions. The course focuses on the principles, and application of business statistics and various kinds of latest statistical tools used in everyday business practice.

**COURSE CODE** : GEB1253  
**COURSE** : Business Mathematics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

In this course, students will be exposed to basic function of Mathematics to solve simple mathematical problems encountered in business and investment decision making. Students will gain the ability to apply mathematical methods, concepts, and principles to areas such as business and finance.

**COURSE CODE** : GEB2173  
**COURSE** : Introduction to Data Mining for Business  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The goal of this course is to provide a solid understanding of the opportunities, techniques and critical challenges in using data mining and predictive modelling in a business setting. This course will provide students with hands-on experience using a variety of real-world datasets. Special attention is given to how students can best understand and translate business challenges into data mining problems. It will get students to develop the ability, through coverage of major issues involved in knowledge discovery and decision making as well as core technical concepts and machine learning methods. The core essence of these more technical aspects will be carried out without getting into their mathematical underpinnings. This course however is not a guarantee to turn students into a data scientist, it is meant to make students literate in data science, which means students will be comfortable doing some hands-on work, interacting with and managing data scientists as well as evaluating data science proposals from a business standpoint.

**COURSE CODE** : GEB3193  
**COURSE** : Supply Chain Analytics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The main aim of this course is to provide students with knowledge of business intelligence and data management and provide use of latest tools and applications for useful management of the data for successful business projects. The course focuses on the principles, and application of business intelligence and various kinds of data management used in everyday business practice.

**COURSE CODE** : GEB3213  
**COURSE** : Forecasting Methods for Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Forecasting is a vital part of our economic lives, both in public policy and business management. The reason is simple – all management and economic decisions are forward looking. We make decisions today for some type of return or improvement in the future. The returns depend on the future states-of-the-world (SOW) but sitting here today we do not know and never will know exactly what those future states will be; the future SOWs are uncertain. Consequently, we always make our decisions under uncertainty. For an organisation to provide customer delight it is important that the organisation can understand what the customer wants and how much they want. If an organisation can gauge future demand, then the manufacturing plan becomes simpler and cost effective. The process of analysing and understanding current and past information to understand the future patterns through a scientific and systemic approach is called forecasting. And the process of estimating the future demand of product in terms of a unit or monetary value is referred to as demand forecasting. The purpose of forecasting is to help the organisation manage the present as to prepare for the future by examining the most probable future demand pattern. However, forecasting has its constraints, for example, we cannot estimate a pattern for technologies and product where there are no existing pattern or data.

**COURSE CODE** : GEB3223  
**COURSE** : Customer Behaviour and Analysis  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Analytics is both an art and a science to discover and understand historical patterns in a company's data in order to predict and improve business performance under forecasted environmental, economic, and competitive conditions. Customer analytics is the subset of marketing and business analytics. This course will introduce students to the basics of customer analytics and will demonstrate how to practically apply these analytics to real-world business decisions. Students will develop an understanding of the data available to marketers, its uses and limitations, and be exposed to methods for measuring performance of marketing efforts towards customer recruitment and retention. Students will also acquire hands-on experience with customer analytics enabling tools and software. In a world where marketers are held accountable for results, the mastery of customer analytics is an indispensable competitive advantage.

**COURSE CODE** : GEB3203  
**COURSE** : Strategic Business Analytics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed for students, to apply statistical knowledge and techniques to business contexts. It provides knowledge to experience doing analytics that would lead them into a business role. students will learn overview on Strategic Business Analytics topics then into a wide variety of applications of Business Analytics. From Marketing to Supply Chain and HR Analytics, etc. The course covers many different data analytics techniques, each time explaining how to be relevant for your business. Students will be able to develop four sets of skills needed to leverage value from data: Analytics, IT, Business and Communication.

**COURSE CODE** : GEB3243  
**COURSE** : Law and Ethics in Business Analytics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Law and Ethics serve an important role in the national business environments by providing the rules of the road. Informed decision-making requires knowledge of the foundations of the Malaysian and international legal systems, including contract law, property law, business formation, and many other areas.

**COURSE CODE** : GEB3263  
**COURSE** : Decision-Making and Scenarios  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course aims to provide students with good understanding in decision making and scenario planning process and techniques. Students will be equipped with the knowledge and skills required in a decision making and scenario planning process. Students will also be introduced to the core concepts, methods and decision-making issues which lay the foundations for making a decision. Decision analysis, interpretation and presenting analysis output will also be discussed.

**COURSE CODE** : GEB3233  
**COURSE** : Enterprise Risk Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The principal aim of this course is to provide students to have a solid understanding in the corporate risk management sphere. This subject focuses on the concepts, principles and application of Enterprise Risk Management (ERM) as an important aspect for organizations to have in facing uncertain and risky business environment. The topics for the course will cover the theories, analytics and strategy of ERM to nurture the risk consciousness and understanding of future business leaders.

## 5.5 Electives (E) Courses Synopsis

**COURSE CODE** : GEB3273  
**COURSE** : Operations Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course examines the strategic role of operations, familiarise students with some major issues and challenges that confront managers face. Students will examine theories and strategic tools to deal with these operational issues in order to gain competitive advantage through operations.

**COURSE CODE** : TEB1073  
**COURSE** : Enterprise Resource Planning  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course will introduce concepts and techniques of forecasting, production system, plant location and plant layout. Some analysis of plant layout material handling, job enrichment, job enlargement and purchase systems also introduced.

**COURSE CODE** : TEB1213  
**COURSE** : Knowledge Discovery  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course will introduce concepts and techniques of data mining and data warehousing, including principle, architecture, design, implementation and application of data mining. Some systems for data warehousing and/or data mining will also be introduced.

**COURSE CODE** : TEB2213  
**COURSE** : Introduction to Cyber Security  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers fundamental issues and first principles of cyber security. The course will look at the security policies, models and mechanisms related to confidentiality, integrity, authentication, identification, and availability issues related to information and information systems. Other topics covered include basics of cryptography (e.g., digital signatures, PKI) and network security (e.g., firewall, intrusion detection and prevention), risk management, security assurance and secure design principles. Issues such as organizational security policy, legal and ethical issues in security, standards and methodologies for security evaluation and certification will also be covered.

**COURSE CODE** : TEB3043  
**COURSE** : IS Strategy Planning  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course reviews the concepts of information systems, organizational structures and models. It introduces students with current issues and development of information systems. It then goes on to deal with planning, control and evaluation of information systems.

# Bachelor of Computer Science (Hons)

## Bachelor of Computer Science (Hons)

### 1.1 Introduction

This programme provides students with fundamental knowledge and practical skills of computer science especially in programming, networking and software engineering. Throughout the program there is also emphasis on how students could blend their technical expertise with management know-how in order to support business decision-making and to communicate effectively in commercial and business environment.

In later years of study, students will have the opportunity to major in one of these selected areas:

- **Data Analytics**
- **Cyber Security**
- **Enterprise Systems**
- **Software Quality**

### 1.2 Programme Educational Objectives

- Computer scientists who apply Computer Science knowledge and technical skills in providing practical solutions to computing issues and problems.
- Computer scientists who integrate positive values and professionalism and engage with the society in providing innovative computing solutions.
- Computer scientists who take alternate roles as leader and team player who effectively communicate and employ scientific methods in providing creative computing solutions to real world problems.
- CS professionals who are job creators rather than job seekers that practice continual career development through lifelong learning and effectively plan, implement, configure and maintain computing infrastructure and resources.

### 1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- Apply knowledge and understanding of mathematics and computing sciences to develop software applications.
- Develop software application to solve computing problems.
- Demonstrate social skills and responsibility for the well-being of society.
- Balance and uphold positive values, ethics and accountability in societal and professional engagement.
- Lead and communicate with team members and the stakeholders.
- Provide scientific solutions to computing related issues.
- Manage information and seek new knowledge and skills independently.
- Demonstrate relevant and appropriate managerial and entrepreneurial skills.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Computer Science (Hons), students are required to obtain a minimum of **123 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CT - Core Technology	37
CD - Core Discipline	18
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
P - Project	6
EM – Minor Electives	15
<b>TOTAL</b>	<b>123</b>



SEMESTER 7			
Code	Courses	Cr	G
IFB3047	Student Industrial Project (SIP)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 8			
Code	Courses	Cr	G
GFB2102	Entrepreneurship	2	UR
TEB2083	Technopreneurship Team Project	3	CT
TEB2093	Computer Security	3	CT
TEB2103	Modelling and Simulation	3	CD
XXXxxx3	Minor Elective II	3	EM
<b>Credit Hours</b>		<b>14</b>	

SEMESTER 9			
Code	Courses	Cr	G
TEB3012	Final Year Project I	2	P
XXXxxx3	Minor Elective III	3	EM
XXXxxx3	Minor Elective IV	3	EM
TEB3XX3	Core Specialisation I	3	CSp
TEB3XX3	Core Specialisation II	3	CSp
<b>Credit Hours</b>		<b>14</b>	

SEMESTER 10			
Code	Courses	Cr	G
TEB3024	Final Year Project II	4	P
XXXxxx3	Minor Elective IV	3	EM
TEB3xx3	Core Specialisation III	3	CSp
TEB3033	Distributed and Parallel Computing	3	CD
<b>Credit Hours</b>		<b>13</b>	

**Total Credit Hours : 123**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets (set A, B, C or D) of Core Specialisation areas for Core Specialisation I, II and III.

A. Data Analytics				
No	Code	Course Name	Cr	G
1	TEB3113	Big Data Analytics	3	Csp
2	TEB3123	Machine Learning	3	Csp
3	TEB3133	Data Visualisation	3	Csp

B. Cyber Security				
No	Code	Course Name	Cr	G
1	TEB3213	Computer Forensic	3	Csp
2	TEB3223	Information Assurance	3	Csp
3	TEB3233	Computer Ethics and Cyber Law	3	Csp

C. Enterprise Systems				
No	Code	Course Name	Cr	G
1	TEB3313	Business Intelligence	3	Csp
2	TEB3323	Enterprise System Development	3	Csp
3	TEB3333	IT Audit & Risk Management	3	Csp

D. Software Quality				
No	Code	Course Name	Cr	G
1	TEB3413	Software Requirement Engineering	3	Csp
2	TEB3423	Software Design and Architecture	3	Csp
3	TEB3433	Software Testing & Quality Assurance	3	Csp

#### 4.0 Minor Electives (EM) Courses

Choose any ONE(1) of the following sets of Minor Elective's areas (set A, B or C) for Minor Elective I, II, III, IV and V.

<b>A. Corporate Management - Choose ONLY 5 Courses</b>				
No	Code	Course Name	Cr	
1	GEB1033	Management & Organisational Behaviour	3	EM
2	GEB2043	Principles of Marketing	3	EM
3	GEB3113	Corporate Communication	3	EM
4	GEB3093	Strategic Management	3	EM
5	GEB3073	Human Resource Management (Final Year Only)	3	EM
6	GEB3213	Forecasting Methods for Management	3	EM
7	GEB3203	Strategic Business Analytics	3	EM
<b>Total Credit Hours</b>			<b>21</b>	

  

<b>B. Financial Management – Choose ONLY 5 Courses</b>				
No	Code	Course Name	Cr	
1	GFB2053	Principle of Finance	3	EM
2	GFB2013	Business Accounting	3	EM
3	GFB2113	Fundamental of Investment	3	EM
4	GFB3033	Corporate Finance	3	EM
5	GFB3043	International Financial Management	3	EM
6	GEB3083	International Business	3	EM
7	GEB3233	Enterprise Risk Management	3	EM
<b>Total Credit Hours</b>			<b>18</b>	

  

<b>C. Accounting and Finance</b>				
No	Code	Course Name	Cr	G
1	GFB2013	Principle of Finance	3	EM
2	GFB2153	Business Accounting	3	EM
3	GFB2283	Fundamental of Investment	3	EM
4	GFB2293	Corporate Finance	3	EM
5	GFB2303	International Financial Management	3	EM
<b>Total Credit Hours</b>			<b>15</b>	

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**Note:**

<b>Code C</b>	:	Please refer to Chemical Programme for Course Synopsis.
<b>Code E</b>	:	Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.
<b>Code F, Y, Z</b>	:	Please refer to Fundamental & Applied Sciences Department for Course Synopsis
<b>Code K</b>	:	Please refer to Credited Co-Curriculum Programme for Course Synopsis.
<b>Code M</b>	:	Please refer to Mechanical Engineering Programme for Course Synopsis.
<b>Code P</b>	:	Please refer to Petroleum Engineering Programme for Course Synopsis.
<b>Code Q</b>	:	Please refer to Petroleum Geoscience Programme for Course Synopsis.
<b>Code T</b>	:	Please refer to Information Systems and Information Technology Programmes for Course Synopsis.
<b>Code V</b>	:	Please refer to Civil Engineering Programme for Course Synopsis.
<b>Code L, G, H, MPU</b>	:	Please refer to Management & Humanities Department for Course Synopsis

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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : TEB1053  
**COURSE** : Discrete Mathematics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover topics such as sets, relations, functions, counting principles, logic, proof techniques, mathematical induction, graphs, directed graphs, trees and Boolean algebra. The relationship of these and related concepts with computer science will be emphasised.

**COURSE CODE** : TEB1063  
**COURSE** : Data Communication and Network  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is aimed to give students an understanding of the basic theory and practical understanding of a data communications and computer networking system. The course will also provide opportunity for students to design, construct, evaluate and analyse a simple network infrastructure based on some basic performance measures for efficient and reliable network communications system. Both wired and wireless networking setups are to be exposed to students.

**COURSE CODE** : TEB1113  
**COURSE** : Algorithm and Data Structure  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers the different types of data structures as well as several common algorithms used when solving programming problems. It is aimed to improve the student's skills in programming. Students will be exposed to different ways of data representation and applying them to solve various problems. A detailed coverage of all fundamental data structures will be presented: lists, stacks, queues and trees; and, several commonly used algorithms will be introduced and analysed.

**COURSE CODE** : TEB2053  
**COURSE** : Embedded Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Structured Programming

This course will introduce the principles of embedded and real-time systems inherent in many hardware platforms and applications being developed for engineering and science as well as ubiquitous systems. As part of this course, students will learn about quality of service and real-time system principles, understand embedded and real-time applications design & development. A systematic approach is used to cover various aspects of assembly language programming and interfacing using one of the most popularly used PIC as well as develop embedded software based on high level programming and real-time operating system. A mini project based on all concepts learnt is to be completed by the student.

**COURSE CODE** : TEB3033  
**COURSE** : Distributed and Parallel Computing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers a broad range of topics related to parallel and distributed computing, including parallel and distributed architectures and systems, parallel and distributed programming paradigms, parallel algorithms, and scientific and other applications of parallel and distributed computing. The lab portion of the course includes programming projects using different programming paradigms. Course topics may include: multi-core, SMP, MMP, client-server, clusters, clouds, grids, peer-to-peer systems, GPU computing, scheduling, scalability, resource discovery and allocation, fault tolerance, security, parallel I/O, sockets, threads, message passing, MPI, RPC, distributed shared memory, data parallel languages, MapReduce, parallel debugging, and applications of parallel and distributed computing.

**COURSE CODE** : TEB2103  
**COURSE** : Modelling and Simulation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers modelling and simulation principles with applications to systems architecting and engineering. Students will use simulation tools and conduct studies to address current research issues for complex systems. It covers modelling approaches with a focus on continuous and discrete simulation, and survey applications for complex systems across a variety of engineering domains. The semester project is to develop an extensive simulation study related to systems architecting and engineering. Each student will define his/her research topic to be addressed by systems modelling and simulation. The variety of topics is flexible and in approved cases students can team up in groups of two.

## 5.2 Core Technology (CT) Courses Synopsis

**COURSE CODE** : TEB1013  
**COURSE** : Structured Programming  
**NO. OF CREDITS** : 3 credit  
**PRE-REQUISITE** : None

There are two parts in this subject. The first half is an introduction to problem solving using computers. It emphasises on various aspects of problem solving, mainly consisting of the problem domain, phases of problem solving and basic techniques of designing a solution.

The second half is an introduction to the fundamental concepts of programming using a structured programming language. The language will be used to write a working programme for enhancing students understanding of the problem-solving concepts discussed in the first part.

**COURSE CODE** : TEB1024  
**COURSE** : Computer Systems  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This course deals with various components of the computer system such as memory and I/O interface techniques. It assumes some programming experience and equips students with knowledge of a computer structure, operation and I/O facilities. It also includes concepts relating to the design and implementation of the computer operating systems.

**COURSE CODE** : TEB2023  
**COURSE** : Artificial Intelligence  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will introduce the aims and scope of learning Artificial Intelligence (AI) and also include the principles and concepts of AI. It covers basic issues such as fundamental definitions, characteristics of intelligent programs, and an overview of advance topics in intelligent computing. The techniques introduced are knowledge representation and reasoning, heuristic searching, and machine learning. Some advance topics such as expert systems, natural language processing, are also introduced in general.

**COURSE CODE** : TEB1043  
**COURSE** : Object Oriented Programming  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Structured Programming

This course introduces fundamental concepts of object-oriented programming such as encapsulation, inheritance and polymorphism. Students will apply the concepts to build software system that are highly reusable and extensible.

**COURSE CODE** : TEB1093  
**COURSE** : Statistics and Empirical Method  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This subject introduces the use of statistical methods in evaluating research data for business application and decision making. It demonstrates the use of descriptive and inferential statistics. The focus will be on the application of the statistics that are relevant to the functional area of business.

**COURSE CODE** : TEB1103  
**COURSE** : Data and Information Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides a study of the practical aspects of the computerised information systems by understanding theoretical concepts of database systems, its design and manipulation techniques. It also requires applied knowledge obtained from the course to design, develop and implement a database system. It emphasises on the relational database model as a guide to create a stable database system underlying most applications.

**COURSE CODE** : TEB2014  
**COURSE** : Software Engineering and HCI  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This course provides a foundation in Software Engineering (SE) and Human Computer Interaction (HCI), covering a range of core topics needed to be able to model, design, implement and evaluate larger software systems effectively, and gain a further understanding of the wider context in which software is developed. The SE portion has two major themes. The first covers what software engineering is, managing the development process with an emphasis on agile development, legal issues and contract law, report writing, risk and risk management, quality control and standards, financial costing, and health and safety. The second theme explores the practical knowledge and skills to carry out software development, including requirements specification, the Unified Modelling Language (UML), software architecture, object-oriented analysis and design, design patterns and testing. The HCI portion introduces essential knowledge and methods for understanding users, designing systems and interactions that are effective, efficient and satisfying to use, and evaluating the usability of these systems.

**COURSE CODE** : TEB2043  
**COURSE** : Data Science  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover topics such as analytic approach, data requirements, modelling, evaluation, deployment and feedback. The flow of methodology will help students on problem solving process.

**COURSE CODE** : TEB2093  
**COURSE** : Computer Security  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Data Communication and Network

This course covers fundamental issues and first principles of computing security. The course will look at the security policies, models and mechanisms related to confidentiality, integrity, authentication, identification, and availability issues related to information and information systems. Other topics covered include basics of cryptography (e.g., digital signatures, PKI) and network security (e.g., firewall, intrusion detection and prevention), risk management, security assurance and secure design principles. Issues such as organisational security policy, legal and ethical issues in security, standards and methodologies for security evaluation and certification will also be covered.

**COURSE CODE** : TEB2083  
**COURSE** : Technopreneurship Team Project  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The emphasis on this course is on the aspect of nurturing technopreneurship among students so they can understand the concept of creativity and innovation to produce IT solutions to real-life scenario. The course discusses concepts of technopreneurship: drivers of IT industry (e.g. government policies, domestic market, infrastructure, and market linkages), business concepts, and project management methodology, which are necessary in setting up and managing IT business. The implication of this course covers the technopreneurship from conception to implementation of a new IT venture. The technopreneurship team project emulates a consulting relationship. The completion of this course is the students' 'proof of competency'.

### 5.3 Project (P) Courses Synopsis

**COURSE CODE** : TEB3012  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : 3rd year standing

This course provides students with opportunities to enhance skills that may not be easy to accomplish in the traditional classroom setting such as interacting with users, developing formal problem specifications, reviewing research journal, building prototypes, scientific writing and making oral presentations.

**COURSE CODE** : TEB3024  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This course provides students with the opportunity to enhance skills that may not be easy to accomplish in the traditional classroom setting such as interacting with users, developing formal problem specifications, reviewing research journal, building prototypes, scientific writing and making oral presentations.

### 5.4 Core Specialisation (CSp) Courses Synopsis

#### 5.4.1 Data Analytics

**COURSE CODE** : TEB3113  
**COURSE** : Big Data Analytics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Object Oriented Programming

In this course we explore key data analysis and management techniques, which applied to massive datasets are the cornerstone that enables real-time decision making in distributed environments, business intelligence, and scientific discovery at large scale. In particular, we examine the statistical, machine learning, parallel computation and big data management techniques that make possible the efficient analysis of large volumes of data in near real time. Students are expected to make use of said techniques to design highly scalable systems that can process and analyze Big Data for a variety of scientific, social, and environmental challenges.

**COURSE CODE** : TEB3123  
**COURSE** : Machine Learning  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will introduce the principles and concepts of machine learning. It covers topics such as machine learning concepts, statistical pattern recognition, and an overview of various techniques in machine learning. The techniques introduced are supervised learning, unsupervised learning, reinforcement learning and deep learning. Some recent applications of machine learning will also be discussed.

**COURSE CODE** : TEB3133  
**COURSE** : Data Visualization  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The goal of this course is to introduce students to data visualization using JavaScript. Students will learn how to plot various type of charts using Flot Javascript library. The students will also learn how to make charts interactive, integrate charts on a web page, create specialized graphs such as tree maps, heat maps, network graphics, and word clouds. Students will further learn how display timelines, visualize geographic data, and create custom visualizations using D3.js library. The course end with a mini project that covers most of the concepts and activities delivered in this course.

## 5.4.2 Cyber Security

**COURSE CODE** : TEB3213  
**COURSE** : Computer Forensic  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers the need for computer forensics and the basic concepts used in a computer forensics examination; introduces techniques required for conducting a forensic analysis on systems and data. The theories directly correlate to methods used to recover/restore data for various requirements, ranging from litigation to fraud based investigations.

**COURSE CODE** : TEB3223  
**COURSE** : Information Assurance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides the foundations of information assurance and security from a business perspective. Topics covered include information assurance principles and policies, information assurance management systems and information assurance detection and recovery processes.

**COURSE CODE** : TEB3233  
**COURSE** : Computer Ethics and Cyber Law  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to examine the ethical issues surrounding computer usage and the connection between ethics and technology. It involves definition of computer ethics, basic principles of Malaysian law in relation to cyber issues, and professional responsibilities. Several relevant topics in computer ethics that relate to legal aspects will be covered. These topics include computer security, privacy and computing, computing and intellectual property, and global information ethics.

### 5.4.3 Enterprise Systems

**COURSE CODE** : TEB3313  
**COURSE** : Business Intelligence  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

In this course we introduces the concept of business intelligence and explores its various major components such as Data Warehousing, Business Analytics and Data Visualisation, Data Mining and Business Performance Management in detail. In particular, we look at the process, contents and context of managerial decision making. This includes on how the implementation of Business Intelligence can help in improving management decision-support effectiveness and discuss issues affecting the success of Business Intelligence.

**COURSE CODE** : TEB3323  
**COURSE** : Enterprise Systems Development  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Data and Information Management

This course builds upon advanced programming skill and develops students further, both theoretically and practically, in a business environment. It gives students experience in using third and fourth generation languages, with emphasis on building maintainable information systems for enterprises. It also exposes students on building enterprise systems using basic and intermediate programming skill and knowledge, which integrates with databases. Furthermore, it will profoundly develop students with systematic and structured project management. The course is divided into several main topics such as list processing, screens, database updates and object oriented programming.

**COURSE CODE** : TEB3333  
**COURSE** : IT Audit & Risk Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The evolution of information technology (IT) continues to significantly affect the business environment. It changes business practice, and alters the ways in which systems should be controlled. Therefore, it raises the level of knowledge and skills required to determine the risks, impacts, control processes, audit procedures, and platform for clear communication and reporting of the evidence while utilising latest methods, tools and techniques. As such, it increases the need for well-educated professionals in this field that are able to cope with the rapid pace of methodological and technological change.

### 5.4.4 Software Quality

**COURSE CODE** : TEB3413  
**COURSE** : Software Requirement Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Software Engineering and HCI

Requirements analysis in systems engineering and software engineering, encompasses those tasks that go into determining the needs or conditions to meet for a new or altered product, taking account of the possibly conflicting requirements of the various stakeholders, analysing, documenting, validating and managing software or system requirements. Requirements analysis is critical to the success of a systems or software project. The requirements should be documented, actionable, measurable, testable, traceable, related to identified business needs or opportunities, and defined to a level of detail sufficient for system design.

**COURSE CODE** : TEB3423  
**COURSE** : Software Design and Architecture  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Software developers have often adopted specific architectural patterns for system organization - but, for most part informally. This subject presents the state-of-the-art in software architectures as an engineering discipline. The focus is on practical and proven models, styles and methods presented from an object-oriented

**COURSE CODE** : TEB3433  
**COURSE** : Software Testing & Quality Assurance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Software Engineering and HCI

The purpose of the course is to introduce fundamental notions of software testing and the techniques used to build and check quality in software systems. This course equips the students with a solid understanding of:

- Practices that support the production of quality software
- Software testing techniques
- Life-cycle models for requirements, defects, test cases, and test results
- Process models for units, integration, system, and acceptance testing
- Software quality process and techniques

# **Programme Information**

**Bachelor of Information Systems  
(Hons)**

## Bachelor of Information Systems (Hons)

### 1.1 Introduction

This programme provides students with fundamental knowledge and practical skills of computer technologies especially in data analytics and business intelligence with opportunities of taking specialisation in Big Data Analytics, Digital Technology, FINTECH and Software Quality. Throughout the programme there is also emphasis on how students could blend their technical expertise with management know-how to support business decision-making as well as to communicate effectively in commercial and business environment.

In later years of study, students will have the opportunity to major in one of following selected areas:

- **Big Data Analytics**
- **Digital Technology**
- **FINTECH**
- **Software Quality**

### 1.2 Programme Educational Objectives

- i. Information Systems Specialists who are able to adopt appropriate methodologies and techniques to provide computing solutions based on relevant knowledge and technical skills in the fields of study in line with the industry requirements.
- ii. Information Systems Specialists having positive attitudes, commitment for lifelong learning and entrepreneurial mind-set within industry for self and career progression.
- iii. Information Systems Specialists having leadership skills, autonomy and responsibility and communicate effectively with discipline-related stakeholders.
- iv. Information Systems Specialists who uphold ethical and professional practices in maintaining self and profession integrity.

### 1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Analyse knowledge, facts concepts, principles, and theories relating to Information System.
- ii. Analyse theoretical principles on Information Systems in providing business solutions.
- iii. Adapt appropriate methodologies and techniques for planning, designing, developing and managing business information system to enhance organisational performance.
- iv. Communicate effectively with peers, clients, superiors and society at large.
- v. Utilise relevant techniques and demonstrate analytical and critical thinking skills in problem solving.
- vi. Demonstrate leadership, teamwork, accountability and responsibility in delivering services related to field of study.
- vii. Practice principles of lifelong learning with entrepreneurial mind set in performing task.
- viii. Uphold professional and ethical practices in delivering services related to the field of study.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Information Systems (Hons), students are required to obtain a minimum of **122 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Common Core	23
CD - Core Discipline	36
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
EM - Minor Electives	15
<b>TOTAL</b>	<b>122</b>



SEMESTER 7			
Code	Courses	Cr	G
IFB3037	Student Industrial Training (SIT)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 8			
Code	Courses	Cr	G
IFB3047	Student Industrial Project (SIP)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 9			
Code	Courses	Cr	G
TFB3012	Final Year Project I	2	P
XXXxxx3	Minor Elective III	3	EM
TFB3033	IT Project Management	3	CD
TFB3XX3	Core Specialisation I	3	CSp
TFB3XX3	Core Specialisation II	3	CSp
<b>Credit Hours</b>		<b>14</b>	

SEMESTER 10			
Code	Courses	Cr	G
GEB4104	Final Year Project II	4	P
TFB3XX3	Core Specialisation III	3	CSp
XXXxxx3	Minor Elective IV	3	EM
XXXxxx3	Minor Elective V	3	EM
<b>Credit Hours</b>		<b>13</b>	

**Total Credit Hours : 122**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets of core specialisation's areas (set A, B, C or D) for Core Specialisation I, II and III.

A. Big Data Analytics					
No	Code	Course Name	Cr	G	
1	TFB3113	Data Mining	3	CSp	
2	TFB3123	Machine Learning	3	CSp	
3	TFB3133	Data Visualisation	3	CSp	

B. Digital Technology					
No	Code	Course Name	Cr	G	
1	TFB3213	Digital Innovations	3	CSp	
2	TFB3223	Emerging Topics in Digital Technology	3	CSp	
3	TFB3233	Digital Economy	3	CSp	

C. FINTECH					
No	Code	Course Name	Cr	G	
1	TFB3313	Introduction to Fintech	3	CSp	
2	TFB3323	Fintech Innovation	3	CSp	
3	TFB3333	Fintech Ethics and Regulations	3	CSp	

D. Software Quality					
No	Code	Course Name	Cr	G	
1	TFB3413	Software Requirement Engineering	3	CSp	
2	TFB3423	Software Design and Architecture	3	CSp	
3	TFB3433	Software Testing & Quality Assurance	3	CSp	

#### 4.0 Minor Electives (EM) Courses

Choose any ONE (1) of the following sets of Minor Elective's areas (set A, B or C) for Minor Elective I, II, III, IV and V.

<b>A. Corporate Management – Choose ONLY 5 Courses</b>				
No	Code	Course Name	Cr	G
1	GFB1033	Management & Organisational Behaviour	3	EM
2	GFB2043	Principles of Marketing	3	EM
3	GFB3113	Corporate Communication	3	EM
4	GFB3093	Strategic Management	3	EM
5	GFB3073	Human Resource Management (Final Year Only)	3	EM
6	GEB3213	Forecasting Methods for Management	3	EM
7	GEB3203	Strategic Business Analytics	3	EM
<b>Total Credit Hours</b>			<b>21</b>	

<b>B. Financial Management – Choose ONLY 5 Courses</b>				
No	Code	Course Name	Cr	G
1	GFB2053	Principle of Finance	3	EM
2	GFB2013	Business Accounting	3	EM
3	GFB2113	Fundamental of Investment	3	EM
4	GFB3033	Corporate Finance	3	EM
5	GFB3043	International Financial Management	3	EM
6	GFB3083	International Business	3	EM
<b>Total Credit Hours</b>			<b>18</b>	

<b>C. Accounting and Finance</b>				
No	Code	Course Name	Cr	G
1	GFB2013	Principle of Finance	3	EM
2	GFB2153	Business Accounting	3	EM
3	GFB2283	Fundamental of Investment	3	EM
4	GFB2293	Corporate Finance	3	EM
5	GFB2303	International Financial Management	3	EM
<b>Total Credit Hours</b>			<b>15</b>	

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**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : TFB1063  
**COURSE** : Web Application and Integrative Programming  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces students to the fundamental concepts of web systems and technologies as well as the practical aspects of multi-tier application development. The course is centred towards the programming of the world wide web and the development of e-commerce and data-driven web-based applications. The course also covers the concepts of Web Services and remote application development. Students will learn the craft of web Programming and develop a deeper understanding of XHTML, Cascading Style Sheets (CSS), JavaScript, for client-side programming, and PHP for Server Side Programming. Students will also learn to develop dynamic web data retrieval for offline and online with XML formatting and JSON.

**COURSE CODE** : TFB1073  
**COURSE** : Information Technology Infrastructure  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover topics related to current IT Infrastructure such as cloud computing models, trends in database and enterprise management systems. This course will help students on management and development of information technology infrastructure in an enterprise business management.

**COURSE CODE** : TFB1083  
**COURSE** : Fundamental of IS  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover topics such as Trends in database, trends in networks and trends in enterprise systems and feedback. The flow of methodology will help students on enterprise business process management and problem solving process.

**COURSE CODE** : TFB1123  
**COURSE** : Enterprise Resource Planning  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course will introduce concepts and techniques of forecasting, production system, plant location and plant layout. Some analysis of plant layout material handling, job enrichment, job enlargement and purchase systems are also introduced.

**COURSE CODE** : TFB1143  
**COURSE** : Finance Information Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the use of Finance functions and how information systems concepts used in financial. Transactions are done through online. It demonstrates the use of all information systems capabilities applied in digital financial transaction for any business transactions.

**COURSE CODE** : TFB2043  
**COURSE** : Information Assurance and Security  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers fundamental issues and first principles of information assurance and security. The course will look at the security policies, models and mechanisms related to confidentiality, integrity, authentication, identification, and availability issues related to information and information systems. Other topics covered include basics of cryptography (e.g., digital signatures, PKI) and network security (e.g., firewall, intrusion detection and prevention), risk management, security assurance and secure design principles. Issues such as organisational security policy, legal and ethical issues in security, standards and methodologies for security evaluation and certification will also be covered.

**COURSE CODE** : TFB2053  
**COURSE** : Enterprise Architecture  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to allow students to apply their IT skills together with additional learning related to enterprise architecture. Students will learn the theoretical and practical understanding of the subject areas related to enterprise architecture. Additionally, the technical and business opportunities as well as the industry trends. It will also introduce the implementation methodology and the technology essential to realisation of enterprise architecture.

**COURSE CODE** : TFB2103  
**COURSE** : IT Audit  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Today's complex business and technology environment continues to challenge enterprises seeking to protect and control IT and business systems. In addition, there is an ever-increasing number of government regulations and oversight that require stronger internal control and disclosures. The evolution of information technology (IT) continues to significantly affect the business environment. It changes business practice, and alters the ways in which systems should be controlled. Therefore, it raises the level of knowledge and skills required to determine the risks, impacts, control processes, audit procedures, and platform for clearly communication and reporting of the evidence while utilising latest methods, tools and techniques. As such, it increases the need for well-educated professionals in this field that are able to cope with the rapid pace of methodological and technological change.

**COURSE CODE** : TFB1133  
**COURSE** : System Analysis and Design  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is an introductory course covers develops awareness of the techniques, tools and methods of information systems analysis and design in a business environment. Develops analytical skills in the systems development lifecycle including: system requirements analysis, problem identification, feasibility assessment and case analysis. Provides insight into the specifications and management of socio-technical issues.

**COURSE CODE** : TFB2153  
**COURSE** : Business Intelligence  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

In this course we introduces the concept of business intelligence and explores its' various major components such as Data Warehousing, Business Analytics and Data Visualisation, Data Mining and Business Performance Management in detail. In particularly, we looks at the process, contents and context of managerial decision making. This included on how the implementation of Business Intelligence can help in improving management decision-support effectiveness and discuss issues affecting the success of Business Intelligence.

**COURSE CODE** : TFB2163  
**COURSE** : Digital Marketing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

In this course we introduce the landscape of Digital Marketing (DM) and explores its' various major components such as DM concepts, strategy & tools, and the future of Digital media. This includes varioustypes of analysis that are important for business ROI. The future of DM uses Digital Data also discussed.

**COURSE CODE** : TFB3033  
**COURSE** : IT Project Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides a comprehensive view of the nine project management knowledge areas and also the five project management process groups, following the PMBOK® Guide. The course builds on the PMBOK® Guide, an American National Standard, provides a solid framework and context for managing information technology projects. To better equip students for this environment, the course will include a team project, in which students will learn how to successfully plan, manage and deliver projects. Students will also learn how to implement project management processes, develop leadership skills and respond to real-world scenarios. All activities in this course are targeted towards exploring a variety of problems and issues in managing projects, addressing both the technical and social or human sides of the field.

## 5.2 Common Core (CC) Courses Synopsis

**COURSE CODE** : TFB1013  
**COURSE** : Structured Programming  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

There are two parts in this course. The first half is an introduction to problem solving using computers. It emphasises on various aspects of problem solving, mainly consisting of problem domain, phases of problem solving and basic techniques of designing a solution. The second half is an introduction to the fundamental concepts of programming using a structured programming language. The language will be used to write a working program by applying the problem-solving concepts discussed in the first part.

**COURSE CODE** : TFB1023  
**COURSE** : Database Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides a study of the practical aspects of the computerized information systems by understanding theoretical concepts of database systems, its design and manipulation techniques. It also requires applied knowledge obtained from the course to design, develop and implement a database system. It emphasizes on the relational database model as a guide to create a stable database system underlying most applications. In addition, an introduction to transaction management is also highlighted in the course to provide better understanding of database implementation.

**COURSE CODE** : TFB2063  
**COURSE** : Data Science  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover topics such as analytic approach, data requirements, modelling, evaluation, deployment and feedback. The flow of methodology will help students in their problem-solving process.

**COURSE CODE** : TFB2083  
**COURSE** : Statistics and Empirical Method  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the use of statistical methods in evaluating research data for business application and decision making. It demonstrates the use of descriptive and inferential statistics. The focus will be on the application of the statistics that are relevant to the functional area of business.

**COURSE CODE** : TFB2113  
**COURSE** : Technopreneurship Team Project  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The emphasis on this course is on the aspect of nurturing technopreneurship among students so they can understand the concept of creativity and innovation to produce IT solution to real-life scenario. The course discusses concepts of technopreneurship: drivers of IT industry (e.g. government policies, domestic market, infrastructure, and market linkages), business concepts, and project management methodology, which are necessary in setting up and managing IT business. The implication of this course covers the technopreneurship from conception to implementation of a new IT venture. The technopreneurship team project emulates a consulting relationship. The completion of this course is the students' 'proof of competency'.

### 5.3 Project (P) Course Synopsis

<b>COURSE CODE</b>	: TFB3012
<b>COURSE</b>	: Final Year Project I
<b>NO. OF CREDITS</b>	: 2 credits
<b>PRE-REQUISITE</b>	: None

This is an individual research project in connection with an information & communication technology or business information system problem and under the guidance of a faculty member. The project undertaken may fall under the following areas; mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

<b>COURSE CODE</b>	: TFB4014
<b>COURSE</b>	: Final Year Project II
<b>NO. OF CREDITS</b>	: 4 credits
<b>PRE-REQUISITE</b>	: Final Year Project I

This is an individual research project in connection with an information & communication technology or business information system problem and under the guidance of a faculty member. The project undertaken may fall under the following areas; mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

### 5.4 Core Specialisation (CSp) Courses Synopsis

#### 5.4.1 Big Data Analytics

<b>COURSE CODE</b>	: TFB3113
<b>COURSE</b>	: Data Mining
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

The course focuses on principles of data mining and data warehousing including algorithms and applications perspective of data mining.

<b>COURSE CODE</b>	: TFB3123
<b>COURSE</b>	: Machine Learning
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

This course will introduce the principles and concepts of machine learning. It covers topics such as machine learning concepts, statistical pattern recognition, and an overview of various techniques in machine learning. The techniques introduced are supervised learning, unsupervised learning, reinforcement learning and deep learning. Some recent applications of machine learning will also be discussed.

<b>COURSE CODE</b>	: TFB3133
<b>COURSE</b>	: Data Visualisation
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

The goal of this course is to introduce students to data visualisation using JavaScript. Students will learn how to plot various type of charts using Flot Javascript library. The students will also learn how to make charts interactive, integrate charts on a web page, create specialised graphs such as tree maps, heat maps, network graphics, and word clouds. Students will further learn how display timelines, visualise geographic data, and create custom visualisations using D3.js library. The course ends with a mini project that covers most of the concepts and activities delivered in this course.

## 5.4.2 Digital Technology

<b>COURSE CODE</b>	: TFB3213
<b>COURSE</b>	: Digital Innovations
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

This course will focus on the notion of digitisation, digitalisation and digital transformation based on organisational case studies. A special emphasis will be given to digital innovation and how it plays a critical role in transforming a business and disrupting an ecosystem. This course also places a special emphasis on transformations that are caused by digital innovation technologies like the IoT. In the course, students will discuss how such digital transformations is driven by digital innovation that influences change in organisational, business process and business model decisions. The class also explores how the kind of "holistic" thinking that stakeholders would expect from entrepreneurs might translate into a business advantage in formulating and executing new business strategies for digital-centric businesses.

<b>COURSE CODE</b>	: TFB3223
<b>COURSE</b>	: Emerging Topics in Digital Technology
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

Technology is an ever-changing playing field and those wanting to remain at the helm of innovation have to adapt. The consumer journey is charting a new course and customers and companies alike are embracing emerging technologies. As the IT industry trends such as cloud computing and SaaS become more pervasive, businesses and solution providers must also turn toward the latest trends and possibilities provided by emerging innovations to realise their full potential. This course is designed to expose students to some emerging trends in Information Technology and their applications. This course is taught through lecture and interactive discussion. Throughout this course, learned skills are practiced using team exercise, case studies and projects.

<b>COURSE CODE</b>	: TFB3233
<b>COURSE</b>	: Digital Economy
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

The global economy is undergoing a digital transformation and it's happening at breakneck speed. The economic activity that results from billions of everyday online connections among people, businesses, devices, data, and processes means growing interconnectedness of people, organisations, and machines that results from the Internet, mobile technology and the internet of things (IoT). The digital economy is taking shape on how businesses are structured; how firms interact; and how consumers obtain services, information, and goods. A nation must embrace this revolution for it to be competitive and appeal to foreign investors. This course focuses on the industries, business practices, and policy issues associated with the digital industry. This course provides a mixture of theoretical and empirical works that are central to understanding the digital economy. The content of this course covers the fundamentals of digital economy, infrastructure, standards, platforms and application tools, the impact of digital economy on society and the nation. This course aims to inspire the learners to venture into technological businesses that could contribute to the nation's digital economy thus benefitting society.

## 5.4.3 FINTECH

**COURSE CODE** : TFB3313  
**COURSE** : Introduction to Fintech  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to expose students to the fundamentals of blockchain technologies, its working structure, concepts of crypto-currency, and a popular blockchain application (Bitcoin). Students will also learn why blockchain is going to revolutionise businesses, what benefits blockchain can bring to businesses and will learn the platform strategy.

**COURSE CODE** : TFB3323  
**COURSE** : Fintech Innovation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to expose the students to the fundamentals of blockchain technologies, its working structure, concepts of crypto-currency, and a popular blockchain application (Bitcoin). Students will also learn why blockchain is going to revolutionize businesses, what benefits blockchain can bring to businesses and will learn and the platform strategy.

**COURSE CODE** : TFB3333  
**COURSE** : Fintech Ethics and Regulations  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to expose students to current ethics and regulations challenges. Especially in fintech emerging market for sustainable economy leading to better integration of circular economy practices hence facilitating the achievement of Sustainable Development Goals (SDGs). This may require restoration, regeneration, and disruption to the current linear economic systems and consequently poses severe challenges to the adaptation and evolution of business models. This course is taught through lectures and interactive discussion. Throughout this course, learned skills are practiced using team exercise, numerous case studies, assignments and a project.

#### 5.4.4 Software Quality

**COURSE CODE** : TFB3413  
**COURSE** : **Software Requirement Engineering**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Requirements analysis in software systems engineering encompasses tasks that include determining, resolving conflicts, validating, documenting and managing the needs and conditions of a new or altered software system. Requirements analysis is critical to the success of software system projects. The requirements should be documented, actionable, measurable, testable and traceable to business needs or opportunities at level of detail sufficient for system design.

**COURSE CODE** : TFB3423  
**COURSE** : **Software Design and Architecture**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Software developers have often adopted specific architectural patterns for system organisation - but, for most part, informally. This subject presents the state-of-the-art in software architectures as an engineering discipline. The focus is on practical and proven models, styles and methods presented from an object-oriented perspective.

**COURSE CODE** : TFB3433  
**COURSE** : **Software Testing & Quality Assurance**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The purpose of the course is to introduce fundamental notions of software testing and the techniques used to build and check quality in software systems. This course equips students with a solid understanding of:

- Practices that support the production of quality software
- Software testing techniques
- Life-cycle models for requirements, defects, test cases, and test results
- Process models for units, integration, system, and acceptance testing
- Software quality process and techniques

# **Bachelor of Information Technology (Hons)**

# Bachelor of Information Technology (Hons)

## 1.1 Introduction

This programme provides students with fundamental knowledge and practical skills of computer technologies especially in programming, data science, network and software engineering with opportunities of taking specialisation in Big Data Analytics, Digital Technology, FINTECH and Software Quality. Throughout the programme there is also emphasis on how students could blend their technical expertise with management know-how to support business decision-making as well as to communicate effectively in commercial and business environment.

In later years of study, students will have the opportunity to major in one of following selected areas:

- **Big Data Analytics**
- **Digital Technology**
- **FINTECH**
- **Software Quality**

## 1.2 Programme Educational Objectives

- i. Information Technology professionals who are able to adopt appropriate methodologies and techniques to provide computing solutions based on relevant knowledge and technical skills in the fields of study in line with the industry requirements.
- ii. Information Technology professionals having positive attitudes, commitment for lifelong learning and entrepreneurial mind-set within industry for self and career progression.
- iii. Information Technology professionals having leadership skills, autonomy and responsibility and communicate effectively with discipline-related stakeholders.
- iv. Information Technology professionals who uphold ethical and professional practices in maintaining self and profession integrity.

## 1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Analyse knowledge, facts concepts, principles, and theories relating to Information Technology.
- ii. Analyse theoretical principles on Information Technology in managing Information Technology resources.
- iii. Adapt appropriate methodologies and techniques for proposing, designing, implementing and managing Information Technology solutions.
- iv. Communicate effectively with peers, clients, superiors and society at large.
- v. Utilise relevant techniques and demonstrate analytical and critical thinking skills in problem solving.
- vi. Demonstrate leadership, teamwork, accountability and responsibility in delivering services related to field of study.
- vii. Practice principles of lifelong learning with entrepreneurial mind set in performing tasks.
- viii. Uphold professional and ethical practices in delivering services related to the field of study.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Information Technology (Hons), students are required to obtain a minimum of **122 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Common Core	23
CD - Core Discipline	36
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
EM - Minor Electives	15
<b>TOTAL</b>	<b>122</b>



SEMESTER 7			
Code	Courses	Cr	G
IFB3037	Student Industrial Training (SIT)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 8			
Code	Courses	Cr	G
IFB3047	Student Industrial Project (SIP)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 9			
Code	Courses	Cr	G
TFB3012	Final Year Project I	2	P
XXXxxx3	Minor Elective III	3	EM
TFB3033	IT Project Management	3	CD
TFB3XX3	Core Specialisation I	3	CSp
TFB3XX3	Core Specialisation II	3	CSp
<b>Credit Hours</b>		<b>14</b>	

SEMESTER 10			
Code	Courses	Cr	G
TFB4014	Final Year Project II	4	P
TFB3xx3	Core Specialisation III	3	CSp
XXXxxx3	Minor Elective IV	3	EM
XXXxxx3	Minor Elective V	3	EM
<b>Credit Hours</b>		<b>13</b>	

**Total Credit Hours : 122**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets of core specialisation's areas (set A, B, C or D) for Core Specialisation I, II and III.

A. Big Data Analytics				
No	Code	Course Name	Cr	G
1	TFB3113	Data Mining	3	CSp
2	TFB3123	Machine Learning	3	CSp
3	TFB3133	Data Visualisation	3	CSp

B. Digital Technology				
No	Code	Course Name	Cr	G
1	TFB3213	Digital Innovations	3	CSp
2	TFB3223	Emerging Topics in Digital Technology	3	CSp
3	TFB3233	Digital Economy	3	CSp

C. FINTECH				
No	Code	Course Name	Cr	G
1	TFB3313	Introduction to Fintech	3	CSp
2	TFB3323	Fintech Innovation	3	CSp
3	TFB3333	Fintech Ethics and Regulations	3	CSp

D. Software Quality				
No	Code	Course Name	Cr	G
1	TFB3413	Software Requirement Engineering	3	CSp
2	TFB3423	Software Design and Architecture	3	CSp
3	TFB3433	Software Testing & Quality Assurance	3	CSp

#### 4.0 Minor Electives (EM) Courses

Choose any ONE (1) of the following sets of Minor Elective's areas (set A, B or C) for Minor Elective I, II, III, IV and V.

<b>A Corporate Management - Choose ONLY 5 Courses</b>				
No	Code	Course Name	Cr	G
1	GFB1033	Management & Organisational Behaviour	3	EM
2	GFB2043	Principles of Marketing	3	EM
3	GFB3113	Corporate Communication	3	EM
4	GFB3093	Strategic Management	3	EM
5	GFB3073	Human Resource Management (Final Year Only)	3	EM
6	GFB3213	Forecasting Methods for Management	3	EM
7	GFB3203	Strategic Business Analytics	3	EM
<b>Total Credit Hours</b>			<b>21</b>	

<b>B Financial Management – Choose ONLY 5 Courses</b>				
No	Code	Course Name	Cr	G
1	GFB2053	Principle of Finance	3	EM
2	GFB2013	Business Accounting	3	EM
3	GFB2113	Fundamental of Investment	3	EM
4	GFB3033	Corporate Finance	3	EM
5	GFB3043	International Financial Management	3	EM
6	GFB3083	International Business	3	EM
<b>Total Credit Hours</b>			<b>18</b>	

<b>C. Accounting and Finance</b>				
No	Code	Course Name	Cr	G
1	GFB2013	Principle of Finance	3	EM
2	GFB2153	Business Accounting	3	EM
3	GFB2283	Fundamental of Investment	3	EM
4	GFB2293	Corporate Finance	3	EM
5	GFB2303	International Financial Management	3	EM
<b>Total Credit Hours</b>			<b>15</b>	

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**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : TFB1033  
**COURSE** : Object Oriented Programming  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces fundamental concepts of object-oriented programming such as encapsulation, inheritance and polymorphism. Students will apply the concepts to build software system that are highly reusable and extensible.

**COURSE CODE** : TFB1053  
**COURSE** : Computer Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course deals with various components of the computer system such as memory and I/O interface techniques. It assumes some programming experience and equips students with knowledge of a computer structure, operation and I/O facilities.

**COURSE CODE** : TFB1063  
**COURSE** : Web Application and Integrative Programming  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces students to the fundamental concepts of web systems and technologies as well as the practical aspects of multi-tier application development. The course is centred towards the programming of the world wide web and the development of e-commerce and data-driven web-based applications. The course also covers the concepts of Web Services and remote application development. Students will learn the craft of web Programming and develop a deeper understanding of XHTML, Cascading Style Sheets (CSS), JavaScript, for client side programming, and PHP for Server Side Programming. Students will also learn to develop dynamic web data retrieval for offline and online with XML formatting and JSON.

**COURSE CODE** : TFB1093  
**COURSE** : Data Communication and Network  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course aims to give students an understanding of the basic theory and practical understanding of a data communications and computer networking system. The course will also provide an opportunity for students to design, construct, evaluate and analyse a simple network infrastructure based on some basic performance measures for efficient and reliable network communications system. Both wired and wireless networking setups are to be exposed to students.

**COURSE CODE** : TFB1103  
**COURSE** : Software Engineering  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Software Engineering addresses the theory and methodology of programming of enormous and heterogeneous computer software. The course covers project planning and management, requirements identification, analysis, and management, development tools and methods, UML, software architecture and design, detailed design, implementation and testing. Special emphasis is given to planning and estimating and to quality development practices such as product inspections and testing and an in-depth understanding of why computers are essential components in the business world and society in general. The course will also focus on the computer as a valuable productivity tool and recognition of the personal computer's position as the backbone of the computer industry. The course would also highlight on the importance of computers utility as a standalone and/or within networked devices.

**COURSE CODE** : TFB1113  
**COURSE** : Discrete Mathematics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the fundamental concepts of Discrete Mathematics such as sets, functions, counting principles, logic, proof techniques, mathematical induction, graphs, directed graphs, trees, relations and Boolean algebra. Students will be exposed to problem-solving skills by applying the theoretical concepts of Discrete Mathematics.

**COURSE CODE** : TFB2033  
**COURSE** : Human and Computer Interaction  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The purpose of this course is to explain the underlying causes of cognitive, social and organisational problems as well as to provide students with an opportunity to explore the relevant features of interfaces conceptualisation, design and implementation. In addition, the course will review some of the major development and areas of research that contribute to enhancing the quality of human-computer interaction.

**COURSE CODE** : TFB2043  
**COURSE** : Information Assurance and Security  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course covers fundamental issues and first principles of information assurance and security. The course will look at the security policies, models and mechanisms related to confidentiality, integrity, authentication, identification, and availability issues related to information and information systems. Other topics covered include basics of cryptography (e.g., digital signatures, PKI) and network security (e.g., firewall, intrusion detection and prevention), risk management, security assurance and secure design principles. Issues such as organisational security policy, legal and ethical issues in security, standards and methodologies for security evaluation and certification will also be covered.

**COURSE CODE** : TFB2093  
**COURSE** : Internet of Things  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

IoT applications are increasing due to a strong drive by the rise in IoT offerings from system integrators, industries automation, drones technology, and telecommunication companies across the globe. This course is to bridge the gap between the industry and academic institutions such that the knowledge and the skill gained by the students is to match the local and global IoT skill sets as well as the IoT skilled workforce needs. This course is to teach students technology involved in building an IoT system and IoT applications. It covers core topics such as programming of embedded devices, making devices communicate, and good data visualisation/presentation. Other than the core topics, students will learn about standardization issues, IoT security, ethics, and the impact of IoT on society & business.

**COURSE CODE** : TFB2133  
**COURSE** : Computer Ethics and Cyber Law  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to examine the ethical issues surrounding computer usage and the connection between ethics and technology. It involves definition of computer ethics, basic principles of Malaysian law in relation to cyber issues, and professional responsibilities. Several relevant topics in computer ethics that relate to legal aspects will be covered. These topics include computer security, privacy and computing, computing and intellectual property, and global information ethics.

**COURSE CODE** : TFB2143  
**COURSE** : Computer Forensic  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course aims to give students an understanding of the basic theory and practical understanding of a data communications and computer networking system. The course will also provide opportunity for students to design, construct, evaluate and analyse a simple network infrastructure based on some basic performance measures for efficient and reliable network communications system. Both wired and wireless networking setups are to be exposed to students.

**COURSE CODE** : TFB3033  
**COURSE** : IT Project Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides a comprehensive view of the nine project management knowledge areas and also the five project management process groups, following the PMBOK® Guide. The course builds on the PMBOK® Guide, an American National Standard, provides a solid framework and context for managing information technology projects. To better equip students for this environment, the course will include a team project, in which students will learn how to successfully plan, manage and deliver projects. Students will also learn how to implement project management processes, develop leadership skills and respond to real-world scenarios. All activities in this course are targeted towards exploring a variety of problems and issues in managing projects, addressing both the technical and social or human sides of the field.

## 5.2 Common Core (CC) Courses Synopsis

**COURSE CODE** : TFB1013  
**COURSE** : Structured Programming  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

There are two parts in this course. The first half is an introduction to problem solving using computers. It emphasises on various aspects of problem solving, mainly consisting of problem domain, phases of problem solving and basic techniques of designing a solution. The second half is an introduction to the fundamental concepts of programming using a structured programming language. The language will be used to write a working program by applying the problem-solving concepts discussed in the first part.

**COURSE CODE** : TFB1023  
**COURSE** : Database Systems  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides a study of the practical aspects of the computerised information systems by understanding theoretical concepts of database systems, its design and manipulation techniques. It also requires applied knowledge obtained from the course to design, develop and implement a database system. It emphasises on the relational database model as a guide to create a stable database system underlying most applications. In addition, an introduction to transaction management is also highlighted in the course to provide better understanding of database implementation.

**COURSE CODE** : TFB2063  
**COURSE** : Data Science  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover topics such as analytic approach, data requirements, modelling, evaluation, deployment and feedback. The flow of methodology will help students in their problem-solving process.

**COURSE CODE** : TFB2083  
**COURSE** : Statistics and Empirical Method  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the use of statistical methods in evaluating research data for business application and decision making. It demonstrates the use of descriptive and inferential statistics. The focus will be on the application of the statistics that are relevant to the functional area of business.

**COURSE CODE** : TFB2113  
**COURSE** : Technopreneurship Team Project  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The emphasis on this course is on the aspect of nurturing technopreneurship among students so they can understand the concept of creativity and innovation to produce IT solutions for real-life scenario. The course discusses concepts of technopreneurship: drivers of IT industry (e.g. government policies, domestic market, infrastructure, and market linkages), business concepts, and project management methodology, which are necessary in setting up and managing IT business. The implication of this course covers the technopreneurship from conception to implementation of a new IT venture. The technopreneurship team project emulates a consulting relationship. The completion of this course is the students' 'proof of competency'.

### 5.3 Project (P) Courses Synopsis

<b>COURSE CODE</b>	: TFB3012
<b>COURSE</b>	: Final Year Project I
<b>NO. OF CREDITS</b>	: 2 credits
<b>PRE-REQUISITE</b>	: None

This is an individual research project in connection with an information & communication technology or business information system problem and under the guidance of a faculty member. The project undertaken may fall under the following areas; mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

<b>COURSE CODE</b>	: TFB4014
<b>COURSE</b>	: Final Year Project II
<b>NO. OF CREDITS</b>	: 4 credits
<b>PRE-REQUISITE</b>	: Final Year Project I

This is an individual research project in connection with an information & communication technology or business information system problem and under the guidance of a faculty member. The project undertaken may fall under the following areas; mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

### 5.4 Core Specialisation (CSp) Courses Synopsis

#### 5.4.1 Big Data Analytics

<b>COURSE CODE</b>	: TFB3113
<b>COURSE</b>	: Data Mining
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

The course focuses on principles of data mining and data warehousing including algorithms and applications perspective of data mining.

<b>COURSE CODE</b>	: TFB3123
<b>COURSE</b>	: Machine Learning
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

This course will introduce the principles and concepts of machine learning. It covers topics such as machine learning concepts, statistical pattern recognition, and an overview of various techniques in machine learning. The techniques introduced are supervised learning, unsupervised learning, reinforcement learning and deep learning. Some recent applications of machine learning will also be discussed.

<b>COURSE CODE</b>	: TFB3133
<b>COURSE</b>	: Data Visualisation
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

The goal of this course is to introduce students to data visualisation using JavaScript. Students will learn how to plot various type of charts using Flot Javascript library. The students will also learn how to make charts interactive, integrate charts on a web page, create specialised graphs such as tree maps, heat maps, network graphics, and word clouds. Students will further learn how display timelines, visualise geographic data, and create custom visualisations using D3.js library. The course ends with a mini project that covers most of the concepts and activities delivered in this course.

## 5.4.2 Digital Technology

<b>COURSE CODE</b>	: TFB3213
<b>COURSE</b>	: Digital Innovations
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

This course will focus on the notion of digitisation, digitalisation and digital transformation based on organisational case studies. A special emphasis will be given to digital innovation and how it plays a critical role in transforming a business and disrupting an ecosystem. This course also places special emphasis on transformations that are caused by digital innovation technologies like the IoT. In the course, students will discuss how such digital transformations is driven by digital innovation that influences change in organisational, business process and business model decisions. The class also explores how the kind of "holistic" thinking that stakeholders would expect from entrepreneurs might translate into a business advantage in formulating and executing new business strategies for digital-centric businesses.

<b>COURSE CODE</b>	: TFB3223
<b>COURSE</b>	: Emerging Topics in Digital Technology
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

Technology is an ever-changing playing field and those wanting to remain at the helm of innovation have to adapt. The consumer journey is charting a new course and customers and companies alike are embracing emerging technologies. As the IT industry trends such as cloud computing and SaaS become more pervasive, businesses and solution providers must also turn toward the latest trends and possibilities provided by emerging innovations to realise their full potential. This course is designed to expose students to some emerging trends in Information Technology and their applications. This course is taught through lecture and interactive discussion. Throughout this course, learned skills are practiced using team exercise, case studies and projects.

<b>COURSE CODE</b>	: TFB3233
<b>COURSE</b>	: Digital Economy
<b>NO. OF CREDITS</b>	: 3 credits
<b>PRE-REQUISITE</b>	: None

The global economy is undergoing a digital transformation and it's happening at breakneck speed. The economic activity that results from billions of everyday online connections among people, businesses, devices, data, and processes means growing interconnectedness of people, organisations, and machines that results from the Internet, mobile technology and the internet of things (IoT). The digital economy is taking shape on how businesses are structured; how firms interact; and how consumers obtain services, information, and goods. A nation must embrace this revolution for it to be competitive and appeal to foreign investors. This course focuses on the industries, business practices, and policy issues associated with the digital industry. This course provides a mixture of theoretical and empirical works that are central to understanding the digital economy. The content of this course covers the fundamentals of digital economy, infrastructure, standards, platforms and application tools, the impact of digital economy on society and the nation. This course aims to inspire the learners to venture into technological businesses that could contribute to the nation's digital economy thus benefitting society.

## 5.4.3 FINTECH

**COURSE CODE** : TFB3313  
**COURSE** : Introduction to Fintech  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to expose students to the fundamentals of blockchain technologies, its working structure, concepts of crypto-currency, and a popular blockchain application (Bitcoin). Students will also learn why blockchain is going to revolutionise businesses, what benefits blockchain can bring to businesses and will learn the platform strategy.

**COURSE CODE** : TFB3323  
**COURSE** : Fintech Innovation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to expose students to the fundamentals of blockchain technologies, its working structure, concepts of crypto-currency, and a popular blockchain application (Bitcoin). Students will also learn why blockchain is going to revolutionise businesses, what benefits blockchain can bring to businesses and will learn the platform strategy.

**COURSE CODE** : TFB3333  
**COURSE** : Fintech Ethics and Regulations  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to expose students to current ethics and regulations challenges. Especially in fintech emerging market for sustainable economy leading to better integration of circular economy practices hence facilitating the achievement of the Sustainable Development Goals (SDGs). This may require restoration, regeneration, and disruption to the current linear economic systems and consequently poses severe challenges to the adaptation and evolution of business models. This course is taught through lectures and interactive discussion. Throughout this course, learned skills are practiced using team exercise, numerous case studies, assignments and a project.

#### 5.4.4 Software Quality

**COURSE CODE** : TFB3413  
**COURSE** : **Software Requirement Engineering**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Requirements analysis in software systems engineering encompasses tasks that include determining, resolving conflicts, validating, documenting and managing the needs and conditions of a new or altered software system. Requirements analysis is critical to the success of software system projects. The requirements should be documented, actionable, measurable, testable and traceable to business needs or opportunities at the level of details sufficient for system design.

**COURSE CODE** : TFB3423  
**COURSE** : **Software Design and Architecture**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Software developers have often adopted specific architectural patterns for system organisation - but, for most part informally. This subject presents the state-of-the-art in software architectures as an engineering discipline. The focus is on practical and proven models, styles and methods presented from an object-oriented perspective.

**COURSE CODE** : TFB3433  
**COURSE** : **Software Testing & Quality Assurance**  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The purpose of the course is to introduce fundamental notions of software testing and the techniques used to build and check quality in software systems. This course equips the students with a solid understanding of:

- Practices that support the production of quality software
- Software testing techniques
- Life-cycle models for requirements, defects, test cases, and test results
- Process models for units, integration, system, and acceptance testing
- Software quality process and techniques

## **Programme Information**

**Bachelor of Science (Hons) in  
Applied Chemistry**

## Bachelor of Science (Hons) in Applied Chemistry

### 1.1 Introduction

The Bachelor of Science (Hons) in Applied Chemistry Programme is aligned with UTP's Mission Statements to produce skilled knowledge workers, addressing the nation's call for more scientists and technologists, especially in the areas of Petrochemistry and Sustainable Chemistry. This programme is developed to nurture students to become competent graduates with the knowledge, understanding, skills and values required in our move towards a high-income society.

This exclusive programme adopts the multi-mode educational delivery system which emphasises on student-centred learning, a practical-based approach, and experiential learning, as individuals or in teams, intending to realise UTP's seven (7) attributes for a well-rounded graduate model. The programme stresses the need for a firm foundation in Fundamental Chemistry, followed by advanced courses such as Separation Process, Hydrocarbon and Petrochemical, Quantum and Computational Chemistry, Analytical Instrumentation and Molecular Spectroscopy. Students learning experience is also enhanced with the incorporation of Science Team Project and the compulsory 7-month structured Student Industrial Internship Programme.

In addition to the above, students are given the opportunity to choose their specialisation in any of the following areas:

- **Petrochemistry**
- **Sustainable chemistry**

Career opportunities for graduates from the Bachelor of Science (Hons) in Applied Chemistry programme are enormous. They will be able to enter the scientific workforce in various industries such as oil and gas, petrochemicals, pharmaceuticals, food and cosmetics; as well as in other sectors such as Government, Academia and Research and Development sectors. These include but are not confined to exciting roles such as Analytical Chemists, Computational Chemists, Quality Control Chemists, Researchers, Entrepreneurs and Academics.

### 1.2 Programme Educational Objective

- Chemists who are competent with the potential to become leaders in industries related to Applied Chemistry.
- Chemists who are committed to sustainable development of Applied Chemistry for the betterment of the society.

### 1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- Acquire knowledge and understanding of Chemistry.
- Solve problems related to Chemistry and its applications.
- Apply knowledge of Chemistry to conduct practicals, as well as to analyse and interpret data.
- Communicate effectively with community at large.
- Use scientific techniques, skills or tools necessary for professional practice.
- Demonstrate effective leadership and team players for life-long learning.
- Demonstrate business acumen, entrepreneurial skills and social responsibility.
- Conduct applied chemistry project in an ethical and professional manner.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Science (Hons) in Applied Chemistry, students are required to obtain a minimum of **127 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
<u>Course Group (G)</u>	<u>Number of Credit Hours</u>
NR - National Requirement	10
UR - University Requirement	14
CC – Core Common	8
CD - Core Discipline	69
CI - Core Industrial Internship	14
CSp - Core Specialisation	12
TOTAL	127

## 2.0 Programme Curriculum Structure: Bachelor of Science (Hons) in Applied Chemistry

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika dan Peradaban (Local)	2	NR	MPU 2	One (1) MPU2 Course	2	NR	MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR
MPU3142	BM Komunikasi 2 (International)			KXXXXX1	Co Curriculum I	1	UR	HFB1023	Scientific Inquiry	3	UR
MPU3192	Falsafah dan Isu Semasa (Local & International)	2	UR	LFB1042	Academic Writing	2	UR	YBB1053	Analytical Instrumentation	3	CD
PFB1012	Introduction to Oil & Gas Industry & Sustainable Development	2	UR	YBB1023	Physical Chemistry I	3	CD	YBB1063	Organic Chemistry I	3	CD
FFM1083	Mathematics for Scientists	3	CT	YBB1033	Analytical Chemistry	3	CD	YBB1074	Chemistry Laboratory II	4	CD
CFB1032	Health, Safety & Environment	3	CC	YBB1044	Chemistry Laboratory I	4	CD				
YBB1013	Inorganic Chemistry I	3	CD								
	<b>Credit Hours</b>	<b>14</b>			<b>Credit Hours</b>	<b>15</b>			<b>Credit Hours</b>	<b>15</b>	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
KXXXXX1	Co Curriculum II	1	NR	GFB2102	Entrepreneurship	2	UR	MPU 4/ HFB1012	Community Engagement Project	2	NR
HFB2033	Professional Communication Skills	3	UR	YBB2043	Material and Energy Balance	3	CD	FFM2063	Data Analytics	3	CC
YBB2013	Organic Chemistry II	3	CD	YBB2053	Organotransition Metal Chemistry	3	CD	YBB2083	Separation Process	3	CD
YBB2023	Inorganic Chemistry II	3	CD	YBB2063	Physical Chemistry II	3	CD	YBB2093	Molecular Spectroscopy	3	CD
YBB2034	Chemistry Laboratory III	4	CD	YBB2074	Chemistry Laboratory IV	4	CD	YBB2103	Hydrocarbon and Petrochemical	3	CD
	<b>Credit Hours</b>	<b>14</b>			<b>Credit Hours</b>	<b>15</b>			<b>Credit Hours</b>	<b>14</b>	

SEMESTER 7			
Code	Courses	Cr	G
IFB3037	Student Industrial Training (SIT)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 8			
Code	Courses	Cr	G
IFB3047	Student Industrial Project (SIP)	7	CI
<b>Credit Hours</b>		<b>7</b>	

SEMESTER 9			
Code	Courses	Cr	G
YBB3014	Science Team Project	4	CD
YBB3022	Final Year Project I	2	CD
TFB3XX3	Core Specialisation I	3	CSp
TFB3XX3	Core Specialisation II	3	CSp
<b>Credit Hours</b>		<b>12</b>	

SEMESTER 10			
Code	Courses	Cr	G
YBB4014	Final Year Project II	4	CD
YBB4024	Quantum and Computational Chemistry	4	CD
TFB3XX3	Core Specialisation III	3	CSp
TFB3XX3	Core Specialisation IV	3	CSp
<b>Credit Hours</b>		<b>14</b>	

**Total Credit Hours : 127**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets A or B for Core Specialisation I, II and III and choose one (1) from other Core Specialisation for Core Specialisation IV.

A. Petrochemistry				
No	Code	Course Name	Cr	G
1	YBB4113	Catalysis in Petrochemistry	3	CSp
2	YBB4123	Reaction and Synthesis of Polymeric Materials	3	CSp
3	YBB4133	Fine and Speciality Chemical	3	CSp

B. Sustainable Chemistry				
No	Code	Course Name	Cr	G
1	YBB4213	Green Processes and Products	3	CSp
2	YBB4223	Sustainable Water Management	3	CSp
3	YBB4233	New Energy	3	CSp

#### 4.0 Minor (EM) Courses

Minor in Management is made available to all students who are interested to enhance their knowledge in management and business. However, the option to do the Minor in Management is at the students' discretion and is **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **128 credit hours**.

Minor in Management					
No	Code	Course Name	Cr	G	Semester
1	GDB1033	Management & Organisational Behaviour	3	EM	Students can take these courses in any semester
2	GDB2013	Business Accounting	3	EM	
3	GDB2053	Principles of Finance	3	EM	
4	GDB2043	Principles of Marketing	3	EM	
5	GDB3013	Small Business and Entrepreneurship	3	EM	
Total Credit Hours			15		

Students have to complete and pass all of listed courses to get Minor in Management. All results will be counted in the GPA/CGPA calculation.

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#### Note:

<b>Code A</b>	:	Please refer to Materials Engineering Programme for Course Synopsis.
<b>Code C</b>	:	Please refer to Chemical Engineering Programme for Course Synopsis.
<b>Code E</b>	:	Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.
<b>Code F, Y, Z</b>	:	Please refer to Fundamental & Applied Sciences Department for Course Synopsis
<b>Code K</b>	:	Please refer to Credited Co-Curriculum Programme for Course Synopsis.
<b>Code M</b>	:	Please refer to Mechanical Engineering Programme for Course Synopsis.
<b>Code P</b>	:	Please refer to Petroleum Engineering Programme for Course Synopsis.
<b>Code Q</b>	:	Please refer to Petroleum Geoscience Programme for Course Synopsis.
<b>Code T</b>	:	Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.
<b>Code V</b>	:	Please refer to Civil Engineering Programme for Course Synopsis.
<b>Code L, G, H, MPU</b>	:	Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.

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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : YBB1013  
**COURSE** : Inorganic Chemistry I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the basic concepts of bonding, structures and properties related to atoms and molecules.

**COURSE CODE** : YBB1023  
**COURSE** : Physical Chemistry I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the Gas Properties, Zeroth Law of Thermodynamics, First Law of Thermodynamics, Second Law of Thermodynamics, Third Law of Thermodynamics, Solid State, Phase Equilibria, Chemical and Electrochemical Equilibrium.

**COURSE CODE** : YBB1033  
**COURSE** : Analytical Chemistry  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the introduction to data handling, stoichiometric calculations, general concepts of equilibrium, gravimetric analysis, acid-base equilibria, acid-base titrations, complexometric titrations, precipitation reactions and titrations and redox and potentiometric titrations.

**COURSE CODE** : YBB1044  
**COURSE** : Chemistry Laboratory I  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None  
**CO-REQUISITE** : Analytical Chemistry & Physical Chemistry I

This course will cover the practicals on Analytical Chemistry and Physical

**COURSE CODE** : YBB1053  
**COURSE** : Analytical Instrumentation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the fundamentals and applications of electroanalytical, spectroscopic, chromatographic and thermal methods.

**COURSE CODE** : YBB1063  
**COURSE** : Organic Chemistry I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the concepts of electron structure of atoms and molecules, nomenclatures, syntheses and reaction mechanisms of alkanes, alkenes, alkynes, vinylic compounds and dienes, alkyl halides, alcohols, carbonyl compounds, aromatics, amines, aryl halides and phenols.

**COURSE CODE** : YBB1074  
**COURSE** : Chemistry Laboratory II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None  
**CO-REQUISITE** : Organic Chemistry I, Analytical Instrumentation

This course will cover the basic Organic Chemistry and Analytical Instrumentation practicals.

**COURSE CODE** : YBB2013  
**COURSE** : Organic Chemistry II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Organic Chemistry I

This course covers methods for the determination of organic molecules, organic reaction mechanisms and methods for the synthesis of organic compounds.

**COURSE CODE** : YBB2023  
**COURSE** : Inorganic Chemistry II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Inorganic Chemistry I

This course will cover the atomic properties and structural bonding of simple compounds in main group elements and complexes.

**COURSE CODE** : YBB2034  
**COURSE** : Chemistry Laboratory III  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None  
**CO-REQUISITE** : Inorganic Chemistry II & Organic Chemistry II

This course will cover the basic Inorganic Chemistry II and Organic Chemistry II Practical.

**COURSE CODE** : YBB2043  
**COURSE** : Material and Energy Balance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Physical Chemistry I

This course covers the chemical engineering calculations, fundamental principles of material and energy balance and problem solving techniques using computing tools.

**COURSE CODE** : YBB2053  
**COURSE** : Organotransition Metal Chemistry  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Inorganic Chemistry II

This course covers the structure, bonding and reactivity of organotransition metal compounds with emphasis on the mechanisms of organometallic transformation and methods for their elucidation. The importance of organotransition metal complexes in physical and biological applications will also be considered.

**COURSE CODE** : YBB2063  
**COURSE** : Physical Chemistry II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Physical Chemistry I

This course will cover solids states, molecules in motion, chemical kinetics, and reaction dynamics surface chemistry. The course will consider the processes by which chemical change occurs and one form of matter is converted into another. The course prepares the ground for a discussion of the rates of reactions by considering the motion of molecules in gases and in liquids. The course establishes the precise meaning of reaction rate and sees how the overall rate and the complex behaviour of some reactions may be expressed in terms of elementary steps and the atomic events that take place when molecules meet. Of enormous importance the in industry are the reactions on solid surfaces, such as redox reactions at electrodes and various chemical transformations accelerated by solid catalyst.

**COURSE CODE** : YBB2074  
**COURSE** : Chemistry Laboratory IV  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None  
**CO-REQUISITE** : Physical Chemistry II & Organotransition Metal Chemistry

This course will cover the basic Physical Chemistry II and Organotransition Metal Chemistry practical.

**COURSE CODE** : YBB2083  
**COURSE** : Separation Process  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides an understanding of the general fundamentals such as mass and energy balances, phase equilibria, and how these principles are applied in separation processes in the process industry.

**COURSE CODE** : YBB2093  
**COURSE** : Molecular Spectroscopy  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Analytical Instrumentation

This course will cover the fundamental interpretation of spectra obtained from molecular spectroscopy, namely, vibration, electronic absorption and nuclear magnetic resonance as well as mass spectrometry.

**COURSE CODE** : YBB2103  
**COURSE** : Hydrocarbon and Petrochemical  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Organic Chemistry I

This course will cover the basic concepts of hydrocarbon and petrochemical as well as their applications.

**COURSE CODE** : YBB3014  
**COURSE** : Science Team Project  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This is a group research project in connection with a special science issue and under the guidance of a faculty member. Each group prepares a comprehensive research report, and presents and demonstrates the findings and results of the research work.

**COURSE CODE** : YBB3022  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Student Industrial Internship Training, Student Industrial Internship Project

This is an individual research project in connection with a special scientific problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas; mathematical analysis, experimental tests, computer simulation, hardware and/or software development, and device fabrication.

**COURSE CODE** : YBB4014  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project in connection with a special scientific problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas; mathematical analysis, experimental tests, computer simulation, hardware and/or software development and device fabrication.

**COURSE CODE** : YBB4024  
**COURSE** : Quantum and Computational Chemistry  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : None

This course provides intermediate level of knowledge in molecular modelling and plays a key role in accelerating the scientific chemical progress necessary for development in chemical molecular design. It covers a brief theoretical and practical of quantum chemistry and molecular modelling. An introduction to theoretical chemistry, quantum mechanics, classical mechanics, molecular mechanics, ab initio methods, molecular modelling and molecular dynamics are also included.

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Petrochemistry

**COURSE CODE** : YBB4113  
**COURSE** : Catalysis in Petrochemistry  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Hydrocarbon & Petrochemical

This course covers the fundamental principles of homogeneous and heterogeneous catalysis and their applications in petrochemical processes. The importance of structure of surfaces, concepts of catalytic reactions on surfaces, preparation, characterisation and deactivation of catalysts and some examples of industrial catalytic processes were also included. Emerging trend in catalysts development is also considered.

**COURSE CODE** : YBB4123  
**COURSE** : Reaction and Synthesis of Polymeric Materials  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Organic Chemistry II

This course covers polymers from petrochemicals, their applications and processes.

**COURSE CODE** : YBB4133  
**COURSE** : Fine and Speciality Chemical  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Organic Chemistry II

This course will cover the basic concepts of fine and speciality chemicals and their applications.

### 5.2.2 Sustainable Chemistry

**COURSE CODE** : YBB4213  
**COURSE** : Green Processes and Products  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Organic Chemistry II

This course covers green technologies such as alternative reaction media, green catalysis, electrochemistry, photocatalyst, available technologies and greener products.

**COURSE CODE** : YBB4223  
**COURSE** : Sustainable Water Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the interdisciplinary management of water resources.

**COURSE CODE** : YBB4233  
**COURSE** : New Energy  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the fundamental of new energy systems: Solar Energy, Bioenergy, Shale, Hydropower, Wind Energy, Geothermal Energy and Ocean Energy (Tides, Waves, Currents).

**Bachelor of Science (Hons) in  
Applied Physics**

## Bachelor of Science (Hons) in Applied Physics

### 1.1 Introduction

Applied Physics involves the application of Physics principles to the design, construction and operation of various systems and devices. A physicist generally works at any industrial or research establishments such as those dealing with semiconductor devices, solar cells, electronic and product processing. The job involves supervision of equipment operation and maintenance, troubleshooting operational problems related to process, and undertaking modification work for product and safety improvement.

The Bachelor of Science (Hons) in Applied Physics programme stresses the need for a strong foundation in Mathematics, Physics and Chemistry, followed by a thorough coverage of basic science courses such as Mechanics, Thermodynamics and Electromagnetics. In the later years of study, students are exposed to Optics, Quantum Mechanics, Semiconductor Devices & Technology, Solid States Physics and Measurement & Instrumentation.

In addition to the above, at the end of their studies a student will have the opportunity to take special topics in one of these selected areas of interest:

- **Oil & Gas Exploration**
- **Renewable Energy**
- **Nanotechnology**

### 1.2 Programme Educational Objective

To produce scientific workforce in the field of Applied Physics with the potential to become leaders in industries and R&D with emphasis in Oil & Gas, Renewable Energy and Nanotechnology.

### 1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Apply knowledge of Applied Physics.
- ii. Plan and conduct experiments, as well as to analyse and interpret scientific data.
- iii. Identify and solve applied physics problems and challenges in industries.
- iv. Use the techniques, skills and latest scientific and technical tools necessary for innovative, creative and professional practice.
- v. Conduct applied physics research project effectively both independently or in teams in a professional and ethical manner.
- vi. Communicate effectively with the community at large.
- vii. Demonstrate business acumen and entrepreneurship skills.
- viii. Recognise the importance to undertake life-long learning.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Science (Hons) in Applied Physics, students are required to obtain a minimum of **128 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
<u>Course Group (G)</u>	<u>Number of Credit Hours</u>
NR - National Requirement	14
UR - University Requirement	9
CS - Common Science	19
CD - Core Disciplines	60
CI - Core Industrial Internship	14
CSp - Core Specialisation	12
<b>TOTAL</b>	<b>128</b>

## 2.0 Programme Curriculum Structure: Bachelor of Science (Hons) in Applied Physics

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika dan Peradaban (Local)	2	NR	CFB1032	Health, Safety & Environment	2	CS	MPU 2	One (1) MPU2 Course	3	NR
MPU3142	BM Komunikasi 2 (International)			ZAB1043	Mathematical Methods for Physics	3	CD	LDB1042	Academic Writing	2	UR
MPU3192	Falsafah dan Isu Semasa (Local & International)	2	UR	ZAB1013	Mechanics	3	CD	PDB1023	Introduction to Petroleum Geoscience	3	CS
PFB1012	Introduction to Oil & Gas Industry & Sustainable Development	2	UR	ZAB1032	Physics Practical I	2	CD	ZAB1063	Electromagnetics I	3	CD
FDM1023	Ordinary Differential Equations	3	CS	ZAB1053	Modern Physics	3	CD	ZAB1072	Physics Practical II	2	CD
KXXXXX1	Co Curriculum I	1	UR					KXXXXX1	Co Curriculum II	1	UR
<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>14</b>	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3182/ MPU3183	Integrity and Anti-corruption	3	NR	HFB2033	Professional Communication Skills	3	UR	GDB1033	Management and Organisational Behaviour	3	CS
ZAB2072	Philosophy of Science and Technology	2	CS	ZAB2033	Optics	3	CD	YAB2042	Science Team Project	2	CD
EFB1023	Structured Programming & Interfacing	3	CD	ZAB2012	Physics Practical III	2	CD	FDM2043	Computational Methods	3	CS
ZAB1023	Thermodynamics	3	CD	ZAB2024	Quantum Mechanics	4	CD	ZAB2043	Vibrations & Waves	3	CD
ZAB2053	Electromagnetics II	3	CD					ZAB2063	Atomic Physics	3	CD
<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>12</b>		<b>Credit Hours</b>		<b>14</b>	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU4/ HFB1012	Community Engagement Project	2	NR	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
GFB2102	Entrepreneurship	3	CS								
ZAB3014	Solid States Physics	4	CD								
ZAB3034	Measurement & Instrumentation	4	CD								
Credit Hours		13		Credit Hours		7		Credit Hours		7	

SEMESTER 10				SEMESTER 11			
Code	Courses	Cr	G	Code	Courses	Cr	G
ZAB4024	Semiconductor & Devices Technology	4	CD	ZAB4034	Final Year Project II	4	CD
ZAB4012	Final Year Project I	2	CD	ZABxxx3	Core Specialisation III	3	Csp
ZABxxx3	Core Specialisation I	3	Csp	ZABxxx3	Core Specialisation IV	3	Csp
ZABxxx3	Core Specialisation II	3	Csp				
Credit Hours		12		Credit Hours		10	

**Total Credit Hours : 128**

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets of Core Specialisation areas (set A, B, or C) for Core Specialisation I, II, III and IV.

A. Nanotechnology				
No	Code	Course Name	Cr	G
1	ZAB4113	Nanoscience	3	CSp
2	ZAB4123	Fundamentals of Nanotechnology	3	CSp
3	ZAB4133	Simulation and Design of Nanostructures	3	CSp
4	ZAB4143	Nanoelectronic	3	CSp

B. Renewable Energy				
No	Code	Course Name	Cr	G
1	ZAB4213	Renewable Energy	3	CSp
2	ZAB4223	Renewable Energy Conversions	3	CSp
3	ZAB4233	Renewable Energy Informatics	3	CSp
4	ZAB4243	Green Electricity Generation	3	CSp

C. Oil and Gas Exploration				
No	Code	Course Name	Cr	G
1	ZAB4313	Seismic Theory & Practices	3	CSp
2	ZAB4323	Electromagnetics: Theory and Practices	3	CSp
3	ZAB4333	Physical & Structural Geology	3	CSp
4	ZAB4343	Petro Physics & Well-logging	3	CSp

#### 4.0 Minor (EM) Courses

Minor in Management is made available to all students who are interested to enhance their knowledge in management and business. However, the option to do the Minor in Management is at the students' discretion and is **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **128 credit hours**.

Minor in Management					
No	Code	Course Name	Cr	G	Semester
1	GDB1033	Management & Organisational Behaviour	3	EM	Students can take these courses in any semester
2	GDB2013	Business Accounting	3	EM	
3	GDB2053	Principles of Finance	3	EM	
4	GDB2043	Principles of Marketing	3	EM	
5	GDB3013	Small Business and Entrepreneurship	3	EM	
Total Credit Hours			15		

Students have to complete and pass all of listed courses to get Minor in Management. All results will be counted in the GPA/CGPA calculation.

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**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.
  - Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.
  - Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.
  - Code F, Y, Z** : Please refer to Applied Chemistry, Applied Physics Programme and Fundamental & Applied Sciences Department for Course Synopsis
  - Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.
  - Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.
  - Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.
  - Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.
  - Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.
  - Code V** : Please refer to Civil Engineering Programme for Course Synopsis.
  - Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.
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## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : ZAB1013  
**COURSE** : Mechanics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Physics (A-level or Equivalent)

This course covers topics on vector addition and subtraction, unit vectors, scalar and vector products, motion in one dimension, motion in a plane, work and energy, conservation laws, projectile motion, uniform circular motion, simple harmonic motion, rotational motion, moment of inertia, angular momentum, Newton's Law of gravitation, gravitational field and potential, escape velocity, Hooke's Law, elastic moduli, adhesive and cohesive forces, molecular theory of surface tension, capillarity, Streamline flow, Poiseuille's formula, streamline and turbulent flow, Equation of Continuity, Bernoulli's Theorem and Stokes' Law.

**COURSE CODE** : ZAB1023  
**COURSE** : Thermodynamics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Physics (A-level or Equivalent)

This course is designed to provide clear concepts and problem-solving skills in Thermodynamics. This course covers the temperature and the zeroth Law of thermodynamics, simple thermodynamic Systems, Work, Heat and the First Law of Thermodynamics, Ideal Gas, The Second Law of thermodynamics, The Carnot Cycle and Thermodynamic Temperature and Entropy.

**COURSE CODE** : ZAB1032  
**COURSE** : Physics Practical I (Mechanics)  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Physics (A-level or Equivalent)

This practical course will cover motion in one dimension, projectile motion, work and energy, uniform circular motion, simple harmonic motion, rotational motion, moment of inertia, angular momentum, Hooke's law and fluid motion.

**COURSE CODE** : ZAB1043  
**COURSE** : Mathematical Methods for Physics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Ordinary Differential Equations

This course will cover Vector Analysis, Vector Integration, Vector Analysis in Curved Coordinates, Tensor Analysis, Determinants and matrices, Group Theory, Infinite series and Differential Equations. It is a practical introduction to mathematical methods that are useful in various areas of physics. The goal of this course is to give an introduction to mathematical methods for solving hard mathematics problems that arise in the sciences.

**COURSE CODE** : ZAB1053  
**COURSE** : Modern Physics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Physics (A-level or Equivalent)

This course will cover Relativity, Quantization of Charge, Light, and Energy, The nuclear Atom, The wavelike Properties of Particles, The Schrodinger Equation, Nuclear Physics, Nuclear Reaction and Applications.

**COURSE CODE** : ZAB1063  
**COURSE** : Electromagnetics I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover electricity and magnetism topics required to understand electric and magnetic forces, the electric Potential and potential energy, the direct and alternating currents, electromagnetic induction and motional electromotive force, the course also covers circuits that include resistor, capacitor and inductor, and also covers electrical and magnetic energy storage and electromagnetic waves.

**COURSE CODE** : ZAB1072  
**COURSE** : Physics Practical II (Electricity and Magnetism)  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Physics Practical I (Mechanics)

This course will cover the Electrostatic Charging, Faraday's Law, Coulomb's Law, Inductance of Solenoids, Kirchhoff's Laws, Magnetic Induction, Magnetic moment in the magnetic field, Temperature dependence of different resistor and diodes, Transformer, Phase Relationships in an LRC Circuit.

**COURSE CODE** : ZAB2012  
**COURSE** : Physics Practical III (Optics)  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Physics Practical II (Electricity and Magnetism)

This course will cover the propagation of light: reflection, refraction, and total internal reflection, image formation with lenses and mirrors, dispersion, interference, diffraction, polarisation, scattering of light, Huygens's Principle, holography, birefringence, optical instruments, microscopes and telescopes, cameras and projectors, aberrations of optical systems, quantum nature of light, photons, lasers and laser applications.

**COURSE CODE** : ZAB2024  
**COURSE** : Quantum Mechanics  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Mathematical Methods for Physics

This course will cover the Limits of Classical Physics, Wave Particle Duality, Probability, and the Schrodinger Equation, the Eigenvalues, Eigen functions, and Expansion Postulate, One-Dimensional Potentials, The General Structure of wave Mechanics, The General Structure of wave Mechanics, Operator Methods in quantum Mechanics, The Schrodinger Equation in Three Dimensions and The Hydrogen atom, Matrix Representation of operators.

**COURSE CODE** : ZAB2033  
**COURSE** : Optics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Physics (A-level or Equivalent)

This course will cover the propagation of light: reflection, refraction, and total internal reflection, image formation with lenses and mirrors, dispersion, interference, diffraction, polarisation, scattering of light, Huygens's Principle, holography, birefringence, optical instruments, microscopes and telescopes, cameras and projectors, aberrations of optical systems, quantum nature of light, photons, lasers and laser applications.

**COURSE CODE** : ZAB2043  
**COURSE** : Vibrations and Waves  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mathematical Methods for Physics

This course will cover Simple Harmonic Motion, The Damping Harmonic Oscillator, Force Oscillations, Coupled Oscillators, Travelling Waves, Standing waves, Longitudinal Waves, Interference, Diffraction, and Dispersion of Waves.

**COURSE CODE** : ZAB2053  
**COURSE** : Electromagnetics II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Electromagnetics I, Ordinary Differential Equations

This course will cover vectors and fields; Maxwell's equations in integral form; Maxwell's equations in differential form; Maxwell's equations for time-varying fields; Plane EM wave propagation; Reflection, Transmission, and Waveguides; Radiation and antennas; Satellite communication systems and radar sensors. A brief introduction of CSEM and the survey design will be done. Some mathematical methods in solving some problems will be done. The survey design will be done using CST software.

**COURSE CODE** : ZAB2063  
**COURSE** : Atomic Physics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the fundamental atomic and molecular structure. It will also cover radiation and matter, quantum theory of one electron atoms, many-electron atoms, hyperfine structure and isotope shift. Schrodinger equation in three dimension, wave functions of hydrogen, fine structure of hydrogen, Pauli Exclusion Principle and Zeeman effect will be covered extensively in this course.

**COURSE CODE** : ZAB2072  
**COURSE** : Philosophy of Science and Technology  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course focuses on the principles that impel a culture to utilise knowledge, principles and process in science for the convenience of man, traces the historical highlights of low, medium and high technological developments and conducts an analysis of major factors that impinge on technology.

**COURSE CODE** : ZAB3014  
**COURSE** : Solid State Physics  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Quantum Mechanics

This course discusses crystal structure and crystal binding forces. Experiments in structure analysis are briefly mentioned. The topic of lattice vibration and their effect on thermal, acoustic and optical properties are examined and form the basis for the discussion of free electron model in metals. More realistic behaviour of these electrons is discussed in the Band Model which is the main theme of the course. This model is later employed to distinguish between semiconductor, insulator and metals. The final topic is defects in solid.

**COURSE CODE** : ZAB3034  
**COURSE** : Measurement and Instrumentation  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Physics (A-level or Equivalent)

This course will cover Sensor and Transducers, Electrical Variables, Electromagnetic Variables, Mechanical Variables, Thermal Variables, X-ray measurement, Interferometers and Spectrometers, Microscopy and Radiation detection & measurement.

**COURSE CODE** : ZAB4012  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : Student Industrial Internship Programme

This is an individual research project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

**COURSE CODE** : ZAB4024  
**COURSE** : Semiconductor Devices and Technology  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Electromagnetics I, Ordinary Differential Equations

This course will cover review of the Atomic and Crystal Structure of Semiconductors, Semiconductor Materials and Properties, Carrier Transport in Semiconductors, the physics and characteristics of major semiconductor devices, beginning with p-n junction, bipolar and field effect devices and photonic devices, Semiconductor processing technology from crystal growth to lithographic process of pattern transfer, introduction to microelectronic circuits and logic circuits and a Microelectronic Application Project.

**COURSE CODE** : ZAB4034  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project in connection with a special engineering problem and under the guidance of a faculty member. The project undertaken may fall under one of the following areas: mathematical analysis, experimental tests, computer simulation, hardware and/or software development, device fabrication.

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Nanotechnology

**COURSE CODE** : ZAB4113  
**COURSE** : Nanoscience  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the fundamental of nanoscience that deals with the physical perspective, societal implications of nano, characterisation and fabrication techniques. It also delves into nanoscience by covering the properties and phenomena and in the surface of nanomaterials and its importance.

**COURSE CODE** : ZAB4123  
**COURSE** : Fundamentals of Nanotechnology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course focuses on five (5) general topics namely perspectives, electromagnetic nanoengineering, mechanical nanoengineering, chemical nanoengineering and environmental nanoengineering.

**COURSE CODE** : ZAB4133  
**COURSE** : Simulation and Design of Nanostructures  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Solid State Physics

This course covers on application of knowledge and skills of nanotechnology principles to a potential project application. The ability to search and read current nanotechnology literature applied to a particular problem domain will be emphasised. The history of nanotechnology, and where the field may evolve over the next 10 to 15 years will be given. Identify societal and technology issues that may impede the adoption of nanotechnology. Besides concepts of molecular modelling and simulation of nanomaterials. Major topics include force fields, statistical mechanics, molecular dynamics and the analysis of simulation results. Attendees will work through short tutorial on the topics discussed in the class. This course will provide a comprehensive overview of how nonmaterial can be prepared, stabilized, surface-functionalized and assembled for various applications in the current industrial needs from sensors to fuel cell to electronic.

**COURSE CODE** : ZAB4143  
**COURSE** : Nanoelectronic  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Electromagnetics I & II, Quantum Mechanics and Solid State Physics

This course covers the theory of current, voltage and resistance from atoms up. To describe electrons at the nanoscale, we will begin with an introduction to the principles of quantum mechanics, including quantization, the wave-particle duality, wave functions and Schrödinger's equation. Then we will consider the electronic properties of molecules, carbon nanotubes and crystals, including energy band formation and the origin of metals, insulators and semiconductors. Electron conduction will be taught beginning with ballistic transport and concluding with a derivation of Ohm's law. We will then compare ballistic to bulk MOSFETs. The course will also explore the world of quantum-controlled nano-electro-mechanical systems (NEMS). Topics that will be covered are scaling laws and principles for NEMS, modelling of NEMS devices and structures, control of NEMS, and applications of NEMS in carbon nanotubes and nanowires.

### 5.2.2 Renewable Energy

**COURSE CODE** : ZAB4213  
**COURSE** : Renewable Energy  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover the fundamental of renewable energy systems, Solar Energy, Photovoltaic Systems, Biomass, Biofuels and Biogas, Biopower, Hydropower, Wind Energy Conversion System, Geothermal Energy, Ocean Thermal, Tidal, Wave and Animal Energy Conversion System, Integrated Energy Systems and Energy cost analysis.

**COURSE CODE** : ZAB4223  
**COURSE** : Renewable Energy Conversions  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mechanics, Electromagnetics I, Solid State Physics

This course will cover the key renewable energy conversion technologies for sustainable power generation, including energy balance studies and quality energy storage systems. It involves analysis of energy conversion and storage in thermal, mechanical, nuclear, chemical, and electrochemical processes in power systems, with emphasis on efficiency, performance and environmental impact.

**COURSE CODE** : ZAB4233  
**COURSE** : Renewable Energy Informatics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mechanics, Electromagnetics I, Solid State Physics

This course will cover the regulations for waste stream, recycling issues, manufacturing efficiency and process improvement. It involves analysing, designing, and implementing systems to increase the efficiency of energy demand and supply systems. This requires the collection and analysis of data used to optimise energy distribution and consumption networks. Students will leverage the necessary information systems competencies and multi-disciplinary knowledge to increase societal energy efficiency.

**COURSE CODE** : ZAB4243  
**COURSE** : Green Electricity Generation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mechanics, Electromagnetics I, Solid State Physics

This course will cover the major green electricity generation technologies for sustainable power generation, including solar photovoltaic, high temperature solar thermal, wind power, hydroelectricity, biomass, hybrid system and electricity storage systems.

### 5.2.3 Oil and Gas Exploration

**COURSE CODE** : ZAB4313  
**COURSE** : Seismic Theory and Practices  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Vibration and Waves

This course will cover the Seismic wave propagation, seismic imaging, seismic data acquisition, processing and interpretation, seismic attribute for structural interpretation and hydrocarbon prediction, seismic inversion and application of geophysics in reservoir. Seismic Processing leading to Imaging of the subsurface is the most critical step and objective of the whole Seismic Method as applied to the Oil and Gas industry. The basis of seismic interpretation applied to structural analysis of sedimentary basin will be introduced.

**COURSE CODE** : ZAB4323  
**COURSE** : Electromagnetics: Theory and Practices  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Electromagnetics I, Solid State Physics

This course will cover the general theory of electromagnetism based on Maxwell's equations incorporating vector calculus; illustrates the theory using applications, for example in communications and in consumer electronic; and introduces practical techniques for solving problems in electromagnetism. The unit comprises the following topics: introduction to vector calculus; electrostatics—Gauss's Law, electric potential, polarisation, energy stored in an electric field, steady current flow, resistance and capacitance, boundary conditions, Poisson's equation and Laplace's equation; magnetostatics—Biot-Savart Law, Ampere's Law, magnetic scalar and magnetic vector potential, magnetisation, boundary conditions, energy stored in a magnetic field, inductance and mutual inductance; time-varying electromagnetic fields—Faraday's law. A brief introduction of CSEM and the survey design will be done. Some mathematical methods in solving some problems will be done. The survey design will be done using CST software.

**COURSE CODE** : ZAB4333  
**COURSE** : Physical & Structural Geology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Physics (A-level or Equivalent)

This course will cover the Earth & Universe, Plate Tectonics, Geomorphology, Rock cycle, Hydrologic cycle, Structural geology, Time and geology, Geohazards, Earth energy and resources, Earth Materials Properties, Earth Materials Properties, Syn-depositional Structure, Environment, time & material, Tectonic related structure, Macro and Micro structures, and Geomorphology & structures.

**COURSE CODE** : ZAB4343  
**COURSE** : Petro Physics and Well-logging  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : Mechanics, Electromagnetics I, Solid State Physics

This course will focus on the seismic expression of hydrocarbons and lithology estimation using Amplitude Variation with Offset (AVO). It demonstrates how rock physics can be applied to predict reservoir parameters, such as lithologies and pore fluids, from seismically derived attributes. It also includes an introduction to wireline logging tools and techniques. Then, the course discusses on the practical understanding of the interpretation: open and some cased hole log analysis methods for the determination of lithology, porosity, fluid content and movement, and net pay both qualitative (quick look) and quantitative analyses methods are covered. An overview of dipmeter, MWD and some cased hole logs is also given.

Bachelor of Science (Hons)  
in Petroleum Geoscience

# Bachelor of Science (Hons) in Petroleum Geoscience

## 1.1 Introduction

Geoscience has always been the centre of all modern natural resource industries, starting from exploration phase, through to their development and production phase. This programme has been designed to provide students with a strong understanding of geology and geophysics that relate to exploration, petroleum discovery, development and production.

The Bachelor of Science (Hons) in Petroleum Geoscience degree at UTP emphasises on quantitative geosciences, thus requiring strong fundamentals in mathematics and physics, followed by a thorough coverage of basic geology courses such as Physical Geology, Mineralogy and Petrology, Structural Geology, Stratigraphy and Palaeontology, and Geological Field Mapping. At higher levels, students are exposed to more petroleum geoscience related courses such as Clastic and Carbonate Sedimentology, Geochemistry, Seismic Acquisition and Processing, Seismic Interpretation, Formation Evaluation, and Seismic Data Imaging. In the final year, students have the opportunity to major in a mix of these two selected areas of interest:

- **Basin Reservoir Studies**
- **Exploration Geophysics**

Students acquire the ability to communicate with a diverse array of people and will have an understanding of the geological and technological complexity of the petroleum systems with which they are working. Student may opt for a Minor in Data Science as an option is made available to students who are interested to enhance their knowledge in management and business, at their discretion.

## 1.2 Programme Educational Objective

To produce technically qualified well-rounded petroleum geoscientists with the potential to become leaders of industry and the nation.

- i. Geoscientists who are competent with the potential to become leaders in Geoscience and related industries.
- ii. Geoscientist who are involved towards sustainable development in Geoscience and related industries for the betterment of the society.

## 1.3 Programme Outcomes

At the end of the programme, the graduates should be able to:

- i. Describe advanced and comprehensive, theoretical, and technical knowledge in Geosciences.
- ii. Demonstrate intellectual independence in complex application of geoscientific knowledge by applying critical, analytical and evaluation proficiencies in respective fields.
- iii. Apply a range of essential methods and procedures to solve a broad range of complex problems in Geosciences.
- iv. Work in diverse communities and communicate Geoscience information concisely using written, visual and verbal means appropriate to the situation.
- v. Adapt a broad spectrum of digital and numeracy skills to support complex Geoscience applications by synthesising quantitative and qualitative data.
- vi. Work autonomously and demonstrate leadership and professionalism in managing responsibilities within broad organizational parameters.
- vii. Demonstrate business acumen in Geosciences and other related matters.
- viii. Commit to professional and ethical principles, responsibilities, and norms of geoscience practice.

## 1.4 Graduation Requirements

In order to graduate with the Bachelor of Science (Hons) in Petroleum Geoscience, students are required to obtain a minimum of **144 credit hours** and a minimum CGPA of 2.00.

Summary of Courses Required for Graduation	
Course Group (G)	Number of Credit Hours
NR - National Requirement	10
UR - University Requirement	15
CC - Core Common	17
CD - Core Discipline	79
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
<b>TOTAL</b>	<b>144</b>

## 2.0 Programme Curriculum Structure: Bachelor of Science (Hons) in Petroleum Geoscience

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3152	Penghayatan Etika dan Peradaban (Local)	2	NR	MPU3192	Falsafah dan Isu Semasa (Local & International)	2	NR	LFB1042	Academic Writing	2	UR
MPU3142	BM Komunikasi 2 (International)										
PFB1012	Introduction to Oil & Gas Industry & Sustainable Development	2	UR	FFM1023	Engineering Mathematics II	3	CC	HFB1022	Scientific Inquiry	2	UR
HFB2152	Ethics and Integrity	2	UR	CFB1032	Health, Safety & Environment	2	CC	KXXXXX1	Co-Curriculum 1	1	UR
FFM1013	Engineering Mathematics I	3	CC	QDB1033	Mineralogy and Petrography	3	CD	FFM1063	Statistics and Application	3	CC
QDB1013	Physical Geology	3	CD	QDB1043	Structural Geology	3	CD	QDB1063	Palaeontology	3	CD
QDB1023	Fundamentals of Geophysics	3	CD	QDB1052	Geological Mapping Techniques	2	CD	QDB1073	Principal of Stratigraphy	3	CD
<b>Credit Hours</b>		<b>15</b>		<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>14</b>	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU2	One (1) MPU2 Course	2	NR	MPU3182/ MPU3183	Integrity and Anti-corruption	2	UR	MPU 4 / HFB1012	Community Engagement Project	2	UR
HFB2033	Professional Communication Skills	3	UR	FFM2063	Data Analytics	3	CC	KXXxxx1	Co Curriculum II	1	UR
GFB2102	Entrepreneurship	2	UR	QDB2033	Geospatial and Remote Sensing	3	CD	QDB2063	Seismic Methods	3	CD
QDB2013	Carbonate Sedimentology	3	CD	QDB2043	Inorganic Geochemistry	3	CD	QDB2072	Geo-Field Camp	2	CD
QDB2023	Clastic Sedimentology	3	CD	QDB2053	Organic Geochemistry	3	CD	QDB2083	Non-Seismic Methods	3	CD
<b>Credit Hours</b>		<b>13</b>		<b>Credit Hours</b>		<b>14</b>		<b>Credit Hours</b>		<b>11</b>	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
FFM1073	Computational Methods	3	CC	IFB3037	Student Industrial Training (SIT)	7	CI	IFB3047	Student Industrial Project (SIP)	7	CI
QDB3013	Geological Data Analysis	3	CC								
QDB3023	Seismic Interpretation	3	CD								
QDB3033	Petroleum Geology	4	CD								
Credit Hours		12		Credit Hours		7		Credit Hours		7	

SEMESTER 10				SEMESTER 11				SEMESTER 12			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
QDB4013	Exploration and Production Team Project	3	CD	QDB4053	Reservoir Characterisation	3	CD	QDB4084	Final Year Project II	4	CD
QDB4023	Well Logging Techniques and Interpretation	3	CD	QDB4063	Regional Geology of Malaysia and Southeast Asia	3	CD	QDB4093	Earth Resource Management	3	CD
QDB4033	Attributes and 3D Visualisation	3	CD	QDB4072	Final Year Project I	2	CD	QDB4XX3	Core Specialisation II	3	CSp
QDB4043	Basin Analysis	3	CD	QDB4XX3	Core Specialisation I	3	CSp	QDB4XX3	Core Specialisation III	3	CSp
Credit Hours		12		Credit Hours		11		Credit Hours		13	

Total Credit Hours : 144

### 3.0 Core Specialisation (CSp) Courses

Choose any of the following sets of Core Specialisation areas (set A or B) for Core Specialisation I, II and III.

A. Basin Reservoir Studies				
No	Code	Course Name	Cr	G
1	QDB4113	Basin Maturity Modelling	3	CSp
2	QDB4123	Geodynamics and Basin Development	3	CSp
3	QDB4133	Formation Evaluation and Operation	3	CSp

B. Exploration Geophysics				
No	Code	Course Name	Cr	G
1	QDB4213	Seismic Data Processing	3	CSp
2	QDB4223	Seismic Data Imaging	3	CSp
3	QDB4233	QI and Rock Physics	3	CSp

## 4.1 Minor (EM) Courses

Petroleum Geoscience students who are interested to enhance their knowledge in computer and information systems or finance, accounting, and business will have the options to complete courses offered under a Minor. There are two (2) Minor packages available for Petroleum Geoscience students as below:

- i. Minor in Data Science
- ii. Minor in Accounting and Finance

In order to be eligible for Minor, students are required to pass and complete all the courses under the same package (15 credits). Results obtained from courses under Minor will be counted into GPA/CGPA calculation. Students are reminded that the option to complete Minor courses are at the students' discretion and are **not compulsory**. The total credit hours accumulated under Minor courses will be over and above the graduation requirements of **144 credit hours**.

Minor in Data Science					
A No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

Minor in Accounting and Finance					
B No	Code	Course Name	Cr	G	Semester
1	GFB2013	Business Accounting	3	EM	Students can take these courses in any semester
2	GFB2153	Business Law	3	EM	
3	GFB2283	Business and Financial Technology	3	EM	
4	GFB2293	Management Accounting	3	EM	
5	GFB2303	Assurance	3	EM	
Total Credit Hours			15		

**Note:**

- Code A** : Please refer to Materials Engineering Programme for Course Synopsis.  
**Code C** : Please refer to Chemical Engineering Programme for Course Synopsis.  
**Code E** : Please refer to Electrical & Electronic Engineering and Computer Engineering Programme for Course Synopsis.  
**Code F, Z** : Please refer to Applied Chemistry and Fundamental & Applied Sciences Department for Course Synopsis  
**Code K** : Please refer to Credited Co-Curriculum Programme for Course Synopsis.  
**Code M** : Please refer to Mechanical Engineering Programme for Course Synopsis.  
**Code P** : Please refer to Petroleum Engineering Programme for Course Synopsis.  
**Code Q** : Please refer to Petroleum Geoscience Programme for Course Synopsis.  
**Code T** : Please refer to Computer Science, Information Systems and Information Technology Programmes for Course Synopsis.  
**Code V** : Please refer to Civil Engineering Programme for Course Synopsis.  
**Code L, G, H, MPU** : Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.

## 5.0 Programme Courses Synopsis

### 5.1 Core Discipline (CD) Courses Synopsis

**COURSE CODE** : QDB1013  
**COURSE** : Physical Geology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course draws from all fields of geosciences to explore the evolution of Planet Earth. Topics include: An introduction to earth materials (minerals, rocks, soils, and water); Earth's interior structure; Geological processes in operation on and beneath the surface of the earth and their effects (weathering, erosion, deformation and geologic structures, earthquakes, plate tectonics, ocean basins, running water, ground water, glaciers, winds and deserts, coasts, and shorelines); Techniques of dating geological events.

**COURSE CODE** : QDB1023  
**COURSE** : Fundamentals of Geophysics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides an introduction to the application of math and physics in the study of Geophysics. It presents a comprehensive overview of the fundamental principles of each major branch of geophysics (gravity, seismology, radioactivity, thermodynamics, geoelectricity, and geomagnetism), in addition to basic knowledge on well logging techniques.

**COURSE CODE** : QDB1033  
**COURSE** : Mineralogy & Petrography  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course includes the classification of igneous, sedimentary and metamorphic rocks based on their origin. An introduction to descriptive crystallography and to chemical, physical, determinative and descriptive mineralogy. Areas covered include crystal symmetry, classification, morphology, crystal chemistry, physical properties, geologic occurrence, significance, and characteristic properties of minerals. Structural texture, chemistry and mineralogy of Igneous rocks; metamorphism and metamorphic rock texture, structures and mineralogy, metamorphic facies, metamorphic phase diagrams.

Laboratory work includes hand specimen identification and petrographic studies of various rock types.

**COURSE CODE** : QDB1043  
**COURSE** : Structural Geology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course covers basic concept of structural geology in term of the formation of megastructure, mesostructured and microstructure. The stress-strain relationships encompass more on the brittle and ductile behaviour of material. Plate tectonic in relation to deformation on developing major structures, such as joint, fault, fold, cleavage, lineation, foliation etc.

Laboratory sessions focus more on data acquisition (geological field data), plotting on stereonet (Schmidt Net), rose diagram, contouring data etc. Bunch of discontinuity data will be utilised for structural analysis and interpretation of stresses.

**COURSE CODE** : QDB1052  
**COURSE** : Geological Mapping Techniques  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course provides training and experience in geologic mapping and field methods. Practical field skills applicable to geological, geo-engineering, and environmental studies developed through field exercises. Methods used in the field mapping such as remote sensing; photo geology, are sampling techniques. The use of GIS and mapping software.

Field Exercise at Outcrops in Seri Iskandar:

Geological Observation / Field note (structural geology)  
 Geological Observation / Field note (sedimentology logging)

**COURSE CODE** : QDB1063  
**COURSE** : Palaeontology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Lectures touch on the co-evolution of life on earth. Basic concepts in biology are presented in the context of significant events in Earth's history. This course introduces physiological processes of plants and animals as they relate to evolutionary and ecological processes. Topics in the course include fundamentals of palaeontology; overview of fossils and their use in geology; Taxonomy of invertebrates micro- and macro fauna; Overview of paleo-botany and palynology, including taxonomy of fossil micro- and macro flora; Processes of fossilization and preservation of fossils; Techniques of collection, observation, and analysis of fossils. Laboratory: observation and recognition of fossils in hand specimen and thin section. Field work supplements lectures and laboratory.

**COURSE CODE** : QDB1073  
**COURSE** : Principal of Stratigraphy  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The principles laws of stratigraphy are covered. Relative and absolute age dating methods in addition to the main hypothesis, theories and experiment on origin of life are introduced. Basic concepts are presented in the context of significant events in earth's history (life). Principal of stratigraphy; overview of chronostratigraphic, lithostratigraphy, biostratigraphy and sequence stratigraphy. The geologic time scale; origin, controls, relationships with eustatic curve, sequence system tracts conventions and nomenclature; applications of stratigraphic properties in sequence stratigraphy and its correlation.

**COURSE CODE** : QDB2013  
**COURSE** : Carbonate Sedimentology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course covers an overview of carbonate minerals and their properties; a brief introduction to carbonate chemistry; Overview of the components (skeletal and non-skeletal) of carbonate sediments and rocks; Classifications and nomenclature of texture and porosity types in carbonate rocks; An overall view of the different carbonate depositional environments and facies, illustrated with classical present-day analogues. Description of diagnostic elements to identify depositional facies in rock sequences; Carbonate diagenesis: processes, chemistry and analytical methods and the role of diagenesis in enhancing or destroying reservoir quality (porosity and permeability).

Laboratory stresses use of the petrographic microscope for identification, description, and analysis of carbonate rock components, texture and diagenetic processes.

**COURSE CODE** : QDB2023  
**COURSE** : Clastic Sedimentology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course gives comprehensive review on how depositional processes are recognised and interpreted from the characteristics of sediment texture bedform geometry and their sedimentological structures. It also includes a brief overview of how the various processes operates and their sedimentary products (facies) are spatially distributed in diverse depositional system, such as fluvial and coastal environments, shallow-marine and deep-marine environments, and related studies. The subsequent lectures are combined by practical exercises to give a comprehensive background for facies analysis of sedimentary successions including pre-request courses of Physical Geology and Mineralogy. This course will give students a good knowledge of physical sedimentology and a solid foundation for further work within the field sedimentology.

**COURSE CODE** : QDB2033  
**COURSE** : Geospatial and Remote Sensing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to provide students with a basic principles, methods, techniques and applications of GIS and remote sensing. It covers fundamental of GIS and remote sensing, spatial data collection and management, spatial data manipulation, spatial data analysis and modelling, remote sensing image processing and interpretation and spatial data visualisation which are essential for scientific investigations in environmental science, earth science, geography and other scientific studies that have a spatial dimension.

**COURSE CODE** : QDB2043  
**COURSE** : Inorganic Geochemistry  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

It is a comprehensive introduction to most aspects of geochemistry including the fundamental concepts, aquatic chemistry, trace elements and radiogenic isotope geochemistry, the geochemistry of the core, mantle and crust and the geochemistry of the oceans, atmosphere, and weathering processes. Chapters on organic geochemistry are also included.

**COURSE CODE** : QDB2053  
**COURSE** : Organic Geochemistry  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

To introduce to students the description and classification of sedimentary OM that includes virtually all aspects of OM-bearing rocks and encompasses all possible analytical methods. The knowledge has found many applications in fundamental and applied earth sciences.

**COURSE CODE** : QDB2063  
**COURSE** : Seismic Methods  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course gives comprehensive theoretical and practical aspects of seismic methods. The course started with the Digital signal analysis, followed by seismic waves and seismic tools. The second part of this course will discuss in detail about seismic methods such as refraction and reflection. Toward the end of the course, other seismic related methods (VSP, Tomography) will also be discussed.

**COURSE CODE** : QDB2072  
**COURSE** : Geo-field Camp  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course provides a comprehensive introduction to independent geological mapping and the construction of geological maps. Skills are developed to interpret and solve geological relationships at various scales, and to synthesize them into four-dimensional models that describe the geological evolution of terrains. These skills also include hand specimen and outcrop geology, mapping and stratigraphic analysis at a range of scales, aerial photo interpretation, remote sensing and the integration of geophysical datasets into geological mapping and interpretation. Thus, the course will draw upon the principals of structural geology and combine them with an understanding of sedimentary, igneous and metamorphic rock systems.

**COURSE CODE** : QDB2083  
**COURSE** : Non-Seismic Methods  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course gives comprehensive theoretical and practical aspects on non-seismic method. This course discusses the technique implementation in geophysics explorations, especially in oil and gas industry, mineral exploration, engineering, and environmental studies.

**COURSE CODE** : QDB3013  
**COURSE** : Geological Data Analysis  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides an introductory class on how to quantitatively analyse data in the geosciences. Examples on how to use the various statistical techniques on real data will be stressed and will include both geological and geophysical examples.

**COURSE CODE** : QDB3023  
**COURSE** : Seismic Interpretation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will focus on the seismic expression of folding, faulting, depositions, and erosion. It starts with the seismic events, followed with tying geology and seismic sections. Manual interpretation technique and subsurface contouring will be discussed for the first part of the course. Advanced attributes interpretation will also be discussed.

**COURSE CODE** : QDB3033  
**COURSE** : Petroleum Geology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course covers the basic concept of petroleum geology focusing on source rock, petroleum generation, migration, accumulation, and trapping system. The history of hydrocarbon discoveries around the globe will be taught to insight for comparison with the advancement of technology. Several geophysical methods for exploring hydrocarbon onshore and offshore will be briefly covered, which are seismic, gravity and resistivity. Besides, the well-logging and formation evaluation will be shared for the benefits of the students.

**COURSE CODE** : QDB4013  
**COURSE** : Exploration and Production Team Project  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The module integrates the learning outcomes of previous years taught courses. The main aim is to produce a petroleum potential exploration/appraisal plan based on given data. The main learning outcomes are expected to enhance cognitive and core skills: team working, developing problem solving strategies etc.

The basin scale subsurface data provided include key petroleum systems elements, general well results and trap styles, to allow analysis of subsurface risks and evaluation of volumetrics uncertainties. The ensuing techno-commercial exploration proposal will be negotiated to satisfy the stakeholders contractual requirements and management approval.

Each group will consolidate the final recommendation using a decision tree and present the finding in front of expert / industry panels for feedback and endorsement.

**COURSE CODE** : QDB4023  
**COURSE** : Well Logging Techniques and Interpretation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course begins with an introduction to wireline logging tools and techniques. Then, the course discusses on the practical understanding of the interpretation: open and some cased hole log analysis methods for the determination of lithology, porosity, fluid content and movement and net pay Both qualitative (quick look) and quantitative analyses methods are covered. An overview of diameter, MWD and some cased hole logs is also given.

Second part of this course covers the practical approach of subsurface mapping techniques, where students will be introduced to x-section, log correlation and creating subsurface maps, and calculating reserves.

**COURSE CODE** : QDB4033  
**COURSE** : Attributes and 3D Visualisation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will focus on the application of seismic attributes to subsurface seismic data. The seismic attributes will be taught to enhance the conventional seismic interpretation technique that was taught during Seismic Interpretation Subject during previous semester.

**COURSE CODE** : QDB4043  
**COURSE** : Basin Analysis  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course is a combination of lectures, exercises, and a team project aiming at evaluating the petroleum potential of an imaginary basin. Lecturers will teach the students the elements of a petroleum system, using real examples of proven petroleum system in Malaysia, the Middle East, and other oil provinces of the world. Lectures and exercises will familiarise students with techniques in evaluating the hydrocarbon potential of a sedimentary basin, including regional geological studies, seismic, well log correlations, source rock, and reservoir analysis.

**COURSE CODE** : QDB4053  
**COURSE** : Reservoir Characterisation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course is to run through the workflow of reservoir characterisation and modelling as routinely used in oil industry. The lecture will be illustrated by practical work using actual data. Deterministic and stochastic modelling, volumetric calculation, and uncertainties will be developed at each stage, with focus on geology, seismic, and geostatistical methods. The course covers; the characterisation and modelling fundamentals in the geological reservoir modelling. Application of modelling software will also be introduced.

**COURSE CODE** : QDB4063  
**COURSE** : Regional Geology of Malaysia and Southeast Asia  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course gives an insight on the regional geology and regional tectonics of Southeast Asia with emphasis on the geology and tectonic setting of Peninsular Malaysia, Sabah and Sarawak. The course emphasizes on the lithological settings from the Cambrian to Tertiary. The course also covers the offshore geology in the various petroleum producing basins in the South China Sea.

**COURSE CODE** : QDB4072  
**COURSE** : Final Year Project I  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This is an individual research project in connection with a special geo-scientific problem and the student is under the guidance of a faculty member. The project undertaken may fall under one of the following areas: field mapping, laboratories analysis, and field test. For both FYP I and II, each student prepares a comprehensive geoscience report, present and demonstrate findings and results of the project work.

**COURSE CODE** : QDB4084  
**COURSE** : Final Year Project II  
**NO. OF CREDITS** : 4 credits  
**PRE-REQUISITE** : Final Year Project I

This is an individual research project in connection with a special geo-scientific problem and the student is under the guidance of a faculty member. The project undertaken may fall under one of the following areas: field mapping, laboratories analysis, and field test. For both FYP I and II, each student prepares a comprehensive geoscience report, present and demonstrate findings and results of the project work.

**COURSE CODE** : QDB4093  
**COURSE** : Earth Resources Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will provide a basic introduction to the field of earth resources management covering the non-renewable resources such as oil & gas, ground water & minerals. This course takes an integrated view of all aspect of earth resource management that requires an understanding of the interactions between natural resources and social processes. Consequently, the course will focus on concepts dealing with not limiting to environmental, governing laws & agreements, commercial, fiscal economics, politics, and technical work processes.

## 5.2 Core Specialisation (CSp) Courses Synopsis

### 5.2.1 Basin Reservoir Studies

**COURSE CODE** : QDB4113  
**COURSE** : Basin Maturity Modelling  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

It covers the concept of concept of petroleum systems, focusing on examining the dynamics of sedimentary basins and their associated fluids to determine if past conditions were suitable for hydrocarbons to fill potential reservoir and be preserved there. The syllabus will emphasise on the burial history, 1D and 2D modelling, and a brief introduction of 3D modelling.

**COURSE CODE** : QDB4123  
**COURSE** : Geodynamics & Basin Development  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

To understand the regional structures and sedimentary basins in different stress regimes with analysis of brittle and ductile deformations that occurred at different scales. Global structure of the earth with the analysis of brittle and ductile deformations in sedimentary basins at different scales and in different stress regimes. Course covers; Plate tectonics; faults and folds; rift margins; passive margins; active margins; thrust belts; stereo nets; sections balancing; tectonic inversion; geodynamic of Southeast Asia.

**COURSE CODE** : QDB4133  
**COURSE** : Formation Evaluation and Operation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course focuses on the well site geology and different operations. It also provides the fundamental basics of coring and the study of the physical properties of rocks focusing on the storage and flow of the fluids contained within them and carry out different petrophysical property measurements in lab. Log data from some advanced tools will be presented to highlight the significance of the recorded parameters and the impact of uncertainties on the evaluation results. The student will evaluate clastic and carbonate reservoirs by integrating log and core data. He should be able to prepare and use this information for integrated geological workflows in flow units, basin analysis and reservoir characterisation.

### 5.2.2 Exploration Geophysics

**COURSE CODE** : QDB4213  
**COURSE** : Seismic Data Processing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Part I will focus on the fundamental theory and practice in data processing, starting with a simple data set that will be used as an example to demonstrate the steps involved. Throughout the course, students will have the opportunity to try various processing combinations on other data sets from areas with interesting geological structures. Part II will give students the chance to try out more advanced processing concepts and techniques on seismic data to target specific processing problems and will emphasise the interaction between interpretation and data processing. This part of the course will involve more hands-on examples, class discussions and presentations.

**COURSE CODE** : QDB4223  
**COURSE** : Seismic Data & Imaging  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course deals with the wave theory underlying the seismic imaging method as well as the algorithm used in the industry (acoustic waves in fluids, elasto-dynamic waves in solids, Kirchhoff and Rayleigh integrals, diffraction, velocity model building etc.). In addition, the course also looks into greater depth of seismic anisotropy and inverse problem (wave field decomposition, inverse wave field extrapolation, imaging principle, etc.).

**COURSE CODE** : QDB4233  
**COURSE** : QI and Rock Physics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will focus on the seismic expression of hydrocarbons and lithology estimation using Amplitude Variation with Offset (AVO) and Seismic Inversion. It demonstrates how rock physics can be applied to predict reservoir parameters, such as lithologies and pore fluids, from seismically derived attributes. It shows how the multidisciplinary combination of rock physics models with seismic data, sedimentological information, and deterministic techniques can lead to more powerful results than can be obtained from a single technique.

**Chapter II:  
Department of  
Management and Humanities**

## Department of Management and Humanities

### 1.1 Introduction

The Department of Management and Humanities provides courses that are aimed at producing well-rounded graduates who will possess not only the latest competencies in Engineering, Science and Technology, but also other qualities such as strong leadership, good behavioural and communication skills, analytical thinking ability, as well as managerial, business and social competencies.

### 1.2 Objectives

In line with the University's mission in producing well-rounded graduates, the objectives of our programmes are to:

- i. Enhance management, communication and behavioural skills,
- ii. Enhance critical thinking, and
- iii. Instil ethical values.

### 1.3 Outcomes

UTP Graduates must be able to:

- i. Demonstrate good oral and written professional communication skills.
- ii. Demonstrate the ability to lead and work in cross-functional and multidisciplinary teams in a global work environment.
- iii. Apply creative, critical and innovative thinking in decision-making process.
- iv. Practise good management and entrepreneurial skills.
- v. Demonstrate good ethical values.

### 1.4 Courses Offered and Categories

The Department of Management and Humanities offers the following courses to all Undergraduate students:

- i. National Requirement (NR) Courses: Mata Pelajaran Umum (MPU).
- ii. University Requirement (UR) Courses.
- iii. Minor Electives (EM) Courses for Technology Programmes (Information Systems and Information Technology).
- iv. Common Science (CS) Courses for Applied Sciences Programmes (Chemistry and Physics).
- v. Minor in Management (EM) Courses for Applied Sciences (Chemistry and Physics) and Computer Engineering Programmes.
- vi. Minor (EM) Courses for Chemical, Civil, Electrical and Electronic, Materials, Mechanical, Petroleum Engineering and Petroleum Geoscience Programmes.
- vii. Community Engagement Project (CEP) for all programmes.

## 2.1 National Requirement (NR): Mata Pelajaran Umum (MPU) Definition and Categories

- The implementation of MPU will be based on knowledge, skills, morals, value, patriotism and towering personality. The implementation will focus within the curriculum/co-curriculum context that involves practical and philosophical knowledge in supporting students' development.
- All MPU Courses are 100% coursework with no Final Examination.
- Vertical exemption (Diploma to Degree) of MPU courses is not allowed.

There are four (4) categories under MPU;

<b>U1</b>	Penghayatan falsafah, nilai dan sejarah ( <i>Appreciation of philosophy, values and history</i> )
<b>U2</b>	Penguasaan kemahiran insaniah ( <i>Competency in soft skills</i> )
<b>U3</b>	Integriti dan Antirasuah ( <i>Integrity and Anti-Corruption</i> )
<b>U4</b>	Kemahiran pengurusan masyarakat yang bersifat praktikal seperti khidmat masyarakat, ko-kurikulum ( <i>Practical people management skills such as community service, and extra-curricular activities</i> )

## 2.2 Mapping of MPU Courses

Listed below is the mapping of MPU courses in the curriculum structure for all Undergraduate programmes, as follows:

Semester	Course Name	Credit of Hours	Category	Medium
<b>Local students:</b>				
1	i. Penghayatan Etika & Peradaban	2	U1	Bahasa Melayu
2	ii. Falsafah dan Isu Semasa	2		Bahasa Melayu
<b>International Students:</b>				
1	i. Bahasa Melayu Komunikasi 2	2	U1	English
2	ii. Falsafah dan Isu Semasa	2		Bahasa Melayu
3	One (1) U2 course*	2	U2	English
4	Integrity and Anti-corruption	2	U3	English
7	Community Engagement Project	2	U4	English
<b>TOTAL CREDIT HOURS FOR MPU COURSES</b>			<b>10 CREDITS</b>	

\* If a student does not have any credit for Bahasa Melayu in SPM (local students only), he/she needs to take **LEB2032 Bahasa Kebangsaan A** under U2 category.

## 2.3 List of Courses for Mata Pelajaran Umum (MPU)

Course Code	Course Name	Credit Hour(s)	Status	Remarks
<b>U1</b>				
MPU3152	Penghayatan Etika & Peradaban	2	NR	For local students only
MPU3192	Falsafah dan Isu Semasa	2	NR	For local and international students
MPU3142	Bahasa Melayu Komunikasi 2	2	NR	For international students only
<b>U2 - Choose only ONE</b>				
HFB2042	Islamic Critical Thinking *	2	NR	*Applicable for all students
HFB2052	Islamic and Contemporary Leadership *	2	NR	
HFB2062	Stress Management Skills *	2	NR	
HFB2072	Innovation and Creativity Skills *	2	NR	
HFB2082	Problem Solving and Decision Making *	2	NR	**Applicable for <b>NON-conversant</b> (familiar by use/study or having regular or frequent conversation; intimately associating) with the language
LFB2012	Basic Arabic Communication **	2	NR	
LFB2022	Basic Mandarin Communication **	2	NR	
LFB2042	Technical Writing *	2	NR	
LFB2052	Basic Korean Communication **	2	NR	
LFB2062	Basic French Communication **	2	NR	
LFB2072	Basic Spanish Communication **	2	NR	
LFB2082	Basic Japanese Communication **	2	NR	***Compulsory for local students who do not have National Examination/and credit in Bahasa Melayu.
LFB2092	Business Ventures *	2	NR	
LFB2032	Bahasa Kebangsaan A (Local only) ***	2	NR	
<b>U3</b>				
MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	Offered to all students
<b>U4</b>				
HFB1012	Community Engagement Project	2	NR	100% project-based course and need to be taken in two (2) consecutive semesters

### 3.0 University Requirement (UR) Courses

These courses need to be taken by all Undergraduate students:

No	Course Name	Course Code	Credit Hour(s)	Semester
1	HFB2152	Ethics and Integrity	2	1
2	LFB1042	Academic Writing	2	3
3	HFB2033	Professional Communication Skills	3	5
4	GFB2102	Entrepreneurship	2	6

\* Academic writing is prerequisite for PCS

#### 4.1 Minor Electives (EM) Courses for Technology Programmes (Computer Science, Information Systems and Information Technology)

These courses will be offered to all Technology Programmes (Information System/Information Technology) to complete their graduation requirements. Students need to choose ONLY ONE (1) Minor Elective package as follows:

- i. Corporate Management, or;
- ii. Financial Management, or;
- iii. Accounting and Finance

Minor Elective Package 1: Corporate Management				
No	Course Code	Course Name	Credit Hour(s)	Semester
1	GFB1033	Management & Organisational Behaviour	3	5
2	GFB2043	Principles of Marketing	3	6
3	GFB3113	Corporate Communication	3	7
4	GFB3093	Strategic Management	3	7
5	GFB3073	Human Resource Management (Final year only)	3	8

Minor Elective Package 2: Financial Management				
No	Course Code	Course Name	Credit Hour(s)	Semester
1	GFB2053	Principles of Finance	3	5
2	GFB2013	Business Accounting	3	6
3	GFB2113	Fundamental of Investment	3	7
4	GFB3033	Corporate Finance	3	7
5	GFB3043	International Financial Management	3	8

Minor Elective Package 3: Accounting and Finance				
No	Course Code	Course Name	Credit Hour(s)	Semester
1	GFB2013	Business Accounting	3	5
2	GFB2153	Business Law	3	6
3	GFB2283	Business and Financial Technology	3	7
4	GFB2293	Management Accounting	3	7
5	GFB2303	Assurance	3	8

## 5.0 Common Science (CS) Courses for Applied Sciences Programmes (Chemistry and Physics)

These courses **MUST** be taken by Applied Chemistry and Applied Physics students **ONLY** to complete their graduation requirements:

No	Course Code	Course Name	Credit Hour(s)	Semester
1	GDB1033	Management and Organisational Behaviour	3	6
2	GDB3013	Small Business and Entrepreneurship	3	8

## 6.0 Minor in Management (EM) Courses for Applied Sciences (Chemistry and Physics) and Computer Engineering Programmes

Minor in Management is made available to all Applied Sciences (Chemistry/ Physics) and Computer Engineering programmes students who are interested to enhance their knowledge in management and business. However, the option to do the Minor in Management is at the students' discretion and is **not compulsory**. The credit hours will be over and above the graduation requirements of **128 hours and 145 hours for Applied Sciences and Computer Engineering, respectively**.

Minor in Management				
No	Course Code	Course Name	Credit Hour(s)	Semester
1	GDB1033	Management & Organisational Behaviour	3	Students can take these courses in any semester
2	GDB2013	Business Accounting	3	
3	GDB2053	Principles of Finance	3	
4	GDB2043	Principles of Marketing	3	
5	GDB3013	Small Business and Entrepreneurship	3	

Students have to **complete** and **pass** all of the listed courses to get Minor in Management. All results will be counted in the GPA/CGPA calculation.

## 7.0 Minor (EM) Courses for Chemical, Civil, Electrical and Electronic, Materials, Mechanical, Petroleum Engineering and Petroleum Geoscience Programmes

Minor in Accounting and Finance are made available to all Chemical, Civil, Electrical and Electronic, Material, Mechanical, Petroleum Engineering & Petroleum Geosciences students who are interested to enhance their knowledge in business and accounting. However, the option to do the Minor is at the students' discretion and is **not compulsory**. The credit hours will be over and above the graduation requirements of **144 hours for Chemical, Civil, Electrical and Electronic, Materials, Mechanical, Petroleum Engineering and Petroleum Geosciences**.

Accounting and Finance				
No	Course Code	Course Name	Credit Hour(s)	Semester
1	GFB2013	Business Accounting	3	Students can take these courses in any semester
2	GFB2153	Business Law	3	
3	GFB2183	Business and Financial Technology	3	
4	GFB2193	Management Accounting	3	
5	GFB2213	Assurance	3	

Students have to **complete** and **pass** all of the listed courses to get minor in Accounting and Finance. All results will be counted in the GPA/CGPA calculation.

## 8.0 Community Engagement Project (CEP)

Community Engagement Project is a compulsory course offered to all UTP students as part of Mata Pelajaran Umum (MPU) as a National requirement prescribed by the Ministry of Education Malaysia. This course is a project-based activity, categorised under MPU U4 to complement MPU U1, MPU U2 and MPU U3 courses that are based on knowledge, skills, morals, value, patriotism and towering personality. The course is designed to ensure that students will acquire some of those basic elements to be applied in a community engagement project to support students' development. The social and value emphasis on this community-based project is in line with UTP mission to produce well-rounded graduates with a broad-minded, balanced and holistic views.

In this course, students are required to form a group of **FIVE (5)** (preferably from different races and nations) to plan and execute any community project with the approval of UTP MPU Committee. The project may come from any official programme organised by UTP Co-Curriculum groups, student's clubs and associations, Student Support Services Department or any UTP legal entities, or the students may also propose their own project that meet the required criteria of MPU U4 project.

*\*Please take note that this course is a 100% project-based course and needs to be taken in two (2) consecutive semesters.*

## 9.1 Courses Synopsis

### 9.2 National Requirement (NR): Mata Pelajaran Umum (MPU)

#### 9.1.1 Category U1: Penghayatan Falsafah, Nilai dan Sejarah (*Appreciation of Philosophy, Values and History*)

**COURSE CODE** : MPU3142  
**COURSE** : Bahasa Melayu Komunikasi 2 (Pelajar antarabangsa sahaja)  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

Kursus ini membolehkan pelajar berkomunikasi dalam Bahasa Melayu secara betul dan berkesan dalam pelbagai situasi formal dan tidak formal menggunakan aktiviti-aktiviti interaktif untuk meningkatkan kemahiran pelajar berkomunikasi, khususnya, dalam kemahiran lisan dan mendengar.

**COURSE CODE** : MPU3152  
**COURSE** : Penghayatan Etika dan Peradaban  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

Pengisian kursus ini memfokuskan kepada penghayatan etika dan peradaban dalam acuan Malaysia. Pelajar akan didedahkan dengan dinamika konsep etika dan peradaban yang menjadi kekuatan kepada pembentukan negara Malaysia berdasarkan susur masa evolusi sejarahnya dari era pra-kolonial sehingga ke pasca-kolonial. Kefahaman tentang pembentukan etika dan peradaban dalam masyarakat kepelbagaian dibincangkan bagi meningkatkan penghayatan etika dan peradaban ke arah pemantapan kesepaduan nasional dan bangsa Malaysia. Peradaban acuan Malaysia perlu dikupas serta diperdebatkan dalam aktiviti akademik berpandukan Perlembagaan Persekutuan sebagai tapak integrasi dan wahana etika dan peradaban. Pembinaan kesepaduan nasional amat dipengaruhi oleh globalisasi dan perkembangan teknologi maklumat dan komunikasi yang kompleks. Oleh kerana itu, penghayatan etika dan peradaban menzahirkan perilaku tanggungjawab sosial dan digerakkan pada peringkat individu, keluarga, komuniti, masyarakat, dan negara. Justeru, perubahan yang berlaku dalam masyarakat dan pembangunan langsung ekonomi telah membawa cabaran baru dalam mengukuhkan kelestarian etika dan peradaban di Malaysia.

**COURSE CODE** : MPU3192  
**COURSE** : Falsafah dan Isu Semasa  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course covers the relationship between philosophy with the Malaysian National Education Philosophy and Rukun Negara. The use of philosophy as a tool to purify the culture of thought in life through the arts and methods of thinking as well as the humanistic concept is at the core of the course. The main topics in philosophy are discussed in the context of current issues. Emphasis is given to philosophy as a basis for inter-cultural dialogue and fostering common values. At the end of the course, students will be able to perceive the discipline of knowledge in comprehensive way and connected to each other.

### 9.1.2 Category U2: Penguasaan Kemahiran Insaniah (*Competency in Soft Skills*)

**COURSE CODE** : LFB2012  
**COURSE** : Basic Arabic Communication  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course emphasises basic grammar and functions in Arabic Language communication. It also stresses on the differences in the pronunciation of Arabic letters. The course exposes learners to the Arabic letter writing system and word construction. The course is applicable for those non- conversant with this language.

**COURSE CODE** : LFB2022  
**COURSE** : Basic Mandarin Communication  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course introduces the basic components of the Chinese language: grammar – sentence structure and sentence pattern; speaking and listening – everyday usage of conversation & listening skills; reading & comprehension – reading simple passages and **writing** – writing simple sentences and short essays using

**COURSE CODE** : LFB2032  
**COURSE** : Bahasa Kebangsaan A – *for Malaysian Citizen only\**  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

Pengenalan sistem ejaan dan sebutan Baku, tatabahasa, dinamika dan apresiasi bahasa. Kursus ini wajib bagi pelajar-pelajar Malaysia yang tidak mengambil Sijil Pelajaran Malaysia (SPM) dan tidak mendapat kredit Bahasa Melayudalam SPM.

**COURSE CODE** : LFB2062  
**COURSE** : Basic French Communication  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course covers basic communication skills and the basis of French phonetic and grammar with everyday vocabulary. The course is applicable for those non- conversant with this language.

**COURSE CODE** : LFB2052  
**COURSE** : Basic Korean Communication  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

An introductory course which will enable students to speak, read and write basic everyday Korean Language. The major areas of study include: listening, speaking, reading, writing, grammar and vocabulary. The course is applicable for those non- conversant with this language.

**COURSE CODE** : LFB2042  
**COURSE** : Technical Writing  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course introduces students to professional and technical writing by helping them to internalise the skills and standards necessary to produce good clear writing. The course emphasises on skills like technical writing style, definition and description, defining audiences, and on such common forms as memos, informal and formal reports, proposals and job application materials.

**COURSE CODE** : GFB2092  
**COURSE** : Business Ventures  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course provides students the entrepreneurial knowledge required to start a successful business venture. It covers the founders' mindset, behaviors and leadership qualities that future entrepreneurs should emulate as well as the processes of creating and transforming ideas from one's invention and innovation into marketable products and services. It also analyses how business entities grow and sustain their existence and position and overcome challenges domestically and internationally.

**COURSE CODE** : HFB2042  
**COURSE** : Islamic Critical Thinking  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course explores critical thinking from the Islamic perspectives which reveal the distinctive natures of thinking. It discusses the model or concept of Islamic critical thinking that bears three distinguished elements of *al-tafakkur*, *al-yaqin* and *al-'adl* which deal relatively with the aspects of spirituality, epistemology and axiology before finally assimilating them into the technological ventures.

**COURSE CODE** : HFB2052  
**COURSE** : Islamic and Contemporary Leadership  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course covers the evolution of leadership from the 'Great Man' Theory of born leaders to Transformational Leadership Theory including from the Islamic perspective. It will explore the knowledge and skills necessary to be an effective leader in a variety of setting.

**COURSE CODE** : HFB2062  
**COURSE** : Stress Management Skills  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course exposes students to a holistic approach to stress management. It treats both cognitive skills and relaxation techniques with the intention of preventing and/or alleviating the physical symptoms of stress. The learning activities of the course are both theoretical and experiential.

**COURSE CODE** : HFB2082  
**COURSE** : Problem Solving and Decision Making  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course breaks down issues into problems, potential problems that need to be resolved, or decisions that need to be made at the workplace. Logical thought processes will be used to create and converge on solutions and balanced decisions.

**COURSE CODE** : LFB2072  
**COURSE** : Basic Spanish Communication  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course is designed to guide beginners to communicate effectively in Spanish for social purposes. The rationale of the course is to introduce students with simple conversations skills to be applied in daily communication. The course is applicable for non- conversant with this language.

**COURSE CODE** : LFB2082  
**COURSE** : Basic Japanese Communication  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course is an introductory course in which students will be exposed to basic communication skills in the Japanese Language. They will also be exposed to the Hiragana characters to help them in their reading and writing skills. Students will learn the basic grammar and vocabulary required in daily communicative contexts and also attempts to provide a basic insight into the Japanese culture. The course is applicable for those non- conversant with this language.

**COURSE CODE** : HFB2072  
**COURSE** : Innovation and Creativity Skills  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course is on discovering future values which will benefit society. The focus will be on problem definition because learning to identify the real problem is the key to value creation. The course will emphasise the importance of being able to identify the root cause of everyday problems, through a systematic and predictable methodology for data-based creativity and innovation. As all innovations emerge from the application of a very small number of inventive principles and strategies, the course will also use an approach to directing the development of new products and processes using a system that points out multiple potential solution paths and concepts for solutions. During the course, students will learn that many problems and solutions were repeated across industries & sciences, and that patterns of technical evolution were repeated across industries & sciences. The course will discuss innovations which used scientific effects outside the field where they were developed. The course emphasises the importance of solving real-world problems through group-based projects.

### 9.1.3 Category U3: Integriti Dan Antirasuah (Integrity And Anti-Corruption)

**COURSE CODE** : MPU3182 / MPU3183  
**COURSE** : Integriti Dan Antirasuah (Integrity And Anti-Corruption)  
**NO. OF CREDITS** : 2/3 credits  
**PRE-REQUISITE** : None

This course covers the basic concept of corruption including the value of integrity, anti-corruption, forms of corruption, abuse of power in daily activities and organizations as well as ways to prevent corruption. Cases related to corruption are discussed. Teaching and learning methods are implemented in the form of 'experiential learning' through individual and group activities. At the end of this course, students are able to understand the practice of integrity, the concept of corruption, anti-corruption, abuse of power as well as the prevention of corruption in society and organizations.

### 9.1.4 Category U4: Kemahiran Pengurusan Masyarakat yang Bersifat Praktikal seperti Khidmat Masyarakat, dan Ko-kurikulum (*Practical People Management Skills such as Community Service, and Extra-Curricular Activities*)

**COURSE CODE** : HFB1012  
**COURSE** : Community Engagement Project  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

The course is in the form of projects that foster students' awareness towards community engagement and develop moral and professional ethics in organising events.

## 9.2 University Requirement (UR) Courses

**COURSE CODE** : LFB1042  
**COURSE** : Academic Writing  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course emphasises on the theory and practice of academic writing. Students will be introduced to the writing process and writing supporting details using facts, quotations and citations. They will also be exposed to summarizing, paraphrasing, synthesizing and analysing texts. In addition, accurate use of grammar and mechanics of English will also be emphasised. The end product will be report writing and they will be introduced to types of reports commonly produced by students at tertiary level.

**COURSE CODE** : HEB1022  
**COURSE** : Scientific Inquiry  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

Scientific inquiry helps students develop critical thinking abilities and enables students to think and construct knowledge scientifically. This course focusses on the fundamental processes of scientific thinking through scientific inquiry process in reflecting contemporary issues in local or global contexts. The course also develops learners' specific skills that allow them to craft and present evidence-based critiques that either support or challenge arguments that circulate in public domains. Materials that are focused on in this course will be drawn from mainstream media platforms so that learners can apply scientific inquiry into real-time information which contributes to the 'thinking', 'doing' and 'communicating' within the scientific inquiry process.

**COURSE CODE** : HFB2033  
**COURSE** : Professional Communication Skills  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : LEB1042

This course emphasises the theory and practice of professional communication at interpersonal level, in teams and to a large group. The course serves to build upon the students' academic and professional knowledge acquired through other core courses and will enable them to be highly effective in expressing themselves and in imparting their professional and technological expertise in a variety of jobs, business, professional and social settings. This course will be delivered through a series of simulated and activity-based situations.

**COURSE CODE** : GFB2102  
**COURSE** : Entrepreneurship  
**NO. OF CREDITS** : 2 credits  
**PRE-REQUISITE** : None

This course is designed to help students understand the importance of entrepreneurship in today's global economy and cultivate an entrepreneurial mind-set. It will provide students with the tools they need to manage the issues involved in starting up and managing a successful new business venture. It will cover many different forms of entrepreneurship such as small businesses, competitors' analysis, opportunities, start up, marketing, finance, internet business and growth ventures towards sustainability. The course will also focus on the types of innovation, turning innovation into an ongoing new venture and on the entrepreneurial growth. Entrepreneurship theories and concepts will be discussed with real life examples and cases.

### 9.3 Minor Elective (EM) Courses for Information Systems and Information Technology Programmes

#### 9.3.1 Minor Elective Package 1 - Corporate Management

**COURSE CODE** : GFB1033  
**COURSE** : Management and Organisational Behaviour  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the students to the business organisations and the various roles of managers in organisations. It covers important management topics such as planning, organising, leading and controlling, and introduces basic organisational behaviour concepts such as individual and group behaviour, team, motivation and leadership. While the course approaches management from a theoretical and descriptive standpoint, emphasis is placed on the practical application of the materials through examples and discussion.

**COURSE CODE** : GFB2043  
**COURSE** : Principles of Marketing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the students on how modern marketing practices may contribute towards firm's profitability. It develops understanding on the importance of marketing concepts and activities tailored to the customers' needs and satisfaction in the marketplace. The subject introduces the use of basic concept in marketing, marketing strategy and marketing process for more added values and building profitable relationship with customers. The focus will be on the application of the marketing principles of 4 P's that are product, place, price and promotions into real situations.

**COURSE CODE** : GFB3113  
**COURSE** : Corporate Communication  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course emphasises the theories, concepts and practices of effective communication. It relates organisational theory on systems and channels of internal and external communication with practical skills on interpersonal and operational, strategic, and group communication in simulated corporate settings.

**COURSE CODE** : GFB3093  
**COURSE** : Strategic Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to prepare student to make a smooth transition from the academic program into the business world. It focuses on the analytical and decision-making processes involved in formulating, implementing and evaluation management strategies. Students will be exposed on three central questions in thinking strategically about the company's present circumstances and prospects: What's the company's present situation? Where does the company need to go from here? How should it get there? It is also based on the belief that organizations should continually monitor internal and external events and trends so that timely changes can be made as needed for example the emergence of internet, e-commerce, merger mania, and globalization. It is aimed at allowing organizations to adapt effectively to change over the long run. This course will help to develop new perspectives for creating innovative management strategies. This is done by exposing students to draw up a clear vision and mission statements that can be resulting in documenting the directions and management strategy.

**COURSE CODE** : GFB3073  
**COURSE** : Human Resource Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course aims to provide a broad introduction to the theoretical and practical knowledge of human resource management (HRM) in organisations. It provides students with an understanding of the issues involved in staffing (job analysis, recruitment and selection), training and development, performance appraisal and compensation (salary, incentives and benefits). It also exposes students to current trends, issues and research publications relating to human resource aspects and practices in organizations. This course is for final year students.

### 9.3.2 Minor Elective Package 2 - Financial Management

**COURSE CODE** : GFB2053  
**COURSE** : Principles of Finance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides students with the background knowledge of financial industry and the introduction to the theory of financial management that provide practical basis for financial decision making and valuation of financial securities.

**COURSE CODE** : GFB2013  
**COURSE** : Business Accounting  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces basic financial accounting and managerial accounting. It provides non-accounting students with accounting knowledge and exposure.

**COURSE CODE** : GFB2113  
**COURSE** : Fundamental to Investment  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The subject introduces students to the concept of investment so to recognise the environment in which investment and investment decision take place. It also describes the variety of securities available when investing directly or indirectly, the markets in which they are traded, and the mechanics of securities trading. The course presents to students the analysis of returns and risk, along with portfolio and capital market theories. It also incorporates Malaysia's investment environment and the framework that regulates its industries.

**COURSE CODE** : GFB3033  
**COURSE** : Corporate Finance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The subject introduces students to the concept of wealth maximization and theory of corporate finance to provide a practical basis for financial decisions making in achieving this objective within corporations. It also highlights the risk-reward trade off in problems associated with financing and investment of corporation with particular reference to the impact they have on a firm's value.

**COURSE CODE** : GFB3043  
**COURSE** : International Financial Management  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the concept of financial management from the perspective of a manager in a multinational corporation (MNC) who faces tremendous challenges in dealing with various risks brought about by international trades, especially due to foreign exchange movement. Students will also be exposed to potential risk as well as opportunities inherent in global flow of capital and international financial integration. Students will be exposed to financial derivatives used as instruments in international financial risk management.

### 9.3.3 Minor Elective Package 3 – Accounting and Finance

**COURSE CODE** : GFB2013  
**COURSE** : Business Accounting  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces basic financial accounting and managerial accounting. It provides non-accounting students with accounting knowledge and exposure.

**COURSE CODE** : GEB2153  
**COURSE** : Business Law  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

To develop knowledge and skills in the understanding of the general legal framework, and of specific legal areas relating to business. The syllabus starts with an introduction to overall Malaysian Legal system such as court system, sources of laws, including human rights legislations. It then leads into the area of the law of obligations including contract and tort law which underpins business transactions generally. The specific areas relating to various aspects of business is also covered such as employment law, law of agency, and partnership law.

**COURSE CODE** : GFB2283  
**COURSE** : Business and Financial Technology  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

Business Technology and Finance enables students to develop the knowledge and skills to adopt the technological input into the application of finance and accounting practices in the real business environment. Students will develop the knowledge and skills necessary to blend the components of technology into accounting practices and financial decision makings. Students will learn to justify and take extra mileage for actions and decisions, consistent with requirements of accounting profession.

**COURSE CODE** : GFB2293  
**COURSE** : Management Accounting  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course enables students to understand and apply management accounting techniques to support management in planning, controlling and monitoring performance in a variety of business contexts. This course also helps to develop students in analysing management accounting practices directed towards the effective and efficient use of organisational resources.

**COURSE CODE** : GFB2303  
**COURSE** : Assurance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course enables students to understand the auditor's decision-making process in a financial statement audit, as well as an integrated audit of both financial statements and internal control. It also provides students with general understanding of the Malaysian tax system to enable them to impact individuals and companies. It seeks to assist students to apply relevant knowledge and skills as well as exercising professional judgement in providing relevant information and advice to individuals and businesses on the impact of the major tax regimes on financial decisions and situations.

#### 9.4 Minor (EM) Courses for Computer Engineering, Applied Chemistry and Applied Physics Programmes

**COURSE CODE** : GDB1033  
**COURSE** : Management and Organisational Behaviour  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the students to the business organisations and the various roles of managers in organisations. It covers important management topics such as planning, organising, leading and controlling, and introduces basic organisational behaviour concepts such as individual and group behaviour, team, motivation and leadership. While the course approaches management from a theoretical and descriptive standpoint, emphasis is placed on the practical application of the materials through examples and discussion.

**COURSE CODE** : GDB2013  
**COURSE** : Business Accounting  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces basic financial accounting and managerial accounting. It provides non-accounting students with accounting knowledge and exposure.

**COURSE CODE** : GDB2043  
**COURSE** : Principles of Marketing  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course introduces the students on how modern marketing practices may contribute towards a firm's profitability. It develops understanding on the importance of marketing concepts and activities tailored to the customers' needs and satisfaction in the marketplace. The subject introduces the use of basic concept in marketing, marketing strategy and marketing process for more added values and building profitable relationship with customers. The focus will be on the application of the marketing principles of 4 P's that are product, place, price and promotions into real situations.

**COURSE CODE** : GDB2053  
**COURSE** : Principles of Finance  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides students with the background knowledge of financial industry and the introduction to the theory of financial management that provide practical basis for financial decision making and valuation of financial securities.

**COURSE CODE** : GDB3013  
**COURSE** : Small Business & Entrepreneurship  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course provides students with background knowledge of small business management and entrepreneurship. It explains the tools and techniques used in making a business venture a success. It also analyses the reason behind the success and failure of a business.

**Chapter III:  
Department of Fundamental  
and Applied Sciences**

## Department of Fundamental and Applied Sciences

### 1.0 Introduction

The Department of Fundamental and Applied Sciences provides courses that are aimed to produce well-rounded graduates who will possess the latest competencies in mathematics, science and applied sciences.

### 2.1 Objectives

In line with the University's mission in producing well-rounded graduates, the objectives of our department are to produce students with the ability to:

- i. Acquire and apply knowledge of mathematics, science and applied sciences.
- ii. Design, manage and conduct experiments, as well as to analyse and interpret data.
- iii. Use the techniques, skills, and modern scientific and technical tools necessary for professional practice.
- iv. Communicate effectively not only with other engineers or technologists but also with the community at large.

### 3.0 Courses Offered by Fundamental and Applied Sciences Department for Engineering Programmes and Petroleum Geoscience Programme

Common Core (CC)				
No	Code	Courses	Cr	G
1	FFM1013	Engineering Mathematics I	3	CC
2	FFM1023	Engineering Mathematics II	3	CC
3	FFM1063	Statistics and Application*	3	CC
4	FFM2063	Data Analytics	3	CC
Total Credit Hours			12	

**Note:**

All the courses are NOT applicable for Applied Chemistry, Applied Physics and Computer Engineering Programmes.

\* This course is NOT applicable for Electrical and Electronic Engineering Programme.

### 4.0 Minor (EM) in Data Science Courses Offered by Fundamental and Applied Sciences Department for Engineering Programmes and Petroleum Geoscience Programme

Minor in Data Science					
No	Code	Course Name	Cr	G	Semester
1	TFB2073	Artificial Intelligence	3	EM	Students can take these courses in any semester
2	FFM3023	Simulation and Optimisation	3	EM	
3	TFB3113	Data Mining	3	EM	
4	TFB3123	Machine Learning	3	EM	
5	TFB3133	Data Visualisation	3	EM	
Total Credit Hours			15		

## 5.1 Fundamental and Applied Sciences Courses Synopsis

### 5.2 Common Core (CC) Courses Synopsis

**COURSE CODE** : FFM1013  
**COURSE** : Engineering Mathematics I  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course consists of two parts: vector calculus and numerical methods. Vector calculus includes vector operations and functions, partial derivatives, double integrals, triple integrals, vector field, line integral, surface integral, Green's Theorem, Stoke's Theorem, and Divergence Theorem. Numerical methods include finding roots of equation using bisection method and Newton-Raphson method; solving linear equations using Gauss elimination, LU-decomposition, matrix inversion, special matrices, Gauss-Seidel method; interpolation, numerical differentiation and integration.

**COURSE CODE** : FFM1023  
**COURSE** : Engineering Mathematics II  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover introductory concepts of ordinary differential equations and its applications, series solutions of ordinary differential equations, Laplace Transforms, Euler method, Runge-kutta 4th order, Method for solving, wave, heat and Laplace equations, Finite Difference Method.

**COURSE CODE** : FFM1063  
**COURSE** : Statistics and Application  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will cover on the Descriptive Statistics; Basic Probability; Random Variables and their Probability Distributions; Random Sample and Central Limit Theorem and Quality Control Charts; Statistical Inference (Hypothesis Testing One and Two populations); Simple and Multiple Linear Regression, Design of Experiment (One and Two Way ANOVA) and Application.

**COURSE CODE** : FFM2063  
**COURSE** : Data Analytics  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

In this course, we introduce the tools and techniques for data analytics. We examine the statistical, machine learning, data mining and data management techniques that make possible the efficient analysis of data in real time. Students are expected to have a good overview of data analytics techniques from the management, manipulation, analysis, interpretation and storage. Techniques, issues and challenges will also be covered for big data.

### 5.3 Minor (EM) in Data Science Courses Synopsis

**COURSE CODE** : TFB2073  
**COURSE** : Artificial Intelligence  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course will introduce the aims and scope of learning Artificial Intelligence (AI) and also include the principles and concepts of AI. It covers basic issues such as fundamental definitions, characteristics of intelligent programmes, and an overview of advance topics in intelligent computing. The techniques introduced are knowledge representation and reasoning, heuristic searching, and machine learning. Some advance topics such as expert systems, natural language processing, are also introduced in general.

**COURSE CODE** : FFM3023  
**COURSE** : Simulation And Optimisation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

This course is designed to provide introductory concepts of operation research methods and solving its applications using network analysis, transportation models, decision theory and decision tree and simulation applications, for second year students for application in the subsequent courses.

**COURSE CODE** : TFB3113  
**COURSE** : Data Mining  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The course assumes that students are familiar with statistics with the purpose to conduct regression analysis for solving business problems.

**COURSE CODE** : TFB3123  
**COURSE** : Machine Learning  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

In this course we explore key data analysis and management techniques, which applied to massive datasets are the cornerstone that enables real-time decision making in distributed environments, business intelligence, and scientific discovery at large scale. In particular, we examine the statistical, machine learning, parallel computation and big data management techniques that make possible the efficient analysis of large volumes of data in near real time. Students are expected to make use of said techniques to design highly scalable systems that can process and analyse Big Data for a variety of scientific, social, and environmental challenges.

**COURSE CODE** : TFB3133  
**COURSE** : Data Visualisation  
**NO. OF CREDITS** : 3 credits  
**PRE-REQUISITE** : None

The goal of this course is to introduce students to data visualisation using JavaScript. Students will learn how to plot various type of charts using Flot Javascript library. The students will also learn how to make charts interactive, integrate charts on a web page, create specialised graphs such as tree maps, heat maps, network graphics, and word clouds. Students will further learn how display timelines, visualise geographic data, and create custom visualisations using D3.js library. The course ends with a mini project that covers most of the concepts and activities delivered in this course.

## **Chapter IV:**

# **Credited Co-Curriculum Courses**

## Credited Co-Curriculum Courses

### 1.0 Introduction

Co-Curricular activities are regarded as an important component in building self-esteem and a tool in moulding students into well-rounded graduates. Participation in these activities is one of the many requirements needed for graduation at (UTP).

Co-Curriculum Programme is an on-going process, which provides students with experience and exposure to theories and practical work without interfering with their main focus of studies. Co-Curriculum courses in UTP have been carefully developed and designed to achieve the University's objectives and requirements. Each co-curricular activity is handled by experienced and qualified personnel to ensure high quality in the teaching-learning process of all existing courses.

### 2.0 Credited Co-Curriculum Philosophy

Education through involvement in co-curricular activities is an on-going process, which develops the individual's behavioural, emotional, physical and social aspects. This on-going learning experience can come in the form of formal and informal ways, which develop total awareness such as appreciation, analytical thinking and problem solving which are essential in everyday life.

### 3.0 Credited Co-Curriculum Mission and Objectives

#### 3.1 Mission

To offer Credited Co-Curriculum Courses which are niche, enriching, and vibrant to suite the 21st century skillsets in supporting the university's aspiration to produce well-rounded global graduates.

#### 3.2 Objectives

The objectives of the Co-Curriculum Programme are as stated below:-

- i. To fulfil the mission and vision of UTP in producing well-rounded global graduates who are creative and innovative.
- ii. To provide a comprehensive all-round education to enhance students' knowledge, experience and capabilities.
- iii. To produce graduates with rational thinking, healthy body, and mind.
- iv. To provide invaluable experiences in all aspects of management such as planning, coordinating and implementation through co-curricular activities.

### 4.0 Implementation

Participation in Credited Co-Curriculum Programme is essential and as important as academic pursuit in producing well-rounded global graduates. Credited Co-Curriculum Programme is part of University's courses and therefore is **COMPULSORY** for all students to obtain minimum of "D" grade in at least **FOUR (4)** Credited Co-Curriculum courses taken.

#### 4.1 Credit Hours

Total credit hours required according to undertaking programmes:

- i) **FOUNDATION programme: The total credit hours is TWO (2) credit hours for completion.**
- ii) **UNDERGRADUATE programme: The total credit hours is TWO (2) credit hours for completion.**

Students are allowed to take more than the required credit hours but only the required number of credit hours will be taken into consideration for graduation purposes.

## 4.2 Choice of Courses

There are four clusters in the Co-Curriculum Programme, which are:

- i. Cluster 1: Leadership & Communication
- ii. Cluster 2: Creativity, Innovation & Entrepreneurship
- iii. Cluster 3: Arts & Culture
- iv. Cluster 4: Sports & Recreation

Students are required to at least enrolled in 2 different clusters throughout the studies. Students are not permitted to enrolled in the same course throughout the studies either in Foundation or Undergraduate programme.

## 5.0 Credited Co-Curriculum Course Clusters

All credited co-curriculum courses are divided into four clusters, which can be identified with certain codes. Course code ended with letter 'F' are offered for Foundation programme while course code ended with letter 'U' are offered for Undergraduate programme These clusters and codes are as stated below:

### 5.1 KFL – Leadership & Communication

- i. KFL1011F / KFL1011U Event Management
- ii. KFL1021F / KFL1021U Groom-Me
- iii. KFL1031F / KFL1031U Safety & Risk Management
- iv. KFL1041F / KFL1041U Wellbeing & Resilience
- v. KFL1051F / KFL1051U Global Citizen
- vi. KFL1061F / KFL1061U Territorial Army 101
- vii. KFL1071F / KFL1071U Speaking Out Loud
- viii. KFL1081F / KFL1081U The Press
- ix. KFL1091F / KFL1091U Content Creator
- x. KFL1101F / KFL1101U Effective Influencer

### 5.2 KFC – Creativity, Innovation, and Entrepreneurship

- i. KFC1011F / KFC1011U Creative Animation
- ii. KFC1021F / KFC1021U Snap a Shot!
- iii. KFC1031F / KFC1031U Interior Design
- iv. KFC1041F / KFC1041U 3D Prototyping
- v. KFC1051F / KFC1051U Drone Piloting
- vi. KFC1061F / KFC1061U The Inventors
- vii. KFC1071F / KFC1071U Digital-preneur
- viii. KFC1081F / KFC1081U E-marketing
- ix. KFC1091F / KFC1091U FinTech
- x. KFC1101F / KFC1101U Investment

### 5.3 KFA - Arts & Culture

- i. KFA1011F / KFA1011U Culinary Arts
- ii. KFA1021F / KFA1021U Lights, Camera, Action!
- iii. KFA1031F / KFA1031U Traditional Music
- iv. KFA1041F / KFA1041U Let's Dance
- v. KFA1051F / KFA1051U Malaysian Craft
- vi. KFA1061F / KFA1061U The Voice
- vii. KFA1071F / KFA1071U Doodle Arts
- viii. KFA1081F / KFA1081U Calligraphy
- ix. KFA1091F / KFA1091U String Ensemble
- x. KFA1101F / KFA1101U Creative Writing

**5.4 KFS – Sports & Recreation**

- i. KFS1011F / KFS1011U Outdoor Recreation
- ii. KFS1021F / KFS1021U Fencing
- iii. KFS1031F / KFS1031U Aerobic Dance
- iv. KFS1041F / KFS1041U Shooting
- v. KFS1051F / KFS1051U Golf
- vi. KFS1061F / KFS1061U Mixed Martial Arts
- vii. KFS1071F / KFS1071U Wall Climbing
- viii. KFS1081F / KFS1081U Scuba Diving
- ix. KFS1091F / KFS1091U Sports First Aider
- x. KFS1101F / KFS1101U Sports Management

**5.5 Entry Guidelines**

- i. Students registered for the Credited Co-Curriculum Programme are advised to follow all the requirements and guidelines for all courses.
- ii. Students are allowed to register for **ONLY** one (1) credit hour in any semester.
- iii. All registration guidelines are in accordance with the academic rules and regulations of the university.

**6.0 Courses Registration**

Registration for Credited Co-Curriculum course is based on "first come first served" basis and students are advised to register early in order to avoid any inconveniences.

**6.1 Credit Transfer**

Credit Transfer for Co-Curriculum courses can be obtained if student meet below requirement:

- i. Eligible to request for Credit Transfer with Grade only
- ii. Eligible for horizontal students only (Current students who changes program within UTP / Student who participated in mobility program at other university)
- iii. Must obtain a minimum grade of C/60%
- iv. Credit transfer must be same credit as the course credits for the programme being transferred into
- v. Credit transfer must be based on subject-to-subject mapping with at least 80% match in content and equivalent course outcome.
- vi. Maximum allowable credit transfer with grade is one (1) credit hour.

Credit transfer Without Grade & vertical credit transfer is not permitted for Credited Co-Curriculum Courses.

**6.2 Course Requirements**

Students are required to participate in all activities involved in the Co-Curriculum programme, which involves classroom, and outdoor activities. Any additional expenses (i.e. uniforms, personal equipment etc.) needed for any of the activities are to be borne by the respective students.

**6.3 Participation of Students with Special Needs**

All students with physical disabilities are also required to participate in Co-Curriculum Programme. However, students requiring special assistance should notify the Co-Curriculum Coordinator for guidance and advice regarding the suitability of a course to their needs.

#### 6.4 Course Evaluation

Evaluation of each co-curriculum course is based on the requirements of the courses. Normally, evaluation is done on these criteria:

- i. **Attendance (80 % of all classes)**
- ii. **Practical and coursework (100%)**

The grading system for Credited Co-Curriculum Programme is based on Academic Grading System and will be recorded in the end-semester results' slip. The grading **WILL BE INCLUDED** in the CGPA.

#### 6.5 Attendance

Every student will have to fulfil the required 80% of attendance in accordance with the academic rules and regulations. If a student has been absent for more than **20%** without any approved exemption, he/she can be barred from taking any further part in the programme and may/will be assigned an "F" grade. Students, who are unable to attend classes and/or practical because of various reasons, student **MUST**:

- i. Fill in the form (**UTP-AA-001**) from Registry Office and hand it to the Centre for Student Development (Co-Curriculum Unit, Talent Enrichment Office) within a week (7 days) from the date of absence. Please do enclose all related documents. Personal letters will not be entertained.
- ii. Students will be notified of the outcome.

#### 6.6 Fixtures

Normally all classes, training or co-curriculum activities are held on **Fridays** and **Saturdays**. However, these activities can be held at any other day, which is deemed appropriate. Students are advised to refer to the ULearn platform for information on the time and day of a particular course.

#### 6.7 Attire

Students attending the co-curriculum courses will have to abide by all rules/regulations of each particular course. This includes attire and personal equipment/s needed for certain activities.

## 7.1 Rules and Regulations

Students are allowed to choose only one (1) from many courses offered in any one semester. Registration is on "first come first served" basis, which means students who register late, may not be able to participate in the preferred co-curriculum course due to limited places.

It is advisable for students to complete the **four (4) or two (2) credit hours** requirement as soon as possible in order not to jeopardize the graduation process.

Few registration rules & regulations for students to abide are as follows:

- i. Students can opt for the co-curriculum course of their choice, depending on the courses offered and the availability of intake quota.
- ii. After registration, students are not allowed to change courses without prior consent from the Co-Curriculum Coordinator.
- iii. Every student is responsible for his/her actions in order to complete the allocated four (4) or two (2) credit hours needed for graduation.
- iv. All students must abide by all the rules & regulations regarding the Credited Co-Curriculum Programme.

## 8.0 Appeals

Appeal is a formal application instituted by students regarding the Credited Co-Curriculum Programme. Types of appeals are as stated below:

### 8.1 Change of Course

- i. In any event where students are not able to continue in the registered Co-Curriculum course due to health reasons (*with the recommendation & report by the physician*), they may participate in another suitable course with the consent of Co-Curriculum Coordinator.
- ii. Application to change co-curriculum courses can be considered in the first two weeks of the semester with prior consent of the Co-Curriculum Coordinator.

### 8.2 Dropping/Withdrawal

Dropping/Withdrawal from any co-curriculum courses due to unavoidable circumstances can be permitted. This has to be done during the Add/Drop/Withdrawal period as stated by Registration & Examination (REX) Unit, Registry.

## 9.0 Credited Co-curriculum Courses Synopsis

### 9.1 Cluster 1: Leadership & Communication

**COURSE CODE:** KFL1011F / KFL1011U  
**COURSE:** Event Management  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course highlight on the introduction to Event Management phases and processes. It also emphasizes on the skills to organize virtual, physical & hybrid event. This course is focusing on the event flow, protocol, and event coordination skills.

**COURSE CODE:** KFL1021F / KFL1021U  
**COURSE:** Groom-Me  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course enables students to learn basic principles in professional and corporate etiquette and provide strategies and tips to refine professional image using the best etiquette techniques. This course also enables student to learn etiquette for networking, social events, and corporate grooming. with government bodies as an added values on knowledge to students.

**COURSE CODE:** KFL1031F / KFL1031U  
**COURSE:** Safety & Risk Management  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course introduces the fundamental of safety and risk management which focuses on the knowledge to identify hazards, conduct risk assessments, basic journey plan (JMP) and emergency preparedness & response. Students will also be introduced to Safety Management System (SMS) in industry.

**COURSE CODE:** KFL1041F / KFL1041U  
**COURSE:** Wellbeing & Resilience  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course enables students to acquire the basic communication skills, techniques and counselling skills needed to lead and assist other student/peers towards a better and productive living. This course complement students with the skills and knowledge to make own decision, future planning, responsibilities as a member of a community and ability to apply it in everyday life, mainly in academic and career matters.

**COURSE CODE:** KFL1051F / KFL1051U  
**COURSE:** Global Citizen  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

The aim of the course is to present major social scientific concepts referring to trends and problems of the current transformation of societies throughout the world. The key concepts are globalization and social change. The course is also fostering students' appreciation of the significance of diversity, involving ethnicity, gender, religion and disability and to encourage them to develop cross-cultural communication skills.

**COURSE CODE:** KFL1061F / KFL1061U  
**COURSE:** Territorial Army 101  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Introduction to the Territorial Army 101 (Askar Wataniah) Malaysia. This course will instill the leadership elements and basic military training to students. Student will be attaching to main Wataniah Base which appropriate as per trainers' advice. The course will cover basic battlefield knowledge skills, tactics and as well as survival skills.

**COURSE CODE:** KFL1071F / KFL1071U  
**COURSE:** Speaking Out Loud  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Objective of the Speaking Out Loud (Public Speaking) course is to inculcate confidence and courage for students to speak. This course focusing on practical content, method to deliver, introduction and differential on debate vs public speaking.

**COURSE CODE:** KFL1081F / KFL1081U  
**COURSE:** The Press  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This (Journalism) course addresses the fundamental skills associated with journalistic writing and demonstrate basic skills and techniques in newsgathering and newswriting including an understanding of major legal and ethical issues in journalism. This course also enables student to acquire the skills and information to write clear, concise, accurate and interesting news stories and independent news reporting.

**COURSE CODE:** KFL1091F / KFL1091U  
**COURSE:** Content Creator  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course enables students to acquire basic content creation skills which allow them to create the right/ impactful contents to the right audience effectively. Cyber ethic knowledge is also embedded as part of skill set in this course. Platform to express and publish the contents will be through podcast, v-logging and social media.

**COURSE CODE:** KFL1101F / KFL1101U  
**COURSE:** Effective Influencer  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This (Key Opinion Leader) course focuses on character building ethically and spiritually to produce individual as an ethical influencer. Student will learn basic skills to express idea / to talk and to write ethically to different type of audience.

## 9.2 Cluster 2: Creativity, Innovation &amp; Entrepreneurship

**COURSE CODE:** KFC1011F / KFC1011U  
**COURSE:** Creative Animation  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Introduction on the fundamental processes of design and practice design solutions that are innovative and creative. The course will provide students with the necessary skills sets to conceptualise and create aesthetically outputs that are creative, functional, entertaining, engaging, and communicable.

**COURSE CODE:** KFC1021F / KFC1021U  
**COURSE:** Snap a Shot!  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course covers the fundamental and introduction to photography as an visual arts and commercial practice. Areas covered includes composition and the aesthetic, conceptual and technical concerns in digital imaging and hands-on skills in editing.

**COURSE CODE:** KFC1031F / KFC1031U  
**COURSE:** Interior Design  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course introduces the knowledge of art and science of understanding people's behaviour and needs to create functional spaces, that are aesthetically pleasing, within a building.

**COURSE CODE:** KFC1041F / KFC1041U  
**COURSE:** 3D Prototyping  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Through this course, student will learn basic knowledge on how to be “makers” by using various types of 3D modelling software and imaging equipment, printing actual physical objects based on 3D Design. Digitally designed simple tools & viable mechanism prototypes and see their motion mechanics.

**COURSE CODE:** KFC1051F / KFC1051U  
**COURSE:** 3D Prototyping  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Through this course, student will learn basic knowledge on how to be “makers” by using various types of 3D modelling software and imaging equipment, printing actual physical objects based on 3D Design. Digitally designed simple tools & viable mechanism prototypes and see their motion mechanics.

**COURSE CODE:** KFC1061F / KFC1061U  
**COURSE:** The Inventors  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course equips student with creative and critical thinking skills in order to invent or create some new process, appliance, or machine that did not exist before which can add value to daily operation or lives.

**COURSE CODE:** KFC1071F / KFC1071U  
**COURSE:** Digital-preneur  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course provides insight into the emergence of digital entrepreneurship, key concepts, business models and the resources needed to develop successful ventures. Students will develop a business plan for a digital enterprise as part of a venture team.

**COURSE CODE:** KFC1081F / KFC1081U  
**COURSE:** E-marketing  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course will provide basic knowledge on identifying marketing trends, understand consumer behaviour and create attention-grabbing campaigns through the digital marketing such as SocMed (FB, Instagram, Youtube, Social Engine Optimization and Google Adwords). This course will also include basic knowledge on customer insight, brand management and social media focus on real world knowledge.

**COURSE CODE:** KFC1091F / KFC1091U  
**COURSE:** FinTech  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course focuses on how to compete traditional financial methods which to improve and automate the delivery of financial services. FinTech is utilized to help companies, business owners, and consumers better manage the financial operations, processes, and lives.

**COURSE CODE:** KFC1101F / KFC1101U  
**COURSE:** Investment  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course is focuses on the study of concepts relevant to investment management and empirical evidence that are useful for investment decisions. Topics include asset allocation, portfolio optimization, trading, and simulation.

## 9.3 Cluster 3: Arts and Culture

**COURSE CODE:** KFA1011F / KFA1011U  
**COURSE:** Culinary Arts  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Learn the basic to the art of preparing, cooking, presenting and serving food which include knowledge, skills and techniques to prepare various types of food from Western and Asian cuisine.

**COURSE CODE:** KFA1021F / KFA1021U  
**COURSE:** Lights, Camera, Action!  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Learn the basic (Theatre Acting) discipline and art of acting, through exercises, discussion and scene work. Learning the craft of acting, which requires a disciplined commitment to voice, speech and movement training which focus on the work of the ensemble above all.

**COURSE CODE:** KFA1031F / KFA1031U  
**COURSE:** Traditional Music  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Introduction on the knowledge, history, and technique to play traditional music instruments such as Gamelan, Angklung and Caklempong. Only one instrument will be chosen to be offer in a particular semester.

**COURSE CODE:** KFA1041F / KFA1041U  
**COURSE:** Let's Dance  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Through this course, student will learn the history and development of Malaysian folk dance and gain knowledge on the dances genre and theories involved. Student will also be exposed to all elements involved in creation of movements.

**COURSE CODE:** KFA1051F / KFA1051U  
**COURSE:** Malaysian Craft  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course covers the history and introduction of Malaysian craft and basic knowledge of creating Malaysian craft such as embroidery (Tekat), Batik painting, pottery and sculpturing. Only one specific craft will be chosen to be offer in a particular semester.

**COURSE CODE:** KFA1061F / KFA1061U  
**COURSE:** The Voice  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This (Vocal) course focuses on skills required for knowledge acquisition on music theory, vocal practices and performances. Emphasis is placed on techniques in vocal projections, vocal harmony, and styles in choral singing.

**COURSE CODE:** KFA1071F / KFA1071U  
**COURSE:** Doodle Arts  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course enables student to learn basic topics which are doodle techniques, patterns, and common shapes. Student will also learn on the expression, essential meaning, significance, or aesthetic value of a work of art including the knowledge to commercialize the output.

**COURSE CODE:** KFA1081F / KFA1081U  
**COURSE:** Calligraphy  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course enables students to learn introduction and history of calligraphy art, introduction to the stationary use for calligraphy and the correct techniques to write basic letters. Only one type of calligraphy will be chosen to offer in a particular semester.

**COURSE CODE:** KFA1091F / KFA1091U  
**COURSE:** String Ensemble  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course equips student with history and knowledge of string instruments; violin, viola, cello, and double bass. Student will also learn basic technique to play the instruments and perform in an ensemble.

**COURSE CODE:** KFA1101F / KFA1101U  
**COURSE:** Creative Writing  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Introduction to basic skills on how to write and read the creative writing poem, know the types of poems and the suitable language to be use in writing poem. Students are expected to do showcase at the end of course.

## 9.4 Cluster 4: Sports &amp; Recreation

**COURSE CODE:** KFS1011F / KFS1011U  
**COURSE:** Outdoor Recreation  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Introduction to the basic outdoor recreation activities which involved survival skills, basic orienteering and roping that take place in a natural setting which can benefit the body, mind and/or spirit.

**COURSE CODE:** KFS1021F / KFS1021U  
**COURSE:** Fencing  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course is intended to provide students with the fundamentals of fencing, including footwork, bladework, tactical technique, duel and tournament. It will allow students to develop the ability to analyze a fencing bout and promotes creativity in applying acquired skills in a fencing bout.

**COURSE CODE:** KFS1031F / KFS1031U  
**COURSE:** Aerobic Dance  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course covers the knowledge of dance skills includes a warm-up stretch followed by dancing to music, usually at a fast pace. Some of the workout regimens are geared to high impact cardiovascular workout which allows students to experience the right way to perform an aerobic dance.

**COURSE CODE:** KFS1041F / KFS1041U  
**COURSE:** Shooting  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course enable student to learn history, value, rules and regulations of pistols and rifles, with an emphasis on safety, practicing basic handling and shooting skills.

**COURSE CODE:** KFS1051F / KFS1051U  
**COURSE:** Golf  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

Introductory course teaching the fundamental skills of golf. Development of golf skills and basic swing fundamentals, scoring, knowledge of rules, etiquette and strategies of play.

**COURSE CODE:** KFS1061F / KFS1061U  
**COURSE:** Mixed Martial Arts  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course enables students to learn a mix of introductory of martial skills and exercises that will not only aid in their physical fitness but will also help the students understand the vulnerable situations in which they require self-defence. This course also provides the student with a physical and spiritual development which ultimately leads them to live a healthy and positive lifestyle.

**COURSE CODE:** KFS1071F / KFS1071U  
**COURSE:** Wall Climbing  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

In this course, students are introduced to the basic technical skills needed to climb wall. The course covers climbing equipment, how to belay, and technique fundamentals. Our focus is on developing practices that enhance safety and mastering the technical skills.

**COURSE CODE:** KFS1081F / KFS1081U  
**COURSE:** Scuba Diving  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course will cover topic such introduction and equipment needed for diving, decompression diving concerns, dive planning and aquatic environment. The practical session for this class will took place at university's swimming pool by using basic gears for scuba diving.

**COURSE CODE:** KFS1091F / KFS1091U  
**COURSE:** Sports First Aider  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course provides student with information, skills, and techniques to deal with injuries (sprains, fractures, blood loss etc). Students will learn how to respond to emergency situations, perform lifesaving procedures, including chest compressions, CPR, and resting someone.

**COURSE CODE:** KFS1101F / KFS1101U  
**COURSE:** Sports Management  
**NO. OF CREDITS:** 1 credit  
**PRE-REQUISITE:** None

This course covers skills that correspond with planning, organizing, directing, controlling, budgeting, leading, or evaluating of any game/tournament within the sports field. Additionally, students will be able to learn on how to manage/create the game schedule and sports rules & regulations.

**Chapter V:  
Student Industrial Internship  
Programme**

## Student Industrial Internship Programme (SIP)

### 1.0 Introduction

UTP was established with the objective to produce well-rounded graduates who are not only technically competent but also possess other traits such as lifetime learning capacity, critical thinking, communication and behavioural skills, business acumen, practical attitude and solution synthesis ability.

For these reasons, UTP has made it compulsory for its undergraduate students to undergo industrial internship programme in the form of two internship courses consisting of Student Industrial Training (SIT) 14 weeks and Student Industrial Project (SIP) 14 weeks prior to their completion of studies at UTP. It is anticipated that the experience gained from this programme will complement and enhance their knowledge and understanding learned at the university.

UTP has always placed great emphasis in having a close cooperation with the industries. The Student Industrial Internship Programme (SIIP) is a prime example of the University – Industry collaboration.

Currently, UTP offers seven (7) engineering programmes namely Chemical, Civil, Electrical & Electronic, Computer, Materials, Mechanical and Petroleum, four (4) technological programmes namely Computer Science, Information Technology, Information System and Petroleum Geoscience, two (2) Applied science programmes namely, Applied Physics and Applied Chemistry, and one (1) Business Management programme at bachelor's degree level.

The SIIP is divided into two (2) courses. Details are as follows:

**COURSE CODE** : IFB3037  
**COURSE** : Student Industrial Training (SIT)  
**NO. OF CREDITS** : 7 credits  
**PRE-REQUISITE** : Refer to Student Industrial Internship Programme under Academic Requirements  
**DURATION** : 14 weeks

SIT provides an opportunity for students to gain an insight and experience into the real working environment of the industry. Students will develop skills in work ethics, communication, management and working in a team. SIT will establish close relationship between the industry and UTP. For SIT a grade of PASS/FAIL is given and no contribution towards final CGPA.

**COURSE CODE** : IFB3047  
**COURSE** : Student Industrial Project (SIP)  
**NO. OF CREDITS** : 7 credits  
**PRE-REQUISITE** : Pass IFB3037  
**DURATION** : 14 weeks

SIP provides an opportunity for students to integrate \*complex engineering/technology theories with the real working environment. In addition, students are to solve industrial problems through industrial projects. The students will demonstrate skills in work ethics, communication, management and working in a team.

\*General definition on complex engineering project: Multiple solutions to a problem.

## 2.1 Objectives of Student Industrial Internship Programme (SIIP)

The objectives are as follows:

- i. To integrate theory with practice.
- ii. To introduce students to work culture and industrial practices.
- iii. To give opportunity to students to work with industrial practitioners.
- iv. To expose students to potential employers.
- v. To acquaint UTP students with the industry.

## 3.1 Training Approach

The SIIP shall include the following activities:

- i. Hands-on training.
- ii. Real Project-based assignments.
- iii. Research – based activities.
- iv. Team-work activities.
- v. Leadership and management skills.
- vi. Safety awareness.
- vii. Continuous technical building skills and exposure.
- viii. Sustainability awareness.

## 4.0 Roles and Functions of the Host Companies and UTP

### 4.1 HOST COMPANY

A host company plays an important role in ensuring the success of the SIIP.

The host company is expected to provide the following support:

- i. Plans and schedules the overall internship programme to ensure it provides maximum training opportunity for students to obtain useful experience related to their field of study.
- ii. Selects and assigns qualified engineering/technology/science staff to be students' host company supervisor.
- iii. Assists students to find accommodation and transportation (if necessary).
- iv. Provides briefing on the background of the organisation/company.
- v. Discusses with the students the details of their internship programme's expected outcomes.
- vi. Supervises and guides students in their industrial training and project.
- vii. Provides the necessary facilities, equipment, tools and guidance to students.
- viii. Provides necessary recommendations to improve the programme.
- ix. Check logbook reports fortnightly and provide weekly logbook scores.
- x. Evaluates students' oral presentation during assessment visit.
- xi. Evaluates Students' performance and competency.
- xii. Evaluates Industrial Training Report.

### 4.2 RESPONSIBILITIES OF UTP

- i. CAREER DEVELOPMENT OFFICE (CDO), CENTRE FOR STUDENT DEVELOPMENT (CSD)
  - a) Coordinate the internship programme as per university's requirement to ensure it meets the academic quality and learning outcomes.
  - b) Provides list of approved companies to students for selection.
  - c) Facilitate students with the application and placement process.
  - d) Assists students on visa/work permit application for overseas internship (if necessary).
  - e) Coordinates the following visits by UTP supervisors:
    - Pre-visit and briefing to the host company's management (if necessary).
    - Organises and arranges the assessment visit for UTP supervisors to host companies.
  - f) Provide continuous consultation and guidance on matters related to the internship programme.
  - g) Coordinate and implement the process of industrial internship assessment and grading.
  - h) Organises pre-internship programmes such as CV writing, Interview skills, UTP – Industry =\Dialogue, Forum or Sharing Session.

- ii. DEPARTMENT INTERNSHIP COORDINATOR
  - a) Assist CDO to provide consultation and guidance on matters related to internship programme especially on the academic requirement.
  - b) Focal person to address or provide update on internship matters at respective departments.
  - c) Assigns UTP supervisors from respective departments.
  - d) Review and endorse application for new host company's registration, job scope and proposed project title submitted by students.
  - e) Assist in compiling students' scores.
  - f) Promotes and establishes UTP-Industry linkages.
  - g) Encourage continuation of industrial project as final year project.
  - h) Collaborate with CDO to create policy and procedure to ensure academic quality and integrity of the internship programme.
  
- iii. UTP SUPERVISORS
  - a) Establish and maintain communication with students and host company supervisor throughout the duration of the internship period.
  - b) Develop and maintain good rapport with the host companies.
  - c) Visit the host companies and review the industrial training schedules with the host company Supervisor.
  - d) Evaluate the students' oral presentation at the host company.
  - e) Review and assess the students' performance and competency with the host company supervisors.
  - f) Evaluate Student Industrial Training/Project Report.
  - g) Encourage continuation of industrial project as final year project.
  - h) Complete and collect all the assessment forms from host company supervisors at the end of the assessment visit.
  - i) Submit assessment marks to system.
  - j) Provide necessary recommendations to improve the programme.
  
- iv. UTP STUDENTS
  - a) Adhere to the UTP and host company's rules and regulations.
  - b) Follow the host company's safety procedures.
  - c) Maintain good discipline and personal conduct.
  - d) Discuss with supervisor on the training schedule.
  - e) Meet work schedules on time.
  - f) To submit report duty confirmation and details to CDO.
  - g) To confirm and propose Project title to CDO.
  - h) Update logbook regularly and present it to the host company supervisor for review and endorsement.
  - i) Be responsible and committed in acquiring as much knowledge and skills as possible during the internship.
  - j) Perform oral presentation to the host company and UTP supervisors during the assessment visit.
  - k) Submit logbook and both SIT/SIP reports in ULearn within the stipulated time.

## 5.1 Training Details

- i. Interns available are from the following programmes :
  - Bachelor of Chemical Engineering with Honours
  - Bachelor of Civil Engineering with Honours
  - Bachelor of Computer Engineering with Honours
  - Bachelor of Electrical and Electronic Engineering with Honours
  - Bachelor of Materials Engineering with Honours
  - Bachelor of Mechanical Engineering with Honours
  - Bachelor of Petroleum Engineering with Honours
  - Bachelor in Business Management (Hons)

- Bachelor of Computer Science (Hons)
  - Bachelor of Information Systems (Hons)
  - Bachelor of Information Technology (Hons)
  - Bachelor of Science (Hons) in Applied Chemistry
  - Bachelor of Science (Hons) in Applied Physics
  - Bachelor of Technology (Hons) Petroleum Geoscience
- ii. Placement time frame – **January to August, May to December and September to April.**
  - iii. UTP supervisors will visit the students at the host company twice during SIT and SIP.
  - iv. The students are also covered by group personal insurance during the training period.

## 6.0 Offences & Penalties during Student Industrial Internship Programme

Students who undergo SIIP are required to comply with laws and Regulations stipulated by the University and respective company/industry. Internship students committing academic and/or disciplinary misconduct during the course of soliciting internship placement and during the period of undergoing industrial internship programme will be subjected to the following penalties.

### 6.1 Types of Offence and Penalty

ACT	OFFENCE	PENALTY / ACTION
ACADEMIC and/or DISCIPLINARY MISCONDUCT	Termination by host company/institution due to the following offence: <ol style="list-style-type: none"> <li>a. Poor work performance and attitude.</li> <li>b. Poor attendance.</li> <li>c. Missing in action.</li> <li>d. Cause damage or misuse any properties or assets belonging to and/or controlled by host company.</li> <li>e. Violation of confidentiality, e.g. selling, distributing, social media posting, or publishing confidential documents, project and/or other information provided by host company without permission.</li> <li>f. Altered medical certificate (MC).</li> <li>g. Not adhering to host company/institution rules and regulations.</li> </ol>	<ol style="list-style-type: none"> <li>i. F Grade and/or</li> <li>ii. Submission of report to SDC for further action.</li> <li>iii. If found guilty, student can be imposed any one or more appropriate punishment concurrently or consecutively as follows:               <ol style="list-style-type: none"> <li>a. Reprimand</li> <li>b. A fine not exceeding one thousand ringgit (RM1000.00)</li> <li>c. Suspension from one or more facilities of the University for a specific period</li> <li>d. Exclusion from any part of the University for a specific period</li> <li>e. Academic suspension for a specific period</li> <li>f. Expulsion from the University</li> </ol> </li> </ol>
	Non-submission within the duration of assessment period for the following documents: <ol style="list-style-type: none"> <li>a. SIT and SIP logbook.</li> <li>b. SIP report</li> </ol>	F Grade

ACT	OFFENCE	PENALTY / ACTION
ACADEMIC and/or DISCIPLINARY MISCONDUCT (cont'd)	<ol style="list-style-type: none"> <li>1. Forgery of supervisor's signature and/or using official stamp without permission</li> <li>2. Submitting an altered mark to UTP supervisor.</li> <li>3. Submitting an altered transcript of grades to employer (during application)</li> <li>4. Use of intellectual material produced by another person without acknowledging its source e.g. copying of passages, use of the views, opinions, or insights of others into internship report and claim it to be own work</li> <li>5. Copying or attempting to copy internship report or logbook from others.</li> <li>6. Allowing others to do an assignment or portion of an assignment for the intern.</li> <li>7. Undergo internship "at home".</li> <li>8. Conduct and/or kind of conduct which are prohibited by Malaysia Syariah and Civil Law such as the use of drugs, liquor, pornography, damage, to public and/or personal properties, gambling, prostitution, stealing, physical harm, arson, robbery, sexual harassment, murder, etc.</li> <li>9. Conduct of any kind, which may cause detriment to the reputation of the University and/or its studies.</li> <li>10. Not adhering to host company/ Institution rules and regulations</li> </ol>	<ol style="list-style-type: none"> <li>i. Submission of report to SDC for further action</li> <li>ii. If found guilty, student can be imposed any one or more appropriate punishment concurrently or consecutively as follows: <ol style="list-style-type: none"> <li>a. Reprimand</li> <li>b. A fine not exceeding one thousand ringgit (RM1000.00)</li> <li>c. Suspension from one or more facilities of the University for a specific period</li> <li>d. Exclusion from any part of the University for a specific period</li> <li>e. Academic suspension for a specific period</li> <li>f. Expulsion from the University</li> </ol> </li> </ol>

## 7.0 Assessments of Student Industrial Internship Programme

Students will be assessed on their general attitude and receptivity to the working environment in addition to being assessed for performing specific technical tasks. Assessments will be based on the following:

### Assessment for Student Industrial Training (SIT)

Item	Percentage (%)	
	Host Company Supervisor	UTP Supervisor
1. Log Book	20	-
2. Student's Performance & Competency	30	
3. Oral Presentation	10	10
4. SIT Report	10	20
<b>TOTAL</b>	<b>70</b>	<b>30</b>

### Assessment for Student Industrial Project (SIP)

Item	Percentage (%)	
	Host Company Supervisor	UTP Supervisor
1. Log Book	20	-
2. Oral Presentation	10	30
3. SIP Report	-	40
<b>TOTAL</b>	<b>30</b>	<b>70</b>