



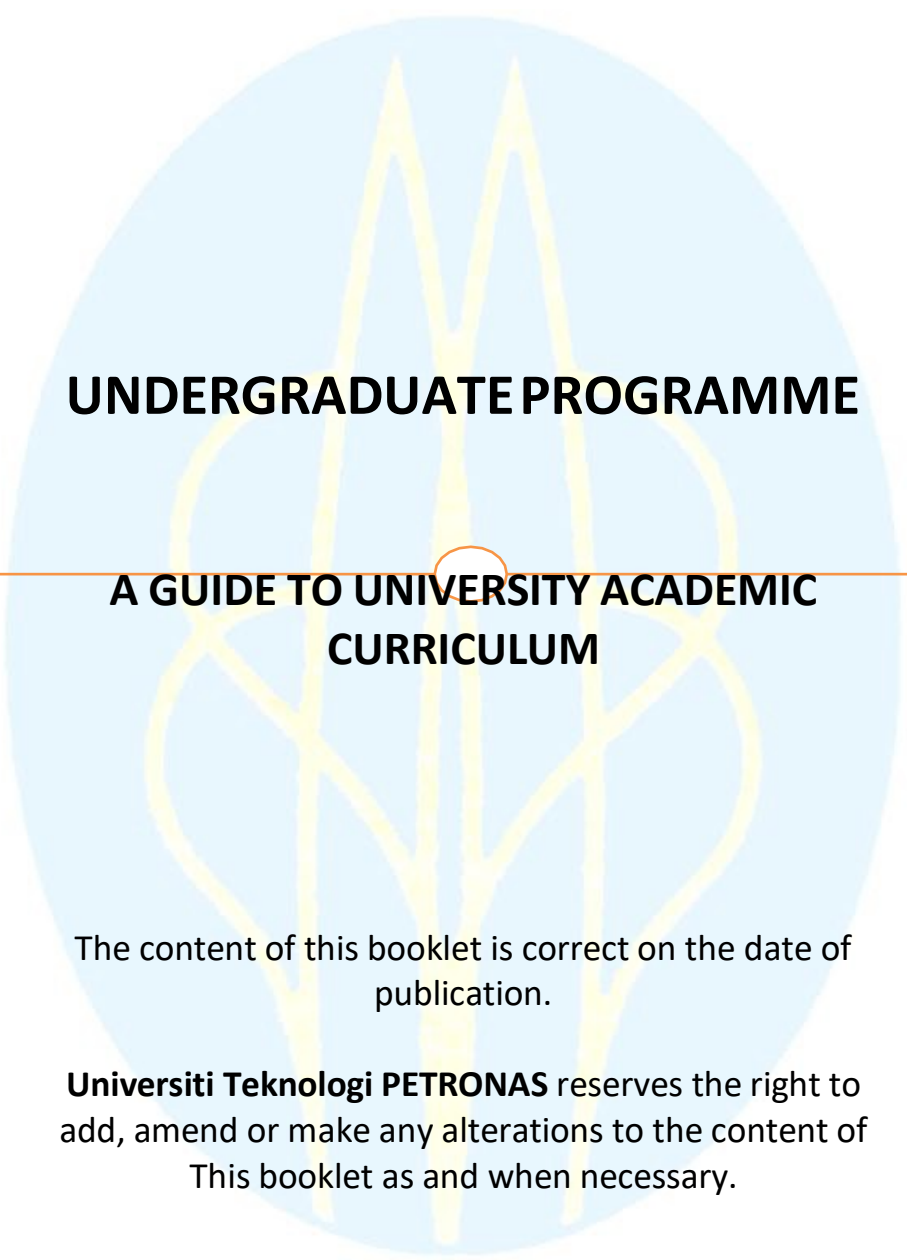
UNIVERSITI
TEKNOLOGI
PETRONAS



Undergraduate Student Handbook

THE CURRICULUM

2023 / 2024



UNDERGRADUATE PROGRAMME

A GUIDE TO UNIVERSITY ACADEMIC CURRICULUM

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Resource Planning & Performance

Universiti Teknologi PETRONAS

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PART B

THE CURRICULUM

- Chapter I: Undergraduate Degree Programmes
- Chapter II: Department of Management and Humanities
- Chapter III: Department of Fundamental and Applied Sciences
- Chapter IV: Credited Co-Curriculum Courses
- Chapter V: Student Industrial Internship Programme

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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	
<u>Course Group (G)</u>	<u>Number of Credit Hours</u>
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
TOTAL	144

2.0 Programme Curriculum Structure: Bachelor of Chemical 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)	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 and 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	CFB1043	Principles of Chemical Engineering	3	CD	FFM1063	Statistics and Application	3	CC
CFB1023	Physical Chemistry	3	CD	CFB1053	Chemical Engineering Fluid Mechanics	3	CD	CFB1063	Process Heat Transfer	3	CD
								CFB1072	Chemical Engineering Thermodynamics I	2	CD
Credit Hours		12		Credit Hours		13		Credit Hours		13	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
HFB2033	Professional Communication Skills	3	UR	MPU2	One (1) MPU2 Course	2	NR	MPU4 / HFB1012	Community Engagement Project	2	UR
CFB4013	Separation Process I	3	CD	GFB2102	Entrepreneurship	2	UR	KXXXXX1	Co Curriculum II	1	UR
CFB2023	Chemical Engineering Thermodynamics II	3	CD	FFM2063	Data Analytics	3	CC	MFB2102	Engineering Team Project II	2	CC
CFB2032	Chemical Engineering Lab I	2	CD	MFB2061	Engineering Team Project I	1	CC	CFB2073	Process Safety & Loss Prevention	3	CD
CFB2043	Organic Chemistry	3	CD	CFB2053	Reaction Engineering I	3	CD	CFB2083	Process Modelling & Simulation	3	CD
				CFB2063	Separation Process II	3	CD	CFB2092	Chemical Engineering Lab II	2	CD
Credit Hours		14		Credit Hours		14		Credit Hours		13	

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								
Credit Hours		13		Credit Hours		7		Credit Hours		7	
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				
Credit Hours		12		Credit Hours		13		Credit Hours		13	
Total Credit Hours: 144											

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**.

A No	Code	Minor in Data Science 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		

B No	Code	Minor in Accounting and Finance 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

COURSE CODE	: CFB4213
COURSE	: Air Pollution Engineering
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

COURSE CODE	: CFB4223
COURSE	: Industrial Effluent Engineering
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

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

This course provides the global prospective 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 : 4th 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 : 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 and 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 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	
<u>Course Group (G)</u>	<u>Number of Credit Hours</u>
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
TOTAL	144

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 MPU3142	Penghayatan Etika & Peradaban (Local) BM Komunikasi 2 (International)	2	NR	MPU3192	Falsafah & Isu Semasa (Local & International)	2	NR	LFB1042	Academic Writing	2	UR
PFP1012	Introduction to Oil & Gas Industry and 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	FFM1063	Statistics and Application	3	CC
FFM1013	Engineering Mathematics I	3	CC	VFB1033	Mechanics of Solids	3	CD	VFB1052	Civil Engineering Fluid Mechanics	2	CD
VFB1012	Civil Engineering Drawing	2	CD	VFB1043	Geomatics	3	CD	VFB1063	Theory of Structures	3	CD
VFB1023	Engineering Mechanics	3	CD	KXXxxx1	Co Curriculum I	1	UR	VFB1072	Traffic Engineering	2	CD
Credit Hours		14		Credit Hours		14		Credit Hours		14	
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
Credit Hours		14		VFB2063	Hydrology	3	CD	VFB2102	Water Supply Engineering	2	CD
Credit Hours		14		Credit Hours		13		Credit Hours		13	

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	Co Curriculum 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								
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
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				
Credit Hours		11		Credit Hours		12		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, 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**.

A No	Code	Minor in Data Science 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		

B No	Code	Minor in Accounting and Finance 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	: VFB1012
COURSE	: Civil Engineering Drawing
NO. OF CREDITS	: 2 credits
PRE-REQUISITE	: 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.

COURSE CODE	: VFB1023
COURSE	: Engineering Mechanics
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

COURSE CODE	: VFB1033
COURSE	: Mechanics of Solids
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

COURSE CODE	: VFB1043
COURSE	: Geomatics
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

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

COURSE CODE	: VFB4113
COURSE	: Fixed Offshore Structures
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

COURSE CODE	: VFB4133
COURSE	: Offshore Project Management
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

COURSE CODE	: VFB4123
COURSE	: Wave Hydrodynamics
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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

COURSE CODE	: VFB4213
COURSE	: Sludge Management and Disposal
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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.

COURSE CODE	: VFB4223
COURSE	: Advanced Physical-Chemical Treatment Technologies
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: 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
TOTAL	144

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
Credit Hours		15		Credit Hours		14		Credit Hours		13	
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
Credit Hours		14		Credit Hours		11		Credit Hours		14	

SEMESTER 7			
Code	Courses	Cr	G
RBB3023	Embedded and IOT Systems	3	CD
EFB4133	Digital System Design	3	CD
EFB3043	Data & Computer Network	3	CD
RBB3033	Cloud System Technologies	3	CD
Credit Hours		12	

SEMESTER 8			
Code	Courses	Cr	G
IFB3037	Student Industrial Training (SIT)	7	CI
Credit Hours		7	

SEMESTER 9			
Code	Courses	Cr	G
IFB3047	Student Industrial Project (SIP)	7	CI
Credit Hours		7	

SEMESTER 10			
Code	Courses	Cr	G
VEB3102	Project Management	2	CC
EFB4033	Probability and Random Process	3	CD
RBB4013	System Integrated Design Project	3	CD
RBB4XX3	Core Specialisation I	3	CSp
TEB2093	Computer Security	3	CD
Credit Hours		14	

SEMESTER 11			
Code	Courses	Cr	G
GFB3022	Engineering Economics	2	CC
EFB4063	Artificial Intelligence & Applications	3	CD
RBB4032	Final Year Project I	2	CD
RBB4XX3	Core Specialisation II	3	CSp
Credit Hours		10	

SEMESTER 12			
Code	Courses	Cr	G
EFB4073	Engineers in Society	3	CC
RBB4044	Final Year Project II	4	CD
RBB4603	Distributed and Parallel Processing	3	CD
RBB4XX3	Core Specialisation III	3	CSp
Credit Hours		13	

Total Credit Hours : 144

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**.

No	Code	Minor in Management 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:

Code A	:	Please refer to Materials Engineering Programme for Course Synopsis.
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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.
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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 : 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 : 4th 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 : 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 and 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 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 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 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
TOTAL	144

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
Credit Hours		15		Credit Hours		15		Credit Hours		14	
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
Credit Hours		13		Credit Hours		11		Credit Hours		14	

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								
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
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				
Credit Hours		13		Credit Hours		13		Credit Hours		10	
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**.

A No	Code	Minor in Data Science 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		

B No	Code	Minor in Accounting and Finance 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 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.

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.

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

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

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

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.

COURSE CODE : EFB4423
COURSE : Sensors & Transducers Design
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

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.

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

System-On-Chip (SOC) designer integrates various system components into a single chip module. An important enabler for the design of SOC 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 : 4th 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 : 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 and 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.

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
TOTAL	143

2.0 Programme Curriculum Structure: Bachelor of Materials 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
FFM1013	Engineering Mathematics I	3	CC	FFM1023	Engineering Mathematics II	3	CC	FFM1063	Statistics and Application	3	CC
AAB1013	Physical Chemistry for Materials	3	CD	AAB1032	Statics and Dynamics	2	CD	AAB1052	Strength of Materials	2	CD
AAB1022	Engineering Drawing	2	CD	AAB1043	Metals and Alloys	3	CD	AAB1063	Materials Processing I	3	CD
								AAB1072	Materials Lab I (Physical and Mechanics)	2	CD
Credit Hours		12		Credit Hours		12		Credit Hours		14	
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	HFB2033	Professional Communication Skills	3	UR	GEB2102	Entrepreneurship	2	UR
HFB1023	Scientific Inquiry	3	UR	TEB2132	Structured Programming & Database System	2	CC	KXXXXX1	Co Curriculum II	1	UR
KXXXXX1	Co Curriculum I	1	UR	AAB2043	Engineering Polymers	3	CD	MFB2063	Engineering Team Project	3	CC
AAB2012	Materials Characterization & Analytical Technique	2	CD	AAB2053	Materials Computational & Modelling	3	CD	AAB2073	Failure Analysis & NDE	3	CD
AAB2033	Materials Processing II	3	CD	AAB2063	Engineering Ceramics	3	CD	AAB2083	Engineering Composites	3	CD
								AAB2092	Phase Transformation in Metallic Materials	2	CD
Credit Hours		13		Credit Hours		14		Credit Hours		14	

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								
Credit Hours		13		Credit Hours		7		Credit Hours		7	

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				
Credit Hours		12		Credit Hours		12		Credit Hours		13	

Total Credit Hours : 143											
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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**.

A No	Code	Minor in Data Science 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		

B No	Code	Minor in Accounting and Finance 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.

5.3 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 : 4th 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 : 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 and 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 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

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

1.3 Programme Outcomes

- i. Apply knowledge of mathematics, natural science, engineering fundamentals and an 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 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
TOTAL	144

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
Credit Hours		14		Credit Hours		13		Credit Hours		14	

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
Credit Hours		14		Credit Hours		14		Credit Hours		14	

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								
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
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				
Credit Hours		13		Credit Hours		12		Credit Hours		10	

Total Credit Hours : 144											
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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**.

A No	Code	Minor in Data Science 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		

B No	Code	Minor in Accounting and Finance 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.

5.6 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 : 4th 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 : 4th 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 : 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 : MFB4133
COURSE : Hybrid and Electric Vehicle
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. 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 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 and 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 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

- i. Engineers who are competent with the potential to become leaders in Oil and Gas, and related industries.
- ii. 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:

- i. Apply knowledge of mathematics, natural sciences, 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 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
TOTAL	144

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
Credit Hours		15		Credit Hours		14		Credit Hours		14	

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
Credit Hours		13		Credit Hours		13		Credit Hours		14	

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								
Credit Hours		13		Credit Hours		7		Credit Hours		7	
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								
Credit Hours		12		Credit Hours		12		Credit Hours		10	
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**.

A No	Code	Minor in Data Science 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		

B No	Code	Minor in Accounting and Finance 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 HIIIP 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 classes-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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 4th 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 : 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 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

- i. Business Professionals who possess comprehensive theoretical and practical knowledge in business sectors.
- ii. Business Professionals who possess comprehensive managerial and intrapreneurial skills to perform effectively and responsibly across diverse organizations.
- iii. Business Professionals who use a broad range of business technology, digital applications and analytical techniques to support business functions.
- iv. Business Professionals who demonstrate life-long learning through teamwork, leadership, interpersonal communication, creativity, innovation skills and global mindset.
- v. Business Professionals who commit and seek life-long learning for continuous development.

1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Assess in-depth theories and concepts in business.
- ii. Apply in-depth and comprehensive business knowledge to manage complex business problems.
- iii. Organise tasks/operations ethically and flexibly in business organisations.
- iv. Demonstrate effective written/oral communication and collaborative skills with stakeholders.
- v. Demonstrate relevant digital skills for work.
- vi. Analyse numerical/graphical data to assist decision-making in work.
- vii. Demonstrate leadership skills and responsibility in managing business organisations.
- viii. Identify self-improvement for academic/career development.
- ix. Demonstrate entrepreneurship skills in resolving business problems.
- x. Display professionalism and uphold ethical conduct in societal & business organisations.
- xi. Evaluate business strategies based on sustainability and responsible management.

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	9
CC – Core Common	8
CD – Core Discipline	63
CI – Core Industrial Internship	14
CSp – Core Specialisation	12
P – Project	6
TOTAL	122

2.0 Programme Curriculum Structure: Bachelor in Business Management (Hons)

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3322 (MPU3)	Energy Sustainability	2	NR	MPU31102/ MPU3142	Aspirasi Negara Bangsa (Local)/ Bahasa Melayu Komunikasi (International)	2	NR	MPU31112/ MPU31132	Falsafah dan Cabaran Kontemporari (Local)/ Uniqueness of Malaysia (International)	2	NR
LGB1042	Scientific Writing	2	UR	KXXXXX1	Co- Curriculum II	1	UR	HGB2033	Professional Communication Skills	3	UR
KXXXXX1	Co- Curriculum I	1	UR	CGB1032	Health, Safety and Environment	2	CC	BBB1073	Business Data Mining	3	CD
BBB1013	Introduction to Management	3	CD	BBB1043	Economics	3	CD	BBB1083	Business Accounting	3	CD
BBB1023	Marketing	3	CD	BBB1053	Organizational Behaviour	3	CD	BBB1093	Business Communication	3	CD
BBB1033	Business Mathematics	3	CD	BBB1063	Statistical Methods for Business	3	CD				
Credit Hours		14		Credit Hours		14		Credit Hours		14	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU2	One (1) U2 Course	2	NR	MPU3412	Resilient Innovation for Social Engagement	2	NR	BBB2073	Human Capital Management	3	CD
MPU31122	Integrity and Anti-corruption	2	NR	TGB2043	Data Science	3	CC	BBB2083	Operations Management	3	CD
BBB2013	Financial Management	3	CD	BBB2043	Innovation & Entrepreneurship	3	CD	TGB2113	Business Intelligence	3	CD
BBB2023	Business Ethics and Sustainability	3	CD	BBB2053	Business Finance Technology	3	CD	BBB2093	Predictive Analytics for Business	3	CD
BBB2033	Business Law	3	CD	BBB2063	Global Business	3	CD	BBB2xxx3	Core Specialization I	3	CSp
Credit Hours		13		Credit Hours		14		Credit Hours		15	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
IGB3037	Student Industrial Training (SIT)	7	CI	IGB3047	Student Industrial Project (SIP)	7	CI	TGB3013	Technopreneurship Team Project	3	CC
								BBB3013	Business Research Method	3	CD
								BBB3023	Strategic Management	3	CD
								BBB3032	Final Year Project I	2	CD
								XXXxxx3	Core Specialization II/ Open Elective II	3	CSp
Credit Hours		7		Credit Hours		7		Credit Hours		14	
SEMESTER 10											
Code	Courses	Cr	G								
BBB4014	Final Year Project II	4	CD								
XXXxxx3	Core Specialization III	3	CSp								
XXXxxx3	Core Specialization IV	3	CSp								
Credit Hours		13									
Total Credit Hours : 122											

3.0 Core Specialisation (CSp) Courses

Track A: Business Analytics				
No	Code	Course Name	Cr	G
1	BBB2113	Digital Transformation and Business Strategy	3	CSp
2	BBB3103	Data Visualisation	3	CSp
3	BBB3113	Supply Chain Analytics	3	CSp
4	BBB3123	Responsible AI	3	CSp

Track B: Accounting				
No	Code	Course Name	Cr	G
1	BBB2203	Fundamental of Taxation	3	CSp
2	BBB3203	Fundamental of Assurance	3	CSp
3	BBB3213	Business Insights & Performance	3	CSp
4	BBB3223	Corporate Reporting	3	CSp

Track C: Business Administration				
No	Code	Course Name	Cr	G
1	OBG5113	Accounting for Decision Making	3	CSp
2	OBG5133	Business Economics	3	CSp
3	OBG5213	Corporate Finance	3	CSp
4	OBG5223	Corporate Ethics, Environmental, Social and Governance	3	CSp

Note:

Code A	: Please refer to Materials Engineering Programme for Course Synopsis.
Code B	: Please refer to Business Management Programme for Course Synopsis.
Code C	: Please refer to Computer Science Programme for Course Synopsis.
Code D	: 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, H, MPU	: Please refer to Business Management Programme and Management & Humanities Department for Course Synopsis.

4.0 Programme Courses Synopsis

4.1 Core Discipline (CD) Courses Synopsis

COURSE CODE : BBB1013
COURSE : Introduction to Management
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the foundational principles, concepts, and functions of management within a business organization. Students will learn about the roles and responsibilities of managers, the management environment, strategic planning, organizational structure, leadership, motivation, and control processes. Emphasis is placed on practical applications and real-world decision-making through case studies and group activities. By the end of the course, students will understand how management principles apply to business challenges in a dynamic global environment.

COURSE CODE : BBB1023
COURSE : Marketing
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the core concepts and strategies of modern marketing, emphasizing how customer-centric approaches drive business value and profitability. Students will explore the foundational elements of marketing on product, price, place, and promotion while gaining insights into the dynamic marketing environment shaped by digital transformation, artificial intelligence, and sustainable business practices. Emphasis is placed on how marketing can contribute to responsible business practices, customer engagement, and ethical decision-making in a rapidly evolving global marketplace.

COURSE CODE : BBB1033
COURSE : Business Mathematics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

In this course, students will be exposed to the basic mathematical methods, concepts, and principles to areas such as business and finance. An emphasis is placed on helping students to formulate, solve and interpret the results of the problems in application. To achieve this, mathematical concepts are introduced with real-life

COURSE CODE : BBB1043
COURSE : Economics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This subject introduces students to fundamental concepts and models in both microeconomics and macroeconomics. In the microeconomics component, students will apply supply and demand analyses, explore consumer choices, and examine production and market structures involving households and firms. The macroeconomics component focuses on the aggregate interactions of goods and services markets, labor, and money, while evaluating the role of government policies at local, national, and international levels. Additionally, the course integrates empirical-based decision making, equipping students with the skills to analyze data and make informed decisions based on empirical evidence.

COURSE CODE : BBB1053
COURSE : Organizational Behaviour
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This subject will be able to equip students with a comprehensive understanding of core Organisational Behavior (OB) concepts such as motivation, leadership, team dynamics, communication, organizational culture, power and politics, conflict resolution, and change management. In addition to traditional OB topics, this subject places special emphasis on contemporary issues such as workplace diversity, equity, and inclusion, as well as the role of sustainability in organisational decision-making and workplace culture. Students will analyse how diverse perspectives contribute to innovation and ethical leadership, and how sustainable practices can be integrated into management strategies to promote long-term organisational and societal well-being.

COURSE CODE : BBB1063
COURSE : Statistical Methods for Business
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course equips students with essential statistical knowledge and skills for data-driven decision making in the business environment. Students will learn to describe, analyze, and interpret data using appropriate statistical tools. Emphasis is placed on real-world application of statistical methods, hypothesis testing, regression analysis, and data visualization for business decisions. The course fosters critical thinking through the interpretation of statistical results to solve complex business problems using tools and software relevant to today's digital economy.

COURSE CODE : BBB1073
COURSE : Business Data Mining
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The course aims to provide a solid understanding of the opportunities, techniques and critical challenges in using data mining and predictive modeling in a business setting. Students will discover knowledge using data mining techniques. The course will provide students with hands on experience using a variety of real-world datasets. The course highlights methods that business leaders and data scientists have found to be the most useful. It introduces the Python software for data mining and explains how data science improves business outcomes.

COURSE CODE : BBB1083
COURSE : Business Accounting
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

Business Accounting enables students to develop the knowledge and skills to manage the financial affairs of individuals, communities, and businesses. Students will develop the knowledge and skills necessary to prepare and maintain financial records. Effective financial management requires systematic planning to ensure deadlines are adhered to. Students will learn to justify and take responsibility for actions and decisions, obey the law, and keep accurate and confidential records.

COURSE CODE : BBB1093
COURSE : Business Communication
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 workplace. This course emphasizes the theories, concepts and practices of effective communication. This course emphasizes a key communication functions such as media relations, internal communication, crisis communication, investor relations and corporate social responsibility (CSR) and development of communication strategies that align with organisational goal and business environment.

COURSE CODE : BBB2013
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 decisions 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, risk management, ESG investing and sustainable financing 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 : BBB2023
COURSE : Business Ethics and Sustainability
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the principles and practices of business ethics and corporate sustainability. It explores ethical decision-making frameworks, responsible business conduct, and the environmental, social, and governance (ESG) dimensions that define sustainable business models. Using real-world case studies and current issues in Malaysia and globally, students will analyze how businesses balance profit motives with accountability to stakeholders and the environment. The course prepares future business leaders to navigate ethical challenges, foster sustainable innovation, and contribute meaningfully to society.

COURSE CODE : BBB2033
COURSE : Business Law
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides an introduction to the fundamental principles of business law, with a focus on how legal frameworks impact and guide business decisions. The course equips students with knowledge of key legal concepts related to contracts, sales, agency, employment, business organizations, intellectual property, and digital business. Emphasis will be placed on current legal and regulatory issues affecting businesses in Malaysia and globally, including corporate governance, sustainability, and digital commerce. Through real-world case studies, interactive discussions, and practical applications, students will develop legal literacy essential for ethical and strategic decision-making in business environments.

COURSE CODE : BBB2043
COURSE : Innovation & Entrepreneurship
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the fundamental concepts, tools, and practices of entrepreneurship and innovation. It focuses on developing an entrepreneurial mindset and the ability to identify, evaluate, and transform innovative ideas into viable business opportunities. Students will explore the process of creating and managing innovative ventures — from opportunity recognition and business model design to implementation and growth. Through real-world examples, case studies, and experiential learning activities, students will understand how innovation drives competitive advantage and sustainability in both startups and established organizations.

COURSE CODE : BBB2053
COURSE : Business Finance & 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 : BBB2063
COURSE : Global Business
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the fundamentals of global business management in a rapidly digitalising world. It examines the structure and environment of international business operations, highlighting how technology, digital platforms, and innovation are reshaping global markets and business strategies. Students explore the influence of geo-politics, law, culture, economics, geography, and sustainability on international business functions. The course prepares students for careers in multinational and technology-driven firms, while also equipping aspiring global entrepreneurs with the knowledge and skills to compete effectively in the interconnected digital economy.

COURSE CODE : BBB2073
COURSE : Human Capital Management
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides a broad introduction to the theoretical foundations and practical applications of Human Capital Management (HCM) in contemporary organizations. It covers key functions including job analysis, recruitment, selection, training and development, performance management, and compensation management (encompassing salary, incentives, and benefits). The course also explores the influence of digital technologies such as HR analytics, artificial intelligence (AI) in recruitment, and cloud-based HR systems on human capital practices. In addition, students will examine current trends and challenges such as remote work, non-traditional employment, workforce diversity, and sustainability in HCM. By the end of the course, students will gain holistic insights into how strategic human capital management supports organizational goals in an evolving business environment.

COURSE CODE : BBB2083
COURSE : Operations Management
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

Operations Management (OM) is a management discipline that designs, manages and controls business processes, that is, the recurring activities of a firm. It includes acquisition and utilization of resources and distribution of its goods/services. As global competition increases, the survival of a firm in the market more largely depends on how well it integrates the operations into its business model. Thus, it is essential for all business managers to acquire an understanding and appreciation of operations. Ultimately, this course aims to familiarize students with the major operational issues that confront managers, and provide them with the basic language, concepts, insights, and analytical tools to deal with these issues.

COURSE CODE : BBB2093
COURSE : Predictive Analytics for Business
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

Predictive analysis is a vital part of our economic lives, both in public policy and business management. We make decisions today for some type of return or improvement in the future. The returns depend on the future states-of-the-world but today's input is essentially important for future prediction and estimation. Consequently, we always make our decisions under uncertainty. For an organization to provide customer delight, it is important that organization can understand the future trends. The process of analyzing the current and past information to understand the future patterns through a scientific and systemic approach is called prediction and forecasting. The application of predictive analysis in the area of finance has become increasingly important that includes understanding the future trends in risk - return, prices, etc.

COURSE CODE : BBB3013
COURSE : Business Research Method
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides students with fundamental skills to design and implement business research projects. Participants will learn to formulate clear research problems, questions, and objectives aligned with organizational needs, then execute the full research cycle through data collection, basic statistical analysis, and evidence-based interpretation. Using real-world case studies and hands-on projects, students will apply qualitative and quantitative methods to solve business challenges, emphasizing ethical data practices and actionable reporting for decision-makers.

COURSE CODE : BBB3023
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.

4.1 Project (P) Courses Synopsis

COURSE CODE : BBB3032
COURSE : Final Year Project I
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The subject introduces students to the concept of investment so to recognize 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 : BBB4014
COURSE : Final Year Project II
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This is an individual research project designed to develop students' ability to undertake independent, original academic research in the diverse fields of business and management. The course provides students with the opportunity to apply theoretical knowledge and research methodologies to investigate real-world or conceptual problems across various disciplines such as accounting, marketing, finance, human resource management, operations, entrepreneurship, corporate governance, sustainability, and strategic management.

Students are encouraged to explore trending areas including digital transformation, ESG (Environmental, Social, and Governance) reporting, circular economy, fintech, green finance, business analytics, AI in management, and inclusive leadership. Through critical inquiry and evidence-based analysis, students will aim to propose innovative and practical solutions to emerging challenges faced by businesses and society.

This course fosters intellectual curiosity, academic rigor, and research integrity while enhancing analytical, problem-solving, and communication skills. It prepares students for postgraduate studies, scholarly publishing, and research-based or strategic roles in both the public and private sectors.

4.2 Core Specialisation (CSp) Courses Synopsis

4.2.1 Business Analytics

COURSE CODE : BBB2113
COURSE : Digital Transformation and Business Strategy
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course prepares students to lead digital transformation in modern businesses by providing strategic frameworks to harness emerging technologies like AI, IoT, and Big Data. Students will evaluate how digital disruption reshapes industries, develop practical plans to connect technologies with core business objectives (e.g., cost reduction, customer experience), and address real-world challenges in change management and ethics through case studies and hands-on exercises.

COURSE CODE : BBB3103
COURSE : Data Visualisation
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

Students will be introduced to the foundational theories of customer behavior (buyers and consumers) in the process of acquiring, using, and disposing of products. The course integrates these behavioral insights with core principles of Business Intelligence (BI) and Data Visualization, enabling students to analyze and interpret customer data effectively. The analysis of customer behavior is structured at three levels: individual, micro-environmental, and macro-environmental factors influencing customers. Students will gain an appreciation of how BI tools and data visualization techniques can enhance the understanding and application of consumer behavior theories in developing effective marketing strategies. Through topical discussions, projects, and presentations, students will learn to apply both behavioral theories and BI methods in organizational and consumer contexts, preparing them to make data-driven decisions in the marketplace.

COURSE CODE : BBB3113
COURSE : Supply Chain Analytics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course aims to equip students with an understanding of the importance and role of supply chain management and supply chain analytics in the modern business enterprises and how business firms can take advantage with the help of supply chain analytics. Further, for students who wish to specialize in analytics, the course provides a strong foundation for the application of supply chain analytics with analytical platforms.

COURSE CODE : BBB3123
COURSE : Responsible AI
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides business students with a foundational understanding of Artificial Intelligence (AI) and its practical applications in various business functions. Students will explore how AI technologies can drive innovation, improve efficiency, and enhance decision-making, while also considering the ethical implications and strategic implementation of AI in organizations.

4.2.2 Accounting

COURSE CODE : BBB2203
COURSE : Fundamental of Taxation
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course enables students to understand the general objectives of taxation, the different types of taxes in the world. 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.

COURSE CODE : BBB3203
COURSE : Fundamental of Assurance
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course helps students understand the decision-making process that auditors use during a financial statement audit, as well as an integrated audit of both financial statements and internal controls. It also assists students in applying relevant knowledge and skills while exercising professional judgment to provide useful information and advice to individuals and businesses regarding the impact of major tax regimes on financial decisions and situations.

COURSE CODE : BBB3213
COURSE : Business Insights & Performance
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course equips students with the knowledge and skills to apply management accounting techniques in supporting strategic planning, performance management, and decision-making across diverse business environments. This course also helps to develop students in analyzing management accounting practices directed towards the effective and efficient use of organisational resources.

COURSE CODE : BBB3223
COURSE : Corporate Reporting
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course develops students' ability to apply technical knowledge and analytical skills in preparing, presenting, and evaluating corporate financial reports. It emphasizes resolving compliance and business issues, enhancing professional judgment, and supporting transparency and accountability in corporate reporting

4.2.3 Business Administration

COURSE CODE : OBG5113
COURSE : Accounting for Decision Making
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides a broad-based understanding of accounting practice by enhancing the ability to analyze financial information, which encompasses both financial accounting and management accounting, for purposes of performance evaluation, decision making, planning, costing and control.

COURSE CODE : OBG5133
COURSE : Business Economics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course examines economic theories, empirical perspectives, and the business economy of supply and demand. It discusses various economic aspects of local, national, and global markets related to resource allocation decisions made by managers in both the private and public sectors under conditions of risk and uncertainty. This course also examines public policies affecting national income, monetary system unemployment, public finance as well as digital and knowledge economy using applications of economic theory principles and methodologies.

COURSE CODE : OBG5213
COURSE : Corporate Finance
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

To equip the students with the knowledge in dealing with financial decisions of business entities and the tools, analysis and techniques used in making these decisions. The financial decisions cover the discipline of capital investment, long term financing, capital structure and short-term decision of working capital management with the objective of maximising corporate value while managing the firm's financial risk. Besides, this course also covers risk diversification, merger & acquisition activities, corporate restructuring and dividends payouts.

COURSE CODE : OBG5223
COURSE : Corporate Ethics, Environmental, Social and Governance
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This subject focuses on the concepts and principles of ethics, social responsibility, good governance and risk management practices. It provides the business framework that guides social responsibility and good governance practices in ensure business sustainability. It seeks to inspire young leaders to become responsible citizens, entrepreneurs and business leaders.

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 specialize in the following area:

- **Artificial Intelligence**

1.2 Programme Educational Objectives

- Computer Science professionals who are able to provide computing solutions for non-routine problems based on appropriate knowledge and technical skills in the computer science discipline according to the industry requirements.
- Computer Science professionals who have leadership skills and good interpersonal and communication skills to interact with stakeholders.
- Computer Science professionals who engage in lifelong learning and have an entrepreneurial mindset for self and career development.
- Computer Science professionals who uphold ethical conduct and professional practices in maintaining integrity.

1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- Apply the knowledge of Computer Science fundamentals to broadly defined procedures, processes, systems, and methodologies in the field of study.
- Propose and employ current tools and techniques to resolve broadly defined complex problems.
- Demonstrate analytical and critical thinking abilities to design and provide a solution for broadly defined complex problems in the field of study.
- Communicate effectively and flexibly in oral and written language for social, academic, and professional purposes.
- Demonstrate the understanding of corresponding issues related to the society and the subsequent responsibilities to the broadly defined technology practices.
- Acknowledge the requirement of professional establishment and to employ independent continuing learning in specialized technology.
- Demonstrate consciousness of management and technopreneurship routine in real perspective.
- Uphold ethical awareness and professionalism.
- Exhibit leadership character, mentoring and work efficiently in diverse teams.

1.4 Graduation Requirements

In order to graduate with the Bachelor of Computer Science (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	11
CC - Core Courses (Computing)	24
CD - Core Discipline	33
CI - Internship	14
FE - Field Electives	9
FYP - Final Year Project	6
EM – Free Electives	15
TOTAL	122

2.0 Programme Curriculum Structure: Bachelor of Computer Science (Hons)

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
LGB1042	Scientific Writing	2	UR	MPU31102 / MPU3142	Aspirasi Negara Bangsa(Local) Bahasa Melayu Komunikasi 2 (International)	2	NR	MPU31112/ MPU31132	Falsafah dan Cabaran Kontemporari (Local)/ Uniqueness of Malaysia (International)	2	NR
MPU3322 (MPU15)	Energy Sustainability	2	NR	KXXXXX1	Co- Curriculum I	1	UR	HGB2033	Professional Communication Skills	3	UR
DBB1013	Database Systems	3	CC	CGB1032	Health, Safety & Environment	2	UR	DBB1073	Applied Mathematics	3	CD
DBB1023	Programming Fundamentals	3	CC	DBB1043	Operating Systems	3	CC	DBB1083	Data Communication and Network	3	CC
DBB1033	Computer Architecture	3	CC	DBB1053	Systems Analysis and Design	3	CC	DBB1093	Object-Oriented Programming	3	CD
				DBB1063	Discrete Mathematics	3	CD				
Credit Hours		13		Credit Hours		14		Credit Hours		14	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU 2	One (1) MPU2 Course	2	NR	MPU3412 (MPU4)	Resilient Innovation for Social Engagement (RISE)	2	NR	DBB2073	Cloud Computing	3	CD
MPU31122 (MPU3)	Integrity and Anti-Corruption	2	NR	DBB2043	Data Science	3	CC	DBB2083	Full-Stack Application Development	3	CD
KXXXXX1	Co- Curriculum II	1	UR	DBB2053	Computer Security	3	CD	BBBXXX3	Free Elective II	3	EM
DBB2013	Artificial Intelligence	3	CC	DBB2063	Applied Statistics	3	CD	BBBXXX3	Free Elective III	3	EM
DBB2023	Software Engineering	3	CD	BBBXXX3	Free Elective I	3	EM	DBB3XX3	Field Elective I	3	FE
DBB2033	Algorithm & Data Structure	3	CD								
Credit Hours		14		Credit Hours		14		Credit Hours		15	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
IGB3037	Student Industrial Training (SIT)	7	CI	IGB3047	Student Industrial Project (SIP)	7	CI	DBB3013	Technopreneurship Team Project	3	CD
								DBB3022	Final Year Project I	2	FYP
								DBB3033	Parallel and Quantum Computing	3	CD
								DBB3XX3	Field Elective II	3	FE
								BBBXXX3	Free Elective IV	3	EM
Credit Hours		7		Credit Hours		7		Credit Hours		14	

SEMESTER 10			
Code	Courses	Cr	G
DBB4014	Final Year Project II	4	FYP
DBB3XX3	Field Elective III	3	FE
BBBXXX3	Free Elective V	3	EM
Credit Hours		10	

Total Credit Hours : 122

3.0 Field Elective (FE) Courses

Choose 3 out of 4 courses as Field Elective I, II and III.

Route: Artificial Intelligence				
No	Code	Course Name	Cr	G
1	DBB3043	Machine Learning	3	FE
2	DBB3053	Robotics	3	FE
3	DBB3063	Large Language Model	3	FE
2	DBB3073	Computer Vision	3	FE

4.0 Free Electives (EM) Courses

Choose any ONE(1) of the following sets of Minor Elective's areas (set A or B) for Free Elective I, II, III, IV and V.

A. Corporate Management – Choose ONLY 5 Courses				
A. No	Code	Course Name	Cr	G
1	BBB1013	Introduction to Management	3	EM
2	BBB1023	Marketing	3	EM
3	BBB1053	Organisational Behaviour	3	EM
4	BBB1093	Business Communication	3	EM
5	BBB2073	Human Capital Management	3	EM
6	BBB3023	Strategic Management	3	EM
Total Credit Hours			18	

B. Accounting & Business – Choose ONLY 5 Courses				
B. No	Code	Course Name	Cr	G
1	BBB1083	Business Accounting	3	EM
2	BBB2023	Business Ethics and Sustainability	3	EM
3	BBB2033	Business Law	3	EM
4	BBB2203	Fundamental of Taxation	3	EM
5	BBB3203	Fundamentals of Assurance	3	EM
6	BBB3213	Business Insights & Performance	3	EM
Total Credit Hours			18	

Note

Code A	:	Please refer to Materials Engineering Programme for Course Synopsis.
Code C	:	Please refer to Chemical Programme for Course Synopsis.
Code D	:	Please refer to Computer Science 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 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
Code Q	:	Please refer to Petroleum Geoscience Programme for Course Synopsis.
Code T	:	Please refer to 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 Management & Humanities Department for Course Synopsis

5.0 Programme Courses Synopsis

5.1 Core Discipline (CD) Courses Synopsis

COURSE CODE : DBB1063
COURSE : Discrete Mathematics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

Discrete Mathematics is a foundational course in computer science, engineering, and mathematics that focuses on structures and techniques essential for problem-solving in computation, cryptography, algorithms, and data analysis. This course covers logical reasoning, mathematical proofs, combinatorial analysis, graph theory, and probability, providing the theoretical backbone for advanced studies in computing and applied sciences.

COURSE CODE : DBB1073
COURSE : Applied Mathematics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces fundamental mathematical techniques essential for solving real-world problems in computing domains. It covers key topics such as matrices and linear algebra, Laplace transforms, Fourier series, and linear programming. Students will learn to apply these concepts to model and solve problems related to systems analysis, optimization, and decision-making. Emphasis is placed on the practical use of these tools through programming and software simulations, enhancing students' problem-solving and analytical skills in computational contexts.

COURSE CODE : DBB1093
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 : DBB2023
COURSE : Software Engineering
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the core principles, methodologies, and practices of software engineering. Key topics include software process models, requirements engineering, system modeling and design, rapid development, software reuse, and component-based engineering. Students will also learn software verification and validation techniques, including testing strategies and test automation. Emphasis is placed on quality assurance and the use of effective development practices to build reliable software systems. The course further highlights the importance of computers as essential productivity tools, both as standalone systems and within networked environments, supporting business operations and societal needs.

COURSE CODE : DBB2033
COURSE : Algorithm & 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 analyzed.

COURSE CODE : DBB2053
COURSE : Computer Security
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the fundamental principles and key challenges in computer security, with a focus on both conceptual understanding and practical implementation. It addresses core security objectives such as confidentiality, integrity, authentication, identification, and availability, alongside the policies, models, and mechanisms used to enforce them within information systems. Topics covered include the foundations of cryptography (e.g., digital signatures, public key infrastructure), network security (e.g., firewalls, intrusion detection and prevention), risk management, security assurance, and secure system design principles. The course also explores organizational security policies, legal and ethical considerations, and recognized standards and methodologies for security evaluation and certification.

COURSE CODE : DBB2063
COURSE : Applied Statistics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to applied statistical methods for data analysis and decision-making across various disciplines. It covers the use of descriptive and inferential statistics to address real-world problems, with an emphasis on practical applications, critical thinking, and the use of statistical software for analysis.

COURSE CODE : DBB2073
COURSE : Cloud Computing
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course covers a broad range of topics related to cloud computing, including cloud infrastructure based on a cloud computing reference model. The reference model includes five fundamental layers (physical, virtual, control, orchestration, and service) and three cross-layer functions (business continuity, security, and service management) for building a cloud infrastructure. It covers the comprising technologies, components, processes, and mechanisms.

COURSE CODE : DBB2083
COURSE : Full Stack Application Development
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to the principles and practices of full stack software development. Students will explore both front-end and back-end technologies while grounding their work in core software engineering methodologies, including requirements analysis, system modeling, agile development, and component reuse. Emphasis is placed on rapid prototyping, collaborative coding, version control, and test-driven development. Learners will apply industry-relevant tools to build, test, and deploy robust web applications, gaining hands-on experience in end-to-end system design. The course highlights the role of computing as a critical enabler of innovation across business and societal contexts.

COURSE CODE : DBB3013
COURSE : Technopreneurship Team Project
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course focuses on nurturing technopreneurship by guiding students through the process of generating innovative computing solutions for real-life scenarios. Students will work in teams to develop ideas that can be commercialized, applying design thinking and covering essential business areas such as financial planning, marketing, and pricing. The course explores key concepts of technopreneurship, including industry drivers (e.g., government policies, domestic market, infrastructure, and market linkages), business principles, and project management methodologies necessary for establishing and managing an IT business.

COURSE CODE	: DBB3033
COURSE	: Parallel and Quantum Computing
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This course introduces students to scalable and quantum computing concepts within distributed environments. Students will apply fundamental techniques to solve computing problems that require performance, efficiency, and parallelism. Emphasis is placed on analyzing architectures such as cloud, edge, and quantum systems, and designing suitable solutions using current frameworks and tools. Practical skills are developed through hands-on activities and projects involving platforms like Spark, Docker, and Qiskit. By the end of the course, students will be able to design, implement, and evaluate scalable and quantum computing solutions relevant to modern networked and high-performance computing environments.

5.2 Core Courses (Computing) (CC) Courses Synopsis

COURSE CODE	: DBB1013
COURSE	: Database Systems
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This compulsory technology course is designed for all undergraduate computing programmes. It provides a comprehensive introduction to the practical and theoretical foundations of database design and development, with a strong emphasis on relational data models. Students will explore core concepts of database technologies, including design principles, data manipulation techniques, and implementation strategies. The course focuses on the relational database model, which serves as the backbone for most modern applications, guiding students in building robust and scalable database solutions. Additionally, the course introduces fundamental aspects of transaction management to deepen understanding of data integrity, concurrency control, and system reliability in real-world scenarios.

COURSE CODE	: DBB1023
COURSE	: Programming Fundamentals
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This course offers a comprehensive introduction to programming fundamentals through a fully coursework-based approach. It is divided into two main parts. The first part focuses on problem-solving using computers. Students will explore the problem domain, understand the phases of problem-solving, and apply basic techniques for designing effective solutions. Emphasis is placed on developing logical thinking and analytical skills essential for programming. The second part introduces the core concepts of structured programming. Students will learn to translate problem-solving strategies into working programs, reinforcing their understanding through hands-on coding exercises. The course also explores complex data types and efficient programming practices required for solving more advanced problems. Designed to strengthen students' programming proficiency, this course equips learners with the foundational skills necessary for further study and application in software development and computational problem-solving.

COURSE CODE	: DBB1033
COURSE	: Computer Architecture
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This course provides a foundational understanding of computer architecture, focusing on the structure, function, and design of digital computer systems. Students will explore fundamental concepts such as number systems, data representation, computer organization, and assembly language. The course examines microprocessor systems, including their components, instruction sets, and control mechanisms. Through theoretical knowledge and practical exercises, students will analyze system behavior, design simple CPUs, and explore the Little Man Computer (LMC) model as a learning tool. Emphasis is placed on understanding how low-level programming interacts with hardware and how data is transmitted and interfaced within computer systems.

COURSE CODE : DBB1043
COURSE : Operating Systems
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the basic concepts and functions of operating systems. It covers how operating systems manage hardware and software resources, including processes, memory, files, and input/output devices. Students will learn about system protection, resource management, and how to compare different operating systems for various computing needs. The course also includes practical examples to help students understand how operating systems work in real-world environments.

COURSE CODE : DBB1053
COURSE : Systems 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 : DBB1083
COURSE : Data Communication and Network
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the fundamental principles, architectures, and protocols of data communication and computer networks. Students will explore the layered network models, including the OSI and TCP/IP frameworks, and understand how data is transmitted across various media and devices. Key topics begin with the application layer and work downward through the transport, network, data link, and physical layers. Hands-on practical sessions will complement theoretical learning. Students will use network simulator to analyze network traffic and simulate small-scale network configurations.

COURSE CODE : DBB2013
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 : DBB2043
COURSE : Data Science
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course will cover topics such as Business understanding, analytic approach, data requirements, data collection, data understanding, data preparation, modelling, Visualization and deployment, evaluation and feedback. The flow of methodology will help student on problem solving process.

5.3 Final Year Project (FYP) Courses Synopsis

COURSE CODE : DBB3022
COURSE : Final Year Project I
NO. OF CREDITS : 2 credits
PRE-REQUISITE : 3rd year standing

This course marks the initial stage of an individual research endeavor within the domains of computing. Under the mentorship of supervisors from the faculty, students will identify a meaningful research problem, conduct a preliminary investigation, and develop a detailed project proposal. Potential areas of exploration may include data analytics, software development, system integration, cybersecurity, network optimization, AI applications, hardware prototyping, or mathematical modeling. Emphasis is placed on developing research literacy, project planning, ethical inquiry, and the professional values essential for sustained innovation in computing disciplines.

COURSE CODE : DBB4014
COURSE : Final Year Project II
NO. OF CREDITS : 4 credits
PRE-REQUISITE : Final Year Project I

This is an individually supervised, application-oriented project where students identify and address a real-world problem within the field of computing. Under the guidance of faculty supervisors, students will apply appropriate computing principles and technologies to investigate, design, and develop practical and innovative solutions.

5.4 Field Elective (FE) Courses Synopsis

5.4.1 Artificial Intelligence

COURSE CODE : DBB3043
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 : DBB3053
COURSE : Robotics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The course provides a comprehensive introduction to the fundamental concepts, design principles, and applications of robotics. It combines theoretical understanding with practical applications to equip students with the knowledge and skills necessary for designing, building, and programming robotic systems. Students will explore various types of robots, delve into kinematics and motion control, and gain insight into perception, navigation, and the latest advancements in robotic technologies.

COURSE CODE : DBB3063
COURSE : Large Language Model
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

Large Language Models (LLMs) have transformed how we interact with technology, delivering unprecedented capabilities in natural language processing. Modeling human language at scale is a highly complex and resource-intensive effort. As models are built bigger and bigger, their complexity and efficacy increase. The impressive capabilities of modern language models and large language models are the result of decades of research and development. This course provides current research that considers LLMs as scientific objects of study and covers the important perspectives on understanding LLMs.

COURSE CODE : DBB3073
COURSE : Computer Vision
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The course covers both classical and modern computer vision theories and methods. It emphasizes both theoretical understanding and practical skills in implementing and developing computer vision algorithms and applications. Students will learn about the formation process and characteristics of digital images, and techniques for image filtering and enhancement, feature extraction and representation, object detection and pattern recognition, image segmentation and classification, motion estimation and object tracking. A wide range of applications will be covered.

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 specialization in **Intelligent Information Systems**. 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 specialize in the following area:

- **Intelligent Information System**

1.2 Programme Educational Objectives

- i. Information Systems professionals who are able to provide computing solutions for non-routine problems based on appropriate knowledge and technical skills in the information systems discipline according to the industry requirements.
- ii. Information Systems professionals who have leadership skills and good interpersonal and communication skills to interact with stakeholders.
- iii. Information Systems professionals who engage in lifelong learning and have an entrepreneurial mindset for self and career development.
- iv. Information Systems professionals who uphold ethical conduct and professional practices in maintaining integrity.

1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Apply the knowledge of Information Systems fundamentals to broadly defined procedures, processes, systems, and methodologies in the field of study.
- ii. Propose and employ current tools and techniques to resolve broadly defined complex problems.
- iii. Demonstrate analytical and critical thinking abilities to design and provide a solution for broadly defined complex problems in the field of study.
- iv. Communicate effectively and flexibly in oral and written language for social, academic, and professional purposes.
- v. Demonstrate the understanding of corresponding issues related to the society and the subsequent responsibilities to the broadly defined technology practices
- vi. Acknowledge the requirement of professional establishment and to employ independent continuing learning in specialised technology.
- vii. Demonstrate consciousness of management and technopreneurship routine in real perspective.
- viii. Uphold ethical awareness and professionalism.
- ix. Exhibit leadership character, mentoring and work efficiently in diverse teams.

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
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CC - Core Courses (Computing)	24
CD - Core Discipline	33
CI - Internship	14
FE - Field Electives	9
FYP - Final Year Project	6
EM – Free Electives	15
TOTAL	122

2.0 Programme Curriculum Structure: Bachelor of Information Systems (Hons)

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
LGB1042	Scientific Writing	2	UR	MPU31102 / MPU3142	Aspirasi Negara Bangsa (Local)/ BM Komunikasi 2 (International)	2	NR	MPU31112/ MPU31132	Falsafah dan Cabaran Kontemporari (Local)/ Uniqueness of Malaysia (International)	2	NR
MPU3322 (MPU3)	Energy Sustainability	2	NR	KXXXXX1	Co- Curriculum I	1	UR	HGB2033	Professional Communication Skills	3	UR
TGB1013	Database Systems	3	CC	CGB1032	Health, Safety & Environment	2	UR	TGB1083	Data Communication and Network	3	CC
TGB1023	Programming Fundamentals	3	CC	TGB1043	Operating Systems	3	CC	TGB1093	UI/UX Design	3	CD
TGB1033	Computer Architecture	3	CC	TGB1053	Systems Analysis and Design	3	CC	TGB1113	Enterprise Resource Planning	3	CD
				TGB1073	Fundamentals of Information Systems	3	CD				
Credit Hours		13		Credit Hours		14		Credit Hours		14	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU 2	One (1) MPU2 Course	2	NR	MPU3412 (MPU4)	Resilient Innovation for Social Engagement (RISE)	2	NR	TGB2113	Business Intelligence	3	CD
MPU31122	Integrity and Anti-Corruption	2	NR	TGB2043	Data Science	3	CC	TGB2083	Full-Stack Application Development	3	CD
KXXXXX1	Co- Curriculum II	1	UR	TGB2103	IT Audit	3	CD	BBBXXX3	Free Elective II	3	EM
TGB2013	Artificial Intelligence	3	CC	TGB2063	Applied Statistics	3	CD	BBBXXX3	Free Elective III	3	EM
TGB2093	Low Code System Development	3	CD	BBBXXX3	Free Elective I	3	EM	TGB3XX3	Field Elective I	3	FE
TGB2033	Computer Security	3	CD								
Credit Hours		14		Credit Hours		14		Credit Hours		15	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
IGB3037	Student Industrial Training (SIT)	7	CI	IGB3047	Student Industrial Project (SIP)	7	CI	TGB3013	Technopreneurship Team Project	3	CD
								TGB3022	Final Year Project I	2	FYP
								TGB3033	IT Project Management	3	CD
								TGB3XX3	Field Elective II	3	FE
								TGBXXX3	Free Elective IV	3	EM
Credit Hours		7		Credit Hours		7		Credit Hours		14	

SEMESTER 10			
Code	Courses	Cr	G
TGB4014	Final Year Project II	4	FYP
TGB3XX3	Field Elective III	3	FE
BBBXXX3	Free Elective V	3	EM
Credit Hours		10	

Total Credit Hours : 122

3.0 Field Elective (FE) Courses

Choose 3 out of 4 courses as Field Elective I, II and III.

Route: Intelligent Information System				
No	Code	Course Name	Cr	G
1	TGB3083	Digital Twin	3	FE
2	TGB3093	Generative AI	3	FE
3	TGB3093	Responsible AI	3	FE
2	TGB3113	Intelligent Decision Systems	3	FE

4.0 Free Electives (EM) Courses

Choose any ONE (1) of the following sets of Minor Elective's areas (set A or B) for Free Elective I, II, III, IV and V.

A. Corporate Management – Choose ONLY 5 Courses				
A. No	Code	Course Name	Cr	G
1	BBB1013	Introduction to Management	3	EM
2	BBB1023	Marketing	3	EM
3	BBB1053	Organisational Behaviour	3	EM
4	BBB1093	Business Communication	3	EM
5	BBB2073	Human Capital Management	3	EM
6	BBB3023	Strategic Management	3	EM
Total Credit Hours			18	

B. Accounting & Business – Choose ONLY 5 Courses				
B. No	Code	Course Name	Cr	G
1	BBB1083	Business Accounting	3	EM
2	BBB2023	Business Ethics and Sustainability	3	EM
3	BBB2033	Business Law	3	EM
4	BBB2203	Fundamental of Taxation	3	EM
5	BBB3203	Fundamentals of Assurance	3	EM
6	BBB3213	Business Insights & Performance	3	EM
Total Credit Hours			18	

Note:

Code A	: Please refer to Materials Engineering Programme for Course Synopsis.
Code C	: Please refer to Chemical Programme for Course Synopsis.
Code D	: Please refer to Computer Science 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 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
Code Q	: Please refer to Petroleum Geoscience Programme for Course Synopsis.
Code T	: Please refer to 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 Management & Humanities Department for Course Synopsis

5.0 Programme Courses Synopsis

5.1 Core Discipline (CD) Courses Synopsis

COURSE CODE : TGB1073
COURSE : Fundamentals of Information Systems
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides an essential introduction to the field of Information Systems (IS), emphasizing their role in supporting business processes, decision-making, and digital transformation in today's connected world. Students will explore the fundamental components of IS—including hardware, software, data, networks, and people—and how these elements interact to create value within organizations. Topics include system development, data management, cybersecurity, enterprise applications, and emerging technologies such as cloud computing, artificial intelligence, and the Internet of Things (IoT). By the end of the course, learners will have a foundational understanding of how Information Systems drive operational efficiency, strategic advantage, and innovation across various industries.

COURSE CODE : TFB1093
COURSE : UI/UX Design
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The purpose of this course is to introduce the principles and practices of user interface (UI) and user experience (UX) design, with a focus on creating effective, user-centered digital products. Students will explore the cognitive, aesthetic, and behavioral aspects of design, and learn how to conceptualize, prototype, and evaluate user interfaces. In addition, the course will examine contemporary tools, methodologies, and industry practices that support the design of intuitive and engaging user experiences.

COURSE CODE : TGB1113
COURSE : Enterprise Resource Planning
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The Enterprise Resource Planning (ERP) course provides students with a comprehensive understanding of the principles, components, and applications of ERP systems in modern organizations. It explores how ERP systems integrate various business functions—such as sales, production, supply chain, human resources, and accounting—into a unified system to enhance operational efficiency and decision-making. Students will begin with foundational concepts, including business processes and the architecture of ERP systems, before advancing to ERP implementation strategies and key functional modules. The course also examines contemporary trends, issues, and challenges in ERP, equipping students with insights into real-world applications and future directions in enterprise systems.

COURSE CODE : TGB2093
COURSE : Low Code System Development
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces low-code development as a modern approach to building business applications with minimal coding. Students will learn to use visual tools and platforms to design and deploy systems that support digital transformation, process automation, and organizational agility. Emphasis is placed on real-world applications, enabling students to rapidly develop solutions while understanding the role of low-code in enterprise environments.

COURSE CODE : TGB2033
COURSE : Computer Security
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the fundamental principles and key challenges in computer security, with a focus on both conceptual understanding and practical implementation. It addresses core security objectives such as confidentiality, integrity, authentication, identification, and availability, alongside the policies, models, and mechanisms used to enforce them within information systems. Topics covered include the foundations of cryptography (e.g., digital signatures, public key infrastructure), network security (e.g., firewalls, intrusion detection and prevention), risk management, security assurance, and secure system design principles. The course also explores organizational security policies, legal and ethical considerations, and recognized standards and methodologies for security evaluation and certification.

COURSE CODE : TGB2103
COURSE : IT Audit
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides a comprehensive introduction to Information Technology (IT) Auditing, focusing on the role of IT audits in ensuring organizational governance, risk management, and internal control effectiveness. Students will explore key frameworks such as COSO, ISO standards, and emerging audit practices involving cloud computing, cybersecurity, and more. The course emphasizes practical knowledge of IT General Controls (ITGC), IT Application Controls (ITAC), risk-based audit approaches, and audit evidence techniques. Students will also examine current challenges in auditing modern technologies such as artificial intelligence and continuous auditing processes. Through case studies and applied activities, students will develop competencies in executing audit procedures and producing professional audit reports aligned with ethical standards and regulatory requirements.

COURSE CODE : TGB2063
COURSE : Applied Statistics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to applied statistical methods for data analysis and decision-making across various disciplines. It covers the use of descriptive and inferential statistics to address real-world problems, with an emphasis on practical applications, critical thinking, and the use of statistical software for analysis.

COURSE CODE : TGB2113
COURSE : Business Intelligence
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

In this course, we introduce the concept of Business Intelligence and explore its major components in detail, including Data Warehousing, Business Analytics, Data Visualization, Data Mining, and Business Performance Management. We examine the processes, content, and context of managerial decision-making. This includes understanding how the implementation of Business Intelligence can enhance the effectiveness of decision support in management. The course also discusses key issues that influence the success of Business Intelligence initiatives.

COURSE CODE : TGB2083
COURSE : Full-Stack Application Development
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to the principles and practices of full stack software development. Students will explore both front-end and back-end technologies while grounding their work in core software engineering methodologies, including requirements analysis, system modeling, agile development, and component reuse. Emphasis is placed on rapid prototyping, collaborative coding, version control, and test-driven development. Learners will apply industry-relevant tools to build, test, and deploy robust web applications, gaining hands-on experience in end-to-end system design. The course highlights the role of computing as a critical enabler of innovation across business and societal contexts.

COURSE CODE : TGB3013
COURSE : Technopreneurship Team Project
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course focuses on nurturing technopreneurship by guiding students through the process of generating innovative computing solutions for real-life scenarios. Students will work in teams to develop ideas that can be commercialized, applying design thinking and covering essential business areas such as financial planning, marketing, and pricing. The course explores key concepts of technopreneurship, including industry drivers (e.g., government policies, domestic market, infrastructure, and market linkages), business principles, and project management methodologies necessary for establishing and managing an IT business.

COURSE CODE : TGB3033
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 build 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 Core Courses (Computing) (CC) Courses Synopsis

COURSE CODE	: TGB1013
COURSE	: Database Systems
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This compulsory technology course is designed for all undergraduate computing programmes. It provides a comprehensive introduction to the practical and theoretical foundations of database design and development, with a strong emphasis on relational data models. Students will explore core concepts of database technologies, including design principles, data manipulation techniques, and implementation strategies. The course focuses on the relational database model, which serves as the backbone for most modern applications, guiding students in building robust and scalable database solutions. Additionally, the course introduces fundamental aspects of transaction management to deepen understanding of data integrity, concurrency control, and system reliability in real-world scenarios.

COURSE CODE	: TGB1023
COURSE	: Programming Fundamentals
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This course offers a comprehensive introduction to programming fundamentals through a fully coursework-based approach. It is divided into two main parts. The first part focuses on problem-solving using computers. Students will explore the problem domain, understand the phases of problem-solving, and apply basic techniques for designing effective solutions. Emphasis is placed on developing logical thinking and analytical skills essential for programming. The second part introduces the core concepts of structured programming. Students will learn to translate problem-solving strategies into working programs, reinforcing their understanding through hands-on coding exercises. The course also explores complex data types and efficient programming practices required for solving more advanced problems. Designed to strengthen students' programming proficiency, this course equips learners with the foundational skills necessary for further study and application in software development and computational problem-solving.

COURSE CODE	: TGB1033
COURSE	: Computer Architecture
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This course provides a foundational understanding of computer architecture, focusing on the structure, function, and design of digital computer systems. Students will explore fundamental concepts such as number systems, data representation, computer organization, and assembly language. The course examines microprocessor systems, including their components, instruction sets, and control mechanisms. Through theoretical knowledge and practical exercises, students will analyze system behavior, design simple CPUs, and explore the Little Man Computer (LMC) model as a learning tool. Emphasis is placed on understanding how low-level programming interacts with hardware and how data is transmitted and interfaced within computer systems.

COURSE CODE	: TGB1043
COURSE	: Operating Systems
NO. OF CREDITS	: 3 credits
PRE-REQUISITE	: None

This course introduces students to the basic concepts and functions of operating systems. It covers how operating systems manage hardware and software resources, including processes, memory, files, and input/output devices. Students will learn about system protection, resource management, and how to compare different operating systems for various computing needs. The course also includes practical examples to help students understand how operating systems work in real-world environments.

COURSE CODE : TGB1053
COURSE : Systems 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 : TGB1083
COURSE : Data Communication and Network
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the fundamental principles, architectures, and protocols of data communication and computer networks. Students will explore the layered network models, including the OSI and TCP/IP frameworks, and understand how data is transmitted across various media and devices. Key topics begin with the application layer and work downward through the transport, network, data link, and physical layers. Hands-on practical sessions will complement theoretical learning. Students will use network simulator to analyze network traffic and simulate small-scale network configurations.

COURSE CODE : TGB2013
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 : TGB2043
COURSE : Data Science
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course will cover topics such as Business understanding, analytic approach, data requirements, data collection, data understanding, data preparation, modelling, Visualization and deployment, evaluation and feedback. The flow of methodology will help student on problem solving process.

5.3 Final Year Project (FYP) Courses Synopsis

COURSECODE : TGB3022
COURSE : Final Year Project I
NO. OF CREDITS : 2 credits
PRE-REQUISITE : 3rd year standing

This course marks the initial stage of an individual research endeavor within the domains of computing. Under the mentorship of supervisors from the faculty, students will identify a meaningful research problem, conduct a preliminary investigation, and develop a detailed project proposal. Potential areas of exploration may include data analytics, software development, system integration, cybersecurity, network optimization, AI applications, hardware prototyping, or mathematical modeling. Emphasis is placed on developing research literacy, project planning, ethical inquiry, and the professional values essential for sustained innovation in computing disciplines.

COURSECODE : TGB4014
COURSE : Final Year Project II
NO. OF CREDITS : 4 credits
PRE-REQUISITE : Final Year Project I

This is an individually supervised, application-oriented project where students identify and address a real-world problem within the field of computing. Under the guidance of faculty supervisors, students will apply appropriate computing principles and technologies to investigate, design, and develop practical and innovative solutions.

5.4 Field Elective (FE) Courses Synopsis

5.4.1 Intelligent Information System

COURSE CODE : TGB3083
COURSE : Digital Twin
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course explores Digital Twin technology as a powerful tool for modeling, monitoring, and optimizing physical systems in a virtual environment. Students will gain hands-on experience using industry-standard platforms and tools to create digital replicas of real-world assets, focusing on data integration, visualization, and simulation. Key enabling technologies such as Internet of Things (IoT), Artificial Intelligence (AI), and cloud services will be introduced through guided exercises and case studies. The course emphasizes practical applications across domains such as manufacturing, energy, healthcare, and smart infrastructure. Students will critically analyze system performance, explore predictive maintenance strategies, and consider ethical implications of data-driven decision-making. By the end of the course, students will be equipped to design and implement Digital Twin solutions that address real-world challenges using contemporary tools and platforms.

COURSE CODE : TGB3093
COURSE : Generative AI
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course explores the principles and practical applications of Generative Artificial Intelligence (Generative AI). Students will learn how generative models can enhance digital systems by producing content such as text, images, code, and synthetic data. The course emphasizes the integration of generative AI into business processes, decision support systems, customer engagement platforms, and enterprise applications.

COURSE CODE : TGB3103
COURSE : Responsible AI
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the foundational principles and practices of Responsible Artificial Intelligence (AI), emphasizing ethical, legal, and societal considerations in AI development and deployment. Students will explore key topics such as algorithmic fairness, accountability, transparency, data privacy, explainability, and sustainability. The course encourages critical thinking and ethical reasoning by engaging students in real-world case studies and policy analysis. By the end of the course, students will be able to evaluate AI systems and design responsible AI solutions using appropriate governance frameworks, ensuring that AI technologies are aligned with societal values and public trust.

COURSE CODE : TGB3113
COURSE : Intelligent Decision Systems
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides a practical exploration of how intelligent systems powered by artificial intelligence (AI) support better decision-making in business, government, and everyday contexts. Aimed at students from diverse academic backgrounds, the course emphasizes real-world applications over technical theory. Students will discover how AI tools such as recommendation engines is used to solve problems, improve efficiency, and enhance strategic decisions. The course highlights how data-driven insights and intelligent technologies are integrated into decision support systems across various industries.

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 specialization in **Cybersecurity**. 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 specialized in the following area:

- **Cybersecurity**

1.2 Programme Educational Objectives

- i. Information Technology professionals who are able to provide computing solutions for non-routine problems based on appropriate knowledge and technical skills in the information technology discipline according to the industry requirements.
- ii. Information Technology professionals who have leadership skills and good interpersonal and communication skills to interact with stakeholders.
- iii. Information Technology professionals who engage in lifelong learning and have an entrepreneurial mindset for self and career development.
- iv. Information Technology professionals who uphold ethical conduct and professional practices in maintaining integrity

1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Apply the knowledge of Information Technology fundamentals to broadly defined procedures, processes, systems, and methodologies in the field of study.
- ii. Propose and employ current tools and techniques to resolve broadly defined complex problems.
- iii. Demonstrate analytical and critical thinking abilities to design and provide a solution for broadly defined complex problems in the field of study.
- iv. Communicate effectively and flexibly in oral and written language for social, academic, and professional purposes.
- v. Demonstrate the understanding of corresponding issues related to the society and the subsequent responsibilities to the broadly defined technology practices.
- vi. Acknowledge the requirement of professional establishment and to employ independent continuing learning in specialized technology.
- vii. Demonstrate consciousness of management and technopreneurship routine in real perspective.
- viii. Uphold ethical awareness and professionalism.
- ix. Exhibit leadership character, mentoring and work efficiently in diverse teams.

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	11
CC - Core Courses (Computing)	24
CD - Core Discipline	33
CI - Internship	14
FE - Field Electives	9
FYP - Final Year Project	6
EM – Free Electives	15
TOTAL	122

2.0 Programme Curriculum Structure: Bachelor of Information Technology (Hons)

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
LGB1042	Scientific Writing	2	UR	MPU31102	Aspirasi Negara Bangsa (Local)/ / MPU3142 BM Komunikasi 2 (International)	2	NR	MPU3192	Falsafah dan Cabaran Kontemporari (Local)/ Uniqueness of Malaysia (International)	2	NR
MPU3322 (MPU3)	Energy Sustainability	2	NR	KXXXXX1	Co- Curriculum I	1	UR	HGB2033	Professional Communication Skills	3	UR
TGB1013	Database Systems	3	CC	CGB1032	Health, Safety & Environment	2	UR	TGB1083	Data Communication and Network	3	CC
TGB1023	Programming Fundamentals	3	CC	TGB1043	Operating Systems	3	CC	TGB1093	UI/UX Design	3	CD
TGB1033	Computer Architecture	3	CC	TGB1053	Systems Analysis and Design	3	CC	TGB1103	Object-Oriented Programming	3	CD
				TGB1063	Discrete Mathematics	3	CD				
Credit Hours		13		Credit Hours		14		Credit Hours		14	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU 2	One (1) MPU2 Course	2	NR	MPU3412 (MPU4)	Resilient Innovation for Social Engagement (RISE)	2	NR	TGB2073	Cloud Computing	3	CD
MPU31122	Integrity and Anti-Corruption	2	NR	TGB2043	Data Science	3	CC	TGB2083	Full-Stack Application Development	3	CD
KXXXXX1	Co- Curriculum II	1	UR	TGB2053	Internet of Things	3	CD	BBBXXX3	Free Elective II	3	EM
TGB2013	Artificial Intelligence	3	CC	TGB2063	Applied Statistics	3	CD	BBBXXX3	Free Elective III	3	EM
TGB2023	Software Engineering	3	CD	BBBXXX3	Free Elective I	3	EM	TGB3XX3	Field Elective I	3	FE
TGB2033	Computer Security	3	CD								
Credit Hours		14		Credit Hours		14		Credit Hours		15	

SEMESTER 7				SEMESTER 8				SEMESTER 9			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
IGB3037	Student Industrial Training (SIT)	7	CI	IGB3047	Student Industrial Project (SIP)	7	CI	TGB3013	Technopreneurship Team Project	3	CD
								TGB3022	Final Year Project I	2	FYP
								TGB3033	IT Project Management	3	CD
								TGB3XX3	Field Elective II	3	FE
								TGBXXX3	Free Elective IV	3	EM
Credit Hours		7		Credit Hours		7		Credit Hours		14	

SEMESTER 10			
Code	Courses	Cr	G
TGB4014	Final Year Project II	4	FYP
TGB3XX3	Field Elective III	3	FE
BBBXXX3	Free Elective V	3	EM
Credit Hours		10	

Total Credit Hours : 122

3.0 Field Elective (FE) Courses

Choose 3 out of 4 courses as Field Elective I, II and III.

Route: Cybersecurity				
No	Code	Course Name	Cr	G
1	TGB3043	Digital Forensic	3	FE
2	TGB3053	Cybersecurity Governance, Risk and Compliance	3	FE
3	TGB3063	Cyber Defender	3	FE
2	TGB3073	Blockchain Technology	3	FE

4.0 Free Electives (EM) Courses

Choose any ONE (1) of the following sets of Minor Elective's areas (set A or B) for Free Elective I, II, III, IV and V.

A. Corporate Management – Choose ONLY 5 Courses				
A. No	Code	Course Name	Cr	G
1	BBB1013	Introduction to Management	3	EM
2	BBB1023	Marketing	3	EM
3	BBB1053	Organisational Behaviour	3	EM
4	BBB1093	Business Communication	3	EM
5	BBB2073	Human Capital Management	3	EM
6	BBB3023	Strategic Management	3	EM
Total Credit Hours			18	

B. Accounting & Business – Choose ONLY 5 Courses				
B. No	Code	Course Name	Cr	G
1	BBB1083	Business Accounting	3	EM
2	BBB2023	Business Ethics and Sustainability	3	EM
3	BBB2033	Business Law	3	EM
4	BBB2203	Fundamental of Taxation	3	EM
5	BBB3203	Fundamentals of Assurance	3	EM
6	BBB3213	Business Insights & Performance	3	EM
Total Credit Hours			18	

Note:

Code A	:	Please refer to Materials Engineering Programme for Course Synopsis.
Code C	:	Please refer to Chemical Programme for Course Synopsis.
Code D	:	Please refer to Computer Science 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 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
Code Q	:	Please refer to Petroleum Geoscience Programme for Course Synopsis.
Code T	:	Please refer to 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 Management & Humanities Department for Course Synopsis

5.0 Programme Courses Synopsis

5.1 Core Discipline (CD) Courses Synopsis

COURSE CODE : TGB1063
COURSE : Discrete Mathematics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

Discrete Mathematics is a foundational course in computer science, engineering, and mathematics that focuses on structures and techniques essential for problem-solving in computation, cryptography, algorithms, and data analysis. This course covers logical reasoning, mathematical proofs, combinatorial analysis, graph theory, and probability, providing the theoretical backbone for advanced studies in computing and applied sciences.

COURSE CODE : TFB1093
COURSE : UI/UX Design
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The purpose of this course is to introduce the principles and practices of user interface (UI) and user experience (UX) design, with a focus on creating effective, user-centered digital products. Students will explore the cognitive, aesthetic, and behavioral aspects of design, and learn how to conceptualize, prototype, and evaluate user interfaces. In addition, the course will examine contemporary tools, methodologies, and industry practices that support the design of intuitive and engaging user experiences.

COURSE CODE : TGB1103
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 : TGB2023
COURSE : Software Engineering
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the core principles, methodologies, and practices of software engineering. Key topics include software process models, requirements engineering, system modeling and design, rapid development, software reuse, and component-based engineering. Students will also learn software verification and validation techniques, including testing strategies and test automation. Emphasis is placed on quality assurance and the use of effective development practices to build reliable software systems. The course further highlights the importance of computers as essential productivity tools, both as standalone systems and within networked environments, supporting business operations and societal needs.

COURSE CODE : TGB2033
COURSE : Computer Security
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the fundamental principles and key challenges in computer security, with a focus on both conceptual understanding and practical implementation. It addresses core security objectives such as confidentiality, integrity, authentication, identification, and availability, alongside the policies, models, and mechanisms used to enforce them within information systems. Topics covered include the foundations of cryptography (e.g., digital signatures, public key infrastructure), network security (e.g., firewalls, intrusion detection and prevention), risk management, security assurance, and secure system design principles. The course also explores organizational security policies, legal and ethical considerations, and recognized standards and methodologies for security evaluation and certification.

COURSE CODE : TGB2053
COURSE : Internet of Things (IoT)
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The adoption of IoT applications is rapidly expanding, driven by advancements in system integration, industrial automation, drone technology, and telecommunications. This course is designed to prepare students with hands-on experience and practical skills that align with industry needs. It covers the end-to-end development of IoT systems, including programming of embedded devices, interfacing with digital and analog sensors and actuators, data communication, and the use of IoT gateways. Students will also learn how to store sensor data in local databases, visualize real-time and historical data through web dashboards, and understand the importance of IoT timing, low-power operation, and task scheduling. The course further introduces students to IoT-related issues such as standardization, security, ethics, and the impact of IoT technologies on society and business.

COURSE CODE : TGB2063
COURSE : Applied Statistics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to applied statistical methods for data analysis and decision-making across various disciplines. It covers the use of descriptive and inferential statistics to address real-world problems, with an emphasis on practical applications, critical thinking, and the use of statistical software for analysis.

COURSE CODE : TGB2073
COURSE : Cloud Computing
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course covers a broad range of topics related to cloud computing, including cloud infrastructure based on a cloud computing reference model. The reference model includes five fundamental layers (physical, virtual, control, orchestration, and service) and three cross-layer functions (business continuity, security, and service management) for building a cloud infrastructure. It covers the comprising technologies, components, processes, and mechanisms.

COURSE CODE : TGB2083
COURSE : Full-Stack Application Development
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to the principles and practices of full stack software development. Students will explore both front-end and back-end technologies while grounding their work in core software engineering methodologies, including requirements analysis, system modeling, agile development, and component reuse. Emphasis is placed on rapid prototyping, collaborative coding, version control, and test-driven development. Learners will apply industry-relevant tools to build, test, and deploy robust web applications, gaining hands-on experience in end-to-end system design. The course highlights the role of computing as a critical enabler of innovation across business and societal contexts.

COURSE CODE : TGB3013
COURSE : Technopreneurship Team Project
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course focuses on nurturing technopreneurship by guiding students through the process of generating innovative computing solutions for real-life scenarios. Students will work in teams to develop ideas that can be commercialized, applying design thinking and covering essential business areas such as financial planning, marketing, and pricing. The course explores key concepts of technopreneurship, including industry drivers (e.g., government policies, domestic market, infrastructure, and market linkages), business principles, and project management methodologies necessary for establishing and managing an IT business.

COURSE CODE : TGB3033
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 build 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 (Computing) (CC) Courses Synopsis

COURSE CODE : TGB1013
COURSE : Database Systems
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This compulsory technology course is designed for all undergraduate computing programmes. It provides a comprehensive introduction to the practical and theoretical foundations of database design and development, with a strong emphasis on relational data models. Students will explore core concepts of database technologies, including design principles, data manipulation techniques, and implementation strategies. The course focuses on the relational database model, which serves as the backbone for most modern applications, guiding students in building robust and scalable database solutions. Additionally, the course introduces fundamental aspects of transaction management to deepen understanding of data integrity, concurrency control, and system reliability in real-world scenarios.

COURSE CODE : TGB1023
COURSE : Programming Fundamentals
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to programming fundamentals through a fully coursework-based approach. It is divided into two main parts. The first part focuses on problem-solving using computers. Students will explore the problem domain, understand the phases of problem-solving, and apply basic techniques for designing effective solutions. Emphasis is placed on developing logical thinking and analytical skills essential for programming. The second part introduces the core concepts of structured programming. Students will learn to translate problem-solving strategies into working programs, reinforcing their understanding through hands-on coding exercises. The course also explores complex data types and efficient programming practices required for solving more advanced problems. Designed to strengthen students' programming proficiency, this course equips learners with the foundational skills necessary for further study and application in software development and computational problem-solving.

COURSE CODE : TGB1033
COURSE : Computer Architecture
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the basic concepts and functions of operating systems. It covers how operating systems manage hardware and software resources, including processes, memory, files, and input/output devices. Students will learn about system protection, resource management, and how to compare different operating systems for various computing needs. The course also includes practical examples to help students understand how operating systems work in real-world environments.

COURSE CODE : TGB1043
COURSE : Operating Systems
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the basic concepts and functions of operating systems. It covers how operating systems manage hardware and software resources, including processes, memory, files, and input/output devices. Students will learn about system protection, resource management, and how to compare different operating systems for various computing needs. The course also includes practical examples to help students understand how operating systems work in real-world environments.

COURSE CODE : TGB1053
COURSE : Systems 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 : TGB1083
COURSE : Data Communication and Network
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the fundamental principles, architectures, and protocols of data communication and computer networks. Students will explore the layered network models, including the OSI and TCP/IP frameworks, and understand how data is transmitted across various media and devices. Key topics begin with the application layer and work downward through the transport, network, data link, and physical layers. Hands-on practical sessions will complement theoretical learning. Students will use network simulator to analyze network traffic and simulate small-scale network configurations.

COURSE CODE : TGB2013
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 : TGB2043
COURSE : Data Science
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course will cover topics such as Business understanding, analytic approach, data requirements, data collection, data understanding, data preparation, modelling, Visualization and deployment, evaluation and feedback. The flow of methodology will help student on problem solving process.

5.3 Final Year Project (P) Courses Synopsis

COURSE CODE : TGB3022
COURSE : Final Year Project I
NO. OF CREDITS : 2 credits
PRE-REQUISITE : 3rd year standing

This course marks the initial stage of an individual research endeavor within the domains of computing. Under the mentorship of supervisors from the faculty, students will identify a meaningful research problem, conduct a preliminary investigation, and develop a detailed project proposal. Potential areas of exploration may include data analytics, software development, system integration, cybersecurity, network optimization, AI applications, hardware prototyping, or mathematical modeling. Emphasis is placed on developing research literacy, project planning, ethical inquiry, and the professional values essential for sustained innovation in computing disciplines.

COURSE CODE : TGB4014
COURSE : Final Year Project II
NO. OF CREDITS : 4 credits
PRE-REQUISITE : Final Year Project I

This is an individually supervised, application-oriented project where students identify and address a real-world problem within the field of computing. Under the guidance of faculty supervisors, students will apply appropriate computing principles and technologies to investigate, design, and develop practical and innovative solutions.

5.4 Field Elective (FE) Courses Synopsis

5.4.1 Cybersecurity

COURSE CODE : TGB3043
COURSE : Digital Forensic
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces students to the foundational principles, tools, and practices of digital forensics in the context of computing and information systems. It explores the legal, ethical, and technical aspects of acquiring, analyzing, and reporting digital evidence from a variety of sources, including computers, mobile devices, networks, and cloud platforms. Students will learn investigative methodologies, data recovery techniques, and forensic tools to examine incidents such as cybercrime, unauthorized access, and data breaches. Emphasis is placed on maintaining chain of custody, ensuring evidence integrity, and aligning investigations with legal and regulatory requirements. Practical exercises and case studies develop students' analytical thinking and professional accountability in real-world forensic scenarios.

COURSE CODE : TGB3053
COURSE : Cybersecurity Governance, Risk and Compliance
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides a comprehensive introduction to the foundational concepts of cybersecurity strategy, which are critical in today's increasingly digital and interconnected world. Students will explore key areas of cybersecurity governance, risk management, and compliance frameworks that organizations use to protect digital assets and ensure regulatory adherence. Through practical case studies from industry and government, learners will develop the ability to assess and quantify cybersecurity risks, apply decision-making strategies, and implement effective governance practices. By the end of the course, students will be equipped with the knowledge and skills to contribute to the development and enforcement of robust cybersecurity policies within various organizational contexts.

COURSE CODE : TGB3063
COURSE : Cyber Defender
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides the essential skills and knowledge required to safeguard digital systems against cyber threats, emphasizing fundamental cybersecurity principles and proactive defense strategies. The course aims to guide learners in identifying vulnerabilities, implementing security measures, and responding effectively to cyber incidents. Additionally, the course incorporates practical exercises utilizing industry-standard tools to simulate real-world cyber defense scenarios.

COURSE CODE : TGB3073
COURSE : Blockchain Technology
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides an in-depth exploration of blockchain as a transformative digital ledger technology. Students will examine the fundamental principles of decentralization, cryptographic security, consensus algorithms, and distributed architecture. Emphasis is placed on real-world applications such as cryptocurrencies, smart contracts, supply chain tracking, and secure data sharing. Learners will gain practical experience with blockchain platforms such as Ethereum or Hyperledger, while critically evaluating design trade-offs, scalability, and ethical concerns in decentralized systems. The course equips students with the technical and analytical skills to innovate and develop blockchain-based solutions in a variety of domains.

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 Energy and Material and Sustainable Chemistry. This programme is aimed at developing skilled and knowledgeable chemists who can address the nation's need for sustainability and contribute to societal advancement.

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 Chemistry, Petrochemical Processes, Quantum Chemistry, 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 field elective in any of the following areas:

- **Energy and Material**
- **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

- i. Chemists who can apply technical knowledge and skills in accordance with current industry demands and development.
- ii. Chemists who can serve as leaders or team members, delivering scientific solutions to societal and industrial challenges through effective communication.
- iii. Chemists with personal and entrepreneurial skills, capable of driving sustainable growth in current industries.
- iv. Chemists with an ethical and professional behaviour, and a commitment to sustainable practices to advance their careers.

1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Describe comprehensive theoretical, and technical knowledge related to chemistry.
- ii. Apply critical thinking and relevant skills to resolve chemistry-related problems
- iii. Perform safe and proficient handling of chemicals, laboratory apparatus, and analytical instruments.
- iv. Collaborate with diverse team members in working communities.
- v. Communicate effectively with community at large.
- vi. Utilize a broad range of digital tools and technology applications effectively to support study and/or work.
- vii. Use and combine numerical and graphical/visual data for study and/or work.
- viii. Work autonomously and show leadership and professionalism in managing responsibilities within study and/or work.
- ix. Integrate effectively in self-directed lifelong learning and professional pathways
- x. Demonstrate entrepreneurial competency with selected project(s).
- xi. Uphold ethics and accountability within various social and professional environments.

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 **125 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
CC - Core Common	17
CD - Core Discipline	48
CI - Core Industrial Internship	14
FE - Field Elective	12
EM - Free Elective	24
TOTAL	125

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
LGB1042	Scientific Writing	2	CC	MPU31102/ MPU3142	Aspirasi Negara Bangsa (Local)/ Bahasa Melayu Komunikasi (International)	2	NR	MPU31112/ MPU32232	Falsafah dan Cabaran Kontemporari (Local)/ Uniqueness of Malaysia (International)	2	NR
XGB1023	Mathematical Methods	3	CC	KXXXXX1	Co Curriculum I	1	CC	HGB2033	Professional Communication Skills	3	CC
CGB1032	Health, Safety & Environment	2	CC	MPU3322 (MPU3)	Energy Sustainability	2	CC	YCB1083	Analytical Instrumentation	3	CD
YCB1013	Inorganic Chemistry I	3	CD	YCB1043	Physical Chemistry	3	CD	YCB1092	Analytical Instrumentation Laboratory	2	CD
YCB1023	Analytical Chemistry	3	CD	YCB1052	Physical Chemistry Laboratory	2	CD	YCB1103	Inorganic Chemistry II	3	CD
YCB1032	Analytical Chemistry Laboratory	2	CD	YCB1063	Organic Chemistry I	3	CD	YCB1112	Inorganic Chemistry Laboratory	2	CD
				YCB1072	Organic Chemistry I Laboratory	2	CD				
Credit Hours		15		Credit Hours		15		Credit Hours		15	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
KXXXXX1	Co Curriculum II	1	CC	MPU3412	Resilient Innovation for Social Engagement (RISE)	2	NR	FGB2063	Data Analytics	3	CC
YCB2013	Organic Chemistry II	3	CD	YCB2063 /CGB1033	Material and Energy Balance /Principles of Chemical Engineering	3	EM	YCB2123/ CGB2013	Separation Process / Separation Process I	3	EM
YCB2022	Organic Chemistry II Laboratory	2	CD	YCB2073/ YCB2083	Organotransition Metal Chemistry/	3	EM	YCB2133/ YCB2143	Hydrocarbon Chemistry/ Petrochemical Processes	3	EM

YCB2033/ YCB2043	Kinetics and Chemical Changes/ Kinetics and Surface Science	3	EM
YCB2052	Kinetics and Separation Laboratory	2	CD
MPU31122	Integrity and Anti-Corruption	2	NR
MPU 2	One (1) MPU2 Course	2	NR

Credit Hours

15

Code	SEMESTER 7 Courses	Cr	G
IFB3037	Student Industrial Training (SIT)	7	CI

Credit Hours

7

Code	SEMESTER 10 Courses	Cr	G
YCB4014	Final Year Project II	4	CD
YCB4023 / YCB4033	Catalysis in Petrochemistry / Polymeric Materials	3	EM
YCBXXX3	Field Elective III	3	FE
YCBXXX3	Field Elective IV	3	FE
Credit Hours		13	

YCB2092	Organometallic Chemistry Laboratory	2	CD
YCB2103 YCB2113	Molecular Spectroscopy Optical Characterization	3	EM

Credit Hours

13

Code	SEMESTER 8 Courses	Cr	G
IFB3047	Student Industrial Project (SIP)	7	CI

Credit Hours

7

YCB2153/ YCB2163	Quantum and Atomistic Modelling/ Quantum and Molecular Design	3	EM
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Credit Hours

12

Code	SEMESTER 9 Courses	Cr	G
YCB3013	Science Team Project	3	CD
YCB3024	Final Year Project I	4	CD
YCBXXX3	Field Elective I	3	FE
YCBXXX3	Field Elective II	3	FE
Credit Hours		13	

TOTAL CREDIT HOURS: 125

3.0 Field Elective (FE) Courses

Choose any of the following sets A or B for Field Elective I, II and III, and one from another set for Field Elective IV.

A. Energy and Material				
No	Code	Course Name	Cr	G
1	YCB4113	Bioenergy	3	FE
2	YCB4123	Materials for Energy	3	FE
3	YCB4133	Chemistry of Functional Materials	3	FE

B. Sustainable Chemistry				
No	Code	Course Name	Cr	G
1	YCB4213	Green Processes and Products	3	FE
2	YCB4223	Sustainable Water Management	3	FE
3	YCB4233	Fine and Speciality Chemical	3	FE

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 **125 credit hours**.

4.1 Data Science

No	Code	Minor in Data Science 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 Visualization	3	EM	
Total Credit Hours			15		

4.2 Accounting and Finance

No	Code	Minor in Accounting and Finance 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		

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:

- 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 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 : YCB1013
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. The Valence Bond Theory, Hybridization, and Molecular Orbital Theory for diatomic and polyatomic molecules will be included. The symmetry of the molecules, bonding in solids, unit cell, crystal structures including calculation and introduction to nuclear chemistry will also be included.

COURSE CODE : YCB1023
COURSE : Analytical Chemistry
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course will cover the introduction to data handling including statistical analysis from sampling. The stoichiometric calculations, general concepts of equilibrium and gravimetric analysis will be included. Lastly, the acid-base equilibria, acid-base titrations, complexometric titrations, precipitation reactions and titrations and redox and potentiometric titrations are also included to cover the equilibria comprehensively.

COURSE CODE : YCB1032
COURSE : Analytical Chemistry Laboratory
NO. OF CREDITS : 2 Credits
CO-REQUISITE : Analytical Chemistry

This course will cover the Analytical Chemistry practical and theory associated to the chemical industry management system.

COURSE CODE : YCB1043
COURSE : Physical Chemistry
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course will cover the Gas Properties and transformation of energy which are described by the laws of thermodynamics including Zeroth Law, First Law, Second Law and Third Law of Thermodynamics. They are applicable to bulk matter, consists of very large numbers of atoms and molecules. The second part will explore the structures and physical properties of solids and liquids in Solid State, Phase Equilibria, Chemical and Electrochemical Equilibrium.

COURSE CODE : YCB1052
COURSE : Physical Chemistry Laboratory
NO. OF CREDITS : 2 Credits
CO-REQUISITE : Physical Chemistry

This course will cover the Physical Chemistry practical and introduction to occupational health, safety and environment management system.

COURSE CODE : YCB1063
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 and nomenclatures of organic molecules. The syntheses and reaction mechanisms of alkanes, alkenes, alkynes, vinylic compounds and dienes are cover as well. The alkyl halides, alcohols, carbonyl compounds, aromatics, amines, aryl halides and phenols are also included in terms of syntheses and reaction mechanims.

COURSE CODE : YCB1072
COURSE : Organic Chemistry I Laboratory
NO. OF CREDITS : 2 Credits
CO-REQUISITE : Organic Chemistry I

This course will cover the Organic Chemistry 1 practical and importance of safety data sheets.

COURSE CODE : YCB1083
COURSE : Analytical Instrumentation
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course covers the fundamentals and principles of various analytical instrumentations. The operations and applications of instruments, namely, electroanalytical, spectroscopic, chromatographic and thermal analytical are covered. Towards the end, the role of analytical chemistry in the community is unveiled to enhance students' comprehension on the scientific essentiality of this course.

COURSE CODE : YCB1092
COURSE : Analytical Instrumentation Laboratory
NO. OF CREDITS : 2 Credits
CO-REQUISITE : Analytical Instrumentation

This course will cover the Analytical Instrumentation practical and chemical exposure controls.

COURSE CODE : YCB1103
COURSE : Inorganic Chemistry II
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Inorganic Chemistry I

This course will cover the basic principles of properties and bonding in elements and simple compounds of main group elements, Group 1 to Group 18. The fundamental understanding of coordination complexes for d-block metals including physical properties, valence bond theory and crystal field theory are discussed. Besides that, the positions, chemical properties, and typical compounds of f-block elements are also included.

COURSE CODE : YCB1112
COURSE : Inorganic Chemistry Laboratory
NO. OF CREDITS : 2 Credits
CO-REQUISITE : Inorganic Chemistry II

This course will cover the Inorganic Chemistry II practical and importance of chemical hazard classification and regulatory compliance.

COURSE CODE : YCB2013
COURSE : Organic Chemistry II
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Organic Chemistry I

This course covers organic reaction mechanisms of carbonyl and its derivatives and applying them for the synthesis of organic molecules. Case studies that covers retrosyntheis topics is incorporated in this course.

COURSE CODE : YCB2022
COURSE : Organic Chemistry II Laboratory
NO. OF CREDITS : 2 Credits
CO-REQUISITE : Organic Chemistry II

This course will cover the Organic Chemistry II practical and importance of classification and labelling of chemicals.

COURSE CODE : YCB2052
COURSE : Kinetics and Separation Laboratory
NO. OF CREDITS : 2 Credits
CO-REQUISITE : Kinetics and Chemical Changes / Kinetics and Surface Science

This course will cover chemical kinetics, surface science, extraction of compounds in various phases, chemical safety and disposal of wastes.

COURSE CODE : YCB2063
COURSE : Material and Energy Balance
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Physical Chemistry

This course covers chemical engineering calculations and fundamental principles of material and energy balance for non-reactive and reactive systems related to single and multiple-phase systems, including a systematic procedure for solving materials and energy balance problems, making appropriate chemical engineering assumptions, drawing and labelling of flowcharts and performing degree of freedom analysis.

COURSE CODE : CGB1033
COURSE : Principles of Chemical Engineering
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course covers the fundamental of chemical engineering, that includes the introduction to the chemical industry, unit conversion, and material and energy balances. This course will help students in performing material and energy balances for solving problems in various chemical engineering systems.

COURSE CODE : YCB2073
COURSE : Organotransition Metal Chemistry
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Inorganic Chemistry II

This course covers the structure, bonding, characterization and reactivity of organotransition metal compounds with emphasis on the reaction mechanisms for production of industrial chemicals using organometallic complexes as catalyst and methods for their elucidation. The importance of organotransition metal complexes in physical and biological applications will also be considered.

COURSE CODE : YCB2083
COURSE : Coordination Chemistry
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Inorganic Chemistry II

Coordination chemistry is a blend of inorganic, organic and physical chemistry. It finds wide applications in catalysis, crystal engineering, drug discovery, enery conversion and storage etc. The concepts of coordination chemistry are introduced in this course, including hard-soft acid-bases, isomerism, crystal field theory, ligand field and molecular orbital theory. On this basis, the structural, thermodynamic, kinetic, spectral, magnetic properties and reactivity of coordination compounds are explained. The importance of coordination compounds in modern coordination chemistry will also be considered.

COURSE CODE : YCB2092**COURSE : Organometallic Chemistry Laboratory****NO. OF CREDITS : 2 Credits****CO-REQUISITE : Organotransition Metal Chemistry / Coordination Chemistry**

This course will cover the Organotransition Metal Chemistry practical and the importance of managing, handling and disposing of chemicals.

COURSE CODE : YCB2103**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 : YCB2113**COURSE : Optical Characterization Methods****NO. OF CREDITS : 3 Credits****PRE-REQUISITE : Analytical Instrumentation**

This course will cover the importance of various optical wavelengths to characterize the unknown chemicals in determining its structural identities as well as other wider applications.

COURSE CODE : YCB2123**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, molecular diffusions, phase equilibria, and of how these principles are applied in various separation processes in the process industry, including adsorption, absorption, liquid-liquid extraction, vapour-liquid extraction, and membrane separation processes.

COURSE CODE : CGB2013**COURSE : Separation Process I****NO. OF CREDITS : 3 Credits****PRE-REQUISITE : None**

This course is a required component of the Body of Knowledge (BoK) in the chemical engineering profession. It is designed to equip students with fundamental principles of chemical engineering, including mass transfer and equilibrium-stage operations such as distillation, absorption, liquid-liquid extraction, and leaching.

COURSE CODE : YCB2133
COURSE : Hydrocarbon Chemistry
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Organic Chemistry I

This course provides an understanding of various hydrocarbon and its classifications and physical properties. The industrial production of hydrocarbons and the basic concepts of hydrocarbon conversion and synthesis from C₁ will be explored. Major hydrocarbon transformation processes including cracking, reforming, isomerization, alkylation, methathesis and polymerization are also included. The course will also focus on the derivatization reactions of hydrocarbon followed by hydrocarbon practical and challenges.

COURSE CODE : YCB2143
COURSE : Petrochemical Processes
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Organic Chemistry I

This course is concerned with the chemical processing of carbon-based raw materials into useful petrochemical products. In essence, it considers the basic chemistry of the raw materials along with some discussion of the equipment in which reactions take place.

COURSE CODE : YCB2153
COURSE : Quantum and Atomistic Modelling
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course provides 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, classical mechanics and machine learning.

COURSE CODE : YCB2163
COURSE : Quantum and Molecular Design
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course provides 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, classical mechanics and machine learning.

COURSE CODE : YCB3013
COURSE : Science Team Project

NO. OF CREDITS : 3 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, presents and demonstrates findings and results of the research work.

COURSE CODE : YCB3024**COURSE : Final Year Project I****NO. OF CREDITS : 4 Credits****PRE-REQUISITE : Industrial Internship Training & 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, device fabrication.

COURSE CODE : YCB4014**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 : YCB4023**COURSE : Catalysis in Petrochemistry****NO. OF CREDITS : 3 Credits****PRE-REQUISITE : Kinetics and Chemical Changes/Kinetics and Surface Science**

This course covers the homogeneous and heterogeneous catalysis and their applications in petrochemical processes. The importance of structure of metal complexes, catalyst surfaces, concepts of catalytic reactions, catalyst preparation and characterisation, deactivation of catalyst and some examples of petrochemical processes were also included. In addition, emerging trend in catalyst development and case studies that cover catalysis in petrochemical application are incorporated in this course.

COURSE CODE : YCB4033**COURSE : Polymeric Materials****NO. OF CREDITS : 3 Credits**

PRE-REQUISITE : Organic Chemistry I

This course introduces polymers derived from petrochemicals, their applications, and processing methods. It provides an overview of polymer chemistry, including monomers, polymer structures, properties, nomenclature, and industrial catalysts used in polymer production. The course also explains step-growth and chain-growth polymerization mechanisms, with a focus on molecular weight control. Specific polymers such as polyethylene, polypropylene, polyvinyl chloride, and polystyrene will be discussed in terms of their properties and processing techniques. Topics also include engineering-grade thermoplastics, thermoset polymers, and plastic manufacturing processes.

5.2 Field Elective (FE) Courses

5.2.1 Energy and Material

COURSE CODE : YCB4113
COURSE : Bioenergy
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course covers the various types of bioenergy which is the largest source of renewable energy globally, accounting for almost 55% of renewable energy (excluding traditional use of biomass). The Net Zero Emissions by 2050 (NZE) Scenario sees a rapid increase in the use of bioenergy to displace fossil fuels by 2030. The course will cover the technology for production of various types of bioenergy and their international standards.

COURSE CODE : YCB4123
COURSE : Materials for Energy
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course is a multidisciplinary field merging materials science, electrochemistry, and physics to tailor properties for specific energy applications. It will cover materials designed for the production, conversion, storage, and transmission of energy. Technologies involved in emerging materials for energy is also covered together with sustainable practices. Case studies that covers a materials for energy that covers the mentioned topics is incorporated in this course.

COURSE CODE : YCB4133
COURSE : Chemistry of Functional Materials
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course provides an in-depth understanding of the chemistry, properties, and applications of functional materials in modern technologies. It covers the synthesis, chemical bonding, and properties of functional materials with mechanical, thermal, electrical, magnetic, and optical properties. Students will explore advanced knowledge on the synthesis, characterization, application, and failure mechanisms of functional materials, including metals, ceramics, and polymeric materials. The course also fosters leadership, autonomy, and professional responsibility through collaborative tasks involving data interpretation and presentation of chemistry-related findings. Furthermore, students will assess the commercial and innovative potential of functional materials, applying entrepreneurial thinking to propose viable solutions or product concepts based on their properties and characteristics. By the end of the course, students will be equipped to evaluate the technological and economic relevance of functional materials, bridging scientific understanding with leadership and innovation competencies.

5.2.2 Sustainable Chemistry

COURSE CODE : YCB4213

COURSE : Green Processes and Products

NO. OF CREDITS : 3 Credits

PRE-REQUISITE : Organic Chemistry I

This course covers green chemical technologies in that is applied in processes or as products. It will cover the following: waste minimisation and clean technology, alternative green reaction media such as ionic liquids, supercritical technology, water encapsulation, greener approach to catalysis such as heterogenisation, biocatalysis, PTC, electrochemistry and photocatalyst. Students will also be taught on evaluating greenness through life cycle analysis and green matrixes.

COURSE CODE : YCB4223

COURSE : Sustainable Water Management

NO. OF CREDITS : 3 Credits

PRE-REQUISITE : None

This course will cover the interdisciplinary management of water resources. The water cycle is initially introduced followed by regulations on water qualities. The water resources, both conventional and unconventional, are then covered. Pollution of water sources is also included together with treatment approaches. Finally, the wastewater treatment process and reclamation are included together with case study.

COURSE CODE : YCB4233

COURSE : Fine and Speciality Chemical

NO. OF CREDITS : 3 Credits

PRE-REQUISITE : Organic Chemistry I

This course will cover concepts of fine and speciality chemicals, its products, industries related and production features. Technologies involved in fine and speciality chemicals is also covered together with sustainable practices and legislations. Case studies that covers a specific product that covers the mentioned topics is incorporated in this course.

Bachelor of Science (Hons) in Industrial Physics

Bachelor of Science (Hons) in Industrial Physics

1.1 Introduction

Industrial Physics applies core physics principles directly to real-world industrial processes, advanced technologies, and modern manufacturing environments. Industrial physicists play a vital role in sectors such as semiconductor fabrication, microelectronics, renewable energy, and advanced materials. Their responsibilities typically involve operating and maintaining specialised equipment, analysing and optimising industrial processes, solving technical problems, and contributing to the development of innovative products and systems.

The Bachelor of Science (Hons) in Industrial Physics programme emphasises strong foundations in Mathematics, Physics, and Chemistry, followed by comprehensive coverage of essential physics courses such as Mechanics, Thermodynamics, Electromagnetism, Optics, Quantum Mechanics, Solid-State Physics, and Measurement & Instrumentation. Building on this core knowledge, students further explore advanced topics in Semiconductor Devices, Renewable Energy, Digital and Analogue Electronics, and Industrial Data Analytics.

In their final year, students have the opportunity to specialise in areas aligned with emerging industrial needs, including:

- **Semiconductor Technology** (Semiconductor Fabrication, Semiconductor Modelling & Simulation, Semiconductor Packaging)
- **New Energy** (Solar System Operation & Maintenance, Photovoltaic System Design & Installation, Hybrid Energy Systems)

Graduates of the Industrial Physics programme emerge as versatile and industry-ready professionals capable of contributing to advanced technology sectors, energy solutions, and innovation-driven industries.

1.2 Programme Educational Objective

1. Industrial Physicist who can demonstrate a deep understanding of semiconductor technology and its integration with new energy applications, enabling them to innovate and solve complex industrial problems.
2. Industrial Physicist with hands-on experience in designing, developing, and implementing solutions in semiconductor technology and energy applications, consistently applying appropriate procedures and leveraging digital/information technologies and quantitative data to support effective and informed decision-making.
3. Industrial physicists who develop the intellectual foundation to become leaders in the integration of advanced technologies in semiconductors and new energy systems, driving innovation, collaborating effectively, and communicating professionally with stakeholders.
4. A sustainability-focused Industrial Physicist who adheres to ethical, environmental, social, and professional responsibilities, embraces an entrepreneurial mindset, and engages in life-long learning for personal development and career advancement while contributing to societal progress.

1.3 Programme Outcomes

To produce well-rounded graduates with the following outcomes:

- i. Acquire knowledge and understanding of Industrial Physics.
- ii. Apply critical thinking skills to analyse and interpret scientific and technical data.
- iii. Plan and conduct experiments, as well as apply a range of essential methods, creativity and innovativeness to solve problems in the field of Industrial Physics for sustainable development.

- iv. Work and interact effectively in diverse communities and environments.
- v. Communicate effectively with the scientific community and society at large for sustainable development.
- vi. Adapt a wide range of suitable digital technologies and appropriate software to enhance study, research and/or practice.
- vii. Apply quantitative and qualitative tools to analyse and evaluate numerical as well as graphical data in Industrial physics.
- viii. Work independently and demonstrate leadership and professionalism in managing responsibilities within broad organizational parameters.
- ix. Integrate effectively in self-directed life-long learning and professional pathways.
- x. Demonstrate business acumen, entrepreneurship skills, and social responsibility.
- xi. Commit to uphold professionalism, ethical principles, responsibilities and standards of scientific and industrial practices

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 **123 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	15
CS - Common Science	11
CD - Core Disciplines	64
CI - Core Industrial Internship	14
CSp - Core Specialisation	9
TOTAL	123

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	PFB1012	Introduction to Oil & Gas & Sustainable Development	2	UR	MPU 2	One (1) MPU2 Course	2	NR
MPU3142	BM Komunikasi 2 (International)										
MPU3192	Falsafah dan Isu Semasa (Local & International)	2	NR	ZBB1033	Applied Maths II	3	CS	LFB1042	Academic Writing	2	UR
CFB1032	Health, Safety & Environment	2	CS	ZBB1043	Thermal Physics	3	CD	ZBB1063	Circuit Theory	3	CD
ZBB1013	Applied Maths I	3	CS	ZBB1053	Modern Physics	3	CD	ZBB1073	Electricity and Electromagnetism	3	CD
ZBB1023	Mechanics	3	CD	HFB2033	Professional Comm. Skills	3	UR	EFB1043	Structured Prog &	3	CD
HFB2152	Ethics and Integrity	2	UR								
Credit Hours		14		Credit Hours		14		Credit Hours		13	
SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Courses	Cr	G	Code	Courses	Cr	G	Code	Courses	Cr	G
MPU3182	Integrity and Anti-corruption	2	NR	KXXXXX1	Co Curriculum I	1	UR	MPU 4	Community Engagement Project	2	NR
HFB1023	Scientific Inquiry	2	UR	ZBB2043	Instrumentation and Measurement	3	CD	ZBB2074	Semiconductor Devices Electronics	4	CD
ZBB2013	Optics and Photonics	3	CD	ZBB2053	Analogue Electronics	3	CD	VFB3102	Project Management	2	CD
ZBB2024	Digital Electronics	4	CD	ZBB1032	Experimental Industrial Physics I	3	CD	KXXXXX1	Co Curriculum II	1	UR
ZBB2033	Solid State Physics	3	CD	FGM2063	Data Analytics	3	CS	ZBB2083	Experimental Industrial	3	CD
								GFB2102	Entrepreneurship	2	UR
Credit Hours		14		Credit Hours		13		Credit Hours		14	

SEMESTER 7			
Code	Courses	Cr	G
IFB3037	Student Industrial Training	7	CI
Credit Hours		7	

SEMESTER 8			
Code	Courses	Cr	G
IFB3047	Student Industrial Project	7	CI
Credit Hours		7	

SEMESTER 9			
Code	Courses	Cr	G
ZBB4012	Final Year Project I	2	CD
ZBB3023	Renewable Energy	3	CD
ZBB3033	Science Team Project	3	CD
ZBB4xxx	Core Specialization I	3	CsP
ZBB3043	Nanoscience	3	CD
Credit Hours		14	

SEMESTER 10			
Code	Courses	Cr	G
ZAB4014	Final Year Project II	4	CD
ZBB4xxx	Core Specialization II	3	CsP
ZBB4xxx	Core Specialisation III	3	Csp
TFB2023	Artificial Intelligence	3	CD
Credit Hours		13	

TOTAL CREDIT HOURS: 123

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.				
No	Code	Course Name	Cr	G
1	ZBB4023	Hybrid Energy Systems	3	CSp
2	ZBB4033	Solar System Operation and Maintenance	3	CSp
3	ZBB4043	Design And Installation of Photovoltaic System	3	CSp

B.				
No	Code	Course Name	Cr	G
1	ZBB4053	Software Tools and Simulation	3	CSp
2	ZBB4063	Semiconductor Packaging	3	CSp
3	ZBB4073	Semiconductor Fabrication	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**.

No	Code	Minor in Management 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:

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
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 : ZBB1023
COURSE : Mechanics
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

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, Equation of Continuity, Bernoulli's Theorem and Stokes' Law.

COURSE CODE : ZBB1043
COURSE : Thermal Physics
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course provides an in-depth exploration of the fundamental principles of thermodynamics and heat transfer, essential for understanding energy systems and processes in various engineering disciplines.

COURSE CODE : ZBB1053
COURSE : Modern Physics
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Physics (A-Level or equivalent)

This course will cover quantization of charge, light, and energy, the nuclear atom, the wavelike properties of particles, the Schrodinger equation in 1D and 3D, nuclear physics, nuclear reactions and applications.

COURSE CODE : ZBB1063
COURSE : Circuit Theory
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course introduces the fundamental concepts related to the principles of electric circuit theory, the quantities, units, symbols, definitions in the field of electric circuit theory, the passive components RLC, the techniques of analyzing 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 : ZBB1073
COURSE : Electricity and Electromagnetism
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course explores the fundamental principles of electricity and electromagnetism and their interrelationship, covering topics such as electric fields, electric circuits, magnetic fields, and electromagnetic waves.

COURSE CODE : ZBB2013
COURSE : Optics and Photonics
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course will cover Propagation of light: reflection, refraction, and total internal reflection, image formation with lenses and mirrors, dispersion, interference, diffraction, polarization, scattering of light, Huygen's Principle. holography, birefringence, aberrations of optical systems, quantum nature of light, photons, lasers and laser applications.

COURSE CODE : ZBB2024
COURSE : Digital Electronics
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 and state minimization.

COURSE CODE : ZBB2033
COURSE : Solid State Physics
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Modern Physics

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 : ZBB2043
COURSE : Instrumentation and Measurement
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course will cover Sensor and Transducers, Electrical Variables, Electromagnetic Variables, Mechanical Variables, Thermal Variables, X-ray measurement, Interferometers and Spectrometers, and Radiation detection & measurement.

COURSE CODE : ZBB2053
COURSE : Analogue Electronics
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : Semiconductor Devices

The course introduces analogue circuits that consist of transistors and diodes active circuit elements in addition to resistors, capacitors and inductors passive circuit elements often in an integrated circuit form. The course covers the basic principle operations and device characteristics of diodes, Bipolar Junction Transistors (BJT), and Metal Oxide Semiconductor Field Effect Transistors (MOSFET) that underpin the analysis, design and implementation of analogue circuits. The course also deal with single-stage linear amplifiers, operational amplifiers, as well as effects of feedback on the performance and stability of amplifiers.

COURSE CODE : ZBB1032
COURSE : Experimental Industrial Physics I
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course covers experiments related to semiconductor devices and electronic circuit. Focus is on understanding the working principals of semiconductor devices and its behaviour in electronic circuits.

COURSE CODE : ZBB2074
COURSE : Semiconductor Devices
NO. OF CREDITS : 4 Credits
PRE-REQUISITE : Solid State Physics, Electricity and Electromagnetism, and Engineering Mathematics

This course provides an in-depth knowledge on semiconductor devices, covering both fundamental principles and advanced topics. It focuses on understanding the operation, characteristics, and applications of semiconductor devices, including diodes, bipolar junction transistors (BJTs), field-effect transistors (FETs), and integrated circuits (ICs). Topics include semiconductor physics, PN junctions, BJT, FETs, and optical devices. Biasing techniques and electrical current characterization will be introduced.

COURSE CODE : ZBB2083
COURSE : Experimental Industrial Physics II
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This hands-on laboratory series focuses on IOT and gradual transition towards renewable energy system such as solar and hydrogen. Each session progresses from fundamentals of IoT, to basic energy harnessing and finally to IoT-based energy system.

COURSE CODE : ZBB4012
COURSE : Final Year Project I
NO. OF CREDITS : 2 Credits
PRE-REQUISITE : None

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, device fabrication.

COURSE CODE : ZBB3023
COURSE : Renewable Energy
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course is designed to introduce students to the latest developments in renewable energy sources, covering topics such as solar energy, wind power, biomass, geothermal energy, hydropower, and nuclear energy, and providing insights into each energy source's principles, technologies, and applications. Students will explore energy trends, solar radiation, photovoltaic power technology, wind turbine mechanics, biomass conversion processes, geothermal exploration techniques, hydropower systems, and nuclear reactor safety.

COURSE CODE : ZBB3033
COURSE : Science Team Project
NO. OF CREDITS : 3 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, presents and demonstrates findings and results of the research work.

COURSE CODE : ZBB3043
COURSE : Nanoscience
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course cover the fundamental of nanoscience that deals with the physical perspective, societal implications of nano, characterization and fabrication techniques. It also delves into nanoscience by covering the properties and phenomena with a focus on the surfaces of nanomaterials and how size, shape, structure, orientation, and composition influence nanoscale material properties and phenomena.

COURSE CODE : ZBB4014
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.

5.2 Core Specialisation (CSp) Courses Synopsis

5.2.1 New Energy

COURSE CODE : ZBB4023
COURSE : Hybrid Energy System
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course will cover A comprehensive study of hybrid energy systems, exploring the integration of renewable and conventional energy sources to meet the growing demand for sustainable energy solutions. Students will learn about the principles, design methodologies, technologies, and applications of hybrid energy systems through lectures, discussions, case studies, and hands-on projects.

COURSE CODE : ZBB4033
COURSE : Solar System Operation and Maintenance
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course will cover Outlines of the necessary steps for planning and directing an operations and maintenance (O&M) program for the life of a photovoltaic (PV) system across a variety of system types, sizes, and environments. It instructs on how to optimize system performance, consider environmental and site conditions when preparing an O&M plan, understand warranties and guarantees, and how to budget for ongoing O&M.

COURSE CODE : ZBB4043
COURSE : Design and Installation of Photovoltaic System
NO. OF CREDITS : 3 Credits
PRE-REQUISITE : None

This course will cover A comprehensive understanding of the design and installation of photovoltaic (PV) systems. The course covers fundamental principles, components, and methods for planning and deploying PV systems for residential, commercial, and industrial applications. Students will learn how to assess energy requirements, select appropriate PV modules, and integrate system components effectively. They will also gain practical insights into system installation and performance analysis.

5.2.2 Semiconductor Technology

COURSE CODE : ZBB4053

COURSE : Software Tools and Simulation

NO. OF CREDITS : 3 Credits

PRE-REQUISITE : Solid State Physics, Electricity and Electromagnetism, and Engineering Mathematics

This course introduces students to a variety of software tools for design, modeling, simulation, and analysis of semiconductor devices and circuits. It then narrows down to Technology Computer-Aided Design (TCAD) tools such as Silvaco ATHENA and ATLAS as well as COMSOL Multiphysics. With Silvaco and COMSOL, students will be able to gain hands-on experience in using TCAD tools to simulate and optimize the characteristics of semiconductor devices. Students should also be able to simulate thermo-mechanical effects, reliability, and stress in advanced packaging.

COURSE CODE : ZBB4063

COURSE : Semiconductor Packaging

NO. OF CREDITS : 3 Credits

PRE-REQUISITE : None

This course will cover a fundamental understanding of the underlying physical properties that make up the materials used in a semiconductor package. By tying together the disparate elements that are essential to a semiconductor package, this course hopes to convey the knowledge of how all the parts fit and work together to provide durable protection to the integrated circuit chip within as well as a means for the chip to communicate with the outside world.

COURSE CODE : ZBB4073

COURSE : Semiconductor Fabrication

NO. OF CREDITS : 3 Credits

PRE-REQUISITE : None

This course provides a foundational understanding of semiconductor fabrication processes, including wafer preparation, crystal growth, doping, photolithography, etching, thin film deposition, and device fabrication. Students will explore how these techniques are used to produce semiconductor devices. The course emphasizes the real-world impact of semiconductors, which power technologies essential to daily life—such as smartphones, computers, electric vehicles, medical equipment, communication systems, and renewable energy solutions. By bridging theory with application, students will appreciate the pivotal role semiconductor manufacturing plays in advancing innovation, enabling connectivity, and driving global technological progress.

Bachelor of Science (Hons) in Geoscience

Bachelor of Science (Hons) in Geoscience

1.1 Introduction

Geoscience plays a vital role in understanding Earth processes, managing natural resources and supporting the energy transition and sustainability. It underpins key industries such as energy, mining, construction, and environmental management. The Bachelor of Science (Hons) in Geoscience at UTP prepares graduates with strong foundations in geology and geophysics, combined with modern, data-driven applications. The programme equips students for diverse careers in the evolving energy and resource sectors.

In the early years, students undertaking this programme will study core subjects including geology, geophysics, earth processes, geochemistry, and engineering mathematics, before progressing to areas such as energy geoscience, strategic minerals, geospatial and remote sensing, and earth resources management. Hands-on learning is emphasised through fieldwork, industrial training, and industry-based projects. In the final year, students complete a capstone team project and a research-based Final Year Project, with options to specialise in selected areas of interest, which are:

- **Petroleum Geoscience**
- **Basin Studies**

The programme embeds a Minor in Data Science within its curriculum, exposing students to applied statistics, artificial intelligence, business intelligence, data science and machine learning for modern geoscience analysis.

1.2 Programme Educational Objective

Within a period of three to five years after completing the programme, graduates are anticipated to attain the following objectives:

- i. Geoscientists who possess proficiency and possess the ability to become leaders in Geoscience and related industries.
- ii. Geoscientists who are dedicated to fostering sustainable development in Geoscience and related industries for societal betterment.

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. Communicate effectively on complex geoscience activities with the geoscience's community and with society at large.
- vi. Adapt a wide range of suitable digital technologies and appropriate software to enhance study, research and/or work/practice.
- vii. Apply mathematical and other quantitative, qualitative tools to analyse and evaluate numerical and graphical data in Geoscience.
- viii. Work autonomously and demonstrate leadership and professionalism in managing responsibilities within broad organizational parameters.
- ix. Demonstrate business acumen in geosciences and other related matters.
- x. Commit to professional and ethical principles, responsibilities and norms of geoscience practice.

1.4 Graduation Requirements

To graduate with the Bachelor of Science (Hons) in Geoscience, students are required to obtain a minimum of **127 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	9
ME – Minor Elective	15
CC – Core Common	8
CD – Core Discipline	59
CI – Core Industrial Internship	14
CSp – Core Specialisation	12
TOTAL	127

2.0 Programme Curriculum Structure: Bachelor of Science (Hons) in Geoscience

SEMESTER 1				SEMESTER 2				SEMESTER 3			
Code	Course	Cr	G	Code	Course	Cr	G	Code	Course	Cr	G
MPU3322 (MPU3)	Energy Sustainability	2	NR	MPU31102/ MPU3142	Aspirasi Negara Bangsa (Local)/ Bahasa Melayu Komunikasi 2 (International)	2	NR	MPU31112/ MPU31132	Falsafah dan Cabaran Kontemporari (Local)/ Uniqueness of Malaysia (International)	2	NR
LGB1042	Scientific Writing	2	UR	XGB1023	Mathematical Methods	3	CC	HGB2033	Professional Communication Skills	3	UR
XGB1013	Vector & Matrix Analysis	3	CC	CGB1032	Health, Safety & Environment	2	CC	KXXXXX1	Co Curriculum I	1	UR
TGB2063	Applied Statistics	3	ME	QEB1023	Structural Geology	3	CD	TGB2013	Artificial Intelligence	3	ME
QEB1013	Physical Geology	3	CD	QEB1034	Sedimentology and Stratigraphy	4	CD	QEB1043	Earth Processes and Geohazards	3	CD
								QEB1054	Geochemistry	4	CD
Credit Hours		13		Credit Hours		14		Credit Hours		16	

SEMESTER 4				SEMESTER 5				SEMESTER 6			
Code	Course	Cr	G	Code	Course	Cr	G	Code	Course	Cr	G
MPU 2	One (1) MPU2 Course	2	NR	MPU3412	Resilient Innovation for Social Engagement (RISE)	2	NR	KXXxxx1	Co Curriculum II	1	UR
MPU31122	Integrity and Anti- Corruption	2	NR	TGB2043	Data Science	3	ME	DBB3043	Machine Learning	3	ME
TGB2113	Business Intelligence	3	ME	QEB2034	Field Geology	4	CD	QEB2064	Geophysical Signal Processing	4	CD
QEB2013	Energy Geoscience	3	CD	QEB2044	Field Geophysics	4	CD	QEB2074	Subsurface Interpretation and Visualisation	4	CD
QEB2023	Strategic Mineral	3	CD	QEB2053	Geospatial and Remote Sensing	3	CD				
Credit Hours		13		Credit Hours		16		Credit Hours		12	

STUDENT INDUSTRIAL INTERNSHIP PROGRAMME			
Code	Course	Cr	G
IGB3037	Student Industrial Training	7	CI
Credit Hours		7	

SEMESTER 8			
Code	Course	Cr	G
QEB3044	Final Year Project II	4	CD
QEB3054	Earth Resources Management	4	CD
QEB3XX3	Core Specialisation III	3	CSp
QEB3XX3	Core Specialisation IV	3	CSp
Credit Hours		14	

STUDENT INDUSTRIAL INTERNSHIP PROGRAMME			
Code	Course	Cr	G
IGB3047	Student Industrial Project	7	CI
Credit Hours		7	

SEMESTER 7			
Code	Course	Cr	G
QEB3012	Final Year Project I	2	CD
QEB3023	Regional Geology of Southeast Asia	3	CD
QEB3034	Exploration and Production Team Project	4	CD
QEB3XX3	Core Specialisation I	3	CSp
QEB3XX3	Core Specialisation II	3	CSp
Credit Hours		15	

Total Credit Hours : 127

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, III and IV.

A. Petroleum Geoscience				
No	Code	Course Name	Cr	G
1	QEB3113	Basin and Petroleum System	3	CSp
2	QEB3123	Reservoir Characterization	3	CSp
3	QEB3133	Formation Evaluation	3	CSp
4	QEB3143	Quantitative & Computational Geophysics	3	CSp

B. Basin Studies				
No	Code	Course Name	Cr	G
1	QEB3213	Basin Maturity Modelling	3	CSp
2	QEB3223	Geodynamics and Basin Development	3	CSp
3	QEB3233	Formation Evaluation Operation	3	CSp
4	QEB3243	Geology and Geophysics Data Analysis	3	CSp

4.0 Minor Elective (ME) Courses

Students undertaking Bachelor of Science (Hons) in Geoscience programme are required to complete a Minor in Data Science as part of their curriculum. The Minor, comprising 15 credits, is fully embedded and compulsory. Grades obtained in Minor courses will be included in the GPA/CGPA calculation, and the credits count toward the total graduation requirement of 127 credit hours.

A No	Code	Minor in Data Science Course Name	Cr	G	Semester
1	TGB2063	Applied Statistics	3	ME	1
2	TGB2013	Artificial Intelligence	3	ME	3
3	TGB2113	Business Intelligence	3	ME	4
4	TGB2043	Data Science	3	ME	5
5	DBB3043	Machine Learning	3	ME	6
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 : QEB1013
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 : QEB1023
COURSE : Structural Geology
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The course covers basic concepts of structural geology, focusing on the formation of megastructures, mesostructures, and microstructures. The stress-strain relationships encompass both the brittle and ductile behavior of materials. Plate tectonics in relation to deformation on developing major structures, such as joints, faults, folds, cleavages, lineations, foliations, etc. Laboratory sessions focus more on data acquisition (geological field data), plotting on a stereonet (Schmidt Net), creating rose diagrams, and contouring data, among other tasks. A Bunch of discontinuity data will be utilized for structural analysis and interpretation of stresses.

COURSE CODE : QEB1034
COURSE : Sedimentology and Stratigraphy
NO. OF CREDITS : 4 credits
PRE-REQUISITE : None

This course offers a comprehensive exploration of sedimentary systems through the integrated study of clastic and carbonate (and their mineralogy and Petrography) sedimentology, paleontology, and stratigraphy. Students will gain a deep understanding of sedimentary processes, fossil records, and stratigraphic principles, providing a holistic view of Earth's sedimentary environments and their historical development.

COURSE CODE : QEB1043
COURSE : Earth Processes and Geohazard
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course is designed to give a comprehensive overview of the various fields of geosciences which result from the evolution of the Planet Earth. The topics start with the different weathering processes and the various modes of transportation which lead to the deposition of the sediments in lakes, floodplain and in the coastal and deep marine environments. The hydrological cycle, hydrogeological regime and geological hazards which affect the environment and the formation of the various metallic and non-metallic ore deposits which are useful to global development will be studied.

COURSE CODE : QEB1054
COURSE : Geochemistry
NO. OF CREDITS : 4 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 : QEB2013
COURSE : Energy Geoscience
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive investigation into the geological dimensions of various energy resources, encompassing fossil fuels, renewable energy sources, and nuclear energy. Students will gain insights into the processes of formation, exploration, and extraction of these resources, along with an understanding of their environmental impacts and sustainability concerns. By integrating theoretical concepts with hands-on applications, the course prepares students to tackle real-world energy challenges effectively. Additionally, students will develop critical skills in assessing environmental risks and implementing sustainable practices in energy management. Through practical exercises and case studies, the course aims to bridge the gap between academic knowledge and industry needs, equipping students for impactful careers in energy geosciences.

COURSE CODE : QEB2023
COURSE : Strategic Mineral
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course offers a comprehensive investigation into the geological dimensions of various energy resources, encompassing fossil fuels, renewable energy sources, and nuclear energy. Students will gain insights into the processes of formation, exploration, and extraction of these resources, along with an understanding of their environmental impacts and sustainability concerns. By integrating theoretical concepts with hands-on applications, the course prepares students to tackle real-world energy challenges effectively. Additionally, students will develop critical skills in assessing environmental risks and implementing sustainable practices in energy management. Through practical exercises and case studies, the course aims to bridge the gap between academic knowledge and industry needs, equipping students for impactful careers in energy geosciences.

COURSE CODE : QEB2034
COURSE : Field Geology
NO. OF CREDITS : 4 credits
PRE-REQUISITE : None

This course provides a comprehensive introduction to independent geological mapping and the construction of geological maps. You will develop the skills required to interpret and solve geological relationships at various scales, and synthesize them into four-dimensional models that describe the geological evolution of terrains. These skills include hand specimen and outcrop geology, mapping, and stratigraphic analysis at various scales, as well as geological mapping and interpretation. Thus, the course will draw upon the principles of structural geology and combine them with an understanding of sedimentary, igneous, and metamorphic rock systems.

COURSE CODE : QEB2044
COURSE : Field Geophysics
NO. OF CREDITS : 4 credits
PRE-REQUISITE : None

This course offers a comprehensive introduction to the application of mathematics and physics in geophysics, covering fundamental principles across major branches such as gravity, seismology, radioactivity, geoelectricity, and geomagnetism, as well as essential well logging techniques. It provides practical training in field geophysical methods, including gravity, magnetic, seismic, and electrical techniques, with a strong emphasis on fieldwork, data collection, and interpretation. Students will gain a foundational understanding of how these principles are applied in real-world geophysical studies, integrating mathematical and physical concepts with hands-on experience to effectively solve complex geophysical problems and prepare for advanced research and professional applications.

COURSE CODE : QEB2053
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 : QEB2064
COURSE : Geophysical Signal Processing
NO. OF CREDITS : 4 credits
PRE-REQUISITE : None

This course focuses on the principles and techniques of signal processing applied to geophysical data. It covers fundamental concepts in digital signal processing, methods for enhancing and analyzing geophysical signals, and practical applications in various geophysical domains, including gravity, seismic, magnetic, and electromagnetic surveys. Students will gain hands-on experience with signal processing tools and techniques, preparing them for advanced geophysical research and professional applications. The course also emphasizes the integration of theoretical knowledge with practical skills, enabling students to effectively tackle complex geophysical data challenges.

COURSE CODE : QEB2074
COURSE : Subsurface Interpretation and Visualisation
NO. OF CREDITS : 4 credits
PRE-REQUISITE : None

This course focuses on the principles and techniques of subsurface interpretation and visualization in geosciences. It covers methods for interpreting subsurface data from various sources, including geological, geophysical, and remote sensing data. The course also emphasizes the use of advanced visualization tools and techniques to create accurate and informative representations of subsurface structures and resources. Students will gain practical experience in data interpretation and visualization, preparing them for real-world applications in exploration and resource management. By the end, students will be equipped with both the technical skills and analytical insights necessary to tackle complex geoscience projects and contribute to decision-making processes in various geoscience fields.

COURSE CODE : QEB3012
COURSE : Final Year Project I
NO. OF CREDITS : 2 credits
PRE-REQUISITE : Third year standing

This is an individual research project related to a special geoscience problem, conducted 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 G&G report, presents, and demonstrates the findings and results of the project work.

COURSE CODE : QEB3023
COURSE : Regional Geology of Southeast Asia
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides an in-depth exploration of the regional geology and tectonics of Southeast Asia, with a focus on the geological and tectonic settings of Peninsular Malaysia, Sabah, and Sarawak. It emphasizes lithological settings from the Cambrian through the Tertiary and covers the offshore geology of major petroleum-producing basins in the South China Sea.

COURSE CODE	:	QEB3034
COURSE	:	Exploration and Production Team Project
NO. OF CREDITS	:	4 credits
PRE-REQUISITE	:	None

This module synthesizes the learning outcomes from previous courses to focus on developing a comprehensive petroleum exploration and appraisal plan. Students will work in teams to analyze basin-scale subsurface data, including key petroleum systems elements, general well results, and trap styles. The course emphasizes enhancing cognitive and core skills, such as teamwork and problem-solving strategies. Participants will evaluate subsurface risks, volumetric uncertainties, and prepare a techno-commercial exploration proposal. The final project involves negotiating with stakeholders, ensuring compliance with contractual requirements, and gaining management approval. Teams will use decision trees to consolidate their recommendations and present their findings to expert and industry panels for feedback and endorsement.

COURSE CODE	:	QEB3044
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 G&G report, present and demonstrate findings and results of the project work.

COURSE CODE	:	QEB3054
COURSE	:	Earth Resources Management
NO. OF CREDITS	:	4 credits
PRE-REQUISITE	:	None

This course will provide a basic introduction to the field of earth resources management covering the nonrenewable resources such as oil & gas, groundwater & 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. The main aim of the course is to produce a technically and commercially savvy potential caliber geoscientist nurtured from given lectures, project database, tutorials and tests. The main learning outcomes are expected to enhance cognitive and core skills of the students via team working, technical & commercial analytical competencies, problem solving ability, business strategist / developer and negotiator.

5.2 Core Specialisation (CSp) Courses Synopsis

5.2.1 Petroleum Geoscience

COURSE CODE	:	QEB3113
COURSE	:	Basin and Petroleum System
NO. OF CREDITS	:	3 credits
PRE-REQUISITE	:	None

The course covers 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 is going to share for the benefit of students.

COURSE CODE : QEB3123
COURSE : Reservoir Characterization
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

The course is to run through the workflow of reservoir characterization and modeling as routinely used in the oil industry. The lecture will be illustrated by practical work using actual data. Deterministic and stochastic modeling, volumetric calculation, and uncertainties will be developed at each stage, with a focus on geology, seismic, and geostatistical methods. The course covers: the characterization and modeling fundamentals in geological reservoir modeling. Application of modeling software will also be introduced.

COURSE CODE : QEB3133
COURSE : Formation Evaluation
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course provides a comprehensive introduction to wireline logging tools and techniques. It begins with an overview of open-hole and cased-hole log analysis methods, focusing on the interpretation of lithology, porosity, fluid content, and movement, and net pay. Both qualitative (quick look) and quantitative analysis methods are explored. Students will also gain insights into dip meter logs, Measurement While Drilling (MWD) logs, and selected cased-hole logs. The second part of the course emphasizes practical subsurface mapping techniques. Students will learn to create cross-sections, perform log correlations, and generate subsurface maps. Additionally, the course covers methods for calculating reserves, equipping students with essential skills for subsurface analysis and interpretation.

COURSE CODE : QEB3143
COURSE : Quantitative dan Computational Geophysics
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

This course introduces the use of computational and quantitative techniques to solve geophysical problems. Students will learn how to process and analyze data from seismic, gravity, magnetic, and electromagnetic methods using programming tools like Python and MATLAB. The course covers key topics such as signal processing, numerical modeling, inverse theory, and data integration. By the end, students will be equipped to apply computational methods to analyze geophysical data and solve real-world subsurface challenges.

5.2.2 Basin Studies

COURSE CODE : QEB3213
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 emphasis on the burial history, 1D and 2D modelling, and a brief introduction of 3D modelling.

COURSE CODE : QEB3223
COURSE : Geodynamics and Basin Development
NO. OF CREDITS : 3 credits
PRE-REQUISITE : None

To understand the regional structures and sedimentary basins in different stress regimes, with an 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; geodynamics of Southeast Asia.

COURSE CODE	:	QEB3233
COURSE	:	Formation Evaluation Operation
NO. OF CREDITS	:	3 credits
PRE-REQUISITE	:	None

This course provides a comprehensive introduction to wireline logging tools and techniques. It begins with an overview of open-hole and cased-hole log analysis methods, focusing on the interpretation of lithology, porosity, fluid content, and movement, and net pay. Both qualitative (quick look) and quantitative analysis methods are explored. Students will also gain insights into dip meter logs, Measurement While Drilling (MWD) logs, and selected cased-hole logs. The second part of the course emphasizes practical subsurface mapping techniques. Students will learn to create cross-sections, perform log correlations, and generate subsurface maps. Additionally, the course covers methods for calculating reserves, equipping students with essential skills for subsurface analysis and interpretation.

COURSE CODE	:	QEB3243
COURSE	:	Geology and Geophysics Data Analysis
NO. OF CREDITS	:	3 credits
PRE-REQUISITE	:	None

This course introduces the integration techniques for analyzing geological and geophysical data. Students will learn how to process, interpret, and present data from various sources, such as seismic surveys, magnetic and gravity studies, and well logs. Emphasis is placed on practical skills using industry-relevant tools and software. Key topics include data preprocessing, error analysis, and visualization methods tailored to geoscience applications. By the end of the course, students will be able to analyze real-world datasets, make informed interpretations, and effectively communicate their findings. This course is ideal for students aiming to enhance their skills in geoscience data analysis for exploration and environmental studies.

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;

U1	Penghayatan falsafah, nilai dan sejarah (<i>Appreciation of philosophy, values and history</i>)
U2	Penguasaan kemahiran insaniah (<i>Competency in soft skills</i>)
U3	Integriti dan Antirasuah (<i>Integrity and Anti-Corruption</i>)
U4	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 of Delivery
Local students:				
1	i. Penghayatan Etika & Peradaban	2	U1	Bahasa Melayu
2	ii. Falsafah dan Isu Semasa	2		Bahasa Melayu
International Students:				
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
TOTAL CREDIT HOURS FOR MPU COURSES			10 CREDITS	

* 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
U1				
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
U2 - Choose only ONE				
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 NON-conversant (<i>familiar by use/study or having regular or frequent conversation; intimately associating</i>) 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	
GFB2092	Business Ventures *	2	NR	***Compulsory for local students who do not have National Examination/and credit in Bahasa Melayu.
LFB2032	Bahasa Kebangsaan A (Local only) ***	2	NR	
U3				
MPU3182/ MPU3183	Integrity and Anti-corruption	2	NR	Offered to all students
U4				
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:

- Acquire and apply knowledge of mathematics, science and applied sciences.
- Design, manage and conduct experiments, as well as to analyse and interpret data.
- Use the techniques, skills, and modern scientific and technical tools necessary for professional practice.
- 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 & 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 & 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 & Electronics, 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), STUDENT AFFAIRS (SA)
 - 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 Electronics 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: a. Poor work performance and attitude. b. Poor attendance. c. Missing in action. d. Cause damage or misuse any properties or assets belonging to and/or controlled by host company. 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. f. Altered medical certificate (MC). g. Not adhering to host company/institution rules and regulations.	i. F Grade and/or ii. Submission of report to SDC for further action. iii. If found guilty, student can be imposed any one or more appropriate punishment concurrently or consecutively as follows: a. Reprimand b. A fine not exceeding one thousand ringgit (RM1000.00) c. Suspension from one or more facilities of the University for a specific period d. Exclusion from any part of the University for a specific period e. Academic suspension for a specific period f. Expulsion from the University
	Non-submission within the duration of assessment period for the following documents: a. SIT and SIP logbook. b. SIP report	F Grade

ACT	OFFENCE	PENALTY / ACTION
ACADEMIC and/or DISCIPLINARY MISCONDUCT (cont'd)	1. Forgery of supervisor's signature and/or using official stamp without permission 2. Submitting an altered mark to UTP supervisor. 3. Submitting an altered transcript of grades to employer (during application) 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 5. Copying or attempting to copy internship report or logbook from others. 6. Allowing others to do an assignment or portion of an assignment for the intern. 7. Undergo internship "at home". 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. 9. Conduct of any kind, which may cause detriment to the reputation of the University and/or its studies. 10. Not adhering to host company/ Institution rules and regulations	i. Submission of report to SDC for further action ii. If found guilty, student can be imposed any one or more appropriate punishment concurrently or consecutively as follows: a. Reprimand b. A fine not exceeding one thousand ringgit (RM1000.00) c. Suspension from one or more facilities of the University for a specific period d. Exclusion from any part of the University for a specific period e. Academic suspension for a specific period f. Expulsion from the University

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
TOTAL	70	30

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
TOTAL	30	70