

Student Handbook

CEEM245

**Bachelor of Mechanical Engineering
(Manufacturing) with Honours**

2022/2023

Centre for Mechanical Engineering Studies



UNIVERSITI
TEKNOLOGI
MARA

Cawangan Pulau Pinang
Kampus Permatang Pauh

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HEAD, CENTER OF STUDIES's FOREWORD

Welcome to the Centre for Mechanical Engineering Studies, UiTM Cawangan Pulau Piannng

Greetings from us at the Centre for Mechanical Engineering Studies (PPKM), Universiti Teknologi MARA Cawangan Pulau Pinang (UiTM CPP). UiTM CPP campus is located within an idyllic environment and township area. With a strong line up of academic and technical staff we are committed to train future leaders with high-quality engineering education.

Our mission is to equip the graduates with strong mechanical engineering knowledge, analytical skills, leadership skills, competitiveness, creativity, innovativeness and professionalism. In our curriculum, we strive to assimilate the latest developments in mechanics, dynamics, thermo-fluid, energy, and manufacturing.

Currently, we offer Diploma in Mechanical Engineering, Bachelor of Manufacturing Engineering Technology with Honours and Bachelor of Mechanical Engineering (Manufacturing) with Honours. Our graduates work in almost every technology-based industry: semiconductor, automotive, power generation, oil and gas, steel and materials, robotics and manufacturing.

We strive to ensure that all our undergraduate students have excellent team-work attributes and leadership skills, active involvement in student activities and great practical experience through internship. We believe that by emphasizing these areas will ensure our students to have great qualifications to carry leadership roles in the future.

With this, we welcome you all to Centre for Mechanical Engineering Studies at UiTM Cawangan Pulau Pinang.

Dr. Mohamad Irwan Bin Yahaya

Head,
Centre for Mechanical Engineering Studies
Universiti Teknologi MARA Cawangan Pulau Pinang
Permatang Pauh Campus

INTRODUCTION

UNIVERSITY MISSION, VISION AND PHILOSOPHY

Motto

“Endeavour, Spirituality, Nobleness”

Vision

To establish UiTM as a Globally Renowned University of Science, Technology, Humanities and Entrepreneurship.

Mission

To lead the development of agile, professional bumiputeras through state-of-the-art curricula and impactful research.

Philosophy

Every individual has the ability to attain excellence through the transfer of knowledge and assimilation of moral values so as to become professional graduates capable of developing knowledge, self, society and nation.

Objectives

- To expedite accessibility to higher education
- To provide world-class education
- To offer competitive academic programmes that fulfil market needs, spearhead national development and promote global prosperity
- To produce well-balanced, entrepreneurial graduates who are globally competent
- To strengthen the internationalisation of values via enhancement programmes
- To sustain organisational excellence through effective and efficient governance
- To champion impactful research through stronger research ecosystem
- To strengthen strategic alliance with alumni and industries
- To provide cutting edge ecosystem conducive for academic advancements
- To regulate cost-effective financial practices towards organisational sustainability.

BACKGROUND OF PPKM

HISTORY

Universiti Teknologi MARA Cawangan Pulau Pinang (UiTM CPP), the 11th branch campuses of UiTM established on 16th June 1996 and temporarily located at Permatang Pasir, Seberang Perai. The first batch of student enrolment was in May 1999 with 230 students pursuing Diploma in Electrical Engineering, Diploma in Mechanical Engineering and Diploma in Civil Engineering. The campus moved to its permanent premise at Permatang Pauh in August 2003 which is strategically located at close vicinity to Bukit Mertajam and Butterworth township as well as Perai Industrial area.

Starting from a modest facility and academic staff, PPKM UiTM CPP continues its' tradition of excellent by offering Bachelor of Mechanical (Manufacturing) with Honours programme in 2014. The pioneer group graduated in 2017 and to this date, the school has produced 597 graduates who are currently playing an active role in mechanical engineering profession through different employment activities either in private or public sectors.

PPKM has currently established three research centers to spearhead research activities. The Creative and Innovation Research Group in Automotive and Aviation was established to provide facilities for research and testing new product development in automotive engineering. The Intelligent and Sustainable Manufacturing Center and Advanced Mechanics Special Interest Group focuses on the research and development in manufacturing, product development, CAD/CAM/CAE, nanotechnology, FEA/FEM simulation and composite materials.

PPKM established international collaborations with the Universitas Pertamina, Indonesia, Thailand institute of science and technological research, and Universitas Sumatera Utara, Indonesia. Outbound and inbound academic exchange are among activities benefit through this collaboration.

PPKM's INFORMATION

Vision

A leader in the mechanical engineering discipline towards global excellence through world class education and research.

Mission

To produce graduates with strong mechanical engineering fundamentals, analytical and leadership skills, competitive, reactive, innovative and professional.

Quality Policy

The School of Mechanical Engineering UiTM CPP is committed to provide a learning programme and an excellent research environment with efficient professional services based on established quality culture to fulfill customer satisfactions by continuous quality improvement.

Student's Quality Objectives

- To attain 90% of the full-time diploma and Bachelor degree students graduating on time (GOT) with CGPA above 3.00.
- To attain 2% of the graduating student awarded with the “*Anugerah Naib Canselor*” annually
- To attain 10% of the full-time student obtaining the dean list awards annually.
- To attain 60% student satisfaction towards campus facilities and welfares annually

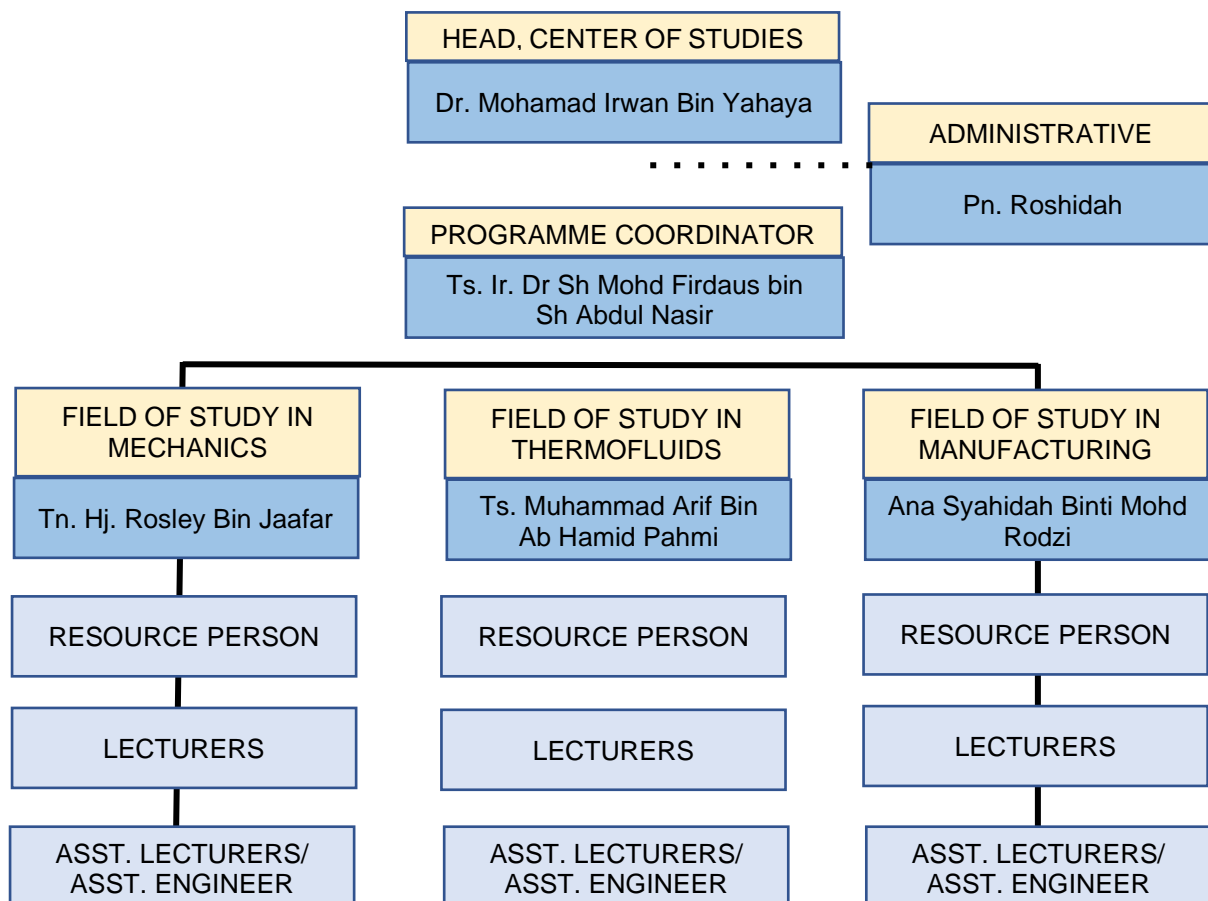
Customer Satisfaction Pledge

- To provide a conducive environment for effective teaching and learning.
- To produce quality graduates who are capable of meeting the global market needs.
- To ensure that the curriculum is continuously improving and to incorporate current technology practice.

- To maintain the relationship and networking with alumni, industries and other higher learning institutions within the country and overseas.
- To deliver efficient and friendly services.

CEEM245 MANAGEMENT TEAM

The management team will ensure that the CEEM245 programme run without hindrance, and that courses are taught and presented according to the stipulated quality standard.



TEACHING STAFF/LECTURERS

Currently there are 68 lecturers, 11 assistant lecturers and 15 technical staff. Lecturers are required to upgrade their knowledge and skills by carrying out research and consultancy work. They could undertake short-term or long-term research projects and other relevant consultancy works. Besides teaching, lecturers are also encouraged to engage in industrial training in order to obtain a professional engineer status (PE).

Academic Staff for CEEM245

Name	Academic Qualification	Specialization
Prof. Dr. Salamiah Kasolang@Kasalong (<i>Rektor, UiTM CPP</i>)	B.Sc. Eng. (Wisconsin-Madison, USA), M.Sc. (UPM), Ph.D. (Sheffield, U.K)	Tribology (Friction, Wear, and Lubrication)
Prof. Madya Ts. Dr. Mohd Mahadzir Mohamud @ Mahmood	Diploma in Mech. Eng., B. Eng. (Aeronautic) (UTM), M.Sc., Ph.D. (USM)	Renewable Energy (Biomass Gasification - CO ₂ absorption), Internal Combustion Engine (Diesel)
Prof. Madya Ir. Dr. Koay Mei Hyie	B.Eng., Ph.D. (UM)	Materials processing and properties, Coating technology
Prof. Madya Ir. Dr. Salina Binti Budin	B. Eng., M.Sc., Ph.D. (USM)	Powder Metallurgy, Advanced Materials, Plastic processing
Prof. Madya Dr. Abdul Halim Bin Zulkifli	B.Eng. (USA), M.Sc., Ph.D. (Dundee)	CAD/CAM, Feature recognition
Dr. Mohamad Irwan Bin Yahaya (<i>Head Center of Studies</i>)	B.Eng., M.Sc. (UPM), Ph.D. (Deakin, Australia)	Manufacturing System (CMM/CAD/CAE/CAM) Advanced Materials Processing (High Manganese Steel)

Dr.-Ing. Azmi bin Mohamed Yusof <i>(Programme Coordinator - CEEM245)</i>	B.Eng., M.Sc. (USM), Ph.D. (Germany)	MEMS/NEMS, Single particle detection, Thin film nanocomposite, Non-contact dispensing technology, Vibrations
Dr. Yusli Bin Yaakob <i>(Programme Coordinator – EM110)</i>	B.Eng., M.Sc., Ph.D. (Australia)	Solar Thermal
Ts. Muhammad Arif Bin Ab Hamid Pahmi	B.Eng. (UTHM), M.Sc.(IIUM)	Automotive, Manifold Performances, Engine Performances
Ir. Normariah Binti Che Maideen	B.Eng., M.Sc. (USM)	Advanced Manufacturing Technology, Manufacturing System, Product Design and Development
Nur Hayati Binti Mohd Yahya	B.Eng., M.Sc. (UTM)	Ergonomics, Industrial Engineering
Nurul Muthmainnah Binti Mohd Noor	B.Eng., M.Sc. (UIA)	Control Systems – Signal Processing Rehabilitation / Biomedical Engineering / Robotics Fuzzy Logic System Artificial Intelligence Machine Learning Microprocessor
Ts. Dr. Abdul Rahman Bin Hemdi	B.Eng. (UNITEN), M.Eng., Ph.D. (UTM)	Sustainable Product and Manufacturing Life Cycle Assessment, Sustainable Machining
Ya'akob Bin Yusof	B.Eng. (UIA), M.Sc. (UM)	Mechatronics
Dr. Ahmad Sufian Bin Abdullah	M.Eng. Ph.D. (Manchester, U.K)	Composite, Finite Element Analysis, Impact of

		Structure, Fiber Metal Laminate
Ts. Dr. Ahmad Faiz Bin Zubair	B.Eng., M.Sc. (U.K), Ph.D. (USM)	CAD/CAM
Azmi Bin Husin	B.Eng, M.Sc.	Fluid Flow, Heat transfer, Computational Fluid Dynamic (CFD)
Chiang Ee Pin	B.Eng, M.Sc. (USM)	
Dr. Ong Jiunn Chit	B.Eng., M.Sc. (UPM), Ph.D. (UIA)	Computational Fluid Dynamic (CFD)
Muhamad Bin Othman	B.Eng. (UKM), M.Sc. (Birmingham, UK)	Manufacturing processes, CAD/CAM
Ir. Dr. Sh. Mohd Firdaus Bin Sh. Abdul Nasir	B.Eng., M.Sc., Ph.D. (USM).	FEA, CFD, Product Design & Innovation, Fire fighting, AC and Gas Piping System, SPAN certified Person
Dr. Hamid Bin Yusoff	B. Eng., M.Sc., Ph.D. (USM)	Aerospace
Dr. Lim Jiunn Hsuh	B.Eng (UTM), M.Sc. Ph.D. (USM)	Experimental Mechanics
Dzullijah Binti Ibrahim	B.Eng., M.Sc. (USM)	Computer Integrated Manufacturing, Industrial Engineering
Dr. Bakri Ali	Diploma in Mech. Eng. (UTM), B.Eng. (UiTM), MSc. (Portsmouth,UK), Ph.D. (UiTM)	Dynamics & Vibration Design & Manufacturing Image Processing Robotic
Ir. Mohd Firdaus Abdullah	B.Eng., M.Sc. (UiTM)	Particle Contamination during Wafer Fabrication Artificial Neural Network Circuit Design
Ir. Dr. Norhazimi Bt Hamzah	B.Eng. (UTP), M.Sc., Ph.D. (UTM)	Automotive Control Mathematical Modeling Control System

Tn. Hj. Rosley Bin Jaafar	B.Eng., M.Sc. (USM)	Engineering Mechanics Fluid Mechanics Manufacturing Management
Ana Syahidah Binti Mohd Rodzi	Diploma in Mech. Eng. B.Eng., M. Sc. (UiTM)	Statics & Dynamics, Nanomaterials, Design Mechanical Engineering
Rizal Bin Mohamed Noor	B.Eng., M.Sc. (USM),	Manufacturing Process Computer Aided Design (CAD) & Computer Aided Machining (CAM)

TECHNICAL STAFF

Name	Position
Mohamad Sopi bin Salleh	Penolong Jurutera Kanan
Sazali bin Ahmad Jumli	Penolong Jurutera
Rozi bin Ali	Penolong Jurutera
Wan Zubaidah binti Wan Karma	Penolong Jurutera
Zool Helmy bin Ismail	Penolong Jurutera
Abdul Halim bin Saad	Penolong Jurutera
Amir Shahril bin Ishak	Penolong Jurutera
Mohd Noor bin Mohamud	Penolong Jurutera
Mohd Ridzuan bin Ramli	Penolong Jurutera
Nurbaidura binti Mohamad Nayan	Penolong Jurutera
Shahrizam bin Johar	Penolong Jurutera
Tunku Noor Ikmal bin Tunku Ishak	Penolong Jurutera
Amir Shahrul bin Ishak	Penolong Jurutera

PROGRAMME INFORMATION

CEEM245 Bachelor of Mechanical Engineering (Manufacturing) With Honours

This programme is offered to graduates with a Diploma in Mechanical Engineering as well as those who have completed the Science Matriculation Program or Pre-University program. The duration of this program is four years comprising of eight semesters. Candidates with a Diploma in Mechanical Engineering from UiTM would be admitted to the third semester. Candidates from the Matriculation Program would start from first semester. Candidates with other diploma qualifications would be admitted with some credit's exemptions. The program incorporates Engineering Mathematics, Mechanics, Material, Strength of Material, Thermo-fluids, Electrical Systems, Design, Computer Applications, Management and Manufacturing courses. There is a strong practical approach to the program and great emphasis is placed on laboratory work, industrial visits, design project, and final year project. In the later years of the program students have the opportunity to select wide range of Manufacturing based elective courses.

Teamwork practice such as project control, management techniques, personal interaction and team skills are all practiced through group projects. As part of the learning process, career talks by professional engineers from the industries are arranged regularly to help student gain knowledge and experience in the related field.

The students are also required to undergo industrial training in industry. This training is for a period of ten weeks during the semester break. The objective of this training is to expose students to real working environment in the industries.

All students undertake a major individual project in their final three semester, as a partial requirement for the Degree Program. During the final project student are involved in planning, designing, fabricating, testing,

collection data, analyzing and arriving at a conclusion before completing the project. The aim of this project is to develop creativity and to get exposure in various industrial processes.

Programme Aim

Naturally, all individuals can excel, and this programme aims to nurture ethical, dynamic and competitive Bumiputera Engineering professionals in forming a highly productive mechanical and manufacturing industry.

ADMISSION REQUIREMENT

The intake process is carried out twice a year (in September and March). The application for the September intake is normally through the UPU, Ministry of Higher Education (MOHE).

Entry Requirements

Program	Entry requirements
<p>Bachelor of Mechanical Engineering (Manufacturing) with Honours (CEEM245) 8 semesters</p>	<p>1. University's General Requirement</p> <ul style="list-style-type: none"> • Pass in SPM or equivalent with good credits • Credits in Bahasa Melayu and Sejarah at SPM level or equivalent • Possess a minimum of C grade (2.00 GPA) in Pengajian Am subject or a minimum CGPA of 2.00 • Pass in KPM Matriculation/ UM Science Foundation/ UiTM Foundation and possess a minimum CGPA of 2.00 • Pass in Diploma from other higher learning institutions (IPTs) recognized by the Malaysian Government • Malaysian University English Test (MUET) of Band 2 <p>2. Programme's Special Requirements</p> <p>a) UiTM Diploma Graduate</p> <ul style="list-style-type: none"> • Graduated Diploma in Mechanical Engineering with a minimum CGPA of 2.50

	<ul style="list-style-type: none">• Graduated Diploma in Science or related engineering discipline with a minimum CGPA of 2.75 <p>b) Other Institutions' Diploma Graduate recognized by the Malaysian Government</p> <ul style="list-style-type: none">• Graduated Diploma in Mechanical Engineering with a minimum CGPA of 3.00 and• Pass in SPM or equivalent with minimum five credits which must <p>include the following subjects:</p> <ul style="list-style-type: none">✓ Mathematics✓ Additional Mathematics✓ Physics✓ English and✓ pass in Chemistry <p>c) UiTM Foundation / UM Science Foundation / KPM Matriculation Graduate</p> <ul style="list-style-type: none">• Minimum grade of B- (2.67) in two (2) subjects and C grade (2.00) in another one (1) subject in any of the following: <ul style="list-style-type: none">✓ Mathematics✓ Physics/ Engineering Physics✓ Chemistry/ Engineering Chemistry and✓ Pass in SPM or equivalent and✓ Pass in English <p>d) STPM holder or equivalent</p> <ul style="list-style-type: none">• Grade of B- (2.67 GPA) in any two <p>(2) of the following subjects:</p> <ul style="list-style-type: none">✓ Mathematics T / Further mathematics T✓ Physics
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	<ul style="list-style-type: none">✓ Chemistry and✓ Pass in SPM or Equivalent and✓ Pass in English <p>Note: Applicant with limb disabilities that could cause difficulties to conduct laboratory works is not qualified to apply for these programs.</p>
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Student Entry Standard

Candidates with a Diploma in Mechanical Engineering from UiTM will be enrolled to the third semester with a maximum credit exemption of 34 credit hours from the total credit hours offered. The exemption of the courses is given for courses offered in semester one and two.

Candidates with diploma from other recognized institutions will be enrolled with some credit exemptions subjected to approval. Candidates from matriculation program and STPM will be enrolled into the first semester.

Student Entry Regulations

Students are not allowed to register more than one programme at any one time. The entry requirement and qualifications of the students will be approved by the faculty based on the approved guidelines set by Senate of UiTM.

The selection of students to the programme is done by the Admissions Office. Failed and dismissed students are not allowed to re-apply to the same programme. Students that fall under this category can apply to other programme after one semester.

Credit Transfer

Students who have applied for credit transfer to any equivalent courses from other recognized institutions shall follow all the regulations specified by UiTM. The total credits that can be transferred from other recognized institutions must not be more than 30% from the total credits hours for vertical credit transfer and 50% from the total credit hours for lateral credit transfer.

Credit Exemption

Students can apply for exemption of courses according to the regulation as specified by the UiTM.

CURRICULUM STRUCTURE

PLAN ID # 7610

PROGRAM ME	BACHELOR OF MECHANICAL ENGINEERING (MANUFACTURING) WITH HONOURS <i>SARJANA MUDA KEJURUTERAAN MEKANIKAL (PEMBUATAN) DENGAN KEPUJIAN</i>
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SEMESTER 1						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM401	INTRODUCTION TO ENGINEERING AND ETHIC	2	0	1	3	
MEM402	STATICS	3	1	0	3	
MEM403	MECHANICAL ENGINEERING DRAWING	2	0	2	3	
MEM404	ENGINEERING WORKSHOP	1	0	3	2	
MAT435	CALCULUS FOR ENGINEERS	3	1	0	3	
EET699	ENGLISH EXIT TEST	0	0	0	0	
XYZ111	CO-CURRICULUM I (HEP List of Elective)	0	0	2	1	
Total					15	

SEMESTER 2						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM491	BASIC FLUID MECHANICS	3	1	0	3	
MEM462	ENGINEERING THERMODYNAMICS	3	1	0	3	
MEM452	THERMOFLUIDS LAB I	0	0	2	1	
MEM482	FOUNDATION OF MATERIALS SCIENCE	3	1	0	3	
CSC430	COMPUTER PROGRAMMING AND APPLICATIONS	3	1	0	3	
CTU552	PHYLOSOPHY AND CURRENT ISSUES	2	0	0	2	
XYZ121	CO-CURRICULUM II (HEP List of Elective)	0	0	2	1	
Total					16	

SEMESTER 3						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM511	STRENGTH OF MATERIALS	3	1	0	3	MEM402
MEM512	ENGINEERING DYNAMICS	3	1	0	3	MEM402
MEM591	ADVANCED FLUID MECHANICS	3	1	0	3	MEM491

EPE491	ELECTRICAL POWER AND MACHINES	3	1	0	3	
MAT455	FURTHER CALCULUS FOR ENGINEERS	3	1	0	3	
ELC501	ENGLISH FOR CRITICAL ACADEMIC READING	2	0	0	2	
XYZ131	CO-CURRICULUM III (HEP List of Elective)	0	0	2	1	
Total					18	

SEMESTER 4						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM581	MECHANICS AND MATERIALS LAB	0	0	2	1	MEM511, MEM512, MEM482
MEM551	THERMOFLUIDS LAB II	0	0	2	1	MEM591
MEM582	MECHANICAL VIBRATIONS	3	0	1	3	
MEM553	APPLIED THERMAL ENGINEERING	3	1	0	3	
MEM550	CONCEPTUAL DESIGN AND CAD	2	0	2	3	
MEM461	MANUFACTURING PROCESSES I	3	0	0	3	MEM404
MAT565	ADVANCED DIFFERENTIAL EQUATIONS	3	1	0	3	
Total					17	

SEMESTER 5						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM604	MANUFACTURING LAB	0	0	2	1	MEM461
MEM605	TQM FOR ENGINEERS	2	0	0	2	
MEM562	COMPUTER INTEGRATED MANUFACTURING	2	0	2	3	
MEM630	DESIGN FOR MANUFACTURE AND ASSEMBLY	2	0	0	2	MEM461
MEM561	MANUFACTURING PROCESSES II	3	0	0	3	
STA408	STATISTIC FOR SCIENCE AND ENGINEERING	3	1	0	3	
BXY401	THIRD LANGUAGE 1 (APB List of Elective)	2	0	0	2	
EWC661	ENGLISH FOR REPORT WRITING	2	0	0	2	
Total					18	

SEMESTER 6						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM681	MACHINE ELEMENT DESIGN	3	1	0	3	
MEM685	ELECTRONICS AND MICROPROCESSOR	3	1	0	3	
MEM682	NUMERICAL METHODS	2	0	2	3	

MEM670	ENGINEERING ECONOMICS	2	0	0	2	
MEM671	MANUFACTURING MANAGEMENT	3	0	0	3	
BXY451	THIRD LANGUAGE 2 (APB List of Elective)	2	0	0	2	BXY401
CTU554	VALUES AND CIVILIZATION II	2	0	0	2	
Total					18	

SEMESTER 6 (SEMESTER BREAK)						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM698	INDUSTRIAL TRAINING	0	0	8	4	
Total					4	

SEMESTER 7						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM601	FINAL YEAR PROJECT I	0	1	2	2	
MEM688	INTEGRATED DESIGN PROJECT	0	2	6	4	
MEM690	ENGINEERING PROFESSIONALISM	2	0	0	2	
MEM686	CONTROL SYSTEM ENGINEERING	3	1	0	3	MEM582,MAT565
MEM687	CONTROL AND INSTRUMENTATION LAB	0	0	2	1	
XXXXXX	SPECIAL TOPIC 1 (ELECTIVE 1)	2	0	0	2	
BXY501	THIRD LANGUAGE 3 (APB List of Elective)	2	0	0	2	BXY451
Total					16	

SEMESTER 8						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM602	FINAL YEAR PROJECT II	0	1	7	4	MEM601
MEM6XX	SPECIAL TOPIC 2 (ELECTIVE 2)	3	0	0	3	
MEM6XX	SPECIAL TOPIC 3 (ELECTIVE 2)	3	0	0	3	
ENT600	TECHNOLOGY ENTREPRENEURSHIP	3	0	0	3	
Total					13	
TOTAL CREDIT HOURS					135	

SPECIAL TOPIC 1						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
FST668	FOOD PRODUCT DEVELOPMENT	2	0	0	2	

LIST OF ELECTIVES -SPECIAL TOPICS 2 & 3						
Code	Course Name	Contact Hrs			EAC Credit Hrs	Co/Pre-Requisite
		L	T	P		
MEM697	SAFETY AND HEALTH FOR ENGINEERS	2	0	2	3	
MEM692	LEAN MANUFACTURING	2	0	2	3	
MEM693	CNC TECHNOLOGY	2	0	2	3	
MEM694	ERGONOMICS	3	0	0	3	
MEM695	ADDITIVE MANUFACTURING	2	0	2	3	
MEM696	SUSTAINABLE MANUFACTURING	3	0	0	3	
MEM689	COMPUTER AIDED PROCESS PLANNING	2	0	2	3	
MEM691	INDUSTRIAL MAINTENANCE	3	0	1	3	

COURSE SYNOPSIS

INTRODUCTION TO ENGINEERING AND ETHIC (3 credit hours)

This course introduces the engineering profession and aspects related to it, and the systematic approach, basic principles and selective computational tools for solving and presenting engineering problems. The following topics will be covered; Engineering profession, Introduction to mechanical engineering design, Engineering solutions, Data acquisition and representation, Engineering approximations, and Dimension, units and unit conversions. Group work introduces students to working in a team to collectively undertake and complete the assigned tasks. The computational tools useful for solving engineering problems are covered in the practical sessions. Industrial visit to expose students to the engineering world is recommended.

STATICS (3 credit hours)

This course covers basic principles in statics. The course begins with basic concepts of mechanics i.e. space, time, mass, and force, the concept of vectors and laws governing addition and resolution of vectors and followed by the equilibrium of particles and rigid bodies. It then proceeds to simple practical applications involving the analysis of forces in structures, machines, and problems involving friction. The course also covers the first and second moments of area and mass.

MECHANICAL ENGINEERING DRAWING (3 credit hours)

This course introduces the basic concepts in technical and mechanical engineering drawing and familiarizes students with the use of drawing instruments and aids in preparing basic geometrical drawing of simple objects. Topics covered includes principles of orthographic projection, isometric drawings, sectioning drawing, development of part and product drawing, drawing standards and practices, fit and tolerances, working drawings, and fabrication drawings. Students will be trained to do manual drawing and CAD practices.

ENGINEERING WORKSHOP (2 credit hours)

The course covers lectures on basic understanding and 'hands on' experiences on workshop related activities. The lectures are on the overall pictures of workshop practice, machines, materials and safety aspects. The 'hands on' experience covers the various basic workshop crafts, forming and metal cutting processes and fabrication methods such as hand tools, sheet metal working, lathe work, milling work, foundry and welding activities.

CALCULUS FOR ENGINEERS (3 credit hours)

This course consists of three chapters: methods of integration, functions of two and three variables and differential equations. In the first chapter, methods discussed are by parts, trigonometric integrals, trigonometric substitution and integration of rational functions. In chapter three, first and second order differential equations will be discussed. Applications in engineering and sciences will be covered for chapter two and three.

HBU111-NATIONAL KESATRIA I (1 credit hour)

State Kesatrias of the course emphasizes those aspects of a balanced proficiency of soft-skill namely self-discipline and skills. These two components will be applied to all students to be able to be the generation that has a high stage of self-discipline, spirit of competitiveness and a strong fighting spirit and national patriotism and next thankful to Allah and to thank the leader. This course cover the components developed discipline,

management and construction of self and ethics in the content of implementing the national Kesatria military training.

BASIC FLUID MECHANICS (3 credit hours)

This course covers the introduction of fundamental fluid mechanics theory including properties of fluid, hydrostatics and control volume analysis. Applied topics covering dimensional analysis and similarity, incompressible flow in pressure conduit and flow measurement are also taught.

ENGINEERING THERMODYNAMICS (3 credit hours)

The course is designed for students studying thermodynamics for the first time at degree level. Considerable emphasis is placed on the understanding and application of the first law and second laws of thermodynamics. Fundamental concepts and principles of various thermodynamics plants and machineries are covered in this course.

THERMOFLUIDS LAB 1 (1 credit hour)

The course consists of two parts, i.e. topics in thermodynamics and fluid mechanics. It provides the opportunity for the students to operate under supervision various experimental equipment. Students shall complete with confidence all laboratory experiments and to relate them to theoretical understandings of thermofluids

FOUNDATION OF MATERIALS SCIENCE (3 credit hours)

This course covers some fundamentals of materials science, which are necessary for the understanding of materials properties for their appropriate applications. The major families of materials such as metals, ceramics, polymers and composite are discussed for their structures, properties and applications.

COMPUTER PROGRAMMING AND APPLICATIONS (3 credit hours)

This course is designed for students to study engineering programming. Fundamental concepts and principles of the chosen computer programming software are covered in this course. Considerable emphasis is placed on the understanding and application of computer programming.

PHILOSOPHY AND CURRENT ISSUES (2 credit hours)

Kursus merangkumi hubungan ilmu falsafah dengan Falsafah Pendidikan Negara dan Rukunegara. Penggunaan falsafah sebagai alat untuk memurnikan budaya pemikiran dalam kehidupan melalui seni dan kaedah berfikir serta konsep insan. Topik utama dalam falsafah iaitu epistemologi, metafizik dan etika dibincangkan dalam konteks isu semasa. Penekanan diberikan kepada falsafah sebagai asas bagi menjalin dialog antara budaya serta memupuk nilai sepunya. Di hujung kursus ini pelajar akan mampu

melihat disiplin-disiplin ilmu sebagai satu badan ilmu yang komprehensif dan terkait antara satu sama lain.

NATIONAL KESATRIA II (1 credit hours)

National Kesatria II is a continuation course of National Kesatria I which includes three major components, discipline, physical development and personal skills as well as spiritual development. This course will expose students to practice the method described above to create students who are competent, have the outstanding leader and a balanced personality in terms of mental, physical and spiritual in line with the demands of religion, race and country

STRENGTH OF MATERIALS (3 credit hours)

The course deals with the study of stresses and strains in deformable bodies under axial loading, torsion, bending, and combined loadings. The study is restricted to the linear-elastic response of the bodies. It covers the transformations of plane stress and strain including the method of Mohr's circle, deflections of beams, buckling of columns, and strain energy.

ENGINEERING DYNAMICS (3 credit hours)

The course covers both kinematics and kinetics of particles and rigid bodies in planar and spatial motion. The course emphasizes the use of both scalar and vector approaches for solving 2D and 3D rigid bodies' problems in dynamics. The rigid body dynamics will be focused mainly in this course.

FURTHER CALCULUS FOR ENGINEERS (3 credit hours)

This course consists of topics in finite series, partial derivative, multiple integral and vector calculus.

ELECTRICAL POWER AND MACHINES (3 credit hours)

The course covers introduction to electrical supply system, single and three phase supply, elements of industrial power system, design, operation and maintenance, industrial applications of electrical machines and power transformers, and single phase motors.

HBU131-NATIONAL KESATRIA III (1 credit hour)

These courses will produce students who have personality perfectly in line with the demands of religion, race and nation. In addition, for have to strengthen the foundation of soft skills in leadership, charisma and skills in social affairs and also has its own identity and spirit of the fighting spirit and heroism as well as sensitive to development efforts and wellbeing of

their race, religion and country. Students are also able to practice the skills needed by all the time.

MECHANICS AND MATERIALS LAB (1 credit hours)

The course consists of three parts, i.e. topics in mechanics of materials; material science; and dynamics and vibrations. It provides the opportunity for the students to operate under supervision various experimental equipment. Students shall complete with confidence all laboratory experiments and to relate them to the theoretical understandings.

CONCEPTUAL DESIGN AND CAD (3 credit hours)

This course introduces and applies computer hardware, its peripherals and software that are essential for Computer Aided Design (CAD), Computer Aided Engineering (CAE) and Computer Aided Manufacturing (CAM) leading to design process and the role of CAD. The topics including the Parametric and Non-Parametric Profile, Constructive Geometric Modelling, Engineering Drawing, and Mechanical Assembly Design. The integration of steps in engineering design and manufacturing is described by applying the CAD model in design process.

ADVANCED FLUID MECHANICS (3 credit hours)

This course is a continuation of Fluid Mechanics 1. The course covers the Differential Approach to Flow Analysis; Potential Flow; Flow Past Immersed Bodies; Compressible Flow; Boundary Layer and Fluid Machinery.

MANUFACTURING PROCESSES 1 (3 credit hours)

This course provides the understanding of the different types of manufacturing processes usually employed in industries. It includes the processing of metal casting, metal forming and shaping processes, sheetmetal working, powder metallurgy, ceramics, glasses, polymers, rubber, polymer matrix composite and integrated circuits. This course also includes the competitive aspects of manufacturing processes.

ADVANCED DIFFERENTIAL EQUATION (3 credit hours)

This course consists of Laplace transforms, system of linear first order differential equation, Fourier series and boundary value problem. In Fourier series, the students will learn how to write any periodic functions in a Fourier series. The students will also learn Laplace transform as a tool to solve ordinary differential equations and system of first order differential equation. The last chapter is to solve the boundary values problems which

include the wave equation by using the method of separation of variables and Fourier series.

VALUES AND CIVILIZATION II (2 credit hours)

Kursus ini menerangkan tentang konsep etika daripada perspektif peradaban yang berbeza. Ia bertujuan bagi mengenal pasti sistem, tahap perkembangan, kemajuan dan kebudayaan sesuatu bangsa dalam mengukuhkan kesepaduan sosial. Selain itu, perbincangan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini. Di hujung kursus ini pelajar akan dapat menghubungkan etika dan kewarganegaraan berminda sivik.

APPLIED THERMAL ENGINEERING (3 credit hours)

The course begins with the introduction of thermodynamics and heat transfer and the relations with energy utilization and environment. The fundamentals of heat transfer mechanisms of conduction, convection, and radiation are introduced as analytical tools to solve various energy problems. Engineering systems with major heat transfer applications is analyzed. The principle of combustion, gas mixtures and stoichiometry are exposed to the students. Refrigeration and air conditioning principles are introduced with respect to major energy transfer applications.

THERMOFLUIDS LAB II (1 credit hour)

The course consists of two parts, i.e. topics in thermodynamics and fluid mechanics. It provides the opportunity for the students to operate under supervision various experimental equipments. Students shall complete with confidence all laboratory experiments and to relate them to theoretical understandings of thermofluids.

MACHINE ELEMENT DESIGN (3 credit hours)

This course covers the Mechanical Engineering Design, Design for Strength and Design of Mechanical Elements. It includes design phases and failure theories for both static and fatigue conditions. Design procedures for designing machine elements such as mechanical joints, power transmission, belt and chain, and bearing are provided. One mini project from conceptual design to Blue Print/Conceptual/Production drawing is also included.

MANUFACTURING PROCESSES II (3 credit hours)

This course deals with various aspects of manufacturing technology, machining and the tools used in manufacturing industry to convert the raw materials into usable products. It provides undergraduate students with an

in-depth overview of production technology, applied mathematical tools and scientific principles to a variety of production technology problems. The course also includes the introduction of ergonomics and quality control related to production.

DESIGN FOR MANUFACTURE AND ASSEMBLY (3 credit hours)

This course exposes the students to the relationship between design and manufacture. It starts with the significance of having a correct design in terms of materials selections and manufacturing processes technology used prior to production. Ergonomics or human factors are also introduced to students to achieve product design that satisfy human needs.

ENGINEERING ECONOMICS (2 credit hours)

This course introduces the basic concepts and tools in engineering economics follow by approaches in analyzing a project. Then, the course offers the fundamental on comparing alternatives and projects. Finally, student will be exposed to the enhancements for the real-world including issues on financial risk.

MECHANICAL VIBRATIONS (3 credit hours)

The course emphasizes understanding of the fundamental concepts of vibrations. It begins with free vibration of single-degree-of-freedom for undamped and damped systems followed by forced vibration with harmonic excitation. Multi-degree-of-freedom systems, equations of motion and solution methods are introduced after which the determination of natural frequencies and mode shapes are further explored. The course concludes with the understanding of continuous media vibrations.

NUMERICAL METHOD (3 credit hours)

The course covers introduction to mathematical modeling and computing environment, numerical approximations and error analysis, solution methods of linear and nonlinear equations, system of linear algebraic equations, curve fitting, numerical differentiation and integration, and numerical solutions of ordinary differential equations, convergence and stability of the methods. Use of computer software in solving engineering problems is emphasized.

STATISTICS FOR SCIENCE AND ENGINEERING (3 credit hours)

This course introduces the students to the basic and intermediate methods of data analysis. Emphasis will be given to the usage of descriptive and inferential statistics including measures of central tendency, measures of dispersion, correlation, regression, hypothesis testing and analysis of

variance. Students will be able to interpret the computer output from the statistical software.

CONTROL SYSTEM ENGINEERING (3 credit hours)

The course covers introduction to mathematical modeling and control engineering, models of industrial control devices and systems, basic concepts and principles of feedback controls, system stability and its criteria, performance specifications, frequency response analysis, control system design via state-space formulation, and control design applications.

CONTROL AND INSTRUMENTATION LAB (1 credit hour)

The course consists of two main parts, the MATLAB and Industry Lab. In MATLAB's session, students will learn basic control features in MATLAB. This session is important as it will be very useful for their assignment in Control System Engineering's assignment. The second part of the laboratory which is the Industry Lab, students will use special tools and equipment to further understand control system and basic Proportional Integral Derivative (PID) control's architecture. Overall, this laboratory provides the opportunity for students to operate under supervision for distinctive experimental equipment. Students shall complete with confidence all laboratory experiments and relate them to the theoretical understandings.

MANUFACTURING MANAGEMENT (3 credit hours)

This course covers theoretical and practical aspects of industrial management. It is based on principal characteristics of the typical manufacturing industry. Topics include concepts of production and operation management with specific techniques in production planning and control, procurement and inventory control, and other aspects on industrial management such as project management, TQM and maintenance management.

INTEGRATED DESIGN PROJECT (4 credit hours)

This course incorporates and integrates previously acquired knowledge and skills in the study of mechanical engineering through a real-world and open-ended engineering project. Students will continue their design efforts until completion. Product design using and based on current standards, codes and practices is emphasized.

ELECTRONICS AND MICROPROCESSOR (3 credit hours)

This course is to provide essential knowledge and understanding to students on the operation and applications of diodes, transistors and operational amplifiers. It also covers the topics on digital principles and microprocessor system, programming, interfacing and applications.

INDUSTRIAL TRAINING (4 credit hours)

This is a 12 weeks (minimum) course of external, full-time, and mechanical engineering-career-related experiences designed to enhance the student's understanding and readiness for an intended career with a business, industry, or government agency. It is aimed at helping them to improve their competency level with direct hands-on or related employment enrichment programs and with exposure to the actual working atmosphere which they will eventually face after graduation. During the training, the students must conduct their activities in accordance with the requirements as approved by the school and shall abide by the personnel regulations of the industry. Students are assessed by both, supervisor from the industry and the evaluating lecturer. A comprehensive written report on the industrial training is required.

ENGINEERING PROFESSIONALISM (2 credit hours)

This course has been designed to accommodate the “Engineers in Society” syllabus of the Institute of Engineers (Malaysia). The course will comprise of topics that are examinable (Topics 1 – 9) and others that are non-examinable (Topics 10 – 11). Examinable topics cover a wide range of management theories and practices while the non-examinable topics would relate to current issues and the inter-relationships between the engineer and society. The non-examinable topics will be delivered in the form of guest lectures by professionals from both private and public sectors. Lectures for the examinable topics would be conducted in a normal classroom manner.

FINAL YEAR PROJECT 1 (3 credit hours)

This course is the first part of the two-phase Final Year Project. It provides the opportunity for students to apply knowledge and skills acquired in all previous courses to undertake problem identification, formulation and solution of a real-world engineering problem. The course is aimed to foster independent thinking and develop problem-solving skills. It focuses on the ability of the students to first identify problem of their own interests and then formulate it for further development in the next following semester. The students will have to do a literature review and come up with project planning and proposal.

SAFETY AND HEALTH FOR ENGINEERS (3 credit hours)

This course covers the fundamentals of occupational safety and health in the working environment. These include the implementation and regulation of Occupational Safety and Health Act (OSHA) in Malaysia. The course also covers the identification of industrial hazards, the types and inspection of the industrial hazards concerned, and addresses the analysis and control of such hazards. The types of hazards included in this course are industrial hazard, mechanical hazard, chemical hazard, physical hazard and psycho-

social hazard. Besides that, the course also emphasizes on industrial hygiene, accident causation, accident investigation and accident analysis. Safety and health management and implementation of health regulation will also be covered.

TECHNOLOGY ENTREPRENEURSHIP (3 credit hours)

In this course, students will be exposed to concepts and philosophies of entrepreneurship. It is expected that they apply the knowledge gained above as a basis for the creation and development of technology based business venture.

FINAL YEAR PROJECT II (4 credit hours)

This course is the second part of the two-phase Final Year Project. It provides an opportunity for students to apply knowledge and skills acquired in earlier courses to the solution of an engineering problem. The second part focuses on the execution of the project, project evaluation, testing, and analysis toward completion and achievement of the project objectives. Students will have to communicate their findings or project outcomes in both written and oral forms.

FOOD PRODUCT DEVELOPMENT (2 credit hours)

This module covers the theoretical and practical steps involved in the development of new food products. The topics covered include the basics of new food product development starting from idea generation stage, development stage, taste paneling stage, consumer sampling stage, shelf life stage, packaging stage, production stage, market testing stage and commercialization stage.

LEAN MANUFACTURING (3 credit hours)

This course covers the fundamentals of Lean Manufacturing as practice in the industry. It encourages the practice of continuous improvement and is based on the fundamental idea of respect for people. This course introduces students to Lean tools to improve processes, using lean manufacturing techniques and other manufacturing best practices in creating sustainable long-term change and to deliver higher quality products at significantly lower costs.

CNC TECHNOLOGY (3 credit hours)

This course is an introduction on CAD/CAM system and its application in industry. The students will be exposed to the application of CAD/CAM software and operate for generating geometric modeling and G-code programming for machining. The topic includes 3D modelling and 3D machining to generate part programming for machining.

ADDITIVE MANUFACTURING (3 credit hours)

This course provides an overview of advance computer-aided design applications in manufacturing industries. It looks closely at the design of product development with the application of Additive Manufacturing. The course will include the advancement of the current technology of Additive Manufacturing with its applications in industries.

ERGONOMICS (3 credit hours)

This course provides the details about the human interaction with work task and technology. Guidelines are given for amplifying human capabilities, utilizing human abilities, facilitating human efficiencies and avoiding overloading or under-loading. Details are presented about the human characteristics for the appropriate design of the living and work environment. Regulations governing safety and health aspects in working environment are presented.

SUSTAINABLE MANUFACTURING (3 credit hours)

Sustainable manufacturing is defined by “the creation of manufactured products that use processes that minimize negative environmental impacts, conserve energy and natural resources, are safe for employees, communities, and consumers and are economically sound.” Even though this definition exists, sustainable manufacturing still has many meanings in many contexts, industries, and forums. This course is designed to introduce the fundamental concepts of sustainable manufacturing. Students will learn these fundamentals through textbook reading, homework assignment, classroom case study discussions, projects, presentations, and guest speakers. While the focus of the course will be on sustainable manufacturing, the course will also look at the connections of sustainable design, environmental sciences, and the social sciences with sustainable manufacturing.

TQM FOR ENGINEERS (2 credit hours)

This course is organized according to traditional management topics. This organization helps students to see the parallels between TQM and management theories. The course is divided into six sections: In the first part of the course students are introduced to fundamental principles of TQM. Second section turned the attention to the role of quality system, and how TQM relates to topics such as organizational design and change. Section 3 presents the themes of the tools and the improvement cycle in TQM. Section 4 discussed TQM in the context of organisational, communication, management role responsibilities and teamwork requirement. In section 5, discussed the implementation of TQM on both the content and process of competitive strategy. In section 6 some cases in TQM are be discussed.

COMPUTER AIDED PROCESS PLANNING (3 credit hours)

This course provides an overview of computer-aided process planning applications in manufacturing industries. It looks closely on the bridging aspect of design and manufacturing in product development with the application of CAPP system. The course will include the applications of feature recognition of 3D CAD model and the integrations towards CAM system.

INDUSTRIAL MAINTENANCE (3 credit hours)

This course covers maintenance principles, types of maintenance, managing maintenance, workplace safety, troubleshooting and service, and repair principles employed either in the factory or non-factory maintenance department. The topics include the mechanical systems, fluid power system, boiler system and heating, ventilating and air conditioning systems. The practical work is embedded within the course to expose the students with the fundamental aspect of industrial management.

AWARDS AND GRADING SCHEME

Award of Degree

Student will be awarded a Bachelor's degree for CEEM245 when they fulfill all the following criteria:

- i. Obtained a minimum Cumulative Grade Point Average (CGPA) of 2.00
- ii. Passed all courses as required by the programme of study;
- iii. Fulfilled all the conditions and requirements set by the University;
- iv. Approved by the University Senate.

Classification of the degree awarded

All students registered for the Bachelor degree program are permitted to attempt the full honours program. The Bachelor degree classification is determined as follows:

Degree Classification	CGPA
First Class	3.50 - 4.00
Second Class Upper	3.00 - 3.49
Second Class Lower	2.20 - 2.99
Third Class	2.00 - 2.19

Grading Scheme

The grading scheme for all assessments and final exam scores is summarized in the table below:

Range of Score	Grade	Grade Points	Result
90 - 100	A+	4.00	Pass
80 - 89	A	4.00	Pass
75 - 79	A -	3.67	Pass
70 - 74	B +	3.33	Pass
65 - 69	B	3.00	Pass
60 - 64	B -	2.67	Pass
55 - 59	C +	2.33	Pass
50 - 54	C	2.00	Pass
47 - 49	C -	1.67	Fail
44 - 46	D +	1.33	Fail
40 - 43	D	1.00	Fail
30 - 39	E	0.67	Fail
0 - 29	F	0.00	Fail

PLAGIARISM

“Plagiarism is a serious academic offence”

The School of Mechanical Engineering UiTM CPP in upholding its professionalism and academic integrity by all means is against all acts and forms of plagiarism by the students. Proper citation and copyright compliance must be always adhered by students in their academic work. Students must be aware that stealing someone else’s work is wrong and is deemed as intellectual dishonesty which carries stern disciplinary penalties. Some examples amounted to plagiarism but not limited to are:-

- Copy an article or a paper from the website or an online data base, or from books or journals without a proper citation.
- Cut and paste to create a paper from several sources without proper acknowledgement.
- Quote less than all the words copied. A student quotes a sentence or two and then continues copying from the sources without citing it.
- Fake a citation. Give a citation when one does not actually quote from it.

The following guidelines provide the basic requirements for the acknowledgement of sources in your academic work.

Bibliographies and footnotes

All the sources - printed materials such as books and journals, or electronic materials such as websites, CD-ROM, and electronic mails, and other sources which have been consulted in the preparation of your academic work should be listed in a bibliography shall not be considered as adequate for the specific use of that source within the report. Therefore, the extent of indebtedness to the source must be made clear.

Any sentence or phrase, however small, which is not your original work must be properly acknowledged. It must be placed in quotation marks or clearly indented beyond the regular margin.

Paraphrasing

Any material which is paraphrased or summarized must also be specifically acknowledged in a footnote or in the text.

Facts, Formulas and Ideas

Any facts, formulas, ideas and other kinds of information which are borrowed should be specifically acknowledged in a footnote or in the text. However, those which are widely known and are considered to be in the “public domain” of common knowledge do not always require citation. Students when in doubt should consult any of the faculty member.

Homework, Laboratory Work, Problem Sets and Computer Programmes

The organization and presentation of laboratory and computational courses may vary from one course to another. Often students work in a group and as such, a proper acknowledgement of the extent of the collaborated work must appear when submitting the reports.

In the cases where there are two or more signatories to a submitted report, each student’s signature is sufficient to signify that the student has contributed fairly in the submitted work’

Multiple Submissions

Occasionally the student may be permitted to rewrite an earlier work or to satisfy two academic requirements by producing a single piece of work more extensive than that which would satisfy either requirement on its own. In such cases, the student must obtain a prior written permission of each instructor. In cases where the previously submitted work, or a portion of it, is submitted in its original or revised form to another instructor, the student must also submit the original work with the revised version. If a single extended work is written for more than one course, a student must clearly indicate that at the beginning of the report.

OUTCOME BASED EDUCATION

Introduction

Outcome Based Education (OBE) is the paradigm shift resulting from the reevaluation of Traditional Education (TE). TE narrowly focused on the content and produced students with varying degrees of achievement levels (stratification of achievers). Thus this model did not produce learners, which could perform effectively in the work place. OBE has changed the focus of learning institutions from the content to the learner. According to William Spady, (1998,1999) a major proponent of OBE, three goals drive this approach to creating academic curricula. 1) All students can learn and succeed, but may not be on the same day or in the same way. 2) Each success achieved by a student breeds more success. 3) Academic institutions control the conditions of success.

Curriculum Design for OBE

OBE is a methodology of curriculum design and teaching that focuses on what students can actually do after they are taught. OBE focuses on these key questions as to:

- a) What should the students learn?
- b) What is the motivation for the students to learn it?
- c) How can the academic institution and its resources help students learn it?
- d) How will it be determined what the students have learned (assessment)?

Thus, the OBE's instructional planning process is a reverse of that associated with traditional educational planning. The desired outcome is determined first and the curriculum, instructional materials and assessments are designed around to support and facilitate the intended outcome (Spady 1988; 1993). All curriculum and teaching decisions are made based on how best to facilitate the desired final outcome.

Sample of Bloom's Taxonomy

Cognitive Skills (C)

KNOWLEDGE

Arrange, define, duplicate, identify, label, list, match, memorize, name, order, outline, recognize, recall, relate, repeat, reproduce, select, state

COMPREHENSION

Classify, convert, defend, describe, distinguish, estimate, explain, express, extend, generalize, give example, identify, indicate, infer, locate, paraphrase, predict, recognize, report, review, rewrite, select, summarize, translate.

APPLICATION

Apply, change, choose, compute, demonstrate, discover, dramatize, employ, illustrate, interpret, manipulate, modify, operate, practice, predict, prepare, produce, relate, schedule, show, sketch, solve, use, write

ANALYSIS

Analyze, appraise, break down, calculate, categorize, compare, contrast, criticize, diagram, differentiate, discriminate, distinguish, examine, experiment, identify, illustrate, infer, model, outline, point out, question, relate, select, separate, subdivide, and test.

EVALUATION

Appraise, argue, assess, attach, choose, compare, conclude, contrast, criticize, defend, discriminate, evaluate, judge, justify, interpret, predict, rate, relate, select, summarize, support, value

CREATE

Account, alter, argue, arrange, assemble, categorize, collect, combine, comply, compile, compose, construct, create, derive, devise, design, develop, explain, formulate, generate, integrate, manage, modify, organize, plan, propose, repair, rearrange, reconstruct, relate, reorganize, revise, rewrite, set-up, summarize, synthesize, tell, write

Affective Skills (A)

RECEIVING (willingness to attend)

ask, choose, describe, follow, give, hold, identify, locate, name, point to, select, reply, use

RESPONDING (active participation)

answer, assist, compile, comply, conform, discuss, greet, help, label, perform, practice, present, read, recite, report, select, tell, write

VALUING (worth or value a student attaches to a particular object)

complete, describe, differentiate, explain, follow, form, initiate, invite, join, justify, propose, read, report, select, share, study, work

ORGANIZATION (bringing together different values)

adhere, alter, arrange, combine, compare, complete, defend, explain, generalize, identify, integrate, modify, order, organize, prepare, relate, synthesize

INTERNALISING VALUE

act, discriminate, display, influence, listen, modify, perform, practice, propose, qualify, question, revise, serve, solve, use, verify

Psychomotor Skills (P)

PERCEPTION

Choose, describe, detect, differentiate, distinguish, identify, isolate, relate, select, separate

SET

Begin, display, explain, move, proceed, react, respond, show, state, volunteer

GUIDED RESPONSE

Assemble, build, calibrate, construct, copy, dismantle, display, fix, fasten, grind, heat, measure, react, reproduce, respond

MECHANISM

Assemble, build, calibrate, construct, dismantle, display, dissect, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, sketch

COMPLEX OR OVERT RESPONSE

Assemble, build, calibrate, construct, dismantle, display, dissect, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, sketch

ADAPTATION

Adapt, alter, change, rearrange, reorganize, revise, vary

ORINATION

Arrange, combine, compose, construct, create, design, originate

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEOs are specific attributes expected in graduate within 3 to 5 years after graduation during their career and professional life. These attributes are consistent with the mission and vision of Institute of Higher Learning (IHL).

PEO1 - Engineers adapt and transform the acquired knowledge in public and private sectors with respect to related professional fields.

(KPI: More than 70% of graduates are employed and involved in engineering practice or other related professional fields)

PEO2 - Engineers are expert and competent in their professional fields.

(KPI: 10% of alumni are registered their professional membership or engineering experts; 25% of alumni holding leadership position having authority and subordinates)

PEO3 - Engineers are globally competitive and professionally employed in multinational/international organizations.

(KPI: 30% of alumni work in multinational/international companies or equivalent international levels)

PEO4 - Engineers practice ethical and professional values in their respective fields.

(KPI: 90% of stakeholders/respondents are satisfied with alumni ethical and professional values)

PROGRAMME OUTCOMES (PO)

Statements that describe what students are expected to know and be able to perform or attain upon graduation. These relate to the skills, knowledge and behaviour that students acquire through the programme. Key Performance Indicator (KPI) for the PO attainment: 65% out of total

students should achieve a minimum of 50% scores for each PO at the end of the programme

PO1 - Engineering Knowledge: Able to apply knowledge of mathematics, natural science, engineering fundamentals and engineering specialization as specified in WK1 to WK4 respectively to the solution of complex mechanical or manufacturing engineering problems.

PO2 - Problem Analysis: Able to identify, formulate, conduct research literature and analyses complex mechanical or manufacturing engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1 to WK4).

PO3 - Design / Development of Solutions: Able to design solutions for complex mechanical or manufacturing 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 (WK5).

PO4 - Investigation: Able to conduct investigation of complex mechanical or manufacturing problems using research based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5 – Modern Tool Usage: Able to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex mechanical or manufacturing engineering problems, with an understanding of the limitations (WK6).

PO6 - The Engineer and Society: Able to 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 (WK7).

PO7 - Environment and Sustainability: Able to understand and evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts (WK7).

PO8 - Ethics: Able to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice (WK7).

PO9 - Individual and Team Work: Able to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

PO10 - Communications: Able to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 - Project Management and Finance: Able to demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member or leader in a team, to manage projects in multidisciplinary environments.

PO12 - Life Long Learning: Able to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

USEFULL REFERENCES

<https://hea.uitm.edu.my/v4/index.php/download>

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2. Pengecualian Kredit Pemindahan Kredit
3. Permohonan Cuti Khas
4. Kalendar akademik UiTM

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