BACHELOR OF ENGINEERING (MECHANICAL – INDUSTRIAL)
PROGRAMME SPECIFICATIONS

1.	**Programme Name**	Bachelor of Engineering (Mechanical – Industrial)
2.	**Final Award**	Bachelor of Engineering (Mechanical – Industrial)
3.	**Awarding Institution**	Universiti Teknologi Malaysia
4.	**Teaching Institution**	Universiti Teknologi Malaysia
5.	**Professional or Statutory Body of Accreditation**	Engineering Accreditation Council (EAC)
6.	**Language(s) of Instruction**	Bahasa Melayu and English
7.	**Mode of Study (Conventional, distance learning, etc.)**	Conventional
8.	**Mode of Operation (Franchise, self-govern, etc.)**	Self-govern
9.	**Study Scheme (Full Time / Part Time)**	Full Time
10.	**Study Duration**	Minimum : 4 years Maximum : 6 years

Type of Semester	No of Semesters	No of Weeks/Semester
Normal	8	14
Short	1	8

11.	**Entry Requirements**	Matriculation/STPM/Diploma or equivalent

12. Programme Objectives (PEO)

To produce graduates who are able to:

(i) demonstrate their academic and technological excellence professionally and globally, particularly in areas related to mechanical engineering practices and contribute innovatively to the nation's wealth creation.

(ii) advance their careers by assuming increasing levels of responsibility, leadership and acquiring professional and advanced academic qualifications.

(iii) recognize and practice professional, ethical, environmental and societal responsibilities and value different global and cultural aspects of their work and society.

(iv) adapt and communicate effectively and be successful working with multi disciplinary teams.

13. Programme Learning Outcomes (PO)

(a) Technical Knowledge and Competencies

Intended Learning Outcomes	Teaching and Learning Methods	Assessment
PO1		
Ability to acquire and apply fundamental knowledge of mathematics, science and engineering principles to solve complex mechanical and industrial engineering problems; Keywords: **Engineering Knowledge**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO2		
Ability to identify, formulate and analyse complex mechanical and industrial engineering problems; Keywords: **Problem Analysis**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO3		
Ability to design solutions for complex mechanical and industrial engineering problems that fulfil health, safety, societal, cultural and environmental needs; Keywords: **Design/Development of Solutions**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO4		
Ability to investigate complex mechanical and industrial engineering problems using research-based knowledge and methods to produce conclusive results; Keywords: **Investigation**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.

(b) Generic Skills		
Intended Learning Outcomes	**Teaching and Learning Methods**	**Assessment**
PO5		
Ability to use modern engineering and information technology (IT) tools in complex mechanical and industrial engineering activities, with an understanding of limitations; Keywords: **Modern Tools Usage**	Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning.	Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports.
PO6		
Ability to apply professional engineering practice related to societal, health, safety, legal and cultural issues with full responsibility and integrity; Keywords: **The Engineer and Society**	Lectures, tutorials, seminars, group projects and industrial training.	Industrial training and group project reports.
PO7		
Ability to identify the impact of mechanical and industrial engineering solutions on sustainability and demonstrate the needs for sustainable development in societal and environmental contexts. Keywords: **Environment and Sustainability**	Tutorials, laboratory works, group assignments and projects, final year project presentations and problem-based learning.	Group reports, learning logs/diaries and oral presentations.
PO8		
Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice; Keywords: **Ethics**	Lectures, tutorials, seminars, group projects and industrial training.	Industrial training and group project reports.
PO9		
Ability to communicate effectively on complex mechanical and industrial engineering activities both orally and in writing; Keywords: **Communication**	Seminars, assignments and final year projects.	Report and theses.
PO10		
Ability to work productively as an individual, and as a member or leader in a team that may involve multi-disciplinary settings; Keywords: **Team Working**	Lectures and project assignments.	Demonstrations, reports, tests, examinations and presentations.
PO11		
Ability to undertake life long learning and manage information including conducting literature study; Keywords: **Life Long Learning**	Lectures and project assignments.	Demonstrations, reports, tests, examinations and presentations.
PO12		
Ability to demonstrate and apply knowledge on finance and management principles and acquire entrepreneurship skill; Keywords: **Project Management, Finance & Entrepreneurship**	Lectures and project assignments.	Demonstrations, reports, tests, examinations and presentations.

14.	Classification of Courses		
No.	**Classification**	**Credit Hours**	**Percentage**
i.	Programme Core	91	66
ii.	Programme Electives	26	19
iii.	Compulsory University Courses	20	15
Total		**137**	**100**
Classification of courses for engineering programme			
A	Engineering Courses	117	85
	Total credit hours for Part A	**117**	
B	Non-Engineering	20	15
	Total credit hours for Part B	**20**	
Total credit hours for Part A and B		**137**	**100**
15.	**Total Credit Hours to Graduate**	**137**	

AREAS OF STUDY

Industrial Engineering covers studies in the design, installation, control and performance improvement of an integrated system which includes man, material and machine. The field of study includes:-

a) Operation Research

Operations Research is divided into deterministic and stochastic categories. This field involves modelling of problems using tools such as linear programming, integer programming and network analysis. This course also covers operational problems which essentially involve probability such as queuing line and simulation models. All these methods aim to arrive at an optimum solution for an organisation.

b) Ergonomics and Safety

Ergonomics is concerned with the study of man and workplace relationship including tools and the environment. All these must be designed to fulfill human needs. The subject is closely related to the industrial safety that concerns with the aspects of workers' safety and health, work tools and machines.

c) Quality Engineering

Quality Engineering is a field that is involved in controlling and improving product and service quality. Statistical methods including Statistical Process Control (SPC) are used to control quality. In addition, Failure Mode Engineering Analysis (FMEA), Quality Function Deployment (QFD) and Design of Experiments (DOE) techniques are also introduced.

d) Production Planning and Control

Production needs to be controlled using a production planning and control system. Students will be exposed to forecasting, inventory control, scheduling and facility planning activities.

e) Work and Facilities Design

Work design involves work method improvement that is best for the worker. A good work system will improve productivity. On the other hand, facilities' planning is related to design of facility layout and determination of location. Various techniques and algorithms are used to design good layouts.

CAREER PROSPECTS

Graduates of this programme are essentially Mechanical Engineers but with specialisation in Industrial Engineering who can easily find job opportunities in various sectors. Alternatively, they can also be known as Industrial Engineers depending on their job placements in industries they are in. Additionally, they may also be known as Quality Engineer, Planner, Process Engineer, Quality Assurance Engineer, Product Engineer, Ergonomic/Safety and Health Engineer, Plant Layout Engineer etc.

Technology and all other resources need to be managed in an integrated and efficient manner either to produce a product or a service. Industrial Engineering concentrates on assembly activities and those of improving the performance of an integrated system involving man, material and machine. This activity requires specific knowledge and expertise in physics, engineering and social sciences together with principles and methods of engineering analysis and design to specify, predict and evaluate results that can be obtained from such system.

An Industrial Engineer generally focuses on work design, planning, management and control in industry. He/she is expected to possess sufficient background in mathematics and engineering principles complemented with knowledge in human factors related to psychology, sociology, physiology and others.

In order to complete the education in industrial engineering, the above aspects are further complemented with understanding of the organisational operations of industries, cost, quality and productivity which constitute the basis of any industrial activity. Industrial Engineering is wider than the conventional engineering and is interdisciplinary in nature and can be applied in many places and situations where cost, quality and productivity are important.

Hence, an Industrial Engineering graduate can be employed in both the industrial sector (small, medium and large) and service sector (government, education, financial, etc.).

CURRICULUM

FIRST YEAR

SEMESTER I

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMM 1013	Programming for Engineers	3	0	3	3	
SKMM 1203	Static*	3	1	0	3	
SKMM 1503	Engineering Drawing	1	0	6	3	
SKMM 1922	Introduction to Mechanical Engineering	0	0	3	2	
SSCE 1693	Engineering Mathematics I	3	1	0	3	
ULAB 1122	Academic English Skills	3	0	0	2	
		Total			**16**	

SEMESTER II

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMM 1113	Mechanics of Solids I*	3	1	0	3	SKMM 1203
SKMM 1213	Dynamics*	3	1	0	3	SKMM 1203
SKMM 1512	Introduction to Design	1	0	3	2	SKMM 1503
SKMM 1912	Experimental Methods	2	0	3	2	
SKEU 1002	Electrical Technology	2	1	0	2	
SSCE 1793	Differential Equations	3	1	0	3	SSCE 1693
UICI 1012/ ULAM 1012	Islamic and Asian Civilization/ Malay Language for Communication 2#	2	0	0	2	
		Total			**17**	

SECOND YEAR

SEMESTER III

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMM 2123	Mechanics of Solids II*	3	1	0	3	SKMM 1113
SKMM 2223	Mechanics of Machines and Vibration*	3	1	0	3	SKMM 1213
SKMM 2313	Mechanics of Fluids I*	3	1	0	3	SKMM 1203
SKMM 2413	Thermodynamics*	3	1	0	3	
SKMM 2921	Laboratory I	0	0	2	1	SKMM 1912
ULAB 2122	Advanced Academic English Skills	3	0	0	2	ULAB 1122
UHAS 1172/ UHAK 1022	Malaysian Dynamics/ Malaysian Studies 3#	2	0	0	2	
		Total			**17**	

SEMESTER IV

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMM 2323	Mechanics of Fluids II*	3	1	0	3	SKMM 2313
SKMM 2433	Applied Thermodynamics and Heat Transfer*	3	1	0	3	SKMM 2413
SKMM 2613	Materials Science	3	1	0	3	
SKEU 2012	Electronics	2	0	0	2	SKEU 1002
SSCE 1993	Engineering Mathematics II	3	1	0	3	SSCE 1693
SSCE 2193	Engineering Statistics	3	1	0	3	
		Total			**17**	

Subject to changes
* Core Courses – minimum passing grade is C (50%)
# University general course for international student only, international students are not required to take UICI 1012 and UHAS 1172.

Notes: L – Lecture, T – Tutorial, P/S – Practical/Studio

THIRD YEAR

SEMESTER V

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMI 3843	Production Planning and Control	3	0	0	3	
SKMI 3853	Work Design and Productivity	3	0	0	3	
SKMM 2713	Manufacturing Processes	3	1	0	3	
SKMM 3233	Control Engineering	3	0	0	3	SKMM 1213**, SSCE 1793**
SKMM 3931	Laboratory II	0	0	3	1	SKMM 2921
UHAK 1012	Graduate Success Attributes	2	0	0	2	
UHAK 1032	Introduction to Entrepreneurship	2	0	0	2	
		Total			**17**	

SEMESTER VI

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMI 3822	Quality System	3	0	0	2	
SKMI 3863	Engineering Economy and Accounting	3	0	0	3	
SKMM 3023	Applied Numerical Methods	3	0	0	3	SKMM 1013, SSCE 1793
SKMM 3242	Instrumentation	2	0	0	2	SKEU 2012**
SKMM 3523	Component Design	2	0	3	3	SKMM 2123**, SKMM 1512
SKMM 3941	Laboratory III	0	0	3	1	SKMM 3931
ULAB 3162	English for Professional Purposes	3	0	2	2	ULAB 1122, ULAB 2122
		Total			**16**	

SHORT SEMESTER

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMM 3915	Industrial Training				5	##, SKMM 2123**, SKMM 2223**, SKMM 2323**, SKMM 2433**
		Total			**5**	

FOURTH YEAR

SEMESTER VII

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMI 3833	Operation Research	3	0	0	3	
SKMI 4xx3	Elective I	3	0	0	3	
SKMI 4xx3	Elective II	3	0	0	3	
SKMM 4533	System Design	2	0	3	3	SKMM 3523
SKMM 4912	Undergraduate Project I	0	0	6	2	SKMM 2123**, SKMM 2223**, SKMM 2323**, SKMM 2433**
UKQX xxx2	Co-curriculum and Service Learning Elective	0	0	3	2	
		Total			**16**	

SEMESTER VIII

CODE	COURSE	L	T	P/S	CREDIT	PRE-REQUISITE
SKMI 4053	Safety and Engineering Management	3	0	0	3	
SKMI 4xx3	Elective III	3	0	0	3	
SKMM 4902	Engineering Professional Practice	0	0	2	2	Must be 3rd year
SKMM 4924	Undergraduate Project II	0	0	12	4	SKMM 4912
ULAX 1112	Language Skills Elective (Foreign Language)	2	0	0	2	
UICL 2302	The Thought of Science and Technology	2	0	0	2	
		Total			**16**	

Subject to changes
** Minimum grade D- (30%) in the pre-requisite courses
Obtained minimum of 80 credits

Notes: L – Lecture, T – Tutorial, P/S – Practical/Studio

ELECTIVE COURSES

Students may take up any THREE (3) of the following elective courses subject to them being offered in the respective semester.

SKMI 4063	Ergonomics and Occupational Safety
SKMI 4073	Industrial Systems Simulation
SKMI 4083	Reliability and Maintenance
SKMI 4093	Supply Chain Management and Sustainability
SKMI 4813	Quality Engineering
SKMI 4833	Facility Design