

## MASTER OF SCIENCE (INDUSTRIAL ENGINEERING)

### PROGRAMME SPECIFICATION

The Master of Science (Industrial Engineering) is offered either on a full-time or part-time basis. The full-time programme is offered only at the UTM Main Campus in Johor Bahru while the part-time programme is offered at various learning centre throughout Malaysia. The normal full-time program can be completed in a minimum of one year, i.e. two long semesters and one short semester. The maximum period for the completion of the full-time program is eight normal semesters (nominally 4 years). The maximum duration allowed for part-time students is also eight normal semesters (nominally 4 years). The full time student is allowed to take a maximum of 20 credits in a normal semester and 10 credits in a short semester. The part time student is allowed to take a maximum of 12 credits in a normal semester and 6 credits in a short semester. Assessment is based on coursework and final examinations given throughout the semester.

### General Information

1. Awarding Institution	Universiti Teknologi Malaysia			
2. Teaching Institution	Universiti Teknologi Malaysia			
3. Programme Name	Master of Science (Industrial Engineering)			
4. Final Award	Master of Science (Industrial Engineering)			
5. Programme Code	MKMN			
6. Professional or Statutory Body of Accreditation	Kementerian Pendidikan Malaysia			
7. Language(s) of Instruction	English			
8. Mode of Study	Conventional			
9. Mode of operation	Self-governing			
10. Study Scheme (Full Time/Part	Full Time / Part Time			
11. Study Duration	Minimum : 1 year Maximum : 4 years			
Type of Semester	No. of Semesters		No of Weeks/Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	8	8	14	14
Short	4	4	8	8

### Course Classification

Course Category	Code	Course	Credit	Percentage
<b>University General Courses</b>	U### ###3	University Electives	3	7.5%
<b>Programme Core</b>	MKMI 1803	Production and Operations Management	3	45%
	MKMI 1813	Supply Chain Management	3	
	MKMI 1823	Human Factors Engineering	3	
	MKMI 1833	Quality Engineering	3	
	MKMI 1843	Operations Research	3	
	MKMI 1903	Research Methodology	3	
<b>Project</b>	MKMI 1914	Master Project I	4	25%
	MKMI 2926	Master Project II	6	
<b>Programme Electives (choose 3 courses only)</b>	MKMI 2803	Lean Manufacturing	3	22.5%
	MKMI 2813	Facilities Planning and Design	3	
	MKMI 2823	Project Management	3	
	MKMI 2833	Advanced Engineering Economy & Accounting	3	
	MKMI 2843	Engineering & Environmental Safety	3	
	MKMI 2853	Safety Management	3	
	MKMI 2863	Quality Management	3	
	MKMI 2873	Industrial Measurement	3	
	MKMI 2883	Advanced Design of Experiment	3	
	MKMI 2893	Reliability Engineering	3	
	MKMI 3803	Modelling & Simulation	3	
	MKMI 3813	Information Technology for Industrial Engineering	3	
	MKMI 38x3	Special Topics (depend on current research areas)	3	
	MKMP 37x3	Option (Approved subjects in M.Sc. Advanced Manufacturing Technology)	3	
<b>Total Credit Value</b>			<b>40</b>	<b>100%</b>

### Program Educational Objectives (PEO)

PEO1: Graduates are able to apply the knowledge gained to identify, develop solution and solve problems related to **Industrial** engineering in various situations, effectively and ethically.

PEO2: Graduates are able to communicate and present ideas intellectually and effectively.

PEO3: Graduates are able to conduct research, manage and publish information and continue life-long learning

### **Program Learning Objectives (PLO)**

PLO1: Demonstrate advanced knowledge and capabilities to further develop or use these for new situations in **industrial** engineering.

PLO2: Demonstrate research skills in appraising available information and research evidence, and applying them in **industrial** engineering contexts

PLO3: Apply critical thinking and problem solving skills in addressing **industrial** engineering problems utilizing relevant tools and techniques.

PLO4: Perform research on **industrial** engineering problems professionally, ethically and responsibly.

PLO5: Communicate technical knowledge and ideas effectively in written and oral forms.

PLO6: Adopt the latest relevant knowledge and technologies through life-long learning.

### **GRADUATION CHECKLIST**

Students must pass all the stated courses in this checklist to graduate. It is the responsibility of the students to ensure that all courses are taken and passed. Students who do not complete any of the courses are not allowed to

graduate.

NO.	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (✓) IF PASSED
<b>UNIVERSITY GENERAL COURSES</b>					
1	U### ###3	University Course Electives	3	3	
<b>TOTAL CREDIT of UNIVERSITY GENERAL COURSES (a)</b>			3	3	
<b>PROGRAMME CORE COURSES</b>					
1	MKMI 1803	Production and Operations Management	3	3	
2	MKMI 1813	Supply Chain Management	3	3	
3	MKMI 1823	Human Factors Engineering	3	3	
4	MKMI 1833	Quality Engineering	3	3	
5	MKMI 1843	Operations Research	3	3	
6	MKMI 1903	Research Methodology	3	3	
<b>TOTAL CREDIT OF PROGRAMME CORE COURSES (b)</b>			18	18	
<b>MASTER PROJECT COURSES</b>					
1	MKMI 1914	Master Project I	4	4	
2	MKMI 2926	Master Project II	6	6	
<b>TOTAL CREDIT OF MASTER PROJECT COURSES (c)</b>			10	10	
<b>PROGRAMME ELECTIVES (3 COURSES)</b>					
1	MKMI 2##3 / 3##3	Elective 1	3	3	
2	MKMI 2##3 / 3##3	Elective 2	3	3	
3	MKMI 2##3 / 3##3	Elective 3	3	3	
<b>TOTAL CREDIT OF ELECTIVES COURSES (d)</b>			9	9	
<b>TOTAL CREDIT TO GRADUATE (a + b + c + d)</b>			<b>40</b>	<b>40</b>	

## **COURSE SYNOPSIS**

### **CORE COURSES**

#### **MKMI 1803 - Production and Operations Management**

Apply production and operations management concepts and issues from both strategic and operational perspectives. Analysis of strategic issues related to competitiveness in production and operations management, and application of tools to improve productivity in production and operations.

#### **MKMI 1813 - Supply Chain Management**

Supply chain design and management which covers supply chain drivers, supply chain strategy, roles of supply chain members and supply chain networks in order to satisfy end customers. This course also concerns about techniques for purchasing management, designing transportation networks, distribution issues, logistics management, integration issues and performance measurement.

#### **MKMI 1823 - Human Factors Engineering**

The course covers concepts and tools in human factors engineering for industrial application. Application and practice of ergonomics principles and methodology, solving industrial problems related to ergonomics. Information input and design, human physical work capacity, job design and task analysis.

#### **MKMI 1833 - Quality Engineering**

This course is about statistical methods in quality improvement. It encompasses various statistical process control problem-solving tools. For control charts, emphasis is given on additional control charts not covered previously at the undergraduate level. Advanced tools and techniques such as Gauge Reliability and Reproducibility (GR & R), and experimental design methodology are also covered.

#### **MKMI 1843 - Operations Research**

This course provides students with the concepts and tools to model manufacturing or service systems efficiently using mainly Operations Research techniques. It focuses on formulating models based on deterministic and stochastic Operations Research techniques, applying these techniques for decision making, developing solutions from the models, and conducting simulation studies.

#### **MKMI 1903 - Research Methodology**

This course aims to provide students with fundamental knowledge of research and the methodologies commonly used in engineering. It encompasses literature review, problem formulation, designing research methods, analysis methods and report writing.

### **ELECTIVE COURSES**

### **MKMI 2803 - Lean Manufacturing**

The course provides concepts related to lean manufacturing including Kaizen system, Value Stream Mapping (VSM), Just in Time (JIT), Kanban, Single Minute Exchange of Die (SMED) technique and line balancing. Selection of lean techniques for problem solving and waste minimization program are also covered.

### **MKMI 2813 - Facilities Planning and Design**

This course provides students with the concepts and issues related to selection of facilities locations, facilities layout planning and design at the macro and micro levels. It also introduces students to the planning and design of warehousing, material handling systems and its related equipment. It uses both, quantitative and qualitative approaches in the analyses, together with the application of several layout procedures, algorithms and computerized layout planning concepts within a typical manufacturing plant.

### **MKMI 2823 - Project Management**

This course enhances students to the myriad and exacting skills and knowledge expected of engineers in order to manage high risk projects and produce high quality deliverable within the time and cost constraints of an organization. It covers the phases of the project life-cycle, management deliverable, project charters, scope, work breakdown structures, activity lists, duration estimates, CPM/PERT network diagrams and risk analysis. This subject also covers scheduling resources and costs, reducing project duration as well progress performance measurement and evaluation.

### **MKMI 2833 - Advanced Engineering Economy and Accounting**

The course provides a broad managerial perspective on the strategic impact of financial and accounting activities to other activities of the firm. Evaluation of company's performance from financial statements, designing cost structures and determine costs of products or services for managerial use, Activity-Based Costing, time value of money, inflation, taxes, measures of worth of individual projects and alternatives, and methods for capital budgeting methods for long term projects.

### **MKMI 2843 - Engineering and Environmental Safety**

The course provides concepts of engineering safety and environmental safety beside some knowledge in the safety management of engineering and environment. In engineering safety, the focus is on the safety of equipment commonly used in engineering installation and maintenance, safety of chemicals used in engineering processes, and implementation of safety engineering programs in engineering installations and plants. In environmental safety, it provides the principles and concepts of environmental safety elements, hazardous waste control, environmental impact assessment, impact and cause of global warming, green design and manufacturing, sustainable energy and design for environment. It also includes hazard identification, risk assessment and control, planning and implementing an

effective safety program, and assessment of the effectiveness of safety program.

### **MKMI 2853 - Safety Management**

This course provides students with the issues related to safety management industry, the principles in hazard identification, risk assessment & control, planning & implementing an effective safety program, and assessment of the effectiveness of safety program.

### **MKMI 2863 - Quality Management**

The course covers the application of quality management concepts, principles, and philosophy. It also covers the Total Quality Management (TQM) in organization, and develops a strategy for the development of the TQM in an organization. It also applies the problem-solving processes and relevant tools for organizational improvement, and using the continuous improvement process for establishing a quality organization.

### **MKMI 2873 - Industrial Measurement**

This course covers industrial measurement system for achieving quality in manufacturing and operations. It focuses on the concepts and principles on how to measure quality, selection and design of measurement systems, and interpretation of quality data. Related research issues are highlighted.

### **MKMI 2883 - Advanced Design of Experiments**

This course is an extension of quality engineering where it focuses on engineering design of experiment technique for process and quality improvement. Involves application of Factorial Design, 2-level Fractional Factorial design, Fold Over and Plackett-Burman and design optimisation technique such as response surface methodology. Linear Regression and Taguchi Method for quality and process improvement will also be discussed.

### **MKMI 2893 - Reliability Engineering**

The course applies relevant statistical tools to solve reliability engineering problems, and conducts statistical data analysis to estimate reliability of component and system. The course also applies related reliability engineering knowledge to improve product quality.