MASTER OF SCIENCE (ADVANCED MANUFACTURING TECHNOLOGY)

PROGRAMME SPECIFICATION

Master of Science (Advanced Manufacturing Technology) aims to enhance participants with related knowledge and skills in advanced manufacturing technology related to various applications involving manufacturing problems. It is offered either on a full-time or part-time basis. The full-time programme is offered only at the UTM Main Campus, Johor Bahru while the part-time programme is offered at various learning centres 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 (Advanced Manufacturing Technology)
4.	Final Award	Master of Science (Advanced Manufacturing Technology)
5.	Programme Code	MKMA
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-Time)	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
University General Courses	U### ###3	University Electives	3	7.5%
Programme Core	MKMP1703	CAD/CAM	3	30%
	MKMP1713	Product Development and Manufacture	3	
	MKMP 1903	Research Methodology	3	
	MKMP 2763	Advanced Manufacturing	3	
Project	MKMP 1914	Master Project I	4	25%
	MKMP 2926	Master Project II	6	
Programme Electives (choose 5 courses only)	MKMP1723	Engineering and Technology Management	3	37.5%
	MKMP1733	Automation and Robotics	3	
	MKMP1743	Tooling for Production	3	
	MKMP1753	Manufacturing Science	3	
	MKMP1763	Design for Manufacture and Assembly	3	
	MKMP1773	Advanced Quality Engineering	3	
	MKMP 2703	Information Technology for Manufacturing	3	
	MKMP 2713	Computer Aided Process Planning	3	
	MKMP 2723	Modern Machining Processes	3	
	MKMP 2733	Computer Integrated Manufacturing	3	
	MKMP 2743	Production Operations and Management	3	
	MKMP 2753	Precision Engineering	3	
	MKMP 2773	Machining and Machine Tools Technology	3	
	MKMP 2003	Special Topic (subject to Faculty approval)	3	
	MKMP 2013	Special Topic (subject to Faculty approval)	3	
	MKMI x8x3	Option (Approved subjects in M.Sc Industrial Engineering)	3	
	MKxx xxx3	Free Engineering Elective	3	
Total Credit Value			**40**	**100%**

Program Educational Objectives (PEO)

PEO1: Graduates are able to apply the knowledge gained to identify, develop solution and solve problems related to manufacturing 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 manufacturing engineering.

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

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

PLO4: Perform research on manufacturing 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
UNIVERSITY GENERAL COURSES					
1	U### ###3	University Course Electives	3	3	
TOTAL CREDIT of UNIVERSITY GENERAL COURSES (a)			3	3	
PROGRAMME CORE COURSES					
1	MKMP1703	CAD/CAM	3	3	
2	MKMP1713	Product Development and Manufacture	3	3	
4	MKMP 1903	Research Methodology	3	3	
3	MKMP2763	Advanced Manufacturing	3	3	
TOTAL CREDIT OF PROGRAMME CORE COURSES (b)			12	12	
MASTER PROJECT COURSES					
1	MKMP 1914	Master Project I	4	4	
2	MKMP 2926	Master Project II	6	6	
TOTAL CREDIT OF MASTER PROJECT COURSES (c)			10	10	
PROGRAMME ELECTIVES (5 COURSES)					
1	MKMP 2##3	Elective 1	3	3	
2	MKMP 2##3	Elective 2	3	3	
3	MKMP 2##3	Elective 3	3	3	
4	MKMP 2##3	Elective 4	3	3	
5	MKMP 2##3	Elective 5	3	3	
TOTAL CREDIT OF ELECTIVES COURSES (d)			15	15	
TOTAL CREDIT TO GRADUATE (a + b + c + d)			**40**	**40**	

COURSE SYNOPSIS

CORE COURSES

MKMP 1703 - CAD/CAM
This course provides basic techniques involved in computer graphics and modelling. Issues in the selection, implementation and management of a Computer Aided Design (CAD) system or a Computer Aided Manufacturing (CAM) system. It also covers the importance of CAM, CNC machine technology, manufacturing systems and programming. Students are required to complete CAD/CAM projects using up-to-date facilities available in the Production Laboratory.

MKMP 1713 - Product Development and Manufacture
This course introduces the product development and manufacture activities and fundamentals. Main content explains the issues affecting needs for reduction of product development cycle times, phases of product design and development, and capturing customer requirements. The course also defines product needs and development of product specifications, product selection, product architecture and prototyping. It involves the manufacturing aspects in terms of components classification, process selection, materials and component manufacture, finishing and assembly operation.

MKMP 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.

MKMP 2763 - Advanced Manufacturing
This course focuses on automation and advanced techniques used in modern manufacturing, various automation systems, their applications and advantages. The topics include principles and basic concepts of CAD/CAM, CAPP and their applications in various manufacturing automation systems such as GT, FMC, FMS and CIM. It also covers the CNC technology and part programming of simple components. Current issues related to advanced manufacturing practices such as lean, agile, networking and cyber manufacturing are also highlighted. Students will be assigned a case study related to advanced manufacturing.

ELECTIVE COURSES

MKMP 1723 - Engineering and Technology Management
This course introduces the fundamental of engineering management, function of management, planning, coordinating, organising, leading and monitoring in an engineering context to train engineers as managers. The topics include the introduction to technology management, definition, components of technology, technology acquisition strategies, case studies of technology transfer, competitive advantage of organisations, characteristics of fast response organisations, innovation management and intellectual property.

MKMP 1733 - Automation & Robotics

This course delivers the principles of design and selection of automated systems in a manufacturing perspective where software and hardware involved in an automation system. Example of robotic technology and its use in various industrial applications is also given.

MKMP 1743 - Tooling for Production

This course aims to equip students with fundamental knowledge of tooling used in production. The topics include introduction to various toolings, their importance, design procedures and responsibilities of a tooling engineer. Procedures in designing jigs and fixtures and selection of tooling for various applications are also delivered. The course also covers the selection and design of the various types of dies for press working. It utilises computer aided analysis of jigs and fixture design and stamping dies.

MKMP 1753 - Manufacturing Sciences

This course aims to provide basic principles and theories of various manufacturing processes. Characteristics of the processes including the setting of parameters for processes and tooling are also given. The course also uses basic case study as a basis for further analysis and development of manufacturing techniques.

MKMP 1763 - Design for Manufacture and Assembly

This course focuses on the cost reduction by drawing attention to the design procedures to assist manufacture and assembly. The intention is to provide design philosophy on how to improve product design for easy and low-cost manufacturing and assembly. The course also highlights issues in designing for casting, welding, machining and other manufacturing processes and products that require assembly.

MKMP 1773 - Advanced Quality Engineering

This course is designed to expose the students to engineering design of experiments technique for process and quality improvement. It involves the application of Factorial Design, 2-level Fractional Factorial design, Fold Over and Plackett-Burman and design optimisation techniques such as response surface methodology. Taguchi Method for quality and process improvement will also be discussed.

MKMP 2703 – Information Technology for Manufacturing

This course introduces the concepts of Information Technology (IT) and the importance of IT in manufacturing. Basic software, operating systems and existing IT tools are amongst the topics covered. Relationship between the role of IT and design methods, implementation and managing IT systems are also included.

MKMP 2713 - Computer Aided Process Planning

This course provides introductory knowledge on the role of process planning in CAD/CAM integration. Basic approaches in Computer Aided Process Planning (CAPP) systems and their implementation techniques will be discussed. The course also provides a case study to demonstrate the selection criteria for CAPP systems.

MKMP 2723 - Modern Machining Processes

This course covers the principles and basic theories of various modern machining processes. Characteristics of processes including process parameters, rate of material removal, surface finish, accuracy and characteristics of shapes produced will be covered. Materials that may be processed, effects of processes on material properties and tooling considerations will also be discussed. It also highlights the process equipment and applications of modern machining processes.

MKMP 2733 - Computer Integrated Manufacturing

This course covers the philosophy of Computer Integrated Manufacturing (CIM) architecture in the context of modern manufacturing system. It includes topics such as the relationship between CAD/CAM, CAE and CIM. Various tools and software used in CIM system will be introduced. The overall aim is to provide awareness on how an organisation can be equipped in basics of design, implementation and management of CIM systems.

MKMP 2743 - Production Operations and Management

This course aims to present the principles and basic production operations management. Topics include techniques and strategies practiced in operations management, quantitative and qualitative techniques in decision making and state-of-the-art techniques in operation management.

MKMP 2753 - Precision Engineering

This course focuses on the basic theories of ultra-precision turning and grinding and their departure from Merchant's theory. It covers the fundamentals of special elements in ultra-precision turning and grinding machines such as hydrostatic and aerostatic bearings, linear motor and, C drives. Other topics such as single-crystal diamond cutting tools and diamond wheels for ultra-precision machining, Taniguchi's classification of precision engineering products, their tolerances, and their fabrication will also be included. Examples on how to manufacture MEMS (Micro Electro Mechanical Sensors) using LIGA and FIB techniques will be presented.

MKMP 2773 - Machining & Machine Tools Technology

This course covers the basic metal cutting operations for product manufacture and machine tool technology. Various aspects of machine tool technology are addressed such as the constructional and design features, major components, drives, vibration and chatter, machine tool metrology, machine tool maintenance and troubleshooting. Students are given various individual assignments and exercises, and group-based case study.