

MASTER OF ENGINEERING (ENVIRONMENTAL MANAGEMENT)

PROGRAMME SPECIFICATIONS

1. Programme Name		Masters of Engineering (Environmental Management)	
2. Final Award		Masters of Engineering (Environmental Management)	
3. Awarding Institution		UTM	
4. Teaching Institution		UTM	
5. Programme Code		MKAK	
6. Professional or Statutory Body of Accreditation		MQA	
7. Language(s) of Instruction		English	
8. Mode of Study (Conventional, distance learning, etc)		Conventional	
9. Mode of operation (Franchise, self-govern, etc)		Self-governing	
10. Study Scheme (Full Time/Part Time)		Full Time	
11. Study Duration		Min: 3 semesters Max: 6 semesters	
12. Entry Requirement	<ol style="list-style-type: none"> 1. Bachelor degree with good honours from UTM or other institution of higher learning recognized by university senate, OR, 2. A Bachelor degree or any other equivalent qualification; with relevant experience recognized by the University Senate. 		
13. Programme Objectives			
<p>PEO 1 Mastery of competencies and integration of knowledge required in the engineering profession.</p> <p>PEO 2 An appreciation of the value of lifelong learning and possessing enthusiasm and strong commitment to continued acquisition of new knowledge and skills.</p> <p>PEO 3 Advanced leadership and team working skills that allow engineers and professionals to become visionary and inspirational leaders.</p> <p>PEO 4 Highly developed oral and written communications skills that fit at all level, appropriate to the field of civil engineering.</p> <p>PEO5 an understanding of moral and ethical challenges that arise in the engineering profession, management and governance.</p>			
14. Programme Learning Outcomes (PLO)			
Code	Intended Learning Outcomes	Teaching and Learning Methods	Assessment
(a) Technical Knowledge and Competencies			
PLO1	Advanced Knowledge Graduates are able to incorporate in-depth relevant knowledge in professional practices for the benefits of both national and international communities. Graduates are able to apply their knowledge and skills in the planning, analysis, design and supervision of works related to the civil engineering discipline.	Lectures, seminars, projects, directed reading, tutorials independent study, active learning	Examinations, group and individual project reports, presentations, assignments, problem-based exercises
PLO2	Research Skills Graduates are able to formulate hypothesis, design and perform experiments/research scientifically to solve and explain observed phenomena.	Lectures, seminars, projects, directed reading, tutorials independent study, active learning	Examinations, presentations, assignments, problem-based exercises, project reports, design tasks, simulation exercises

PLO3	Critical Thinking & Problem Solving Graduates are able to manage conducive working environment qualities problem solving and higher order thinking skills. Graduate are technically competent in solving problems logically, analytically and creatively based on sound facts and ideas.	Computer hands-on sessions, laboratory/field works, lectures, independent study, seminars, active learning, projects	Examinations, presentations, assignments, problem-based exercises, project reports, design tasks, simulation exercises
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(b) Generic Skills

PLO4	Ethics, Values and Professionalism Graduates are able to balance professional and ethical responsibilities including contemporary issues and environmental awareness.	Pre-Projects and Masters Project, lectures, tutorials, group projects, independent study	Masters Project thesis, project reports, design tasks, examinations, presentations, assignments
PLO5	Communication Graduates are able to apply a wide range of relevant knowledge through effective oral and written communication. Graduate are able to communicate effectively across a range of contexts and audiences.	Lectures, tutorials, directed reading, simulation exercises, group project, independent study, problem-based learning, projects	Masters Project thesis, project reports, design tasks, examinations, presentations, assignments
PLO6	Lifelong Learning Graduates are able to adopt the latest relevant knowledge and cutting-edge technologies through life-long learning process.	Group projects, independent study, field trips	Oral presentations, project reports

15. Classification of Courses

No.	Classification	Credit Hours	Percentage
i.	University	6	13 %
iii.	Programme Core	28	61 %
iv.	Programme Electives	6	13 %
v.	Free Electives	6	13 %
	Total	46	100%

For engineering programme please fill up the following classification. (Others please refer to the Statutory Body guidelines)

A	Engineering Subjects		
	(a) Lecture/Project/Design studio	30	87%
	(b) Masters Project	10	
	Total credit hours for Part A	40	

B	Related Subjects (a) Management/Law/Humanities/Ethics	6	13%
	Total credit hours for Part B	6	
Total Credit Hours for Parts A and B		46	100%

16. Total credit hours to graduate 46 credit hours

17. Programme Structures and Features, Curriculum and Award Requirements

The course is offered on full-time mode and is based on a 2-Semester Academic Session with several courses being delivered and assessed in each Semester. Assessment is based on final examination and coursework conducted throughout the semester.

University's General Elective Subject (Total : 6 credits)

UABA 0013	Principle Engineering Management	3 credits
UAPA 0013	Research Methodology	3 credits

Core Subjects – Six subjects (Total : 18 credits)

MKAK 1003	Environmental Management and Sustainability	3 credits
MKAK 1133	Water Pollution Control	3 credits
MKAK 1053	Solid Waste Management	3 credits
MKAK 1103	Air and Noise Pollution	3 credits
MKAK 1083	Landuse and Environmental Planning	3 credits
MKAK 1063	Water Quality Assessment and Management	3 credits

Elective Subjects – Choose any two from the following list (Total : 6 credits)

MKAK 1013	Environmental Assessment and Management System	3 credits
MKAK 1073	Sludge Management	3 credits
MKAK 1043	Environmental Quality and Analysis	3 credits
MKAK 1123	Physico-chemical Treatment Processes	3 credits
MKAK 1333	Biological Treatment Processes	3 credits
MKAK 1143	Environmental Economics	3 credits
MKAK 1153	Environmental and Transport Planning	3 credits

Free Elective Subjects (Total : 6 credits)

Choose any two subjects offered by other programmes or other faculties or from the above elective subjects 6 credits

Masters Project (Total :10 credits)

MKAK 1514	Masters Project 1	4 credits
MKAK 1526	Masters Project 2	6 credits

TOTAL 46 credits

Award requirements:

To graduate, students should:

- Attain a total of no less than 46 credit hours with minimum CPA of 3.0.
- Complete and pass the Master Project.

18. Mapping of Programme Learning Outcomes to Subjects

CORE & ELECTIVE ENGINEERING SUBJECTS OFFERED		LEARNING OUTCOME					
Code	Course	PO1	PO2	PO3	PO4	PO5	PO6
Core Course							
MKAK 1003	Environmental Management and Sustainability	√		√		√	
MKAK 1133	Water Pollution Control	√		√		√	
MKAK 1053	Solid Waste Management	√		√	√		
MKAK 1103	Air and Noise Pollution	√		√		√	√
MKAK 1083	Landuse and Environmental Planning	√		√		√	
MKAK 1063	Water Quality Assessment and Management	√		√		√	√

MKAK 1514	Master Pre-Project	√	√	√	√	√	√
MKAK 1526	Master Project	√	√	√	√	√	√
UABA 0013	Principle Engineering Management	√	√	√	√		
UAPA 0013	Research Methodology	√	√	√	√		√

CORE & ELECTIVE ENGINEERING SUBJECTS OFFERED		LEARNING OUTCOME					
Code	Course	PO1	PO2	PO3	PO4	PO5	PO6
Elective Course							
MKAK 1013	Environmental Assessment and Management System	√		√	√	√	
MKAK 1073	Sludge Management	√		√			√
MKAK 1043	Environmental Quality and Analysis	√		√		√	
MKAK 1123	Physico-chemical Treatment Processes	√		√		√	√
MKAK 1333	Biological Treatment Processes	√		√			√
MKAK 1143	Environmental Economics	√		√		√	
MKAK 1153	Environment and Transport Planning	√		√		√	

19. Our Uniqueness

1. Employability rate
2. Leaders in industry
3. Diversity of lecturers
4. Biggest Civil Engineering School/ Faculty in the world
5. One of the biggest Civil Engineering lab/ facilities in the region
6. ISO 9001:2000 and ISO 17025 accreditations

20. Career Prospects and Career Path

Graduates of the programme can work as Environmental Engineer, Environmental Manager, Environmental Officer, EIA consultant, Water and Wastewater Treatment Plant Consultant, Engineer, and Contractor, Academicians and Researchers.

21. Facilities available

List of laboratories and centres:

1. Structural Engineering Laboratory
2. Material Engineering Laboratory
3. Hydraulics and Hydrology Laboratory
4. Environmental Laboratory
5. Geotechnical Laboratory
6. Highway & Transportation Laboratory
7. Computer Laboratory
8. CETU
9. ITUCE
10. Resource Centre
11. Surveying Unit

CURRICULUM STRUCTURE

University's General Elective Courses(Total : 5 credits)		
UABA 0013	Principle Engineering Management	3 credits
UAPA 0013	Research Methodology	3 credits
Core Courses (Total : 18 credits)		
MKAK 1003	Environmental Management & Sustainability	3 credits
MKAK 1053	Solid Waste Management	3 credits
MKAK 1063	Water Quality Assessment and Management	3 credits
MKAK 1083	Landuse and Environmental Planning	3 credits
MKAK 1103	Air and Noise Pollution	3 credits
MKAK 1133	Water Pollution Control	3 credits

Elective Courses – Choose any two from the following list (Total : 6 credits)		
MKAK 1013	Environmental Assessment and Management	3 credits
MKAK 1043	Systems	3 credits
MKAK 1073	Environmental Quality & Analysis	3 credits
MKAK 1123	Sludge Management	3 credits
MKAK 1143	Physico-chemical Treatment Processes	3 credits
MKAK 1153	Environmental Economics	3 credits
MKAK 1333	Environment and Transport Planning Biological Treatment Processes	3 credits
Free Elective Courses (Total : 6 credits)		
Choose any two subjects offered by other programmes, by other, faculties, or from the above elective subjects		6 credits
Masters Project (Total : 7 credits)		
MKAK 1514	Master Project 1	3 credits
MKAK 1526	Master Project 2	4 credits
TOTAL CREDITS		46 credits
Duration of Study		
Full Time	:	2 – 6 semester

COURSE SYNOPSIS

CORE COURSES

MKAK 1003 - Environmental Management and Sustainability

This course is designed to expose students to various aspects in environmental management and the concept of sustainability. Topics discussed include the principles of sustainable development, understanding the environmental sensitive areas particularly the natural water bodies, catchment management, development of coastal and inland areas. Current issues related to environmental problems especially on climate change and water supply are the main aspects to be addressed. Some methods and concepts of sustainable approaches are introduced in order to promote and achieve sustainable development goals. At the end of the course, the students should be able to understand the concept of environmental sustainability. The course enables the students to understand, plan and incorporate the concept of sustainability in environmental management.

MKAK 1053 - Solid Waste Management

This is an elective course intended designed to expose students with a comprehensive understanding in solid waste management. It provides the students with an overview of solid waste management, particularly municipal solid waste. The program includes discussion on the practices of municipal waste management, sources of wastes, generation rate and characteristics (physical and chemical properties), analysis of collection systems, handling of waste and disposal practices of municipal waste. Processing and recycling of wastes are also discussed. At the end of the course, students should be able to apply the theory and knowledge of managing municipal solid waste. The students should also be able to work in a team and able to present works through a written report as well as an oral presentation.

MKAK 1063 - Water Quality Assessment and Management

This course is designed to expose students to current trends and various aspects in water quality assessment and management for river catchments, lakes, reservoirs and wetlands. It tackles problems involving water pollution and its impacts on the environment and legislation. Water quality monitoring projects carried out by students will enable application of proper sampling and monitoring methods. At the end of the course students will then be able to assess water quality problems and plan mitigation and control measures for water pollution.

MKAK 1083 - Landuse And Environmental Planning

This course covers the fundamental concepts and mechanisms underlying land use and environmental planning from conceptual to its implementation. It focuses on the understanding of ecosystems, the impacts of land development activities along with the appropriate tools/techniques of environmental planning and management used to mitigate them. It provides an overview of the field, along with the fundamentals of land use planning, and presents a collaborative approach to environmental planning while explaining the principles of ecosystem management, restoration, and protection; land conservation; and the mitigation of natural hazards.

MKAK 1103 - Air and Noise Pollution

This course is designed to expose students with a comprehensive understanding in elements involved in air and noise pollution, and the practical approaches to control the pollution. In the air pollution part, topics discussed include elements and phenomena of air pollution, meteorology, control of air pollution and design considerations. In a noise pollution part, topics discussed include elements of noise pollution, effects, types of noise pollution, road traffic & aircraft/industrial noise. At the end of the course, students should acquire the fundamental knowledge related to the principles and control strategies of air and noise pollutions.

MKAK1133 - Water Pollution Control

This course introduces students to water and domestic wastewater treatment

system. The content is designed to enable students to understand the processes that are involved in treating water and domestic wastewater. Students will be introduced to characterization of water and wastewater based on basic water quality parameters. This is followed by water treatment processes, which include coagulation, flocculation, sedimentation, filtration and disinfection. Topics on domestic wastewater treatment includes suspended growth processes i.e. activated sludge, oxidation pond, aerated lagoon and biofilm process i.e. biofilter. Students will be given the basic concept of each process and its conceptual design and analysis.

ELECTIVE COURSES

MKAK 1013 - Environmental Assessment and Management

This course is designed to expose the students to environmental and risk assessment. Topics discussed include the requirement of identification of environmental issues, environmental assessment during preliminary site assessment (PAT), site preparation and construction, project operational and management, and project abandonment, scope of assessment including data collection, prediction of impacts and mitigating measures. Students will also learn about the concepts of Environmental Management Plan (EMP), Environmental Management System (EMS), Environmental Management Compliance Plan (EMCP), Health Risk Assessment (HRA), as well as Quantitative and Qualitative Risk Assessment (QRA). At the end of the course, the student should be able to assess the environmental quality through environmental assessment and risk assessment. The course enables the students to realize the importance of managing the environment, through land-use projects' assessment as well as effective communication, while integrating ethical values during the assessment process.

MKAK 1043 - Environmental Quality and Analysis

This course is designed to expose and train students on analytical principles and method for analyzing environmental quality. Topics discussed will include the theory and practical approaches of analytical tools based on biological, chemical and physical properties and methods. The quality parameters are BOD, COD, TOC, DO, metals constituents, inorganic and organic impurities in air and water samples. Methods based on biological tools are also introduced to the students. Among instrumentations employed for the course are UV VIS spectrophotometer, HPLC, GC, AA spectrometer and IR spectrometer. The students are also required to conduct analysis in laboratory. At the end of the course, the student should be able to explain, determine and apply the methods for environmental analysis.

MKAK 1073 - Sludge Management

This course aimed to expose students to scientific knowledge of sludge processing and sustainable sludge management. The topics include importance of sludge management, sludge quantities and characteristics, sludge treatment and stabilization, conversion of sludge to bio-products as well as the various sludge reduction techniques. At the end of the course, the students should be able to employ and distinguish the different scientific fundamental concepts in sludge treatment processes, which are important for the students to recommend suitable treatment method for different industrial and municipal sludge characteristics for environmental sustainability.

MKAK 1123 - Physico-Chemical Treatment Processes

This course emphasizes on physico-chemical processes of water and wastewater treatment. The content is tailored to enable students to understand, analyze and apply essential theories and principles in removing various types of contaminant from water and wastewater using physico-chemical processes. Students will be introduced to process fundamentals which include thermodynamic and kinetics of reaction, mass balance concept and reactor analysis. Processes that will be discussed include aeration and air stripping, chemical oxidation, disinfection, chemical precipitation, coagulation, sedimentation, filtration, carbon adsorption, ion exchange and membrane processes. Students will be given the basic concept of each process, its applications, advantages and weaknesses. The conceptual design and analysis will be explained in detail.

MKAK 1143 - Environmental Economics

This is an elective course is design to explores the fundamental concepts of economic foundations for decision-making about environmental issues. Designed for students with no training in Economics, the modules will overview at introductory graduate level the basic principle of environmental economics, in three main areas of handling environmental resource; economics instruments of environmental policies; and valuation of cost-benefit from environmental changes. Variety of complex environmental engineering problems related to the environmental protection of water, air and soil will be introduced

MKAK1153 - Environment and Transport Planning

This course analyzes key concepts in the study of transport, energy and the environment, including sustainability. It looks at the importance of transportation-related environmental problems as well as environmental impacts of transport schemes, in the global, national, regional and with particular reference to Malaysia. The course will focus on current transport-related themes confronting many cities in the region, including: rapid motorization and suburbanization and subsequent impacts on transportation infrastructure and quality of life; public sector management and improvement of privately-owned and operated transit systems; and, transportation air

pollution problems and potential solutions.

The course will consist of a series of lectures on the principal issues surrounding transportation in the developing world (including motorization, fiscal pressures, urban sprawl), concepts of sustainability as they relate to urban transportation, regional strategic planning approaches, and transportation policy and technology options and examples of successful implementation.

MKAK 1333 - Biological Treatment Processes

The course is designed to expose students to biological treatment processes in engineered wastewater system. It covers major wastewater engineering aspects, which include process analysis and design, treatment technologies, and modelling. It will include typical calculation, design and analysis of common biological treatment processes. At the end of the course, students should be able to incorporate the knowledge in the planning, design and operation and maintenance of wastewater treatment system.