MASTER OF FORENSIC ENGINEERING

PROGRAMME SPECIFICATIONS

1. Programme Name	Masters of Forensic Engineering	
2. Final Award	Masters of Forensic Engineering	
3. Awarding Institution	UTM	
4. Teaching Institution	UTM	
5. Programme Code	MKAX	
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	Bachelor degree with good honours from UTM or other institution of higher learning recognized by university senate, OR, A Bachelor degree or any other equivalent qualification; with relevant experience recognized by the University Senate.	

13. Programme Objectives

PEO 1 Mastery of competencies and integration of knowledge required in the engineering profession.
PEO 2 An appreciation of the value of lifelong learning and possessing enthusiasm and strong commitment to continued acquisition of new knowledge and skills.
PEO 3 Advanced leadership and team working skills that allow engineers and professionals to become visionary and inspirational leaders.
PEO 4 Highly developed oral and written communications skills that fit at all level, appropriate to the field of civil engineering.
PEO5 An understanding of moral and ethical challenges that arise in the engineering profession, management and governance.

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	Lectures, seminars, projects, directed reading, tutorials independent study, active learning	Examinations, group and individual project reports, presentations, assignments, problem-based exercises

	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.		
PLO2	Research Skills Graduates are able to formulate hyphothesis, 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
(b) Generic Skills			
PLO4	Ethics, Values and Professionalism Graduates are able to balance professional and ethical	Pre-Projects and Masters Project, lectures, tutorials, group projects, independent study	Masters Project thesis, project reports, design tasks, examinations, presentations, assignments

	responsibilities including contemporary issues and environmental awareness.		
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	60.9 %
iv.	Programme Electives	12	26.1 %
v.	Free Electives	-	-
	Total	46	100%

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

A	Engineering Subjects Lecture/Project/Design studio Masters Project	 18 10	60.9%
	Total credit hours for Part A	28	
B	Related Subjects Management/Law/Humanities/Ethics	 18	29.1%
	Total credit hours for Part B	18	
	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 Managment 3 credits
UAPA 0013 Research Methodology 3 credits

Core Subjects – Six subjects (Total : 18 credits)
MKAR 1013 Principles of Forensic Engineering 3 credits
MKAR 1023 Laws in Forensic Engineering 3 credits
MKAR 1033 Safety Engineering 3 credits
MKAR 1043 Risk Analysis 3 credits
MKAR 1053 Investigation of Structural Problems & Failures 3 credits
MKAE 1043 Advanced Construction Materials 3 credits

Elective Subjects – Choose any four from the following list (Total : 12 credits)
MKAE 1013 Advanced Structural Analysis 3 credits
MKAE 1023 Analysis & Design of Structural System 3 credits
MKAE 1153 Advanced Concrete Technology 3 credits
MKAE 1213. Fire Resistance of Structures 3 credits
MKAJ 1053 Software Application in Geotechnical Engineering 3 credits
MKAJ 1083 Environmental Geotechnics 3 credits
MKAG 1173 Water Supply Engineering 3 credits
MKAG 1193 Port & Harbour Engineering 3 credits
MKAQ 1093 Transport Safety 3 credits
MKAK 1043 Environmental Quality & Analysis 3 credits
MKMJ 2163 Crashworthiness & Structural Impact 3 credits
MKMB 1623 Microstructure & Mechanical Properties of Materials 3 credits
MKMB 1603 Advanced Techniques of Materials Characterization 3 credits
MKMB 2613 Corrosion 1 3 credits
MKMB 2653 Corrosion 2 3 credits
MKEL 1133 IC Testing 3 credits
MKEP 1003 Electrical System Forensic 3 credits
MKET 1393 Network Modeling & Performance 3 credits
MKEP 1103 Condition Assessment of High Voltage Insulation. 3 credits
MKKH 1253 Asset Integrity 3 credits
MKKH 1243 Process Safety & Loss Prevention 3 credits
MKKH 1343 Incident Investigation 3 credits
MKKH 1233 Emergency Response Management 3 credits
MKKH 1223 Inherent Safety & Health Design 3 credits

Masters Project (Total :10 credits)

MKAK 1514	Masters Project 1	4 credits
MKAE 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	PO 1	PO2	PO 3	PO 4	PO 5	PO 6
Core Course							
MKAR 1013	Principles of Forensic Engineering	√		√		√	
MKAR 1023	Laws in Forensic Engineering	√			√		
MKAR 1033	Safety Engineering	√	√				√
MKAR 1043	Risk Analysis	√		√			√
MKAR 1053	Investigation of Structural Problems & Failures		√	√		√	
MKAE 1043	Advanced Construction Materials	√					√
MKAR 1514	Master Pre-Project	√	√	√	√	√	√
MKAR 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							
MKAE 1013	Advanced Structural Analysis	√		√			
MKAE 1023	Analysis & Design of Structural System	√		√			

MKAE 1153	Advanced Concrete Technology	√		√		√	
MKAE1213	Fire Resistance of Structures			√			√
MKAJ 1053	Software Application in Geotechnical Engineering	√		√		√	
MKAJ 1083	Environmental Geotechnics	√		√			√
MKAG 1173	Water Supply Engineering	√		√			√
MKAG 1193	Port & Harbour Engineering	√		√		√	
MKAQ 1023	Advanced Road Material	√		√			
MKAQ 1093	Transport Safety	√					√
MKAK 1043	Environmental Quality & Analysis	√		√	√		√
MKMJ 2163	Crashworthiness & Structural Impact	√		√		√	
MKMB 1623	Microstructure & Mechanical Properties of Materials	√		√			√
MKMB 1603	Advanced Techniques of Materials Characterization	√		√		√	
MKMB 2613	Corrosion 1	√		√		√	√
MKMB 2653	Corrosion 2	√		√		√	
MKEL 1133	IC Testing	√		√	√	√	√
MKEP 1003	Electrical System Forensic	√	√	√	√		
MKET 1393	Network Modeling & Performance	√	√				
MKEP 1103	Condition Assessment of High Voltage Insulation	√	√				
MKKH 1253	Asset Integrity	√		√	√	√	
MKKH 1243	Process Safety & Loss Prevention	√		√			
MKKH 1343	Incident Investigation	√		√			√
MKKH 1233	Emergency Response Management	√	√		√		
MKKH 1223	Inherent Safety & Health Design	√		√	√		
19. Our Uniqueness							

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

20. Career Prospects and Career Path

Graduates of the programme can work as a Forensic Engineer, Project Engineer or Academicians and Researchers.

21. Facilities available

List of laboratories and centres:
Structural Engineering Laboratory
Material Engineering Laboratory
Hydraulics and Hydrology Laboratory
Environmental Laboratory
Geotechnical Laboratory
Highway & Transportation Laboratory
Computer Laboratory
CETU
ITUCE
Resource Centre
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)		
MKAR 1013	Principles of Forensic Engineering	3 credits
MKAR 1023	Laws in Forensic Engineering	3 credits
MKAR 1033	Safety Engineering	3 credits
MKAR 1043	Risk Analysis	3 credits
MKAE 1043	Advanced Construction Materials	3 credits
MKAR 1053	Investigation of Structural Problems & Failure	3 credits
Elective Courses – Choose any four from the following list (Total : 12 credits)		
MKEP 1003	Electrical System Forensic	3 credits
MKAE 1013	Advanced Structural Analysis	3 credits
MKAE 1023	Analysis & Design of Structural System	3 credits
MKAQ 1023	Advanced Road Material	3 credits
MKAK 1043	Environmental Quality & Analysis	3 credits
MKAJ 1053	Software Application in Geotechnical Engineering	3 credits
MKAJ 1083	Environmental Geotechnics Transport Safety	3 credits
MKAQ 1093	Condition Assessment of High Voltage Insulation	3 credits
MKEP 1103	IC Testing	3 credits
MKEL 1133	Advanced Concrete Technology Water Supply Engineering	3 credits
MKAE 1153	Port & Harbour Engineering	3 credits
MKAG 1173	Fire Resistance of Structures	3 credits
MKAG 1193	Inherent Safety & Health Design	3 credits
MKAE 1213	Emergency Response Management	3 credits
MKKH 1223	Process Safety & Loss Prevention	3 credits
MKKH 1233	Asset Integrity	3 credits
MKKH 1243	Incident Investigation	3 credits
MKKH 1253	Network Modeling & Performance	3 credits
MKKH 1343	Advanced Techniques of Materials Characterization	3 credits
MKET 1393	Microstructure & Mechanical Properties of Materials	3 credits
MKMB 1603	Crashworthiness & Structural Impact Corrosion 1	3 credits
MKMB 1623	Corrosion 2	3 credits
MKMJ 2163		3 credits
MKMB 2613		3 credits
MKMB 2653		3 credits
Masters Project (Total : 10 credits)		
MKAK 1514	Master Project 1	4 credits

MKAK 1526	Master Project 2	6 credits
TOTAL CREDITS		46 credits
Duration of Study		
Full Time	:	3 – 6 semester

COURSE SYNOPSIS

CORE COURSES

MKAR 1013 - Principles of Forensic Engineering
This course is designed for students to understand the activities of forensic experts in the engineering professions. It covers aspects of forensic activity that are common to all disciplines such as clients, and scope and purpose of investigation, techniques, procedures and tools used in investigation and analysis. Interface with forensic specialists from other discipline. Impact of forensic activity on improved practices, products, or planning to reduce the frequency and severity of failures.

MKAR 1023 - Laws in Forensic Engineering
This course introduces students to laws related to the professional engineering practices. The course will emphasize on two main liabilities; tort, and statutory liabilities. The role of professional as expert witness will be introduced in law of evidence so as the students will be familiar to the role of expert witness and the procedures involved during experts at trial. The focus will be on building a credible and believable testimony. At the end of the course, the students are expected to understand the legal setting in the practice and be able to analyse and apply critical reasoning and make informed judgement in addressing legal issues in engineering practice and to stand as credible expert witness.

MKAR 1033 - Safety Engineering
This subject fundamental concept of safety engineering, and understanding 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.

MKAR 1043 - Risk Analysis
This course aims to give students a comprehensive exposure to structural safety, risk assessment and reliability engineering concept related to civil engineering system. The course contents consist of four different module named Systems Reliability, Safety & Risk, Data Analysis & Simulation and Risk Assessment & Safety Management. Safety & Risk leads to an understanding of the principles of structural reliability theory and its application to risk and reliability engineering. Data Analysis & Simulation is designed to develop knowledge of statistical data analysis and its application in engineering and science and introduces the concepts of using simulation techniques for analysis of complex systems. It also teaches linear optimization techniques and the ability to apply them to solve simple problems. In Systems Reliability, this section gives an understanding of the qualitative and quantitative techniques that are used in the reliability, availability and maintainability analysis of all types of engineering systems. The final part of this course, Risk Assessment & Safety Management gives student an appreciation of risk from individual and societal perspectives as well as

understanding the basic principles of risk assessment and modelling and how safety management works in practice

MKAE 1043 – Advanced Construction Materials

This course is designed for students to acquire or gain knowledge on advanced construction materials in civil engineering. It will emphasize on the use of advanced and new materials in concrete, masonry, highway, and geotechnic. The topics covered include the types of concrete in construction, concrete mix proportions or design, the use of waste materials and industrial by-products in concrete, natural fibres and polymer in concrete, production of high performance and durable concrete; development of modern masonry units in construction, properties and strength of masonry work; design and construction of flexible and rigid pavement, bituminous surfacing; and geosynthetics materials. At the end of the course students should be able to describe, identify, and discuss the properties and behaviour of different types of civil engineering materials together with the selection and applications of the materials for any particular use in practice.

MKAR 1053 - Investigation of Structural Problems and Failures

This course is designed to expose the students on how to conduct forensic engineering investigation according to recommended scientific methods and engineering practice. It covers the different types of problems and failures in engineering infrastructures, the process of investigation as well as the tools and techniques commonly used in forensic engineering. The course also includes the use of various NDT techniques in forensic engineering investigation, how the results are interpreted and how failure hypothesis is developed to determine probable cause or causes of failure. The students will also learn how to present forensic engineering investigation results and gain a basic knowledge on legal aspects of forensic engineering.