MASTER OF SCIENCE (SHIP AND OFFSHORE ENGINEERING)

PROGRAMME SPECIFICATIONS

The Master of Science (Ship and Offshore 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 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 (Ship and Offshore Engineering)	
4. Final Award			Master of Science (Ship and Offshore Engineering)	
5. Programme Code			MKMB	
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	MKMO 1213	Dynamics of Marine Structures	3	45%
	MKMO 1713	Ship and Offshore Production Technology	3	
	MKMO 1903	Research Methodology	3	
	MKMO 2113	Strength and Vibration of Marine Structures	3	
	MKMO 2813	Maritime Safety and Risk	3	
	MKMO 3843	Maritime Management and Law	3	
Project	MKMO 1914	Master Project I	4	25%
	MKMO 2926	Master Project II	6	
Programme Electives **(choose 3 courses only)**	MKMO 1413	Dynamics of Marine Power Plant	3	22.5%
	MKMO 1913	Experimental Techniques in Ship and Offshore Engineering	3	
	MKMO 2013	Computer Methods in Ship and Offshore Engineering	3	
	MKMO 2123	Subsea Technology	3	
	MKMO 2223	Mooring and Riser Analysis	3	
	MKMO 2313	Ship Propulsion and Performance	3	
	MKMO 2513	Advanced Marine Design	3	
	MKMO 2833	Marine Transport System	3	

	MKMO 2003	Special Topic (Subjected to faculty approval)	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 **ship and offshore** 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 **ship and offshore** engineering.

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

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

PLO4: Perform research on **ship and offshore** 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	MKMO 1213	Dynamics of Marine Structures	3	3	
2	MKMO 1713	Ship and Offshore Production Technology	3	3	
3	MKMO 3843	Maritime Management and Law	3	3	
4	MKMO 1903	Research Methodology	3	3	
5	MKMO 2113	Strength and Vibration of Marine Structures	3	3	
6	MKMO 2813	Maritime Safety and Risk	3	3	
TOTAL CREDIT OF PROGRAMME CORE COURSES (b)			18	18	
MASTER PROJECT COURSES					
1	MKMO 1914	Master Project I	4	4	
2	MKMO 2926	Master Project II	6	6	
TOTAL CREDIT OF MASTER PROJECT COURSES (c)			10	10	
PROGRAMME ELECTIVES (3 COURSES)					
1	MKMO 1##3	Elective 1	3	3	
2	MKMO 2##3	Elective 2	3	3	
3	MKMO 2##3	Elective 3	3	3	
TOTAL CREDIT OF ELECTIVES COURSES (d)			9	9	
TOTAL CREDIT TO GRADUATE (a + b + c + d)			**40**	**40**	

COURSE SYNOPSIS

CORE COURSES

MKMO 1213 - Dynamics of Marine Structures

This subject equips the students with knowledge of the environment and relating it with performance of the vessel in seakeeping and manoeuvring. The first part of the subject introduces the ocean environment (Theory of regular/irregular waves and wave energy spectrum). The second part covers the seakeeping aspect – By applying the knowledge of dynamics, vessel's motions due to ocean waves can be predicted. The third part covers the aspect of vessel's manoeuvring and directional stability. The final part discusses on the aspect of using devices such as bilge keels and rudders to control vessel's motions.

MKMO 1713 - Ship and Offshore Production Technology

This course is aims at providing the students with the knowledge on how the ship and offshore structure are constructed in the shipyard and how the construction process is managed. It provides the necessary information and early exposure to the students before they engage their career in work place. The course begins with the introduction to world shipbuilding industry, its important and development in Malaysia. It then followed by topics on Ship and Offshore Structure Production process covering the typical production flow chart and activities, Shipyards location, layout and facilities, Material treatment including surface preparation, cutting process, welding process etc. that involve in ship construction process. Finally, introduction ship and offshore structure survey, repair and conversion works will be discussed briefly.

MKMO 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.

MKMO 2113 - Strength and Vibration of Marine Structures

This course covers to the fundamentals and calculations of structural plastic analysis, strength design of column and beam-column, strength design of unstiffened and stiffened plate, and analysis of structural vibrations for ship and offshore platform. The course begins with the basics and marine structural safety concerns, and design process through all phases of calculations: loads, response, and limits state stress. The focus of this course is on the structural design synthesis including design philosophy and procedures; and also the importance of vibration in ship and offshore structural design. The course is presented through classroom lectures, student participation in practical exercises. The course addresses the universally accepted mathematical calculations of unstiffened and stiffened plate response, and analysis on vibrations model.

MKMO 2813 - Maritime Safety and Risk

This course provides safety and risk assessment of ship and offshore platform. Hazard and operability problems and risk assessment are introduced in the beginning; it allows the severity of the risk of an event occurring to be determined. The description on principle of reliability-based design (RBD) and the possible effect of RBD on its own areas that need to be justified based on Formal Safety Assessment (FSA) are then given, including uncertainties in the loading or environment, defects in the materials, inadequacies in design, and deficiencies in construction or maintenance. At the end of this course the student will be able to understand the fundamentals of reliability-based design: deterministic and stochastic variables, understand the difference between deterministic and probabilistic design. For a given load effect and resistance, the student will be able to define and calculate the probability of failure (at least graphically).

MKMO 3843 - Maritime Management and Law

This course provides candidates with advanced knowledge on marine management and law. The objective is to expose candidates to advanced issues in the marine industry that currently challenge the traditional management principles. Issues will be focussed on four main categories; firstly, general management principles including planning management, organisational management, motivation and leadership management,

secondly, project management, thirdly, risk and safety management and fourthly introduction to maritime law. Instigating the capability of exercising critical thinking in problem solving will be the main focus and as such the course will be delivered via case studies each sandwiched between formal lecture and group discussion facilitated by the lecturer. Problem based approach will be the teaching and learning strategy.

ELECTIVE COURSES

MKMO 1413 - Dynamics of Marine Power Plant

The course is designed for introducing the students to the various aspects of marine power plant dynamic behaviors. This includes the different types of power plant characteristics and selection procedures, machinery control systems, balancing and vibration characteristics of the power plant.

MKMO 1913 - Experimental Techniques in Ship and Offshore Engineering

This course equips the students with theory and practice on experimental techniques in marine technology. It covers the basic experiment planning which include not only the model experiment but also the measurement under controlled or uncontrolled environment. The various how to plan an experiment and what to do with the obtained data will also be covered. The analysis for the experiments with dynamic systems which have the goal to define the dynamic response characteristics of the system for the relevant frequency ranges will be dealt with. Experiment projects will be analysed as part of the teaching tool. The course includes a seminar where students are required to prepare and present papers related to the experiment projects in hydrodynamic coefficient derivatives for ship seakeeping and manoeuvring.

MKMO 2013 - Computer Methods in Ship and Offshore Engineering

In this subject, the students are taught the use of computer programming and other available computer codes in ship and offshore engineering applications. The first part covers on the introduction to computer programming – FORTRAN and MATLAB compilers. The second part covers an overview of ship lines and mathematical representation. The area, centroid and volume are calculated using approximation (numerical) methods. Mathematical methods for ship lines modelling involve polynomial, cubic splines and B-splines. The third part covers the numerical methods for analysis of ship and offshore structures behaviour in regular and irregular waves using linear and nonlinear systems.

MKMO 2123 - Subsea Technology

This course presents an overview of the introduction to subsea technology, subsea production and control system. Topics to be addressed in this course will include: subsea components such as X'trees, wellhead and manifold and template, field equipment, pipelines and flowlines, umbilicals and risers; subsea control and communication and new technology on subsea. This course also provides advanced subsea pipeline engineering with a focus on structural and mechanical design of pipelines. Stress based and limits states design for strength and stability is examined. Other pipeline engineering design considerations are reviewed. Principles of geotechnical engineering and pipeline/soil interaction analysis techniques are examined and special topics are examined. Students will develop general skills on the use of common engineering software tools for report writing and communications.

MKMO 2223 - Mooring and Riser Analysis

This course provides the design and installation operations for riser and mooring systems. Emphasis is made on design of deep water moorings and riser system by the accepted industry practices and design codes and criteria. It starts with the types and layout of risers, layout and geometry of mooring and line types. Then the riser and mooring line design cycle is introduced and in this section the students calculate the environmental loads, pretension and static equilibrium, and Vortex Induced Vibration (VIV), and analyse the static and dynamic performances including floaters. The students also solve the dynamic performances of riser/mooring lines using simulation software (e.g. MOSES, HYDROSTAR, ARIANE and ORCAFLEX) and analyse the fatigue of riser and mooring chains.

MKMO 2313 - Ship Propulsion and Performance

This course provides the knowledge on ship hydrodynamics theory and practices that enable the students to perform calculation, analysis, design and evaluation of ship's performance and behaviour in seaway. The first part of the course provides students with basic knowledge on ship resistance and its component and to predict ship resistance using model experimental results or standard series data; to understand basic propeller action and design propeller using design charts and applying simple theory.

MKMO 2513 - Advanced Marine Design

This course equips the students with knowledge on the development of advance marine vehicles. The course starts with the philosophy of evolution of maritime transportation from the early days to the present state of the transportation system. Students are then provided with the definition and classification of advance marine vehicles together with the method of quantifying the means of achieving high transport. Students are provided with numerous examples of high transportation case studies that enhance the ability to critically decide the viability of the future transportation requirement. Students will be required to comprehend the future potential of advance marine vehicle and the limitations that systems and technology limits.

MKMO 2833 - Marine Transport System

Marine transport is one of the important components in the Marine Technology program. Generally, marine transport is one of the main activities for shipping. The requirement for marine transport system will naturally support direct and indirectly many other shipping or maritime based related activity such shipbuilding, oil and gas, port operation, logistic and supply chain, etc. In the process of executing these activities, a number of relevant policies, rules and regulation such as Flag of Convenient, Chartering, etc. to be considered and applied accordingly ensuring the optimum transport undertakings.