University of Tripoli
Faculty of Engineering

MARINE and OFFSHORE ENGINEERING DEPARTMENT
Graduate programs

General Information

The Marine Engineering is a branch of the Marine and offshore Engineering department at Faculty of Engineering University of Tripoli. The MSc in Marine Engineering is offered full-time Master's Degree programmer that caters for working engineers, executives and managers in the local marine and offshore industry, with minimum disruption to their demanding work commitments.

This dynamic course responds to the challenges and demands of the global maritime sector

The department is concerned with the study of design, construction and maintenance of ships as well as the study of different types of marine engines and auxiliary machineries and their methods of maintenance. Whereas offshore branch is concerned with the study of all branches of offshore engineering fields.

The Department of Marine and Offshore Engineering offers the degree of Bachelor and M.Sc. in Engineering. Both programs were designed in accordance with the provisions of the Faculty of Engineering and in accordance with the requirements of the University of Tripoli. The students of Marine and offshore Engineering study many subjects such as advanced mathematics, statics, dynamics, engineering chemistry, engineering drawing, basics of engineering workshops, basics of electrical engineering, electronics, thermodynamics and heat transfer, basics of naval architecture and ship construction, marine diesel engines, shipyard technology, introduction to marine and offshore engineering systems and methods of diagnosis of their faults. In addition, the program contains a number of proposed elective modules such as refrigeration and air conditioning, planned maintenance, and gas and steam turbines.

The postgraduate program for M.Sc. degree which has been established at the department takes into considerations the experience of the staff members, and follows the most well-known routes or tracks for such degree. The program is basically depending on areas of research that can be currently supported, and of frequent need by the market demand. Through such approach the department role will be significant and reflects its effort as well as the role and effort of the faculty.

Vision.

- Education and training of high-quality in the field of Marine and offshore Engineering.

Mission.

To provide highly efficient and qualified graduates and postgraduates in the field of Marine and Offshore Engineering.

- ***Programs***

The postgraduate program in the. Marine and offshore Department offers M.Sc. degree in the following areas:

Program I*: Marine Engineering*

Program II*: Offshore Engineering*

Program I	
PROGRAM	**Marine Engineering**
DEGREE	M.Sc.
OBJECTIVES	1. To upgrade the Engineers with scientific level, and to link their knowledge with the state of the art technology in the fields of Marine Engineering. 2. Graduating Marine Engineers that are scientifically and professionally qualified for designing, maintain and operating both governmental and commercial high seas ships and in shipyards and dry docks. 3. Providing opportunities for postgraduate studies for the graduates of the department and graduates from other specialties related to Marine Engineering according to the University regulations

Code	Title	Credits	Hours	ECTS
Faculty Requirements (3 credits)				
GE604	Advanced Engineering Mathematics	3	4	8
GE606	Applied Statistics and Computer Application	3	4	8
GE609	Numerical Methods in Engineering	3	4	8
Core courses (12 credits)				
MAR601	Research skills **	1	2	3
MAR620	Applied Thermodynamics and Turbo machines	3	4	8
MAR621	Marine Transmission and Auxiliary *Machinery*	3	4	8
MAR622	Ship Performance at Sea **	2	3	6
MAR623	Ship Propulsion	3	4	8
MAR628	Marine Machinery Control System	3	4	8
Elective Courses (10 Credits)				
MAR625	Marine Electrical Power Systems	3	4	8
MAR626	Material Selection and Process in Marine	3	4	8
MAR627	Heat Transfer & Heat Systems	3	4	8
MAR629	Structural Integrity of Ship	3	4	8
MAR631	Internal Combustion Engine Analysis	3	4	8
MAR633	Vibration of Marine Machinery	3	4	8
MAR634	Marine Electric Propulsion	3	4	8
MAR635	Marine Electrical Machines	3	4	8
MAR636	Thermal System Design and Optimization	3	4	8
MAR643	Advanced Marine Propulsion Plants	3	4	8
MAR648	Advanced Control Systems	3	4	8
MAR697	Special Topics	3	4	8
MAR698	Graduate Seminar **	1	2	10
Thesis (6 Credits)				
MAR699	M. Sc. Thesis	6	-	*50*
Total		**31**	**-**	***125***

*** Mandatory Course* *ECTS: European Credit Transfer and Accumulation System*

Program II	
PROGRAM	**Offshore Engineering**
DEGREE	M.Sc.
OBJECTIVES	1. To upgrade the engineer's scientific level, and to link their knowledge with the state of the art technology in the fields of Offshore Engineering. 2. Graduating Marine Engineers that are scientifically and professionally qualified for designing, maintain and operating both governmental and commercial high seas ships and in shipyards and dry docks. 3. Providing opportunities for postgraduate studies for the graduates of the department and graduates from other specialties related to offshore Engineering according to the University regulations

Code	Title	Credits	Hours	ECTS
Faculty Requirements (3 credits)				
GE604	Advanced Engineering Mathematics	3	4	8
GE606	Applied Statistics and Computer Application	3	4	8
GE609	Numerical Methods in Engineering	3	4	8
Core courses (12 credits)				
MAR601	Research skills **	1	2	3
MAR640	Advanced Offshore Design	3	4	8
MAR641	Offshore Oil and Gas Technology	3	4	8
MAR642	Subsea Technology **	2	4	6
MAR639	Hydrocarbon Processing & Transportation	3	4	8
MAR644	Mooring Riser and Drilling Systems	3	4	8
MAR645	Offshore Engineering Fundamentals	3	4	8
MAR646	Offshore HSE Management	3	4	8
Elective Courses (10 Credits)				
MAR647	Advanced Marine Structure	3	4	8
MAR649	Advanced Offshore Drilling	3	4	8
MAR650	Advanced Offshore Production	3	4	8
MAR651	Maritime Management and Law	3	4	8
MAR633	Vibration of Marine Machinery	3	4	8
MAR643	Advanced Marine Propulsion Plants	3	4	8
MAR631	Internal Combustion Engine Analysis	3	4	8
MAR652	Project Management and Operation Research	3	4	8
MAR648	Advanced Control Systems	3	4	8
MAR697	Special Topics	3	4	8
MAR698	Graduate Seminar **	1	2	10
Thesis (6 Credits)				
MAR699	M. Sc. Thesis	6	-	*50*
Total		**31**	***0***	***125***

*** Mandatory Course* *ECTS: European Credit Transfer and Accumulation System*

Description of the Graduate Courses

Faculty courses

GE604 Advanced Engineering Mathematics (3 *Credits* – 4 Hours)

Review of ordinary differential equations; linear differential equation of the first order; linear differential equations with constant coefficients; particular solutions by variations of parameters. Power series solutions; method of Frobenius; Legendre's equation; Fourier-Legendre Series; Bessel's equation; modified Bessel equation. Fourier methods; Fourier series; Sturm-Liouville theory; Fourier integral; Fourier transformation. Partial differential equations; heat conduction equation; separation of variables; waves and vibrations in strings; wave equation; D'Alembert's solution; longitudinal vibrations in an elastic rod; two dimensional stress systems; solution of Navier's equations by the application of Fourier transforms; Laplace equation.

GE606 Applied Statistics and Computer Application *(3 Credits – 4 Hours)*

Random variables; common discrete, continuous expectations and their applications; Sampling of the mean, hypothesis testing of the mean and variance, confidence intervals and Chi-Square procedures; Simple linear regression and correlation; precision and straight line fits; Matrix approach; multiple; Linear regression; polynomial and extra sum of squares in linear regression analysis; Transformation, weighted dummy variables and special topics in multiple regression analysis; Selecting the best regression model; Design of experiments; Single-factor and Multi-factor analysis of variance. Application of Statistical software packages such as: MINITAB, SPSS, etc.…

GE609 Numerical Methods in Engineering (3 *Credits* – 4 Hours)

Interpolation; Linear interpolation, Lagrange and Aitkin's interpolating polynomials, Difference calculus, Newton forward and backward difference formula, curve fittings, least square approximations, Fitting nonlinear curves, Cubic spline, Chebyshev polynomials, Approximation with rational function ordinary differential equations, Analytical and computer-aided solutions, Boundary conditions, Taylor series method.

- ***Department Courses***

***MAR601 Research skills* (1 *Credits* – 2Hours)**

The course is taught in the first semester in the first year of postgraduate studies. It prepares students for scientific research and development of thesis. The course provides content on Elements of the Research Proposals and Formulation of a research plan, Elements of Technical and Scientific reports, what is the Scientific Research, The Structure of Scientific Research, Methods of Scientific Research, Aims of Scientific Research, and Ethics of Scientific Research, Developing a hypothesis, a research problem and related questions, Being able to perform exploratory data analysis, Understand correct ways to refer to and cite from scientific literature.

MAR620 Applied Thermodynamics (3 *Credits* – 4 Hours)

Introduction, Boilers: steam cycle revision, boiler types, consideration in boiler design, fuel and combustion, environmental considerations. Steam turbines: revision of fundamentals, axial flow turbo machinery stages, comparison between stages, impulse stage losses and Mollies diagram, real turbine construction and control. Steam systems: Operation, condenser and de-aerator, feed-water treatment. Steam cycles: practical and theoretical considerations for Rankin cycle plant. Gas turbine engines: Cycles analysis, compressor characteristics and designs, turbines characteristics and designs, compressor/turbine matching, combustion system design, fuel and fuel system requirements, environmental considerations, practical considerations, case studies. Internal combustion engines: cycles and mathematical modeling of engine performance, thermal loading of components, gas exchange processes, exhaust gas turbo charging matching, pulse and constant pressure turbo charging and turbocharger design, fuel and combustion, combustion chamber design, fuel system design, environmental considerations.

MAR621 Marine Transmission and Auxiliary Machinery Systems (3 *Credits* – 4 Hours)

Transmission types and applications, principle of gears design, geometry, definitions, flanks, involutes and its properties, gears measurements and contact ratio, span width calculations, gear efficiencies calculation and optimization ,gears selection standards, load analysis, Epicyclical gears, combination of gear design and controllable pitch propeller, power matching and optimization. Shafting system static and fatigue loading analysis and design, shafting Line Alignment, selection of rigid flexible coupling, analysis of clutches parts, fluid coupling, torque converters and Franco – Tosi couplings, self-synchronizing clutches, vibration of rotating machinery and balancing, positive displacement and rotary compressors theories, two and three stage compressors, ship board compressed air distribution systems and safety features, flow through non-circular pipes and ducts, pipe networks, ducting systems balancing, introduction to pumps and fans.

MAR622 Ship Performance at Sea (3 *Credits* – 4 Hours)

Ship' Naval architecture review, introduction to ship performance at sea, Direct wind forces and moments, Induced forces and moments, Performance loss estimation, effect of seaway on ship resistance, effect of seaway on ship propulsion, Hull roughness and fouling .
Marine Engineering (Machinery): Performance and fuel economy, Impact on plant layout , Total energy concepts, Marine fuels, Fuel treatment, Maintenance as part of ship life cycle, Maintenance cost evaluation, Failure mode and effect analysis, Risk-Based maintenance, Reliability and maintainability, Fault tree analysis, Failure rate, concept of (Intelligent) condition monitoring, Some techniques for intelligent monitoring, Condition monitoring of diesel engines.

MAR623 Ship Propulsion (3 *Credits* – 4 Hours)

Influence of machinery choice on acquisition and operating costs. Methods of energy saving applied to overall system design. Propeller design procedures and matching of engine and propeller. Propeller performance in service. Propeller excitation forces and design of propeller for minimum excitation. Energy saving propulsions. Machinery and hull vibrations. sources of excitation. Modes of vibration. Method of analysis using case studies.

MAR625 Marine Electrical Power Systems (3 *Credits* – 4 Hours)

The main objective of the course is to give the students an introduction to electro-technical engineering and an understanding of marine electric power systems on ships and platforms, which is of importance for management, engineering, design, and analysis.
Introduction to electric analysis techniques, with basis on electro-technical concepts, laws, and properties for electric systems, such as circuit analysis, electric power, 1-phase and 3-phase systems, phasor diagrams, electro-magnetic energy conversion, and physical principles of transformers and electric machinery. Electric machines, motors, and propulsion drives, electric power generation and distribution, power management systems (PMS), operational issues, and class rules and methods for independent testing and verification. Marine emergency power systems, power quality requirements, shore connections in ports, distribution components and network protection emergency supplies, simultaneous faults. Load flow and fault analysis.

MAR628 Marine Machinery Control Systems **(3 *Credits* – 4 Hours)**

Review to principles of control engineering (continuous (analog) and discrete (digital)). System modeling (Mathematical modeling, linearization, state space). System representation (block diagrams, state-space, transfer functions). Control system analysis (time response, steady state error and sensitivity analysis). Control system stability analysis (classical methods and Lyapunov method). Control system improvement by classical PID controllers and compensators (lead, lag and lead-lag). Multivariable systems and the Controllability and Observability concepts. State space forms. Pole placement state controller and state observer estimator).
The laboratory study will cover: The modeling of engineering systems in LabVIEW and Mat lab/Simulink to study control system design to improve dynamic performance

- ***Elective courses***

MAR624 Marine Machinery System (3 *Credits* – 4 Hours)

Marine system modelling, mathematical representation, system identification, analysis of power plant , Modelling the sensors and actuator used in marine system, Auxiliary system evaluation including clutch and gearbox control, Total system performance when subject to full ahead to crash stop manoeuvre, Stability analysis, Ship dynamic stability, Application of computer simulation techniques to analysis of marine systems.

MAR626 Material Selection and Process in Marine (3 *Credits* – 4 Hours)

Material Selection in Design: The role of materials selection in design, exploring relationship, material property, material charts, the material section process, design models, selecting indices, case studies of materials selection.
Manufacturing of the mechanical parts of marine engine: Making the process of mechanical parts of the engine, General principle to make the process, Data necessary for making mechanical process, Method to make up parts machining process.

MAR627 Heat Transfer & Heat Systems (3 *Credits* – 4 Hours)

Conduction process, radiation heat transfer, heat exchanges, process heat transfer, boiling, condensation, air condition and refrigeration engineering.

MAR629 Structural Integrity of Ship (3 *Credits* – 4 Hours)

Introduction , definition of structure integrity, concept of fitness-for-service methods, fraction mechanics theory (Diving force and fracture toughness, K, CTOD , J) linear elastic fracture mechanics (LEFM) , Elastic fracture mechanics (EPEM), Flow types, Fracture mechanics testing, Fracture assessment using failure assessment diagram (FAD) approach, Fracture toughness R, curve fatigue crack growth, fatigue design of welded joints, fatigue assessment procedures in BS7910 non-destructive testing and practical exercises and case studies.

MAR631 Internal Combustion Engine Analysis (3 *Credits* – 4 Hours)

Design ratios and parameters of larger and medium size marine diesel engines, Study methods to improve combustion through combustion chamber design and new technology fuel injection method, The highly critical and timely topics of exhaust gas analysis and emissions standards will be examined, also study of the latest enhancements to fuel and lubricating oils, and current development and advances in materials technologies applicable to internal combustion engines. The course will include an on-site laboratory with formal report to be submitted after completion of the laboratory exercise.

MAR633 Vibration of Marine Machinery (3 *Credits* – 4 Hours)

Examination of theory of mechanical vibration for free and forced vibration of damped single-degree of freedom systems as well as multi-degrees of freedom problems to include the determination of natural frequencies and critical speeds. Vibration analysis and testing techniques, dynamic balancing and vibration isolation methods are also considered with emphasis on applications in the marine environment.

MAR634 Marine Electric Propulsion (3 *Credits* – 4 Hours)

History and background of electric propulsion, conventional and modern motor technologies, power electronics devices and converter circuitry, motor devices for propulsion and thrusters, variable speed motor devices, propulsion control and operation, future development in propulsion technology.

MAR635 Marine Electrical Machines (3 *Credits* – 4 Hours)

The synchronous machine as a generator, construction, characteristics and control, the DC motor, construction, characteristics and control, the induction motor, construction, characteristics and control, single-phase induction motors, variable-speed drive systems, power electronics devices and converter circuitry**.**

MAR636 Thermal System Design and Optimization (3 *Credits* – 4 Hours)

Simulation and optimization of thermal systems, including gas turbines air conditioning, steam propulsion, components are simulated using various modeling techniques and combined into systems, The systems are examined for operating characteristics and optimization within a concept

MAR643 Advanced Marine Propulsion Plants (3 *Credits* – 4 Hours)

The study of marine propulsion plants beyond the conventional diesel, gas turbine and steam power plants, topics of study will include combined diesel-exhaust gas turbine plants, combined gas-turbine, steam plants, nuclear gas cooled and water cooled reactor plants and fuel cell based plants.

MAR648 Advanced Control Systems (3 *Credits* – 4 Hours)

Control system design methods (root-locus and frequency response methods). Design the PID controllers by (Time response, Root locus and frequency response method). Non-linear systems (Nonlinear phenomena). Fundamental Properties (Mathematical Preliminaries, Existence and Uniqueness…), Analysis of nonlinear systems System analysis using describing functions, phase-plane, Lyapunov methods, Popov and Circle Criterion, Kaman filter. Design methods (Feedback linearization, Lyapunov approach, Sliding mode control and center manifold theory), Introduction to Optimal Control, Optimal linear regulator.

II- Offshore Engineering Program

- ***Department Courses***

MAR601 Research skills **(1 *Credits* – 2Hours)**
The course is taught in the first semester in the first year of postgraduate studies. It prepares students for scientific research and development of thesis. The course provides content on Elements of the Research Proposals and Formulation of a research plan, Elements of Technical and Scientific reports, what is the Scientific Research, The Structure of Scientific Research, Methods of Scientific Research, Aims of Scientific Research, and Ethics of Scientific Research, Developing a hypothesis, a research problem and related questions, Being able to perform exploratory data analysis, Understand correct ways to refer to and cite from scientific literature.

MAR640 Advanced Offshore Design **(3 *Credits* – 4 Hours)**
Fundamental of structural response analysis; Basic features of dynamic loading and response. Physical properties of dynamic analysis. Environmental loads and application to design. Calculation of the dynamic response of typical structures. Structural finite element analysis. Flow induced oscillations. Effects of structural vibrations. Uses of models to predict dynamic loads and the response of structures. Load criteria for offshore structural design. Design principles, criteria and Regulations. Ultimate limit state design. Fatigue limit state design and fatigue resistant detail design. Accidental limit state design. Probabilistic design of offshore structures. Elastic plate theory and responses of grillages; plastic theory and its application to beams and grillages. Materials including composite for offshore applications. Fabrication for corrosion control.

MAR641 Offshore Oil &Gas Technologies (3 *Credits* – 4 Hours)

The aim of the course is to introduce the student to the processes and technologies for the production of offshore Oil & Gas resources. The student will gain knowledge on the off-shore upstream operations and on subsea, topside and floating production technologies.

***MAR642 Subsea Technology* (3 *Credits* – 4 Hours)**

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. Students will develop more specialized skills on the use of engineering software tools for analysis and design.

MAR639 Hydrocarbon Process and Transportation Facilities (3 *Credits* – 4 Hours)

This module aims to acquire knowledge of how hydrocarbons are extracted from the earth; to understand how hydrocarbon properties are related to pressure and temperature and process equipment affects these properties; to understand single phase and multiphase fluid flow in pipes and to acquire knowledge of upstream processing operations. This module is a comprehensive introduction to Hydrocarbon Production and upstream processing. This includes sections on the extraction of hydrocarbons from the earth, their transport through pipelines and processing. Industrial practice and the theory underlying these operations will be covered.

MAR644 Mooring Riser and Drilling Systems (3 *Credits* – 4 Hours)

Mooring configurations: single-leg mooring, spread mooring, turrent mooring; mooring components: wire ropes, synthetic fiber ropes, chains, clump weights, drag and suction anchors, piles; winches and windlass; single component and multi-component catenary equations; soil-mooring interaction; mooring failure modes; static, quasi-static, and dynamic mooring analyses; mooring design criteria and considerations. Drilling risers, production risers: flexible, steel catenary; flexible riser configurations: steep/lazy S and wave, free hanging; flexible riser components: bend stiffeners/ bell mouths, unbounded/bonded flexible risers, bend restrictors; rigid riser components: tieback connectors, stress joints, riser joints and connectors, buoyancy modules, tensioners; riser casing; soil-riser interaction; riser failure modes; structural riser analysis; static and dynamic riser analyses; interference analysis; riser design criteria and considerations. Dynamic performances of riser/mooring lines using simulation software

MAR645 Offshore Engineering Fundamentals (3 *Credits* – 4 Hours)

Principles of oceanography and ocean bed geology, Sea floor spreading, Plate tectonic theory Overview of offshore engineering. Characteristics of offshore structures, Support and supply bases and vessels for offshore operations, Navigational aids maintenance and repair, Types of Offshore Structures and Vehicles, Categories of Loads. Environmental loads (waves-currents- winds). General design of a jacket platform. Oil and gas drilling technology, Production technology. Safety aspects of offshore installations, fixed structures: design criteria and loadings, preliminary design, wind, waves, tides, fatigue analysis, seismic and dynamic analysis, marine studies, and certification and inspection. Floating structures: moorings/riser systems, wave loads on floating

structures, dynamic response of floating structures, stability of vessels, safety of offshore structures.

MAR646 Offshore HSE Management (3 *Credits* – 4 Hours)

Introduction to Safety, Health, and Environment Management, Environmental issues and Management, Accident Modeling, Risk assessment and Management, Safety measures in design and operation, also focusing on those related to the production of Oil & Gas resources.

MAR647 Advanced Marine Structure (3 *Credits* – 4 Hours)

Introduction to Structural Analysis of marine structures; Basic of Fracture Mechanics & Its Application to marine structures; Assessment of defects, such as gouges, corrosion and dents in Pipelines; Fracture Propagation; Fatigue Effects; Yielding and buckling of Submarine Pipelines; Code guidance on defect assessment; Finite element method; Fundamental properties of soil; mechanical properties of soil, Ground water, test of soil, design parameters of soils, Offshore pipeline geotechnical aspects including: : Pipeline stability of seabed, scour, design of buried pipelines, trenching of pipelines, foundation options, geotechnical design of foundations and tie back anchors.

AR649 Advanced Offshore Drilling (3 *Credits* – 4 Hours)

Wave theories; wave, wind, and current force predictions; single and multi-degree of freedom systems; rigid-body equations of single and multi-body systems; vortex induced vibrations; dynamic analysis of semi-submersibles, TLPs, seakeeping design of floating systems. Petroleum geology. Types of rocks. Oil and gas traps. Well types. Offshore exploration methods. Offshore drilling platforms. Drilling equipment. Drilling derrick. Rotary system. Draw works. B.O.P. and well control equipment. Mud system. Mud classification. Mud testing. Mud pumps. Drilling and completion operations. Directional drilling. Drilling problems. Well design.

MAR650 Advanced Offshore Production (3 *Credits* – 4 Hours)

The history of oil and gas production in offshore. Main offshore fields around the world. Offshore Geotechnical Engineering. Differences between onshore and offshore Geotechnical Engineering. Oil platforms. Types of platforms: Fixed platform, Semi-submersible platform, Tension-leg platform, Spar platform, Compliant towers. Offshore drilling, Well completion, Perforating & Stimulating, Pressure Vessel, Oil & Gas separation. Submarine pipeline, Route selection, Physical factors, Pipeline characteristics. Pipeline construction.

MAR651 Maritime Management and Law (3 *Credits* – 4 Hours)

Introduction to Safety: The role of the engineer will be outlined with regard to the impact on the environment. The importance of legislation in improving safety, zones of the seas, the high seas, flag state jurisdiction and piracy. Shipping regulations: SOLAS compliance, MOU, MARPOL, the control of pollution, dumping. Flag state registration: public law regulation and private law functions.

Description of terminology and the various stages of assessing design and operating practices. Safety culture - its importance in minimizing accidents. Acceptable levels of risk - both society and individual. Perceived and actual risk. Risk Analysis: Revision of probability and elementary

set theory, Venn diagrams etc. More advanced treatment of probabilistic variables - probability density functions and the like. Common distributions, Normal (Gaussian), Log-normal, and Rayleigh. Extreme value distributions. An introduction to quantitative and qualitative risk assessment methods.

MAR652 Project Management and Operation Research (*3 Credits* – 4 Hours)

Introduction Philosophy and Concepts, What Is Project Management? Project management: the need. Response to modern society .Systems Approach and Systems Engineering. Systems approach to management project goal: time, cost, and requirements project management: the person, the team, the methodology. Systems Development Cycle and Project Conception. Project and System Definition .Planning Fundamentals .Project Time Planning and Networks. Advanced Project Network Analyses and Scheduling. Cost Estimating and Budgeting .Project Quality Management Managing Risks in Projects. Project Execution and Control. Project Evaluation, Communication, Implementation, and Close out Systems and Procedures for Planning and Control

MAR697 Special Topics *(3 Credits – 4 Hours)*

The topics are not listed in department programs and may vary from year to year according to interests of students and instructors.
M.S. students choose and study a topic under the guidance of the department coordinator. Typical contents include advanced fields of study according to recent scientific and technological developments in the related areas. Also, it could be studied from other related departments after getting the permission.

MAR698 Graduate Seminar (1 Credits - 2 Hours)

This course help students to develop their research proposals, establishing and expanding their research skills and implementing their work through scholarly writing, which can be achieved through the seminar.
The seminar course must to be taken in the second semester of the registration and managed by an instructor who is responsible to prepare the final grade list of all the registered students.
Students must prepare and present their chosen topics through a scientific term paper, which can be shared and discussed with other students and department staff to gain their feedback.

MAR699 M. Sc. Thesis (6 *Credits*)

The student has to carry out a research project in one of the programs. The research topic should tackle contemporary problems in the marine field and upon completion it must stand firm for publication.

- ***Learning Objectives (outcomes) for Program I: Marine Engineering***

This graduate program aims to encourage the acquisition of general scientific skills relating to Marine Engineering, critical analysis, interpretation and discussion of factual information and data. By the end of this program students will be able to evaluate practical solutions to the basic problems that most Marine Engineers are likely to encounter in their practice.

On completion of this Master's program the graduate students will also be able to pursue his/her studies to PhD level. In general the Master Degree Program will help graduates to perform the following activities:

- Enabling students to focus on a particular aspect of a broader subject area in which they have prior knowledge or experience through previous study or employment.
- Enabling students to focus on a particular subject area or field of study in greater depth than they encountered during the course of previous study or experience. This may include enabling students to develop knowledge of a new discipline or field of study in combination with a relevant subject area in which they have prior knowledge or experience.
- Enabling students to learn how to conduct research often linked to a particular discipline or field of study.
- Enabling students to undertake a research project on a topic within the area of interest that makes up the majority of the overall assessment.
- Enabling students to specialize or to become more highly specialized in an area of employment or practice related to a particular profession.

- ***Learning Objectives (outcomes) for Program II: Offshore Engineering***

This graduate program aims to encourage the acquisition of general scientific skills relating to Offshore Engineering, critical analysis, interpretation and discussion of factual information and data. By the end of this program students will be able to evaluate practical solutions to the basic problems that most offshore Engineers are likely to encounter in their practice.

On completion of this Master's program the graduate students will also be able to pursue his/her studies to PhD level. In general, the Master Degree Program will help graduates to perform the following activities:

- Enabling students to focus on a particular aspect of a broader subject area in which they have prior knowledge or experience through previous study or employment.
- Enabling students to focus on a particular subject area or field of study in greater depth than they encountered during the course of previous study or experience. This may include enabling students to develop knowledge of a new discipline or field of study in combination with a relevant subject area in which they have prior knowledge or experience.
- Enabling students to learn how to conduct research often linked to a particular discipline or field of study.

- Enabling students to undertake a research project on a topic within the area of interest that makes up the majority of the overall assessment.
- Enabling students to specialize or to become more highly specialized in an area of employment or practice related to a particular profession.

الاعتماد			
البيان	منسق الدراسات العليا بالقسم	رئيس القسم	مدير مكتب الدراسات العليا بالكلية
الاسم			
التاريخ	2022 / 09 /	2022 / 09 /	2022 / 09 /
التوقيع			
الختم			

اعداد / لجنة دليل الدراسات العليا 2022