Diploma/ Advanced Diploma in Marine Engineering + Professional Diploma in Engineering (Marine & Mechanical)
Bachelor of Engineering (Marine & Mechanical)

Objective

The course prepares students for careers in

- Marine and Offshore Engineering - the selection, deployment and commissioning of machinery, machinery systems and operational systems for merchant and naval vessels plus offshore floating and fixed vessels/structures. Building on core fundamental engineering units, this degree specialises in associated mechanical and mechanical-electrical power generation, machinery and operational systems.

Diploma/ Advanced in Marine Engineering is 30 to 60 credit points diploma. Depending on the amount of study, the graduates can achieve Diploma or Advanced Diploma in Marine Engineering

The students who completed this diploma can proceed to third year and fourth year of Professional Diploma in Mechanical Engineering and can be graduated with Professional Diploma in Marine and Mechanical Engineering OR BE(Marine & Mechanical)

Please see

http://www.highlightcomputer.com/BEwithRE.pdf

http://www.highlightcomputer.com/Dip_Mar_E_Course_outline.pdf

Diploma/ Advanced Diploma in Automotive Engineering

Professional Diploma in Engineering (Automotive & Mechanical)
Bachelor of Engineering (Automotive & Mechanical)

Diploma/ Advanced in Automotive Engineering is 30 to 60 credit points diploma. Depending on the amount of study, the graduates can achieve Diploma or Advanced Diploma in Automotive Engineering

The students who completed this diploma can proceed to third year and fourth year of Professional Diploma in Mechanical Engineering and can be graduated with Professional Diploma in Automotive and Mechanical Engineering OR BE(Automotive& Mechanical)

Please see

http://www.highlightcomputer.com/BEwithRE.pdf

http://www.highlightcomputer.com/Dip_AE_Course_Outline.pdf

Professional Diploma in Engineering
(Naval Architecture)
Bachelor of Engineering (Naval Architecture)

Objective

The course prepares students for careers in

Naval Architecture - the shipbuilding industry, high-speed ferry industry, marine consultancy firms and in government in areas of commercial shipping, transport policy and administration and in the insurance sector.

Learning Outcomes

1. NavArch: Rationally apply comprehensive knowledge of the fundamental principles underpinning maritime engineering, with advanced knowledge of **ocean vehicle design, hydrodynamics, ship structures, and/or on-board systems and equipment** specific to the naval architecture discipline, using creativity, critical thinking and judgement.

   OceanEng: Rationally apply comprehensive knowledge of the fundamental principles underpinning maritime engineering, with advanced knowledge of **the design of offshore to coastal installations, subsea platforms and additional equipment and techniques for operations in the maritime environment** specific to the ocean engineering discipline, using creativity, critical thinking and judgement.

   MarOffEng: Rationally apply comprehensive knowledge of the fundamental principles underpinning maritime engineering, with advanced knowledge of **the design, procurement and installation of mechanical, electrical and thermal systems**, specific to the marine and offshore engineering discipline, using creativity, critical thinking and judgement.

2. Apply knowledge of research principles and management methods to devise, plan and execute a piece of engineering research with limited supervision.

3. Apply problem solving, design and decision-making methodologies to identify complex problems in both the maritime and wider engineering fields and to formulate innovative solutions with intellectual independence.

4. NavArch: Apply abstraction and analysis to complex problems specific to **ship design and construction industries and the wider maritime sector** whilst concurrently considering the implications of the solution in a global and sustainable context using appropriate engineering methods and tools.

   OceanEng: Apply abstraction and analysis to complex problems specific to **the design and development of offshore, subsea and coastal infrastructure and operations in the wider maritime sector** whilst concurrently considering the implications of the solution in a global and sustainable context using appropriate engineering methods and tools.

   MarOffEng: Apply abstraction and analysis to complex problems specific to **the maritime engineering industries** whilst concurrently considering the implications of the solution in a global and sustainable context using appropriate engineering methods and tools.

5. Demonstrate a high level of communication skills in professional practice and articulate complex knowledge, by written and oral means, to specialist and nonspecialist audiences; including clients, multi-disciplinary and multi-cultural project teams and stakeholders.

6. Demonstrate entrepreneurship and creativity, professional accountability and ethical conduct through the application of design, research and project management techniques while concurrently displaying an awareness of professional engineering practice.

7. Review personal performance, demonstrate independent initiatives and leadership as a means of managing continuing professional development, wellbeing and lifelong learning through engagement with stakeholders, colleagues and members of other professions.

Program of study

To qualify for the Professional Diploma/Bachelor of Engineering (Naval Architecture)

a student must complete 120 Credits

GENERAL STUDIES- 60 Credits

ENGR1204-Electronics (6pt)---------- -BAE405/408(EE)

ENGR1401 Professional Skills (2 pt)----------BAE608 (ME Yr 4)

ENGR1711 Engineering Design (2 pt) ----------BAE614 (ME Yr 4)

ENGR1721 Engineering Programming (2 pt)----------BAE601 (ME Yr 4)

ENGR1722Engineering Physics and Materials (4 pt)-----RE010+ EE204 (EE Adv Dip)

ENGR1732 Engineering Mechanics (4 pt)----------ME103 (Adv Dip ME) / BAE403 (Common Yr 3 BE)

MATH1121 Mathematics 1A (4 pt)---------- EE201/302 (EE Adv Dip)

MATH1122 Mathematics 1B (2 pt)---------- BAE401(Common Yr 3 BE)

ENGR2703 Mechanical Practice Certificate (6 pt) PC5 Certificate in Fitting/Machining, PC6 Certificate in Welding/ PC8 Certificate in Air-conditioning Refrigeration & Basic Servicing

ENGR2711 Engineering Mathematics (2 pt) ----------BAE402 (Common Yr 3)

ENGR2722 Analysis of Engineering Systems (6 pt)-----BAE502/BAE50 (Linear System+ Control System) (EE)/ME203 (Adv Dip ME)

ENGR2741 Mechanics and Structures (4 pt)----------RE011a/b Civil & Mechanical Engineering (Mechanical/Civil) (Common Yr 3 BE)

ENGR2751 Fluid Mechanics (2 pt units)----------BAE423 Fluid Mechanics (Civil)

ENGR2771 Dynamics (2 pt)----------BAE614 (ME Yr 4)
ENGR2776 Hydrostatics (2 pt) ----------ME201 (Adv Dip ME)

ENGR3781 Elements of Shipboard Safety (ESS) Certificate (4 units) MarE106 (Dip Mar E)

PHYS2712 Thermodynamics and Energy Systems (2 pt)------BAE404 (Common Yr 3 BE)

ME634 Pnuematics (2 pt) (Adv Dip ME)

ME303 Computer Aided Design (2 pt) (Adv Dip ME)

NAVAL ARCHITECTURE AND RELATED STUDY 60 Credits

ENGR2766 Ship Design and Construction ----------MarE113N (Dip Mar E)

NArch 601Ship Construction (Naval Architecture) Theory 40 Credits

Each 2 credits

MarE113NA Ship Repairing

MarE113NB Ship Construction Engineering

MarE113NC Principle of Ship Stability

ME206 Introduction to Turbo Machinery

Mar E 110 General Engineering Knowledge

Mar E 111 Motor Engineering Knowledge

Mar E 107 Marine Electrical Practice

ME 305 Corrosion Prevention

NArch 501 Naval Architecture

NArch 502 Ship Design and Construction

NArch 503 Practical Ship Design

NArch 504 Ship Stability Control

NArch 505 History of Ship Design Calculations

NArch 506 Ship Technology

NArch 507 Ship Building Methods.pdf

NArch 508 Ship Design Research

Mgt 508 Project Management

Mgt 605 Management

Mgt505 Quality Management

NArch 509 Ship Propulsion

NArch 602 Ship Construction (Naval Architecture) Project 20 Credits

Detailed Contents

ENGR1201 Electronics

Topic Description	Electronics provides students with an understanding of basic electronics. It includes: 1. Digital Electronics: digital design concepts, number systems and signed numbers, combinational logic and design, minimisation of logic expressions, hazards, sequential logic and design, finite state machines 2. Analog Electronics: circuit variables and elements, simple resistive circuits, techniques of circuit analysis 3. Microprocessors: introduction to microprocessors, sensors and motors, microprocessor programming 4. Workshop Practice: bonding methods, soldering and flux, planning and designing electronic equipment, printed circuit boards and microelectronics
Educational Aims	This topic aims 1. To provide students with a thorough understanding of the principles of combinational and sequential digital logic 2. To develop the fundamental theoretical and practical skills required to carry out the design and analysisof digital electronic circuits 3. To introduce the elements and basic operation of a microprocessor 4. To introduce the manufacture and processes of thick and thin film microelectronics, printed circuit boards, and surface mount packages, the processes, practice, and assessment of soldering, component mounting and other connection methods, and fire safety
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Analyse, design and construct simple digital circuits 2. Analyse, design and construct simple finite state machines 3. Understand and apply basic principles of electric circuit theory 4. Understand and use electrical components and instruments 5. Have knowledge and understanding of microprocessors, motors and sensors 6. Write simple programs for a microcontroller 7. Have knowledge and understanding of microelectronics, printed circuit boards and surface mount technology 8. Perform and assess electronics assembly tasks, such as soldering and wiring

ENGR1401 Professional Skills

Topic Description	This topic provides an introduction to engineering with a focus on the role of the engineering team in providing a range of products and services. The initiation, planning and development of engineering projects including such subjects as feasibility studies, design and performance specifications, construction, testing and evaluation, operation and maintenance of engineering systems and the optimum use of resources. Aside from technical considerations, the topic will consider the social, economic, political, environmental and ethical issues related to engineering projects as well as the relevant communication and interpersonal skills.
Educational Aims	The aim of this topic is to introduce students to the general nature of engineering and the core professional practices associated with an engineering project. The topic is to develop an understanding of the nature of engineering a range of transferable skills and knowledge including engineering project planning, feasibility and design, oral and written communication skills, meeting procedures, and the ability to work as a group.
Expected Learning Outcomes	At the completion of the topic, students are expected to be able to: 1. Understand the role of engineers in society and the purposes of engineering projects 2. Understand the basic processes involved in engineering planning and design 3. Apply systems concepts and elementary optimisation theory to the modelling of engineering processes 4. Use decision theory and basic economic analysis for the evaluation of engineering projects 5. Work effectively in a group on a complex problem 6. Demonstrate an ability to apply scientific and engineering methodology 7. Work effectively as part of a team, in project formulation and the execution of feasibility studies 8. Have taken account of environmental and social issues and the human factor in analysing and designing engineering or other complex systems 9. Understand the principles of sustainable development 10. Have a basic competency in the use of word processors, spreadsheets, graphics packages and project management software 11. Use a style guide, write a report, present a set of logically related ideas in spoken and written form, implement appropriate meeting procedures, and prepare and deliver a seminar

ENGR1711 Engineering Design

Topic Description	Initiation, planning and development of engineering projects including such subjects as feasibility studies, design and performance specifications, creativity, decision theory, construction, testing and evaluation, operation, maintenance and sustainability of engineering systems and the optimum use of resources. Social, economic, political, international and environmental issues related to engineering projects. Drawing and documentation standards, theory and practice, including design and modelling software.
Educational Aims	This topic introduces students to the general nature of and the core professional practices associated with engineering design in the context of engineering projects, with emphasis on the social, economic, political, international and environmental issues. The topic also develops skills in drawing and documentation.
Expected Learning Outcomes	At the completion of the topic, students are expected to be able to: 1. Appreciate the role of engineers in society and the purposes of engineering projects 2. Understand the basic processes involved in engineering planning and design 3. Apply systems concepts and elementary optimisation theory to the modelling of engineering processes 4. Use decision theory and basic economic analysis for the evaluation of engineering projects 5. Identify and consider the social, economic, political, international and environmental dimensions of an engineering project 6. Apply the principles of sustainable development 7. Use software tools for engineering drawing, modelling and documentation

ENGR1721 Engineering Programming

Topic Description	The topic is intended as a first course in programming for students who intend to major in engineering. It aims to introduce students to the basic tools and techniques of software development and engineering packages such as Matlab. The topic will cover the following material: the structure of a program, sequence, selection, iteration, assignment and expressions, arrays, operations, input and output, and principles of design and development, testing, and maintenance.
Educational Aims	The topic aims to help develop: 1. An understanding of the nature of programming 2. The ability to read, comprehend and write simple programs 3. The application of appropriate development tools 4. An appreciation of the process by which software systems are developed, including their specification, design, implementation, testing and maintenance
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Demonstrate that they can comprehend basic program control constructs of sequence, selection, and iteration 2. Demonstrate that they can use programming development environments and tools within a defined context 3. Demonstrate that they can read pseudo-code and translate it into a readable, working program

	4. Demonstrate that they know the basics of testing and debugging 5. Demonstrate that they can apply programming principles to solve domain-specific problems

ENGR1722 Engineering Physics and Materials

Topic Description	Engineering Materials: 1. Atomic structure and bonding 2. Structure of metals, ceramics, polymers and composites 3. Material properties 4. Application of Materials 5. Economic, environmental, and societal Issues Electromagnetism: 1. Electric charge and electric field 2. Electric potential 3. Electric current and resistance 4. Magnetism 5. Introduction to Electromagnetic waves
Educational Aims	This topic aims to provide students with: 1. A basic understanding of the underlying science and the engineering performance of materials used in engineering applications 2. An understanding of the fundamental principles of electromagnetism
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Understand the classification, structure and application of materials 2. Evaluate the mechanical properties of materials with regards to elastic and plastic deformation 3. Understand the economic, environmental, and societal Issues related to materials use 4. Understand and communicate the basic principles of electromagnetism 5. Apply the concepts of electromagnetism for solving engineering problems

ENGR1732 Engineering Mechanics

Topic Description	Statics: Force Vectors (vector operations, vector addition of forces, addition of a system of coplanar forces, Cartesian vectors, addition of Cartesian vectors, position vectors, force vector directed along a line, dot product); Force System Resultants (moment of a force, scalar and vector formulations, principle of moments, moment of a force about a specified axis, moment of a couple, simplification of a force and couple system); Equilibrium of a Rigid Body (equilibrium and free-body diagrams 2D/3D, equations of equilibrium (2D/3D), two- and three-force members); Dry Friction (theory of dry friction, equilibrium, impending motion, motion, characteristics of dry friction, problems involving dry friction). Particle Dynamics: Kinematics (rectilinear kinematics: continuous motion, general curvilinear motion - rectangular components, motion of a projectile); Kinetics - Force and Acceleration (Newton's 2nd Law of Motion, equation of motion for a system of particles, equation of motion - rectangular coordinates), Work and Energy (work of a force, principle of work and energy for a system of particles, power and efficiency, conservative forces and potential energy, conservation of energy); Impulse and Momentum (principal of linear impulse and momentum, conservation of linear momentum, impact).
Educational Aims	This topic is a fundamental topic upon which most of the later year engineering topics build. This topic aims to ensure that the students understand both basic laws as they apply to static and dynamic mechanical systems and the theory and laws applicable to fundamental electrical circuits.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Understand concepts of static force systems (machines and structures) 2. Understand in depth the skills to analyse these force systems and the physical meaning of force and moment equilibrium 3. Acquire the skill to draw free-body diagrams and apply the equations of equilibrium for 2D and 3D rigid bodies 4. Understand the characteristics of dry friction and how to analyse problems involving dry friction 5. Understand the dynamic properties of particles and rigid bodies 6. Write the relevant equations of motion associated with Force, Torque and Acceleration, Work and Energy, Impulse and Momentum 7. Solve engineering problems dealing with the static and dynamical motion of particles subject to forces and accelerations

MATH1121 Mathematics 1A

Topic Description	This topic together with MATH1122 Mathematics 1B is designed for students who have studied SACE Stage 2 Mathematics and who wish to proceed to a degree in any discipline which requires higher level mathematics. It is the standard prerequisite for all higher level topics in mathematics that require knowledge of first year mathematics. The material covered includes: functions, limits and continuity, differential calculus, computation of derivatives, the chain rule, Intermediate Value and Mean Value Theorems. Applications to graphing, rates of change, maxima and minima. Complex numbers, Euler's formula, complex exponential. Three-dimensional analytic geometry, matrices, systems of linear equations, vectors, equations of lines and planes.
Educational Aims	This topic introduces the basic concepts and techniques of differential calculus, complex numbers, linear algebra, systems of equations and matrices and provides the foundation for all areas requiring first year university mathematics. Intensive hands-onapproach in the workshops aims to provide the students the essential skills in mathematical manipulations within the context of the course. The topic aims to develop a modelling and problem solving approach to mathematics and its applications through an appropriate combination of the underlying concepts and the facility of mathematical software.
Expected Learning Outcomes	At the completion of the topic, students are expected to be able to: 1. Understand the key concepts which underlie single-variable differential calculus and linear algebra 2. Be familiar with the basic facilities available in Maplemathematical software 3. Use problem solving, critical and reasoning abilities

MATH1122 Mathematics 1B

Topic Description	This topic is a continuation of material of MATH1121 Mathematics 1A and together with MATH1121 Mathematics 1A is intended to provide access to all higher level mathematics topics which require knowledge of standard first year mathematics. The emphasis is on a modelling approach to mathematics and its applications within a coherent framework. The material covered includes elementary transcendental functions. Integral calculus, fundamental theorem of the calculus, standard techniques of integration including substitution, parts, partial fractions, application to motion, arclength, area, volumes and solids of revolution, Taylor polynomials, series, power series, introduction to elementary differential equations, simple harmonic motion. Systems of linear equations, Gaussian elimination, matrix algebra and determinants.
Educational Aims	This topic is a continuation of the material of MATH1121 Mathematics 1A. This topic develops the properties of elementary transcendental functions and introduces key ideas and applications of integral calculus, matrix algebra and linear algebra.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Have a knowledge of the basic properties of the elementary transcedental functions 2. Understand and apply the key ideas and methods of integral calculus 3. Understand and analyse the relation between differential and integral calculus

	4. Understand and apply key ideas from linear and matrix algebra to the solution of systems of linear equations 5. Develop further skills in the use of computational technology 6. Have enhanced problem solving, criical and reasoning abilities 7. Appreciate the historical context underlying the development of modern mathematical principles and ideas 8. Have an informed appreciation of the wide applicability of integral calculus and matrix algebra in other areas of Science and Engineering

ENGR2703 Mechanical Practice Certificate

Topic Description	The topic covers exposure and practice in common mechanical and materials techniques including occupational health and safety, heat treatment, gas metal arc welding, manual metal arc welding, fabrication techniques, gas tungsten arc welding, machining techniques, marking off and hand tools.
Educational Aims	To give students an understanding of, practice in and an understanding of the safety requirements of common mechanical engineering techniques.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to have received traning on OH&S and practical skills essential to being a mechanical engineer, specifically heat treatment, gas metal arc welding, manual metal arc welding, fabrication techniques, gas tungsten arc welding, machining techniques, marking off and hand tools.

ENGR2711 Engineering Mathematics

Assumed Knowledge	An understanding of fundamental concepts of calculus and linear algebra.
Topic Description	First order ODE (Existence and uniqueness, separable, exact equations), linear ODE (Existence and Uniqueness, constant coefficient homogenous, variable coefficient homogenous, constant coefficient nonhomogeneous), boundary value problems. Vectors and the geometry of Space, dot and cross product, equations of lines and planes; Vector Functions, derivatives and integrals of vector functions, velocity and acceleration in space; Partial Derivatives, tangent planes and approximation, chain rule, directional derivatives, maximum and minimum values. Double and Triple Integrals. Vector Fields, Line integrals. Curl and Divergence, Stokes' Theorem. The Divergence Theorem.
Educational Aims	This topic equips the students with the skills needed to solve mathematical problems with several variables, linear systems, and differential equations. These provide the mathematical pre-requisites that the student needs for the second and higher year Engineering topics. The focus is on the application of the mathematical ideas to Engineering problems.
Expected Learning Outcomes	At the completion of the topic, students are expected to be able to: 1. Understand and be able to apply Multivariate Calculus to Engineering problems 2. Understand and be able to apply Differential Equations to Engineering problems

ENGR2722 Analysis of Engineering Systems

Topic Description	Review of linear systems, vector spaces, orthogonality, eigenvalues and eigenvectors, linear transformations. Continuous and discrete time signals, unit impulse and unit step signals, impulse response, step response, linear time invariant (LTI) systems, convolution, correlation, system transfer function, frequency response, Fourier transform, DFT (Discrete Fourier Transform), Periodic signals, Fourier series, Nyquist frequency, sampling theorem, aliasing, Laplace transform, bilinear transfer functions, magnitude and phase responses, Bode plots.
Educational Aims	This topic is an introduction to the concepts and theories of linear algebra and signal analysis and their application to engineering systems.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Understand Linear Algebra and Signal Analysis from a Mathematical perspective 2. Be able to apply Linear Algebra and Signal Analysis to Engineering problems

ENGR2741 Mechanics and Structures

Topic Description	Principles of Statics (Review); Centre of Gravity, Centroid and Moment of Inertia; Distributed Forces; Stress and Strain; Mechanical Properties of Materials: Ductile/Brittle Materials, Hooke's Law, Poisson's Ratio; Axial load; Torsion; Bending: Shear Force and Bending Moment Diagrams; Stress Concentrations; Transverse Shear; Combined Loadings; Transformation of Stress and Strain: Mohr's Circle; Design of Beams and Shafts.
Educational Aims	This topic gives students an understanding of the basic statics concepts associated with engineering mechanics and structures.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Develop and employ principles of Statics in solving problems 2. Learn how to determine centroids and moment of inertias and how to find resultant of distributed loadings 3. Understand concepts of stress, strain and mechanical properties of materials 4. Analyse axial, torsional, bending, transverse stresses and their combinations in structures and machine components 5. Calculate in-plane stresses and strains, their orientations and transformations through Mohr's circle, and calculate principal stresses and strains 6. Develop methods for designing beams to resist both bending and shear loads; prismatic and fully stressed beam designs

ENGR2751 Fluid Mechanics

Topic Description	Fluid Mechanics: Fluid properties; Hydrostatics; One dimensional flow of incompressible fluids; Continuity, momentum and energy equations; Laminar and turbulent flows in pipes and ducts; free surface and channel flows; hydraulic jump; weir and waterfall; Dimensional analysis; Flow measurements and fluid machinery.
Educational Aims	This topic aims to ensure that the students understand the following: 1. Modelling the flows of fluids 2. Measurements of the flows of fluids 3. Heat transferred to and from a fluid
Expected Learning	At the completion of this topic, students are expected to be able to:

Outcomes	1. Understand the basic properties of gases and liquids 2. Write the relevant equations of motion for fluids in pipes and channels 3. Solve simple flow problems 4. Understand how flow measurements are made in practice 5. Understand the flows in pumps and turbines

ENGR2771 Dynamics

Topic Description	1. Particle dynamics: Curvilinear motion, Force and acceleration, Work and Energy, Impulse and Momentum 2. Rigid body dynamics: Planar Kinematics, Force, Torque and Acceleration, Work and Energy, Linear and Angular Impulse and Momentum 3. Vibrations
Educational Aims	This topic aims to ensure that the students understand Kinematics and Kinetics as applied to particles and rigid bodies; and vibration.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Understand the dynamic properties of particles and rigid bodies 2. Write the relevant equations of motion associated with Force, Torque and Acceleration, Work and Engery, Impulse and Momentum 3. Understand the creation and effects of vibration

ENGR2776 Hydrostatics

Topic Description	Geometry of surface vessels; Tabular methods of integration; Mass addition, removal and transfer; Elementary principle of transverse intact stability; Heeling moments and angles, and free surface effects; Inclining experiment; Elementary principles of trim; The Intact Stability Booklet; partially-afloat condition; Damage stability.
Educational Aims	This topic aims to ensure that the students understand the following: 1. Fundamentals of hydrostatics and concepts of statical stability, and trim of intact and damaged vessels 2. Introduction to the practical implications and applications of hydrostatic concepts 3. Generation of all relevant stability criteria data required for both design development and operational purposes 4. Introduction and development of a working knowledge of stability regulations
Expected Learning Outcomes	At the completion of the topic, students are expected to be able to: 1. Calculate hydrostatic data for any floating structure and predict the influence of geometric parameters on a vessel's stability characteristics 2. Interpret a vessel's response to any loading condition from lever and moment curves 3. Calculate and assess a vessel's damage stability response 4. Undertake an inclining experiment according to industry best practice

ENGR3781 Elements of Shipboard Safety (ESS) Certificate

Topic Description	Course content: 1. Elements of fire prevention on board the vessel 2. Theory of combustion and methods of extinguishing fire 3. Practical training in the use of portable fire fighting appliances 4. Practical training in launching, boarding and survival in an inflatable life raft, including man overboard procedures 5. Elements of accident prevention as they apply to the shipboard work place, particularly as they apply to falls, working in close proximity to machinery and moving objects, confined spaces, personal protective equipment and hygiene
Educational Aims	To ensure that students understand basic safety requirements when on board a vessel.
Expected Learning Outcomes	Understand the elements of fire prevention on board the vessel, including the theory of combustion and methods of extinguishing fire. Practical training in the use of portable fire fighting appliances. Practical training in launching, boarding and survival in an inflatable life raft, including man overboard procedures. Elements of accident prevention.

PHYS2712 Thermodynamics and Energy Systems

Topic Description	1. Concepts and Definitions of Thermodynamics 2. Energy and the First Law of Thermodynamics 3. Properties of Substances 4. Ideal and Real Gases 5. Control Volume Analysis Using Energy 6. The Second Law of Thermodynamics 7. Entropy and Entropy Balance for Closed Systems and Control Volumes; Cycle Processes 8. Thermodynamic Equilibrium 9. Phase Diagrams 10. Vapour Power Systems 11. Gas Power Systems 12. Refrigeration and Heat Pump Systems
Educational Aims	In this topic students will learn the fundamentals of Thermodynamics. The students will learn how to apply the concepts to solve experimental problems. Students will learn how to apply the fundamental principles of thermodynamics to predict the behaviour of energy systems and properly design required energy systems.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Demonstrate the understanding of the concepts of Thermodynamics and to apply them to experiments 2. Understand how solids, liquids and gases behave under different temperature and pressure conditions

	3. Apply thermodynamic concepts to energy systems 4. Analyse thermodynamic cycles such as power and refrigeration cycles 5. Apply the concepts of Thermodynamics to laboratory experiments

ENGR2766 Ship Design and Construction

Topic Description	DESIGN: Vessel Types. Design Process & Constraints. Design Analyses & Techniques. Hull Form. Introduction to Propulsor Options. Introduction to Prime Mover Options. Introduction to Structural Systems. Primary Deck Machinery and Installation Considerations. Terminologies and Definitions. CONSTRUCTION: Environmental Framework: Commercial, industrial, legal and regulatory aspects of the ship production industry. Assembly Methodologies: Historical, current and alternative methods adopted in the construction of steel and aluminium vessels. Modular and parallel production methods. Composite Vessel Production: Materials and construction methods for composite vessels and components. Dimensional Control: Referencing moulded dimensions. Symbologies of structural and working drawings. Construction, Launching and Repair Facilities: Shipyard facilities, arrangement and strategic equipment, launching and docking methods. Fabrication Technologies: Cutting, welding and forming technologies. Production and Quality Management: Introduction to the requirement and tools available for production co-ordination and quality assurance.
Educational Aims	1. To provide an introduction to issues influencing a vessel's design 2. To introduce certain fundamental aspects of the rational and engineering approach to marine design 3. Establish an understanding of the considerations essential in the determination of hull characteristics, general arrangement and requisite systems 4. To provide the student with an understanding of the overall philosophy and techniques involved in the manufacture of ships and the context in which the processes are carried out 5. To provide practical experience with commercial surface modelling software and illustrate the scope of Computer Aided Design And Manufacture
Expected Learning Outcomes	At the completion of the topic, students are expected to be able to: 1. Demonstrate a basic knowledge of regulatory, practical and economic constraints on design and production of an ocean vehicle 2. Develop a concept design based on an appraisal of operational requirements via a clearly structured and rational process 3. Identify issues regarding the methodology and efficiency of production for any particular vessel and recognise the concepts of ship production system design and main hardware elements of shipyards 4. Effectively combine the use of conventional design tools with naval architecture design software to produce a limited set of design drawings and models in accordance with industry standards and codes of practice

ENGR2768 Offshore Engineering

Topic Description	Marine Sciences - a) Meteorology: regional weather systems and seasonal variations. Global pressure, air mass movement and circulation patterns. Prediction of local weather. Storms and tropical cyclones. b) Physical Oceanography: ocean structure, physical and chemical properties. Global ocean circulations, tides, waves, winds and currents. Marine resources - mineral, biological and energy. c) Marine Geology: geomorphology of the ocean floors, margins and shelves. Sedimentation and origins of hydrocarbons and minerals in the oceans. Formation and classification of coastal regions Ocean Renewable Energy - Renewable energy systems - wave power, wind power, thermal power and tidal power. Marine Transportation - Environmental forces and voyage planning. Introduction to work vessels and offshore structures. Structures - loading, stability and ballast control. Load-out and sea-transport of modules. Loads during transit and sea-fastening design. Operational codes and practices. Construction and Installation - Installation of fixed, floating and subsea structures. Lifting operations and mooring systems. Diving and ROV operations. Maintenance and repair of offshore installations. Removal and salvage of offshore production facilities. Risk assessment and management on offshore operations and on structures.
Educational Aims	The aim of this unit is to provide students with general skills and knowledge on the range of engineering operational activities in the offshore sector. The scope of the unit encompasses the essential theories of marine science and basic knowledge to plan and manage marine operations, including offshore installation, inspection and maintenance.
Expected Learning Outcomes	At the completion of this topic, students are expected to be able to: 1. Demonstrate a fundamental knowledge of marine geology, physical oceanography and marine meteorology and its applications to a range of offshore technical problems 2. Describe the equipment, technology and methods that are fundamental to common offshore engineering activities 3. Apply scientific knowledge to solve a range of engineering problems 4. Understand the differences between designing and building offshore structures from terrestrial structures