

COURSE CURRICULUM

Module Name	Credit Units
YEAR 1	
Level 1.1 (26.5 hours per week)	
Career & Professional Preparation I	1.5
Engineering Mathematics 1	5
Engineering Mechanics	4
Fundamentals of Naval Architecture 1	4
Manufacturing Technology & Practice	4
Programming for Marine Applications	4
Innovation Toolkit 1 ^	2
Sports & Wellness ^	2
Level 1.2 (24 hours per week)	
Electronics Technology	4
Engineering Materials	4
Engineering Mathematics 2	5
Fundamentals of Naval Architecture 2	5
Communication & Contemporary Issues ^	4
Innovation Toolkit 2 ^	2

MINOR IN BUSINESS MANAGEMENT

Module Name	Credit Units
YEAR 1	
Level 1.1 (22.5 hours per week)	
Career & Professional Preparation I	1.5
Computer Programming	4
Electrical Technology	4
Engineering Mathematics 1	5
Engineering Mechanics	4
Innovation Toolkit 1 ^	2
Sports & Wellness ^	2
Level 1.2 (23 hours per week)	
Engineering Materials	4
Engineering Mathematics 2	5
Fundamentals of Naval Architecture 1	4
Manufacturing Technology & Practice	4
Communication & Contemporary Issues ^	4
Innovation Toolkit 2 ^	2

Notes:

^ For more details on Interdisciplinary Studies (IS) electives, please log on to www.np.edu.sg/is/

IS Modules

The School of Interdisciplinary Studies (IS) delivers a broad-based curriculum, which nurtures a new generation of professionals with multidisciplinary skills and an innovative and entrepreneurial spirit to meet the challenges of a knowledge economy. IS offers both prescribed modules and electives to challenge boundaries. Prescribed modules develop students' competencies in core areas such as Communication, Innovation and Enterprise, Culture and Communication, and Personal Mastery and Development, while elective modules provide insights into Arts and Humanities, Business, Design, and Science and Technology.

COURSE MODULES

LEVEL 1.1

Career & Professional Preparation I

This module helps to give students a foundational introduction to their three-year diploma course curriculum and how it prepares them for industry. It will help them to embark on their three-year course with the end in mind, through guided reflection of their personal characteristics, and producing an overall game plan for their future education and career goals. The module aims to deepen students' commitment to the sector that the course prepares them for.

Computer Programming

This practice-oriented module will equip students with the basic knowledge and skills in computer programming using C language. The main topics include basic computing concepts, fundamentals of C, branching, loops, and C functions. On completion of the module, students will be able to explain and write C programmes for simple engineering applications.

Electrical Technology

This module provides the foundation in electricity to prepare students for more specialised subjects. It deals with the basic concepts of electrical circuits and the methods used to analyse them. The module emphasises the understanding of basic electrical circuit laws (Ohm's Law, Kirchhoff's Voltage and Current Laws) and network theorems, and their application to electrical network analysis. Topics covered include fundamentals of electricity, network theorems and capacitance.

Engineering Materials

This module introduces students to the equilibrium phase diagrams, structures, and properties of common engineering materials with emphasis on mechanical testing methods, heat-treatment, international standard specifications, selection and applications of such materials. Topics include classification of materials, mechanical testing, alloying, steels, non-ferrous alloys, plastics, ceramics, composites, corrosion and selection of materials and shaping processes.

Engineering Mathematics 1

This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Topics include algebra, trigonometry, logarithms, plane analytic geometry, matrices and complex numbers. Throughout the module, there is appropriate use of a Computer Algebra System.

Engineering Mathematics 2

This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include Trigonometry, differentiation and simple integration with applications.

Engineering Mechanics

This module introduces students to the study of external forces in two dimensions and their effect on particles and rigid bodies that are at rest. Students develop the skills to analyse the forces acting on the bodies by drawing free-body diagrams and applying the conditions of equilibrium. Topics include forces and resultants, moments and couples, equilibrium, and the concepts of plane friction. This module also aims to equip students with the skills to analyse problems of rigid bodies in motion. Only linear and rotational motion in two dimensions will be covered. Topics include kinematics and kinetics of linear motion.

Fundamentals of Naval Architecture 1

This module introduces the world of marine & offshore technology and students learn the basic principles of ship construction and floatation. Students will be inducted into the industry with a strong emphasis on pastoral care and career guidance, infused with NP core values. They will have exciting and engaging action-learning experiences such as team-building-team-learning (TBTL) sessions, off-campus visits and career and alumni talks.

Fundamentals of Naval Architecture 2

This module aims to provide students with the basic principles of marine hydrostatics which include the knowledge and understanding of intact stability, large angle stability, trim and damaged stability of a ship. Principles and analysis of centroids on areas, volumes and mass for various types of floating platforms and ships will be covered to enable the learning of marine hydrostatics.

Manufacturing Technology & Practice

Students will acquire the basic knowledge and skills of manufacturing processes, including drilling, turning, milling, grinding, non-conventional machining, welding and assembly. The module is practice-oriented with classroom lectures complemented by practical sessions involving the creation of specially-designed work pieces.

Programming for Marine Applications

This practical-oriented module equips students with basic knowledge and skills in computer programming using Visual Basic.Net language. The main topics include basic computing concepts such as data types, variables, conditional logic, loops, procedures, event handlers and object oriented programming. Upon completion of the module, students will be able to explain and write VB.Net programmes for simple engineering applications.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 2	
Level 2.1 (27 hours per week)	
Engineering Design Thinking	3
Engineering Mathematics 3B	4
Marine Design Drafting	5
Marine Auxiliary Systems	5
Offshore Drilling & Production	3
Thermodynamics	5
Interdisciplinary Studies (IS) elective ^	2
Level 2.2 (27 hours per week)	
Career & Professional Preparation II	2
Fundamentals of Naval Architecture 3	6
Marine Design Practice	3
Marine CAD	4
Marine Production Technology	3
Marine Industry Safety	2

Strength of Materials	5
Interdisciplinary Studies (IS) elective ^	2

MINOR IN BUSINESS MANAGEMENT

Module Name	Credit Units
YEAR 2	
Level 2.1 (28 hours per week)	
Career & Professional Preparation II	2
Fundamentals of Naval Architecture 2	5
Marine Engineering Systems	5
Marine Design Drafting	5
Marketing Fundamentals	4
Thermodynamics	5
Business & the Economy ^	2
Level 2.2 (27 hours per week)	
Engineering Mathematics 3B	4
Fundamentals of Financial Management	4
Fundamentals of Naval Architecture 3	6
Engineering Design Thinking & Practice	3
Offshore Drilling & Production	3
Strength of Materials	5
Effective People Management ^	2

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IS Modules

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COURSE MODULES

LEVELS 2.1 & 2.2

Career & Professional Preparation II

This module helps to equip students with skills necessary to seek and secure work. They will also be equipped to communicate their personal brand in a positive way. As students sharpen their communication skills, they will also learn how to market themselves effectively.

Engineering Design Thinking

This module aims to teach students the engineering design thinking process that designers adopt to define the problem, do relevant research to acquire information, analyse knowledge and provide creative solutions to the problem in the design and planning fields. With the thinking process, problems can be framed, the right questions can be asked, more ideas can be created and the best answers can be chosen.

Engineering Mathematics 3B

This module is a continuation of Engineering Mathematics 2. Topics include Integration Techniques & Applications, First Order Differential Equation, Laplace Transform, Probability and Statistics.

Fundamentals of Financial Management

This module covers basic accounting and financial concepts and principles to enable students to understand and interpret financial statements and reports. Students will also have an understanding of costing concepts and the financial techniques used in making financial decisions and evaluating capital investment projects.

Fundamentals of Naval Architecture 2

This module aims to provide students with the basic principles of marine hydrostatics which include the knowledge and understanding of intact stability, large angle stability, trim and damaged stability of a ship. Principles and analysis of centroids on areas, volumes and mass for various types of floating platforms and ships would be covered to enable the learning of marine hydrostatics.

Fundamentals of Naval Architecture 3

This module aims to provide students with the principles of the ship/oil-rig launching process and the principles and analysis of vessel resistance and propulsion. Strength of ships using the simple beam theory analogy will be analysed. Problems related to vibration and manoeuvrability will be discussed. In addition, elements of marine design such as tonnage, load line assignment and roles of statutory bodies and classification societies will be discussed.

Marine Auxiliary Systems

The module aims to provide students with a broad understanding of marine piping, pumps and cooling and heating systems. Students will also learn about auxiliary machineries on board ships through hands-on practice on common marine equipment such as valves, strainers, pumps, heat exchangers and diesel engines, and their applications in marine systems design and operations.

Marine CAD

Students apply Marine CAD/CAM software to complete the full procedure of hull design and production, including hull form generation, lines fairing, curved surface modelling, planar structure modelling, and generation of production information. They will also carry out 2-D drafting, and then proceed to create marine components as 3-D objects. The module also covers piping programme for pipe routing and pipe assemblies.

Marine Design Practice

This module introduces students to various computer-aided design and manufacturing work processes commonly used in the marine and offshore industry. Students will also carry out hands-on computer and lab practices associated with computer aided design and manufacturing. This module will integrate design thinking concepts and prepare the students for their final-year projects.

Engineering Design Thinking & Practice

This module equips students with the engineering design thinking process that designers adopt to define the problem, do relevant research to acquire information, analyse knowledge and provide creative solutions to the problem in the design and planning fields in the marine and offshore domain. Students have to carry out hands-on computer and lab practices associated with computer aided design and manufacturing to build mock-ups and prototypes. Basic shipyard processes, marine safety and project management skills will be highlighted as an induction and overview for the internship experience.

Marine Design Drafting

The module gives students fundamental training in the principles and practices of the international graphic language for engineering that is based on the International Standard Organisation (ISO) and the Singapore Standards (SS) guidelines. The module comprises short lectures and numerous hands-on exercises in creating design and drafting using various principles and techniques applied on marine design. AutoCAD is taught and used as the tool for design and drafting practical marine examples.

Marine Engineering Systems

This module will provide students with a fundamental knowledge and understanding of marine propulsion systems, marine auxiliary systems and electrical systems through hands-on practices on common marine equipment such as valves, strainers, pumps, heat exchangers and diesel engines; and their applications in marine systems design and operations.

Marine Production Technology

This module aims to help students understand and gain basic knowledge of yard operations and production processes carried out in the various types of yard, from new build to repair and conversion. This module will also impart essential knowledge of welding and various manufacturing processes carried out during different stages of the production process, including weld quality control and various types of non-destructive testing to identify distortion and defects during production.

Marine Industry Safety

This module introduces students to the various important aspects of marine industry safety and legislation governing occupational safety in workplaces. Topics include identification, evaluation and analysis of hazards, control measures and risk assessment.

Marketing Fundamentals

The basic concepts and principles of marketing are introduced. This module enables students to better understand and evaluate the marketing system in which products and services are planned, priced, promoted and distributed. Apart from the four P's in marketing, topics covered also include segmentation, targeting and positioning, product mix, service marketing, channel decisions and branding.

Offshore Drilling & Production

Students will be introduced to offshore oil production covering marine well-drilling, types of drilling rigs and floating production systems. Topics include separators, gas-treatment, gas flaring, enhanced recovery using water and gas injection, produced water treatment, utility systems, mooring arrangements, storage and export systems. Technical consideration of FPSO conversions, subsea product on systems flow lines and risers, as well as remote-operated vehicles will also be covered.

Strength of Materials

This module aims to provide students with the foundational knowledge of strength of materials with an emphasis on applications and problem solving. Topics include simple stresses and strains, torsion in shaft, shear force and bending moment diagrams, stresses in beams, combined stresses and experimental stress analysis.

Thermodynamics

This module covers the properties of working fluids, the first law of thermodynamics and its application to both non-flow and flow processes. Topics include the first law of thermodynamics, properties of liquids and vapours, non-flow processes with steam, steady flow processes with steam, properties of perfect gases, and non-flow processes with perfect gases.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 3	
Level 3.1 (22 hours per week)	
OIL GAS SPECIALISATION	
Marine Propulsion Systems	5
Drilling Engineering	3
Offshore Topsides Systems	3
Subsea Technology	3
Marine Design Project	4
Interdisciplinary Studies (IS) elective ^	2
World Issues: A Singapore Perspective ^	2
DESIGN SPECIALISATION	
Marine Propulsion Systems	5
Drilling Engineering	3
Offshore Topsides Systems	3
Subsea Technology	3
Marine Design Project	4
Interdisciplinary Studies (IS) elective ^	2
World Issues: A Singapore Perspective ^	2
Level 3.2 (22 hours per week)	
Internship	22

MINOR IN BUSINESS MANAGEMENT

Module Name	Credit Units
YEAR 3	
Level 3.1 (21 hours per week)	
Marine Industry Safety	2
Marine Production Technology	3
Marine Business Project	4
Starting & Managing an Enterprise	4
Business Management Elective ^	4
Interdisciplinary Studies (IS) elective ^	2
World Issues: A Singapore Perspective ^	2
Level 3.2 (22 hours per week)	
Internship	22

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COURSE MODULES

LEVELS 3.1 & 3.2

COMMON MODULES:

Internship

The internship aims to provide practice-oriented training to equip students with the appropriate knowledge, management and communication skills imbued with the right values to work as technologists in marine production. Students will get the chance to appreciate the organisational structure and company product and go through the production flow or project cycle with company mentors. Assessment of students' performance will be carried out jointly by both industry as well as NP supervisors.

Marine Design Project

The module will equip students with design, planning and implementation knowledge through projects assigned based on the particular option chosen, either "Design" or "Oil & Gas". Students will apply their knowledge to solve a real design problem related to the marine industry. The module will take students, working in groups, through the entire design life cycle.

Marine Propulsion Systems

Students will attain a fundamental knowledge and understanding of marine propulsion systems, matching of engine and propeller, compressed air system for starting, steering gear systems, reliability concepts applied to machinery design, and marine pollution control.

OIL & GAS SPECIALISATION

Drilling Engineering

This module provides students with an overview of the drilling operations, from planning to completion for production. It develops a functional understanding of the operation and commissioning of various equipment processes and systems involved in the drilling and completion operations. Students are also introduced to analytical methods to select various components of drilling operations and the demonstration of some design problems.

Offshore Topsides Systems

This module provides students with a deeper understanding of the working principles of the offshore topsides systems in the oil and gas upstream process, fundamental organic chemistry, basic production, process plant, equipment and utilities to support the processing of oil and gas. Learning is enhanced through practical sessions on industrial standard software investigating well and flow behaviour.

Subsea Technology

This module provides students with a deeper understanding of subsea systems engineering in offshore oil and gas production. It covers subsea systems, equipment and their architecture, offshore exploration, Remote-Operated Vehicles, subsea processing of oil & gas, subsea control systems, flowline, pipeline and risers.

DESIGN SPECIALISATION

Marine & Offshore Design

This module aims to provide students with theoretical and analytical knowledge in marine and offshore design. Students will have the opportunity to apply the naval architecture knowledge learnt previously in the conduct of marine & offshore design process. The process includes identifying design requirements, data collection, estimation of dimensions, choice of design ratios and hull form. Capacities, weight & centre of gravities (CG) calculations are also included together with stability checks and speed-power estimates.

Marine Design Applications

This module aims to equip students with knowledge and skills of computer software applications in marine design. The emphasis will be placed on carrying out student group work in various preliminary marine designs (e.g. design of container, tanker, bulk carrier, general cargo vessels, offshore oil rigs, etc.). Advanced marine design and simulation analysis software will also be used in the students' design work. Students will be required to ascertain their design feasibility through the classification rules. A critique panel made up of industry partners will share their experiences with the students and also conduct joint assessment with the polytechnic lecturers in a student forum.

Offshore Dynamics

The module aims to help students understand the design considerations for offshore structures. In the analysis and design of offshore structures, students will be introduced to the API RP and ISO 19900 standards for offshore platform design. Topics covered range from various wave theories and diffraction theory, to Morison's theory and spectral modelling approaches. The module will also provide opportunities to explore the capabilities of a software package for offshore dynamics. Overall, students will be exposed to the latest engineering concepts and practices in offshore design, construction and installation.

MINOR IN BUSINESS MANAGEMENT

Marine Business Project

This module is designed for MOT-EBM students to help them apply the knowledge they have learned previously in engineering as well as in business to undertake business-related projects relevant to the marine industry. The module will take students, working in groups, through an entire project cycle.

Starting & Managing an Enterprise

Through this module, students generate business ideas and propose how these ideas can be developed into a business plan incorporating operational and financial requirements and marketing strategies for a new enterprise. In addition, students will learn how the principles of management can be applied to organise and develop the enterprise. Topics covered include entrepreneurial concepts and issues, business entry and exit strategies, types of business ownership, sources of business financing, venture launch and management principles.

BUSINESS MANAGEMENT ELECTIVES

Students are to choose *one* of the three electives below:

Managing Service Operations

This module introduces the operations in service organisations and the use of techniques for designing, planning, organising and controlling resources for the delivery of goods and services to meet customers' needs and organisational objectives. Concepts covered include service facility, managing facilitating goods, forecasting demand, managing waiting lines, process improvement, inventory management, service supply relationship and service quality.

Supply Chain Management

This module introduces students to the process of planning, implementing, and controlling the operations of the supply chain. It will cover the movement and storage of raw materials, work-in-process inventory and finished goods from point-of-origin to point-of-consumption. The module also emphasises the effect supply chain management has on the success and profitability of the organisation.

Understanding Buyer Behaviour

The module provides students with a basic understanding of buyer behaviour concepts. It explores various influencing factors that affect buyer decisions. Buyers could be consumers or corporate buyers. Topics covered include consumer decision-making processes, perceptions and attitudes, consumer demographics and lifestyles, and cultural and group influences.

DIPLOMA PLUS PROGRAMME

The Diploma Plus Programme (DPP) is designed to provide students with proficiency in a selected domain area, either to broaden or deepen their knowledge/ skills in their main discipline of study, or to equip them with additional professional knowledge that would better prepare them for further study or increase their employability. Students can select elective modules from a wide range of clusters to obtain their Diploma Plus Certificate. DPP is optional and it will not affect the graduating requirement for the award of a diploma.

Students can choose the DPP clusters from the list below. The offer of a DPP cluster is subject to the condition that the minimum class size is met and based on available vacancies.

Engineering Clusters

- Applied Physics#
- Computer-Aided Design Skills (World Skills Singapore)
- Workplace Safety & Health

Other available Diploma Plus Certificates

- Advanced Engineering Mathematics*
- Business**
- Innovation Management
- Foreign Languages

The Applied Physics syllabus is aligned with the NTU's FE1012: Physics A module. NP students who obtain good grades in the Applied Physics modules will be granted exemption from the FE1012: Physics A module.

* The CAEM syllabus is aligned with the 'A' Level H2 Pure Mathematics syllabus. NP graduates who have successfully completed the revised CAEM will be granted exemption from the NUS' MA1301 Proficiency Test.

** Students pursuing the Minor in Business Management cannot take the DPP Certificate in Business (CIB).