

MARINE ENGINEERING (MET)

MET 1113 Fabrication and Repair I (3-1-3)

Introduction to workshop practices and the use of machine tools as relevant to seagoing marine engineers. Provides basic quality control checks of finished products. Material includes health, safety and environment regulations, and proper use of fabrication tools and regular logbook maintenance skills.

MET 1122 Introduction to Marine Engineering (2-1-2)

Introduction to marine engineering, designed for students undertaking the bachelor of Applied Science, Marine Engineering Program. Include basic information on marine engineering and the relevant rules and regulations governing maritime operations, including classification societies and IMO.

MET 1132 Marine Chemistry (2-1-2)

Introduction to marine chemistry. Covers the properties of matter in terms of fundamental principles and provides the understanding of chemical energy concepts. Introduce gas law and kinetic theory of gases, spontaneity of reaction, chemical equilibrium, properties of solutions, and study the phenomena of liquid at interface. Focus on applications of particular interest to the marine environment.

MET 1210 Marine Engineering Seetime I (0-10-10)

Undertaken under the supervision of a senior officer while the student is at sea. A detailed record of tasks and duties performed under the direction of ships officers will be kept in a training record book, dated and signed by the supervising officers. This Training Record Book (TRB) together with a number of project work and assignments will be assessed for completion by HCT staff at the end of the semester. The material will include: use of hand tools; watchkeeping; electrical systems; auxiliary equipment; and maintenance.

Prerequisites: MTR 1003, MET 1113, MET 1122

MET 2303 Mathematics for Marine Engineering (3-1-3)

Covers mathematical skills essential for progression to the study of calculus and further engineering mathematics. Includes polynomials, linear algebra, vectors, complex numbers, exponential and logarithmic functions, variation and inequalities.

MET 2313 Marine Engineering Knowledge (3-1-3)

Introduction to the theories and principles of a very wide range of marine engineering equipment, including: main engines (different types); auxiliary engines; marine boilers; shafts; seals; tanks (fresh water, ballast, and cargo); valves; air conditioning equipment; refrigeration equipment; pumps (different types); steering gear; stabilizers; and scrubbers.

MET 2403 Fluid Mechanics for Marine Engineering (3-1-3)

Covers the basic concepts of fluid mechanics. Emphasis will be placed on basic topics including fluid properties, hydrostatics and hydrodynamics (buoyancy, forces on submerged surfaces, pipe flow and energy losses). The course practical work will reinforce the theory through a set of experiments in the hydraulics laboratory.

MET 2413 Applied Marine Mechanics I (3-1-3)

Covers basic theory and operation of two and four-stroke marine engines (inboard, outboard and jet) as well as common boat hull types and boating terminology.

MET 2423 Ship Stability (3-1-3)

Covers the basic stability of ships to enable seagoing officers to understand issues associated with loading, unloading and moving of cargo and related aspects. Includes transverse stability (small angle and large angle), free surface effects, list and loll angles, and trim. Introduce the concept of the trim and stability booklet, and its application.

Prerequisites: MET 2303

MET 2433 Fabrication and Repair II (3-1-3)

Builds upon the fabrication and repair course in first semester, together with the experience that the cadets will have obtained during their first period of seetime. It covers more advanced fabrication techniques, including the construction of a more elaborate example piece. Health and safety issues continue to be emphasized.

Prerequisites: MET 1113, MET 1210

MET 2442 Marine Material Technology I (2-1-2)

Introduction to the wide range of materials used in the maritime environment. It covers: mild steel; stainless steel; aluminium; concrete; wood; and glass reinforced plastic. The particular issues with each of these for the maritime environment are discussed, and applications for each included. In addition, the particular properties of the wide range of different mild steels is discussed in detail.

Prerequisites: MET 1113, MET 1132

MET 3510 Marine Engineering Seetime II (0-10-10)

Conducted at sea, and will be supervised by a senior officer on board. A detailed record of tasks and duties performed under the direction of ships officers will be kept in a training record book, dated and signed by the supervising officers. This Training Record Book together with a number of project work and assignments will be assessed for completion. Includes watchkeeping; practical engineering knowledge; electrical systems; maintenance; and practical control engineering. Meets the requirements of the STCW Convention for shipboard training of deck officer trainees.

Prerequisites: MET 1210, MET 2433, MET 2313

MET 3603 Applied Marine Mechanics II (3-1-3)

Introduction to the concepts and principles of naval architecture and ship construction. It covers practical aspects of ship design, including the purpose and names of important elements of a ship. Different ship types, the reasons for these and their principal design differences are covered. These include: general cargo vessels; dry bulk carriers; oil tankers; gas carriers; containerships; cruise ships; passenger ships; ferries; tugs; supply boats, other support vessels; and warships.

MET 3613 Ship Construction (3-1-3)

Introduction to the concepts and principles of naval architecture and ship construction. It covers practical aspects of ship design, including the purpose and names of important elements of a ship. Different ship types, the reasons for these and their principal design differences are covered. These include: general cargo vessels; dry bulk carriers; oil tankers; gas carriers; containerships; cruise ships; passenger ships; ferries; tugs; supply boats, other support vessels; and warships.

MET 3623 Marine Engineering Control I (3-1-3)

Introduction to the basic applications of automatic control theory and the use of these concepts in a wide variety of different marine applications. Different concepts of control theory are considered, and their applications on board ships discussed. Typical control hardware is studied, and examples given.

MET 3633 Marine Electrical Systems I (3-1-3)

Introduction to the fundamentals of common electrical machines used in maritime environments. The physical concepts and basic laws governing electrical machine operation are introduced, and the principles underlying the performance of electrical machines are explained. In addition, the course covers power transformation and transmission in ships. A number of shipboard applications are given.

Prerequisites: MET 2313

MET 3643 Diesel Engine Maintenance (3-1-3)

Comprehensive introduction to the maintenance of diesel engines in the maritime environment. Typical large low speed two stroke diesel engines are included, as well as smaller high and medium speed diesel engines. In addition to routine maintenance, troubleshooting issues are included.

MET 4710 Marine Engineering Seaside III (0-10-10)

Includes a detailed record of tasks and duties performed under the direction of ships officers will be kept in a training record book, dated and signed by the supervising officers. This Training Record Book together with a number of project work and assignments will be assessed.

Includes marine machinery operations; practical engineering knowledge; maintenance; watchkeeping and practical control engineering. Meets the requirements of the STCW Convention for shipboard training of marine engineering officer trainees.

Prerequisites: MET 3510

MET 4804 Engineering Knowledge - Diesel (4-1-4)

Covers the theory, design, operation and maintenance of marine diesel engines. Two and four stroke diesels are included, as are low speed, medium speed and high speed. Applications of each of these are given, along with the pros and cons of each. In addition, recent developments in diesel engines are covered. Dual fuel diesel/gas engines, and gas engines are also included.

Prerequisites: MET 2313

MET 4814 Engineering Knowledge - Steam (4-1-4)

Covers the theory, design, operation and maintenance of marine diesel engines. Two and four stroke diesels are included, as are low speed, medium speed and high speed. Applications of each of these are given, along with the pros and cons of each. In addition, recent developments in diesel engines are covered. Dual fuel diesel/gas engines, and gas engines are also included.

Prerequisites: MET 2313

MET 4823 Marine Airconditioning and Refrigeration (3-1-3)

Introduction to air conditioning systems and refrigeration systems on board ships. The principles and theory of operation of typical equipment is covered. This includes equipment for hotel services as well as for cargo, such as refrigerated cargo, and refrigerated containers. Examples of applications of various types of equipment are given.

Prerequisites: MET 2313

MET 4833 Marine Engineering Control II (3-1-3)

Builds on the previous control course and extends the knowledge of control theory and its application in the marine environment in a practical manner. In addition, specialist areas of control relevant to different pieces of shipboard equipment are considered, and the range of relevant control strategies examined.

MET 4843 Marine Electrical Systems II (3-1-3)

Introduction to the various electrical systems that are on board ships. It includes an introduction to a variety of bridge equipment such as: electronic navigational aids; sonar; meteorological equipment and instrumentation. Electrical cargo handling equipment, including: cranes; pumps; lifts; and ramps are covered. Electrical equipment in the accommodation and engine room are also included.

MET 5005 Leadership for Chief Engineers (5-1-5)

Prepare students for the position as Chief Engineer. The requirements of a chief engineer are covered, along with various leadership strategies to best meet the challenges of leading a diverse group of officers and crew on a ship. In addition, the differences between shipboard command and senior leadership positions ashore are discussed. In addition to routine operations, the leadership skills and techniques to be employed in a variety of on board emergency situations are covered.

MET 5014 Marine Machinery Operations (4-1-4)

Capstone course which covers all operations of the wide range of marine machinery used on board ships from the view point of a chief engineer. It includes all the processes from start up to shut down, both in routine operations and under emergency conditions. Troubleshooting and other unusual operational scenarios are included.

MET 5024 Advanced Ship Regulation and Survey (4-1-4)

Covers regulations concerning the construction of passenger ships, cargo ships and barges. Conduct a ship survey with effectiveness and efficiency. Essential law, safety and operational surveys, incident and accident investigation along with writing the survey report and flag and port state control inspections.

MET 5903 Marine Material Technology II (3-1-3)

Covers the theory of marine materials in a greater depth. In particular, mild steel, and the various classifications of this are dealt with. Theoretical considerations of other materials used on board ships are also covered, including: high strength steel; stainless steel; aluminium; and fibreglass. The compatibility of different materials is covered, both from a point of view of corrosion and also from load bearing considerations.

MET 5914 Ship Design and Technology (4-1-4)

Covers a range of technical topics, building on knowledge gained earlier in the program, associated with the design and construction of different vessel types, including: general cargo vessels; dry bulk carriers; oil tankers; gas carriers; containerships; cruise ships; passenger ships; ferries; tugs; supply boats; other support vessels; and warships.

MET 5924 Advanced Marine Engineering Knowledge (4-1-4)

Advanced course on marine engineering application and knowledge, which brings together all the earlier courses. This is covered in a capstone manner as required for the chief engineer on board a ship who needs to have a thorough understanding of all equipment and structure on the ship, and their interaction, both in routine situations and in emergencies. An introduction to project management is also included.

MET 5934 Marine Engineering Project (4-1-4)

First of two linked project based final year courses. An appropriate project will be chosen by the student with guidance from relevant faculty members. Conducting the project will integrate many of the skills and knowledge obtained during the program, as well as develop independent learning. Students are expected to submit, and defend, their project in the presence of faculty members, and their peers.

Prerequisites: MET 4710