



MCAST

MQF Level 4

MS4-01-21

Advanced Diploma in Deck Operations

Course Specification

Course Description

This Advanced Diploma programme is designed to prepare candidates for a career in the maritime sector. This programme also prepares such candidates to qualify for a Certificate of Competence as an Officer In Charge of a Navigational Watch on ocean-going merchant vessels. The course consists of a number of maritime related subjects such as Navigation, Meteorology, Signals, Ship Knowledge and Stability, Cargo Operations, International Regulations, and a high level of physical fitness training and leadership training in which all candidates are expected to participate. Officer Cadets are expected to wear a merchant marine uniform whilst undergoing training both ashore and on board ships. Officer Cadets attending the course will be assisted in finding a sponsor for the practical training period at sea during the third phase of training on the course. The programme eventually includes a compulsory 12-month sea placement after the first two years of the course.

Programme Learning Outcomes

At the end of the programme the student is able to

- 1. Explain and undertake navigation at the operational level.*
- 2. Discuss Cargo Handling and stowage at the operational level.*
- 3. Demonstrate the safe operation of the ship and care for persons on board at the operational level.*
- 4. Demonstrate professional recognised navigation and ship operations skills.*

Entry Requirements

4 SEC/O-Level passes/SSC&P (Level 3) passes:

- Compulsory: Physics, Mathematics and English Language;
- Preferred: Geography and a foreign language;

or MCAST Diploma in Deck Operations;

Medical Test, Physical Aptitude Test and Interview

Guidance Note: Students must have reached the age of 18 years during their second academic year.

Current Approved Programme Structure

Unit Code	Unit Title	ECVET	Year
ETMME-406-2101	Mathematics	6	1
ETMME-406-2102	Physical Science	6	1
ETMME-406-2103	Meteorology	6	1
ETMME-406-2104	Celestial Navigation 1	6	1
ETMME-406-2105	Collision Regulations 1	6	1
ETMME-403-2106	General Ship Knowledge 1	3	1
ETMME-403-2107	Stability Part 1	3	1
ETMME-406-2108	Legislation	6	1
ETMME-406-2109	Coastal Navigation 1	6	1
ETMME-406-2110	Seamanship	6	1
ETMME-403-2111	Navigation (Bridge Simulator)	3	1
ETMME-403-2112	Radio Communications (Bridge Simulator)	3	1
ETMME-410-2113	Celestial Navigation 2	10	2
ETMME-405-2114	Collision Regulations 2	5	2
ETMME-406-2115	General Ship Knowledge 2	6	2
ETMME-406-2116	Stability Part 2	6	2
ETMME-412-2117	Coastal Navigation 2	12	2
ETMME-402-2118	Instrumentation	2	2
ETMME-405-2119	Cargo and Operations	5	2
ETMME-402-2120	Signals	2	2
CDKSK-404-1915	Employability and Entrepreneurial Skills	4	2
CDKSK-402-2104	Community Social Responsibility	2	2
CDKSK-406-2001	English	6	2
Total ECVET		120	/

ETMME-406-2101 Mathematics

Unit level (MQF): 4

Credits: 6

Unit Description

The unit is based on the Mathematics in Appendix 1 of the Model Course 7.03 for learners aspiring to become Officers in Charge of Navigational Watch. It covers the mathematics which is deemed necessary to obtain in depth knowledge required under various competencies of section A-II/1 and section A-II/2 of the STCW Code for a watchkeeping officer and for a master or chief mate on ships of 500 gross tonnage or more.

The topics covered are standard algebraic manipulations, graphs, proportion, variation and interpolation, geometry, trigonometry, mensuration, arcs, vectors, circle, ellipse and hyperbola and finally basic logarithms.

To reach this goal, the unit is divided into six learning outcomes which are related to algebraic manipulation, trigonometric functions, mensuration and statistical data. Through these different areas, learners will be able to develop the effective skills for information processing, reasoning, evaluation creative thinking and enquiry, all of which are fundamental skills for the problem-solving process. This will prepare learners in applying and evaluating a range of strategies to solve real-life problems which they will meet on board ships. The content in this unit enables learners to synthesise and evaluate real-life situations. Through this unit the learner will also learn to present and communicate results and conclusions effectively.

On successful completion of the unit the learners will be equipped with mathematical thinking skills which enables learners to be aware of and understand their thought process and to reassess and identify areas for development. Learners learn to evaluate, reflect about their strategies, understand and verify results when solving problems. These skills will equip learners with mathematical skills, to further their studies and for work on board ships.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Perform interpolations, algebraic manipulations and the plotting of data to interpret ship officers' tables.*
2. *Use trigonometrical functions of angles whilst applying coordinate geometry to complete chartwork and radar plotting.*
3. *recognise mensuration, spherical triangles, circles, ellipses, and hyperbolae.*
4. *Solve problems relating to forces, moments, stresses, strains, shear forces and bending moments using the appropriate diagrams of forces and calculations.*
5. *Solve problems relating to distance, velocity, acceleration, circular motion and rotation, machines, work, energy, power and fluids.*
6. *Manipulate data using logarithms.*

ETMME-406-2102 Physical Science

Unit level (MQF): 4

Credits: 6

Unit Description

The unit is based on the Physical Science in Appendix 1 of the Model Course 7.03 for students aspiring to become Officers in Charge of Navigational Watch. It covers the the Physical Science which is deemed necessary to obtain in depth knowledge required under various competencies of section A-II/1 and section A-II/2 of the STCW Code for a watchkeeping officer and for a master or chief mate on ships of 500 gross tonnage or more.

This unit starts with the topic of heat, which includes temperature, solids, liquids and gases, heat transmission, change of state, vapours and refrigeration.
The second topic is waves sound and light.

Third topic is Magnetism and electricity, starting with safety, electrical principles, the electrical circuit, work energy and power in an electrical circuit, electromagnetic induction, capacitors, electric generators and motors, alternating current and voltage, distribution and protective devices, electrochemistry, instruments, Lenz's law and transformers.

The fourth topic is electromagnetism which is based on Faraday's law and includes the concept of electromagnetic radiation, propagation, polarization and wavelength/frequency relationship, ground and sky waves.
The fifth topic is basic chemistry for fire fighting.

The topic relating to mass, weight and force, distance velocity and acceleration, circular motion and rotation, statics, work, energy and power, machines, density, fluids, principles of Archimedes and flotation are included in the Mathematics module.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Perform calculations related to heat transfer, properties of gases.*
2. *Discuss general physics topics related to light and sound.*
3. *Perform calculations related to magnetism and electricity.*
4. *Describe electromagnetism, electromagnetic devices and their applications.*
5. *Outline basic chemistry.*

ETMME-406-2103 Meteorology

Unit level (MQF): 4

Credits: 6

Unit Description

This unit outlines the direct relationship between weather and its resultant phenomena and the importance of safe marine navigation. The learners will have the opportunity to learn in detail about the different meteorological components, particularly those which can have an adverse impact on the maritime industry, namely Tropical Revolving Storms (TRS)/tropical cyclones, depressions, and thunderstorms just to mention a few. Prior to this however, the learners will be introduced to several weather-related topics whereby technical key terms and definitions widely-used by meteorologists will be explained in detail as well as demonstrated in class to improve the understanding of all learners. Such topics consist of the study of the atmosphere and its physical components/sub-layers; clouds and their classification (as per World Meteorological Organization (WMO) instructions); Earth's heat energy distribution in relation to its positioning, tilt, and seasons; the origin and movement of air masses; global atmospheric circulation and winds; positioning of global pressure zones and their respective climatic regimes; and also the relation between wind and the generation of sea waves. As part of the unit, learners will train and practice hands-on how to carry-out basic weather observations by making use of both meteorological instruments available, as well as by applying the theoretical knowledge discussed and delivered. By the end of this unit, the learners are expected to have a solid background in meteorology, being capable to demonstrate and explain reasons causing or contributing to the resultant state of the sky. Ultimately, the learners will be able to identify any offshore weather-related risks beforehand by analysing synoptic weather charts, applying maritime forecasts, and via radar imagery interpretation during or near inclement weather.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Recognise the basics of the atmosphere and its physical conditions.*
2. *Measure meteorological properties by using various instruments.*
3. *Interpret the weather by studying the atmospheric conditions.*
4. *Manage weather forecasting and recording for shipping.*

ETMME-406-2104 Celestial Navigation 1

Unit level (MQF): 4

Credits: 6

Unit Description

The syllabus of the Celestial Navigation Unit covers the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978 as amended chapter II, section A-II/1 and the IMO Model Course 7.03 Officer in Charge of a Navigational Watch 2014 Edition.

It is divided into two units: Celestial Navigation 1 in the first year and Celestial Navigation 2 in the second year.

At the of this unit (Celestial Navigation 1), the learners will acquire various skills like: understanding the solar system and the celestial bodies useful for navigation; calculating the Hour Angle; using the marine sextant, identifying its errors and correcting them; using the chronometer, identifying its error and correcting it to obtain the time of observation; calculating the course and distance between two positions either by performing the relevant calculations or by using the Nautical Tables; using various types of compasses and obtaining the compass error by using the celestial bodies and understanding the contents and use of the Nautical Almanac and Norie's table.

Finally, the learners will develop their understanding of the reasoning behind the processes, thus allowing them to successfully apply their underpinning knowledge at sea.

Learning Outcomes

On completion of this unit the learner will be able to:

- 1. Outline the solar system and celestial bodies useful for navigation.*
- 2. Solve the Hour Angle (HA) problems.*
- 3. Deduce the errors of the sextant.*
- 4. Evaluate the accuracy of gyro compass and magnetic compass using celestial objects.*
- 5. Determine the course and distance between two positions by the parallel or plane sailing method.*

ETMME-403-2106 General Ship Knowledge 1

Unit level (MQF): 4

Credits: 3

Unit Description

This is the first of two units about General Ship knowledge and focuses on the structure of a ship. This unit will expose Learners to the basic knowledge regarding ship dimensions and form. Content will include ship dimension and form, ship stresses, hull structure and fittings, rudders and propellers, load lines and draught marks and information about bow and stern regions.

Learners will be able to make sketches of an elevation and plan views of various ship types such as a general cargo ship, crude oil carrier and bulker showing the arrangement and illustrate a general knowledge of the primary structural members and indicate the proper names for the various parts to include holds, engine-room, peak tanks, doublebottom tanks, hatchway, tween deck and position of bulkheads, cofferdams, pump-room, cargo tanks, slop tank and permanent ballast tanks:

Upon completion of this unit the trainees should have knowledge of the principal structural members of a ship and the proper names of the various parts. Their knowledge should be such that they are capable of intelligent observation during the ordinary course of their work and could make adequate reports describing the location and nature of faults or minor damage discovered.

Learning Outcomes

On completion of this unit the learner will be able to:

- 1. Describe the functions of major structural components of hull and superstructure.*
- 2. Outline the function of major ship's fittings.*
- 3. Explain the conditions of assignment of load lines, their maintenance and use.*
- 4. Describe the function of different types of propellers and rudders.*

ETMME-406-2109 Coastal Navigation 1

Unit level (MQF): 4

Credits: 6

Unit Description

The syllabus of the Coastal Navigation Unit covers the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978 as amended chapter II, section A-II/1 and the IMO Model Course 7.03 Officer in Charge of a Navigational Watch 2014 Edition.

It is divided into two units: Coastal Navigation 1 in the first year and Coastal Navigation 2 in the second year.

At the end of this unit (Coastal Navigation 1), the learners will acquire various skills like: using charts and publications carried onboard, maintaining and keeping them up to date; understanding a basic knowledge of chart projections, the properties of the chart and its limitations; demonstrating a general knowledge about electronic charts (detailed knowledge will be given in ECDIS course); identifying the chart scale and datum; interpreting charted symbols and abbreviations on Admiralty charts; using charted objects suitable for obtaining the ship's fix position; using different methods including bearings, ranges, horizontal angles, vertical angles and running fix to determine ship's position; applying the tidal stream and wind leeway to plot the course to steer, course and speed made good; using the International Association of Lighthouse Authorities (IALA) Maritime Buoyage System, Regions "A" and "B" and appreciate their importance for safe navigation; finding the course and distance between initial and final positions using Parallel, plane or Mercator sailing; using terrestrial objects and other various methods to evaluate the accuracy of gyro/magnetic compass.

Finally, learning and teaching approaches may be enhanced by the use of ICT, NVOD, slides and models. Exercises based on the Maltese coast with early exposure to charts and chart instruments are desirable.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Examine navigational charts.*
2. *Determine the ship's position by various methods.*
3. *Manipulate the vessel's course and speed to take account of the requirements of the passage plan.*
4. *Find the course and distance between two positions by Parallel, Plane and Mercator sailing.*
5. *Recognize the symbols and abbreviations and their use on a navigational chart.*
6. *Evaluate the accuracy of gyro compass and magnetic compass by terrestrial objects.*

ETMME-406-2110 Seamanship

Unit level (MQF): 4

Credits: 6

Unit Description

The unit Seamanship gives the learner the basic knowledge before going to sea. The use of different nautical terms and various equipment utilized on board, including the safest way to use them will be explained. The use of Personal Protective Equipment (PPE) for various jobs including Fire Fighting Equipment (FFE) and Life Saving Appliances (LSA). Different type of ropes, their uses and knots will be demonstrated during this unit. The learner will be able to understand different situations a seaman will encounter when on board a vessel. The use of different equipment like cranes, derricks and their lashing equipment used during loading and discharging. The use of winches, engines and bow thrusters to give knowledge in handling the vessel in a safe and responsible during maneuvering operations including coming alongside, casting off, anchoring, different anchors, type of mooring ropes used.

Learning Outcomes

On completion of this unit the learner will be able to:

- 1. Identify different types of vessels, their parts and safety equipment found on board using correct Nautical language.*
- 2. Use different knot techniques, such as whipping, seizing and splicing, correctly.*
- 3. Recognise different situations and duties on board vessels.*
- 4. Assess the principals of ship handling.*
- 5. Describe different kinds of rigging and slinging.*
- 6. Recognise different emergency situations and safety procedures.*

ETMME-403-2111 Navigation (Bridge Simulator)

Unit level (MQF): 4

Credits: 3

Unit Description

The syllabus of the Navigation (Bridge simulator) Unit covers the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978 as amended chapter II, section A-II/1 and the IMO Model Course 7.03 Officer in Charge of a Navigational Watch 2014 Edition.

Through practical sessions at the bridge simulator room, the learners will acquire various skills such as: using engines; manual and autopilot steering and procedures of changeover from manual steering to auto pilot and vice versa; keeping a proper lookout and situational awareness; setting up and operating navigational equipment including the radar, Automatic Identification System (AIS), Echosounder, Global Navigation Satellite Systems (GNSS) and Speed log; plotting critical targets manually or by the radar; making detailed interpretation and analysis regarding different situations encountered such as the head-on ships, same speed and course ships, anchoring ships, crossing ships, overtaking ships, ships being overtaken and taking appropriate actions to avoid the close-quarters situations in compliance with the Collision Regulations (COLREGs); obtaining the ship's position by various methods including cross bearings, radar ranges, GNSS and other navigational aids; navigating in various environments and areas including Traffic Separation Scheme, narrow channels and clear and restricted visibility; communicating with Master, bridge team, Engine room, other ships and coastal stations.

Learning Outcomes

On completion of this unit the learner will be able to:

- 1. Discuss the principles of keeping a safe navigational watch.*
- 2. Comply with International Regulations for Preventing Collisions at Sea.*
- 3. Use navigational equipment.*
- 4. Maintain a safe navigational watch.*

ETMME-403-2112 Radio Communications (Bridge Simulator)

Unit level (MQF): 4

Credits: 3

Unit Description

In this unit learners will learn and practice the Standard Marine Communication Procedure (SMCP). The SMCP includes phrases which have been developed to cover the most important safety related fields of verbal shore-to-ship (and vice versa), ship to ship, on-board and ship to air SAR communications (and Vice versa). The aim is to reduce the problem of language barriers at sea and avoid misunderstandings which can cause accidents. They will also learn about the types of communications equipment, and how to maintain watch on the distress frequencies used in all Sea Areas in the GMDSS system as required by SOLAS Chapter IV.

Learning Outcomes

On completion of this unit the learner will be able to:

- 1. Apply the requirements of the radio regulations (SOLAS Chapter IV) to be ensured.*
- 2. Describe how the availability of radio equipment required by the regulations is to be ensured.*
- 3. Transmit and receive various signals and communication messages both internally, with other ships and port authorities.*
- 4. Record all incidents connected with the radio communication service which are of importance to the safety of life at sea.*

ETMME-410-2113 Celestial Navigation 2

Unit level (MQF): 4

Credits: 10

Unit Description

The syllabus of the Celestial Navigation Unit covers the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978 as amended chapter II, section A-II/1 and the IMO Model Course 7.03 Officer in Charge of a Navigational Watch 2014 Edition.

It is divided into two units: Celestial Navigation 1 in the first year and Celestial Navigation 2 in the second year.

At the end of this unit (Celestial Navigation 2), the whole syllabus of the celestial navigation will be complete.

The learners will acquire various skills like: using the sextant for taking vertical and horizontal angles; solving the PZX triangle; obtaining the observer's latitude when the celestial body is on the observer's meridian or by Polaris; obtaining the true bearing of a heavenly body on rising or setting, i.e. solves an amplitude problem; finding the ship's position by the intercept and the intercept terminal point method; using the Nautical Almanac to find the Local Mean Time (LMT) and the Equation of Time and calculating initial and final courses and distance by a great circle and composite great circle methods.

Finally, the learners will develop their understanding of the reasoning behind the processes, thus allowing them to successfully apply their underpinning knowledge at sea.

Learning Outcomes

On completion of this unit the learner will be able to:

- 1. Apply the principles and concepts of the celestial sphere to navigation techniques.*
- 2. Use correctly the information provided in the Nautical Almanac.*
- 3. Determine the latitude of the observer by meridian altitude and Pole Star observations.*
- 4. Evaluate the accuracy of gyro and magnetic compasses by Amplitude method.*
- 5. Determine the position of a ship by intercept and intercept terminal point.*
- 6. Explain great circle sailing including composite and limited latitude great circles.*

ETMME-406-2115 General Ship Knowledge 2

Unit level (MQF): 4

Credits: 6

Unit Description

This is the second of two units about General Ship knowledge and focuses on the structure of a ship including rudder, propellers, load lines and draught marks. This unit will expose learners to the basic knowledge regarding ship dimensions and form. Content will include ship dimension and form, ship stresses, hull structure and fittings, rudders and propellers, load lines and draught marks and information about bow and stern regions.

Learners will be able to make more detailed sketches of an elevation and plan views of various ship types such as a general cargo ship, crude oil carrier and bulker showing the arrangement and illustrate a general knowledge of the primary structural members and indicate the proper names for the various parts to include holds, engine-room, peak tanks, doublebottom tanks, hatchway, tween deck and position of bulkheads, cofferdams, pump-room, cargo tanks, slop tank and permanent ballast tanks.

Upon completion of this unit the learners should have knowledge of the principal structural members of a ship and the proper names of the various parts. Their knowledge should be such that they are capable of intelligent observation during the ordinary course of their work and could make adequate reports describing the location and nature of faults or minor damage discovered. This unit will also prepare learners for the Certificate of Competence (CoC) examinations.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Outline the general arrangement of various types of ships.*
2. *Describe the functions of major structural components of hull and superstructure.*
3. *Analyse the function of major ship's fittings.*
4. *Examine the conditions of assignment of load lines, draught marks, their maintenance and use.*
5. *Analyse the function of different types of propellers and rudders.*

ETMME-406-2116 Stability Part 2

Unit level (MQF): 4

Credits: 6

Unit Description

The syllabus of the Stability Unit covers the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978 as amended chapter II, section A-II/1 and the IMO Model Course 7.03 Officer in Charge of a Navigational Watch 2014 Edition. It is divided into two units: Stability Part 1 in the first year and Stability Part 2 in the second year. At the end of this unit (Stability Part 2), the whole syllabus of the stability will be complete.

The learners will acquire various skills such as: constructing a curve of statical stability and identifying, from the GZ curve, the range of stability, initial GM, max GZ, angle of vanishing stability and angle of deck edge immersion; sketching and using curves of statical stability for varying conditions of stability; dealing with the angle of loll situation; using hydrostatic data, trimming table or curves and KN curves in stability calculations to determine the angle of list, final draught and Free Surface Moment (FSM); complying with International Convention on Load Lines, 1966 and performing calculations relating to the loading of a ship to the appropriate load line mark; dealing with partial loss of intact buoyancy and using the stress tables and stress calculating equipment (loadicator).

Finally, the learners will develop their understanding of the reasoning behind the processes, thus allowing them to successfully apply their underpinning knowledge at sea.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Comply with International Convention on Load Lines, 1966 whilst performing calculations relating to the loading of a ship to the appropriate load line mark*
2. *Monitor the changes in stability and draughts resulting from loading, discharging or moving of weights.*
3. *Manage the use of fuel and water to keep free surface effects to a minimum.*
4. *Ensure that appropriate actions are taken in the event of partial loss of intact buoyancy.*
5. *Ensure that shear forces and bending moments do not exceed the permissible limits.*

ETMME-405-2119 Cargo and Operations

Unit level (MQF): 4

Credits: 5

Unit Description

The syllabus content is based on the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention). This module will prepare the learner in basic knowledge of cargo operations and securing and the related hazards.

The teaching will cover various aspects of cargo operations on various types of vessels, including tankers. This will prepare the learner to have the knowledge required in the safe handling of cargoes and related equipment on board a vessel. It will give the learner basic knowledge of the various types of cargoes handled and the securing requirements for the different cargoes and vessels. Learners will also be able to identify the safety hazards that may occur during tanker cargo operations and the related tank cleaning hazards.

For the learner to achieve full competence as an Officer In Charge of a Navigational Watch under the STCW Convention, the learner has to pass the Transport Malta written examinations and go to sea for at least 12 months. Following which s/he will be eligible to sit for the Transport Malta Oral examination and once successful in both the written and oral exams, will be issued with a Certificate of Competency to serve as an Officer in Charge of a Navigational Watch (OIC - NAV) on board vessels of 3000 GT and over.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Describe cargo operations and securing on board a ship before going to sea.*
2. *Apply the principles and knowledge of safe handling and securing of cargoes on board.*
3. *Outline loading of dangerous goods and petroleum tanker operations.*
4. *Recognise the safety aspect when entering enclosed spaces.*
5. *Apply formulae and calculations to obtain volumes and weights of cargoes.*
6. *Outline ballasting operations and damage reports.*

ETMME-402-2120 Signals

Unit level (MQF): 4

Credits: 2

Unit Description

Signals is the art of understanding messages transmitted via morse light or through Code flags. Trainees will have sufficient knowledge of the Morse code and correct procedures to enable them to transmit and receive the distress signal 'SOS' and single-letter signals by Morse light. They will know the flags of the International Code of Signals and know the significance of the single-letter signals and how to make use of that publication. This will also assist and lead the students for the Transport Malta exams for Signals and Orals.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Use the Morse Light and the International Code of Signals to communicate important messages regarding safety of navigation.*
2. *Interpret the light and flag signals pertaining to ships' operations.*

For further information, please contact us on information@mcast.edu.mt.