MCAST

MCAST PROGRAMMES - PUBLIC INFORMATION TEMPLATE (FULL TIME)

Institute	Institute of Engineering and Transport
Department	Centre for Maritime Studies Department

Programme Title	Advanced Diploma in Marine Engineering				
Course Code *To be filled in by Admissions Dept.*	MS4-A04-23		**If the programme includes a WBL element, How is it accredited?**	Apprenticeship	
MQF/ EQF Level	Level 4	**Type** *(refer to Appendix 1 for Parameters)*	Qualification	**Awarding Body**	MCAST – Malta College of Arts, Science and Technology
Accreditation Status	Accredited via MCAST's Self Accreditation Process (MCAST holds Self-Accrediting Status as per 1st schedule of Legal Notice 296/2012)				
Mode of Delivery	Face to Face	**Duration** *(Academic Years or Semesters)*	3 Years	**Mode of Attendance**	Full-time
Total Number of Credits	120 credits	**Total Learning Hours** *(25 Total Learning Hours for each ECTS)*	3000 hours		
Target Audience	Ages 16 - 65	**Target Group** *(the type of learners that the educational institution anticipates joining this programme)*	Students exiting compulsory education		
Programme Fees	There are no fees applicable to Maltese and other EU Nationals (as will be evidenced by their Identity Document) Fees apply for other International Applicants… for fee information and any related updates it is best to communicate with MG2i International through applyinternational@mcast.edu.mt One may consider checking about possible eligibility or otherwise for any exemption from fees by contacting the relevant section within MEYR (Floriana) – or visit the servizz.gov.mt website here				
Date of Next Student Intake	For further information regarding upcoming student intake and applications time windows for same kindly click here				
Language of Instruction	The official language of instruction at MCAST is English. All notes and textbooks are in English (except for language courses, which will be in the respective language being instructed). International candidates will be requested to meet English language certification requirements for access to the course.				
Application Method	Applications to full-time courses are received online via the College Management Information System. Applicants can log-in using Maltese Electronic ID (eID) in order to access the MCAST Admissions Portal directly and create one's own student account with the identity being verified electronically via this secure service. Non-EID applicants need to request account creation though an online form after that they confirm that their local Identification Document does not come with an EID entitlement. . Once the identity is verified and the account is created on behalf of the applicant, one may proceed with the online application according to the same				

	instructions applicable to all other applicants. For more information about how to apply online for a course at MCAST, please visit: https://mcast.edu.mt/how-to-apply-online-2/
Information for Non-EU Citizens	Non-EU candidates require a study visa in order to travel to Malta and join the course applied for (on a Full Time delivery mode). For further information re study-visa please access https://www.identitymalta.com/unit/central-visa-unit/. Further information International / TCN applicants should take note of before requesting to being considered for a programme of studies at MCAST, can be obtained through the respective FAQ found on https://mcast.edu.mt/important-information/
IMPORTANT note to Non-EU Nationals / TCNs	In instances where a TCN is applying for an MCAST programme of studies which includes Apprenticeship / Placement / Internship, it is the applicant's responsibility to check with the relevant Maltese Authority whether one would be eligible to have the necessary permits to be able to carry out the accredited Apprenticeship / Placement / Internship, success from which is expected in order to be able to successfully complete the selected programme of studies. Further information can also be obtained through the respective FAQ found on: https://mcast.edu.mt/important-information/
Address where the Programme will be Delivered	*MCAST has four campuses as follows:* **MCAST Main Campus** Triq Kordin, Paola, Malta *All courses except for courses delivered by the Institute for the Creative Arts, the Centre of Agriculture, Aquatics and Animal Sciences and the Gozo Campus are offered at the Main Campus address (above).* *Courses delivered by the Institute for the Creative Arts, the Centre of Agriculture, Aquatics and Animal Sciences, or the Gozo Campus, are offered in one of the following addresses as applicable:* **Institute for the Creative Arts** Mosta Campus Misraħ Għonoq Tarġa Gap, Mosta **Institute of Applied Sciences** Centre of Agriculture, Aquatics and Animal Sciences, Luqa Road, Qormi **Gozo Campus** J.F. De Chambray Street MCAST, Għajnsielem Gozo *In the case of courses delivered via Online Learning, students will be following the programme from their preferred location/address.* *Programmes delivered via Blended Learning, and which therefore contain both an online and a face to face component shall be delivered as follows:*

	○ Face to Face components – as per above address instructions ○ Online components – from the student's preferred address.
Course Description *(Refer to Programme Specification)*	This programme is the first step for those who wish to embark on a career in the maritime sector, with opportunities being available both locally and internationally. The course introduces the basics of engineering related to marine vessels and is ideal for those who wish to be introduced into this sector and obtain a formal vocational qualification. After successful completion of the course, the learner will have formed sound theoretical and practical competences. This course includes work-related training and practice.
Deskrizzjoni tal-Kors *(Refer to Programme Specification)*	Dan il-programm huwa l-ewwel pass għal dawk li jixtiequ jibdew karriera fis-settur marittimu, b'opportunitajiet disponibbli kemm lokalment kif ukoll internazzjonalment. Il-kors jintroduċi l-elementi bażiċi tal-inġinerija relatata ma' bastimenti tal-baħar u huwa ideali għal dawk li jixtiequ jidħlu f'dan is-settur u jiksbu kwalifika vokazzjonali formali. L-istudenti li jtemmu l-kors b'suċċess, ikunu kisbu kompetenzi teoretiċi u prattiċi sodi. Dan il-kors jinkludi taħriġ u prattika relatati max-xogħol.
Career Opportunities:	Marine Engineering Technician, Ship Repair Technician, Ship Repair Fitter
Entry Requirements *(Refer to Prospectus / Course Page on MCAST website)*	Internal Progression Route… Any MCAST MQF Level 3 Diploma OR 4 SEC / SSQ&P or equivalent with a Pass Grade / Level 3 Compulsory: One subject from Engineering Technology OR Design and Technology OR Chemistry OR Mathematics OR Physics.
Other Notes related to this Programme, and which are to be taken note of	-
Programme Learning Outcomes *(Refer to Programme Specification)*	At the end of the programme the learner will be able to: 1. Be familiar with relevant Shipping Industry Regulations and Legislation and Standards 2. Identify elements of marine engineering plant 3. Understand the application of mechanical engineering theory in a marine engineering environment 4. Follow operations and maintenance procedures as applicable to marine engineering.
Teaching, Learning and Assessment Procedures	The programmes offered are vocational in nature and entail both theoretical lectures delivered in classes as well as practical elements that are delivered in laboratories, workshops, salons, simulators as the module requirements dictate. Each module or unit entails a number of in person and/or online contact learning hours that are delivered by the lecturer or tutor directly (See also section 'Total Learning Hours). Access to all resources is provided to all registered students. These include study resources in paper or electronic format through the Library and Resource Centre as well as tools, software, equipment and machinery that are provided by the respective institutes depending on the requirements of the course or module. Students may however be required to provide consumable material for use during practical sessions and projects unless these are explicitly provided by the College. All Units of study are assessed throughout the academic year through continuous

	assessment using a variety of assessment tools. Coursework tasks are exclusively based on the Learning Outcomes and Grading Criteria as prescribed in the course specification. The Learning Outcomes and Grading Criteria are communicated to the Student via the coursework documentation. The method of assessment shall reflect the Level, credit points (ECTS) and the schedule of time-tabled/non-timetabled hours of learning of each study unit. A variety of assessment instruments, not solely Time Constrained Assignments/Exams, are used to gather and interpret evidence of Student competence toward pre-established grading criteria that are aligned to the learning outcomes of each unit of the programme of study. Grading criteria are assessed through a number of tasks, each task being assigned a number of marks. The number of grading criteria is included in the respective Programme Specification. The distribution of marks and assessment mode depends on the nature and objectives of the unit in question. Coursework shall normally be completed during the semester in which the Unit is delivered. Time-constrained assignments may be held between 8 am and 8 pm during the delivery period of a Unit, or at the end of the semester in which the Unit is completed. The dates are notified and published on the Institute notice boards or through other means of communication. Certain circumstances (such as but not limited to the COVID-19 pandemic) may lead Institutes and Centres to hold teaching and assessment remotely (online) as per MCAST QA Policy and Standard for Online Teaching, Learning and Assessment (Doc 020) available via link https://www.mcast.edu.mt/college-documents/ The Programme Regulations pertaining to this Programme's MQF/EQF level available at: link https://www.mcast.edu.mt/college-documents/, apply.
Grading System	All MCAST programmes adopt a Learner-centred approach through the focus on Learning Outcomes. The assessment of MCAST programmes is criterion-referenced and thus assessors are required to assess learners' evidence against a pre-determined set of Learning Outcomes and Assessment Criteria. For a student to be deemed to have successfully passed a unit, a minimum of 50% (grade D) must be achieved. All full time units are individually graded as follows: A* (90-100) A (80-89) B (70-79) C (60-69) D (50-59) Unsatisfactory work is graded as 'U'. Work-based learning units (where applicable) are graded on a Pass/Fail basis only. Some units which follow industry standards and regulations may also be graded on a Pass/Fail basis as per programme regulations referred below. Detailed information regarding the grading system may be found in the Programme Regulations pertaining to this programme's MQF/EQF Level available at:

	https://www.mcast.edu.mt/college-documents/ (Refer to DOC 003, 004 and 005)
Exit Point (where and as applicable)	Where a student will not make it to the Final Certification achievable from this Programme of Studies (as per Programme Regulations), one might wish to look into Exit Point possibilities as may be applicable to this programme for studies. Further information, is available at https://www.mcast.edu.mt/college-documents/, kindly refer to *DOC 077 Procedure for the processing of Claims for Certificates at Interim Exit Points.*
Contact details for Further Learning Opportunities	The MCAST Career Guidance Team, offers the service of qualified and experienced Career Advisers who will be very willing to discuss with potential applicants the course which best achieves one's career ambitions, as well as exploring one's education route, or similar. **MCAST Career Guidance** Tel: 2398 7135/6 Email: career.guidance@mcast.edu.mt
Regulatory Body/ Competent Authority Contact Details *(where applicable - in the case of a programme leading to Regulated Profession)*	Not Applicable

Programme Structure	Unit Code	Unit Title	ECTS	Year	Semester
	ETMTH-406-1617	Mathematics for Mechanical and Construction Engineering	6	2	Year
	ETH&S-406-1508	Safety and Environment	6	1	Year
	ETMTS-406-1503	Materials Selection	6	1	Year
	ETMEC-406-1510	Pneumatics and Hydraulics	6	2	Year
	ETMTS-406-1504	Statics and Strength of Materials	6	3	Year
	ETCDN-406-1501	Computer Aided Design	6	1	Year
	ETMEC-406-1511	Thermofluids	6	3	Year
	ETMEC-406-1512	Engineering Dynamics	6	1	Year
	ETE&E-406-1501	Electrical Power and Electronics	6	2	Year
	ETELX-406-1517	Fundamentals of Control Systems and Transducers	6	3	Year
	ETMRN-406-1517	Ship Management	6	1	Year
	ETPRJ-412-1514	Project Design Implementation and Evaluation	12	3	Year
	ETMEC-406-1513	Installing and Commissioning Engineering Equipment	6	3	Year

	ETMEC-406-1514	Engineering Practice	6	1 & 2	Year
	ETMEC-406-1518	Monitoring and Fault Diagnosis of Engineering Systems	6	2	Year
	CDKSK-406-2320	Mathematics	6	1	Year
	CDKSK-406-2319	English	6	2	Year
	CDKSK-404-2325	Entrepreneurship Essentials	4	2	Year
	CDKSK-402-2324	Community Social Responsibility	2	2	Year
	ETCMP-406-1622	Apprenticeship Unit : Vocational Competences in Marine Engineering	6	2 & 3	Year

Allocation of Total Learning Hours (per Unit)	The total learning hours required for each unit or module are determined as follows:			
	Credits (ECTS)	**Indicative contact hours[1]**	**Self-Learning and Assessment Hours[3]**	**Total Student workload (hrs)[2]**
	1	5 – 10 hrs	20 - 15 hrs*	25 hrs
	2	10 – 20 hrs	40 - 30 hrs*	50 hrs
	3	15 – 30 hrs	60 - 45 hrs*	75 hrs
	4	20 – 40 hrs	80 - 60 hrs*	100 hrs
	6	30 – 60 hrs	120 - 90 hrs*	150 Hrs
	9	45 – 90 hrs	180 - 135 hrs*	225 hrs
	12	60 – 120 hrs	240 - 180 hrs*	300 hrs
	Note: The 'Self-Learning and Assessment Hours[3]' amount to the difference between the 'Indicative Contact Hours'[1] and the 'Total Student Workload'[2]			

APPENDIX 1

MINIMUM CREDITS FOR QUALIFICATIONS AT DIFFERENT LEVELS

MQF Level	Minimum ECTS Required for a Qualification*
8	
7	30
6	180
5	30
4	30
3	60
2	60
1	40

* Programmes assigned fewer ECTS than indicated will be classified as Awards.

Reference: Fig.1: p48, Malta Further and Higher Education Authority (MFHEA) (October 2024). Referencing Report, 5th Revised Edition.

APPENDIX 2

EXAMPLES OF QUALIFICATION TYPES AT A SPECIFIC MQF LEVEL

MQF Level	Examples of qualification types at a specific MQF level (The list in this column is not exhaustive)	Number of ECTS *
8	Doctoral Programmes:	
	PhD	N/A
	Professional Doctorate	180
7	Master's Degree	90
	Postgraduate Diploma	60
	Postgraduate Certificate	30
6	Bachelor's Degree	180
	Bachelor's Honours	240
5	Undergraduate Higher Diploma	90
	Undergraduate Diploma	60
	Undergraduate Certificate	30
	VET Level 5	60
4	Advanced Diploma	120
	Pre-Tertiary Certificate	30 - 60
	MATSEC Matriculation Certificate (Advanced and Intermediate)	N/A
	VET Level 4	120
3	Certificate	60
	MATSEC Secondary Education Certificate	N/A
	VET Level 3	60
2	Foundation Certificate	60
	MATSEC Secondary Education Certificate	N/A
	VET Level 2	60
1	Introductory Certificate	40
	VET Level 1	40

* Programmes assigned fewer ECTS than indicated will be classified as Awards.

Reference: Fig.2: p48, Malta Further and Higher Education Authority (MFHEA) (October 2024). Referencing Report, 5th Revised Edition.

ETMTH-406-1617: Mathematics for Mechanical and Construction Engineering

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

This unit has been designed to build upon previous theoretical mathematical knowledge, to be used in a more practical context. Furthermore, it acts as an essential basis for the successful completion of other units within the program of study. Delivery of the unit should be set within the engineering context.

The learner will be able to understand and apply algebraic techniques to manipulate expressions and solve algebraic equations commonly found in engineering. This includes linear simultaneous equations, logarithmic equations, exponential equations and series. Furthermore, the learner will also learn that algebraic equations can also have complex roots whenever an algebraic expression is found not to have real roots.

This unit was also designed to deal with geometric and trigonometric analysis to give an extra tool to the learner in how to deal with sides, angles, perimeters, areas and volumes. Furthermore, the learner will also know how to find the surface area of irregular shapes by applying numerical integration and by definite integration. All of this will be applied to engineering contexts.

Part of the syllabus will deal directly with graphical techniques in which the learners will further their studies by introducing higher order equations, trigonometric and logarithmic equations. They will also learn how to solve equations graphically and hence how to find the gradient at a point by using differential calculus.

On successful completion of the unit the learner will be equipped with sufficient mathematical skills to be able to deal with mathematical competencies found in the vocational units at level 4 and even further studies at higher levels.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Apply algebraic techniques to manipulate expressions and solve equations.*
2. *Apply techniques to manipulate complex numbers and series.*
3. *Apply trigonometric techniques to solve engineering problems.*
4. *Apply geometric techniques to solve engineering problems.*
5. *Apply graphical techniques to solve equations.*
6. *Apply calculus to solve practical problems.*

ETH&S406-1508 – Safety and Environment

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

The unit will deal with the topic of Safety and the Environment as it affects aspects of Marine operations and Engineering. Learners will become familiar with concepts of Health and Safety and accident prevention such as the degree of risk being associated and dependant on the likelihood of the accident/incident occurring and the probable severity of the consequence of that accident or incident. In addition, the specifics of legislative needs of PPE, confined space and noise will be considered. It is essential that reflecting current legislation that those employed within Marine operations and engineering is aware of the responsibilities that exist through their own actions and the actions of others. With a particular aspect towards this specialist area; a study of Health and Safety allows learners to appreciate and contextualise the satisfying of not only statutory legal or contractual requirements, but also of how to provide a safe environment for themselves, perhaps those who may be in their employment, other workers and the general public. The responsibility for safe procedures, planning and actions are underpinned throughout this Unit and the learner will benefit from the study of safe working practices with a particular emphasis in their vocational area. The knowledge and skills derived from this Unit are transferable across other areas of employment where the learner will be exposed to risk and environmental hazards through the use of tools, plant, machinery, working within enclosed spaces or with exposure to noise and general engineering environments. The areas addressed within the Unit provide for the learner to achieve best practice and safe working leading to them achieving standards making them responsible and safe employees.

Learning Outcomes

On completion of this unit the student will be able to

1. *Explain the current Health and Safety legislation covering employers and employees.*
2. *Explain the handling, storage and disposal of dangerous substances.*
3. *Explain work equipment safety requirements.*
4. *Carry out a suitable risk assessment within a workplace environment.*

ETMTS-406-1503: Materials Selection

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

Note: This document adheres to the language, format, and content contained in the STCW Code and in the SQA Engineering Framework.

STCW Code Requirements
Excerpts from Standards of Training, Certification and Watch keeping manual, published by International Maritime Organization)
References: Table A-III/1 “Marine engineering at operational level”, (page 144,145: STCW including 2010 Manila Amendments- STCW Convention and STCW Code- 2011 Edition

Competence:
Operate main and auxiliary machinery and associated control systems.
Knowledge, understanding and proficiency:

- Basic construction and operating principles of machinery systems.
- Preparation, operation, fault detection and necessary measures to prevent damage to machinery items.

Criteria for evaluating competence:

- Construction and operating mechanisms can be understood and explained with drawings/instructions .
- Deviations from the norms as stated in operating manuals are promptly identified.
- The output of plant and engineering systems consistently meets requirements.

Designing and producing an engineering component involves several activities: selection of material, specifying dimensions, color and surface finish, choosing a manufacturing process to achieve prescribed accuracy, and meeting special customer requirements.

Engineering raw material --- ores and minerals --- are finite resources and are being consumed at ever-increasing rates. It is the engineer’s responsibility to select the most appropriate materials and use them efficiently in minimum quantities and with minimum impact on the environment during extraction, refining and production.

Selection of the right material at the appropriate price is important as it leads to lower manufacturing cost, reduced in-service failures, safety while handing etc., all resulting in lower product cost and customer acceptability. Furthermore, there are other considerations such as aesthetics, recycle-ability etc. which influence selection. To satisfy all the above parameters, engineers have to deal with and understand the use of a large number of materials.

It is expected that, from this Unit, the learner will understand the need for mechanical components to be designed, manufactured and maintained in a safe and efficient manner. It would be an advantage if candidates had the core skills of critical thinking, reviewing and evaluation, as well as an understanding of physics and chemistry to the desired level

Learning Outcomes

On completion of this unit the learner will be able to

1. *Have an understanding of material properties and testing.*
2. *Apply material science concepts to assess suitability for a range of components.*
3. *Investigate materials and components with the aim of establishing their basic properties.*

ETMEC-406-1510: Pneumatics and Hydraulics

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

Our lives would be very different today, if early civilisations had not recognised the potential of using air and water to do the work. From the first waterwheels to the sophisticated applications we see today, fluid power has enabled us to do what was considered impossible in many instances. Now with computer interfaces, new materials and imaginative technologies, many things related to pneumatics and hydraulics can be achieved.

This unit is designed to allow the students to gain a Knowledge and Understanding of Pneumatics and Hydraulic Fluid power systems.

Students will also have the opportunity to design a fluid power system and develop an understanding of the Construction, Function and the Components of Fluid power systems.

This unit will complement the capabilities of the future marine engineer, in developing an overall competency in all associated marine engineering areas of work.

Any practical work undertaken, should be carried out in a manner that complies with all necessary health and safety requirements

Learning Outcomes

On completion of this unit the learner will be able to

1. *Identify the main components of Pneumatic and Hydraulic and the function and operation of pneumatics and hydraulic components, equipment and plant.*
2. *Design, Construct and test a pneumatic or hydraulic circuit.*
3. *Demonstrate fault finding competence on a fluid power system.*

ETMTS-406-1504: Statics and Strength of Materials

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

Note: This document adheres to the language, format, and content contained in the STCW Code and in the SQA Engineering Framework.

STCW Code Requirements
Excerpts from Standards of Training, Certification and Watch keeping Manual, published by International Maritime Organisation.
(Reference: Table A-III/1 "Marine engineering at operational level" (page 148: STCW including 2010 Manila Amendments- STCW Convention and STCW Code- 2011 Edition)
Competence:
Maintenance and repair of shipboard machinery and equipment.
Knowledge, understanding and proficiency:

- Appropriate basic mechanical knowledge and skills
- Design characteristics and selection of materials in construction of equipment

Criteria for evaluating competence:

- Re-commissioning and performance testing is in accordance with manuals and good practice
- Selection of materials and parts is appropriate.

Statics and strength of materials is the study of the behavior of structural members under application of external forces. The laws of statics help to calculate and determine the ability of the members to withstand these forces.

Ship structures such as hull frames, cargo tanks and double bottoms are subject to mechanical forces as well as fluid pressures. The unit discusses the various types of loading that could come on frames and structures. The learners are to relate these structures with shipboard examples such as the engine room crane supported at the ends and carrying heavy loads in the middle or towards one end. Using the understanding of statics, the learner should be able to relate the knowledge gained to shipboard examples such as:

a) Sizing calculations in order to estimate safe dimensions of structural members such as beams and frames, and components such as shafts and bolts subjected to various forms of loading.
b) Calculations of safe working loads of equipment such as hooks and slings.
c) Direct, shear and torsional stresses on bolts, rivets and other fasteners.

It is expected that, from this Unit, the learner will understand the need for materials and components on board ships to be selected, designed and operated in a safe and efficient manner.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Develop the knowledge required to apply the principles of statics to mechanical systems*
2. *Understand how these principles are relevant in a Marine engineering environment.*
3. *Comply with the requirements stated in STCW code above.*

The Unit also provides the candidates with a base from which future advanced work in marine engineering may be undertaken.
Outcome 1: Explain the effects of, and solve problems related to framed structures and beam sections that are acted upon by moments, and the forces of tension, compression and shear.
Outcome 2: Explain and solve problems relating to shear forces and bending moments on simply supported and cantilever beams; explain and solve problems relating to the theory of bending.
Outcome 3: Explain and solve problems on the theory of torsion for members of circular section.

ETCDN-406-1501: Computer Aided Design

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

Computer-Aided Design (CAD) technology has nowadays become part and parcel of product development. Although ideas start on paper, at one point during the product development process, they have to be translated into three-dimensional (3D) virtual models, using CAD. There are various reasons for going in this route, in particular the rapidity of obtaining two-dimensional (2D) accurate detailed drawings directly from CAD 3D models. Other benefits are related to the possibility of sharing CAD models with other computer-aided engineering applications (e.g. simulation of plastic melt flow behaviour in an injection mould for a product component modelled in CAD).

This is a learning-by-doing type of unit and it will provide learners with the opportunity to apply the skills they have learnt to produce a wide range of drawing layouts, accurate detailed drawings, 3D virtual and physical models. The advantages of using CAD technology in modern product development will be explained at the outset of this unit. Learners will acquire knowledge on the software and hardware requirements needed to run and use effectively a CADD package. One of the most widely used CAD software used for engineering applications is *Autodesk® Inventor®*. Although this software will be employed in this unit, by the end of this study unit, learners will be able to acquire knowledge on the underlying principle of and the basic skills to apply 2D and 3D modelling functions found across different CAD software packages (e.g. *SolidWorks*). Exemplars of such skills include the ability to use CAD to create and edit 2D constrained geometric entities as basis for 3D modelling, and the ability to use CAD to generate 3D virtual models of single components or an assembly of components. In addition, learners will be able to independently select the appropriate CAD functions for the task at hand.

Furthermore learners will be equipped with the necessary skills to independently generate different types of accurate drawings with all required dimensions and other basic information deemed useful for the realisation of a product during the manufacturing phase. Last but not least, learners will gain knowledge on how to obtain a 3D physical prototype models on a 3D printer directly from the corresponding 3D virtual model.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Describe the advantages of using CAD in product development and the basic hardware and software requirements to install and use a CAD software package.*
2. *Use CAD to create and edit 2D geometric entities as basis for 3D virtual modelling.*
3. *Use CAD to generate 3D virtual models of single components or an assembly of components.*
4. *Use CAD to generate different types of drawings and produce physical prototypes directly from 3D virtual models.*

ETMEC-406-1511: Thermofluids

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

Note: This document adheres to the language, format, and content contained in the STCW Code and in the SQA Engineering Framework.

STCW Code Requirements

Excerpts from Standards of Training, Certification and Watchkeeping Manual, published by the International Maritime Organisation)

References: Table A-III/1 "Marine engineering at operational level",(page 144,145: STCW including 2010 Manila Amendments- STCW Convention and STCW Code- 2011 Edition

Competence:

Operate main and auxiliary machinery and associated control systems.

Knowledge, understanding and proficiency:

Basic construction and operating principles of machinery systems.

- Preparation, operation, fault detection and necessary measures to prevent damage to machinery items.

Criteria for evaluating competence

- Construction and operating mechanisms can be understood and explained with drawings/instructions .
- Deviations from the norms as stated in operating manuals are promptly identified.
- The output of plant and engineering systems consistently meets requirements.

Thermofluids knowledge Is essential to understand the operating principles of marine machinery. The energy for conventional ship propulsion and electrical power generation is derived from the use of engines and turbines. These machines convert the chemical energy released by fuel combustion into mechanical energy. The efficiency of energy conversion is based on certain thermodynamic principles.

This unit discusses the laws applicable to gases and vapours during the processes of expansion and compression in engines, turbines and compressors. A sound understanding of thermofluids will enable the learner to design and operate the above machinery at optimum efficiency.

The unit progresses to the theory and practice of steam power plant operation which is of importance to the engineer as many plants are steam driven. The properties of steam and the energy transfer in the various components of a power plant are dealt with.

Many engineering applications such as hydraulic jets, combustion chambers, mixing tanks, centrifugal pumps etc. involve controlled flow of the working fluid, be it liquid or gas. Continuity and momentum principles governing flow through pipes and vanes are therefore discussed.
This unit also covers the behavior of hydrostatic pressure and boyancy. The knowledge of hydrostatic pressure helps the engineer to understand the need to maintain the integrity and sheet-metal thickness on tank bottoms, valve bodies and other equipment under pressure.
It would be an advantage if candidates had a knowledge and understanding of physics, mathematics and marine engineering systems to the desired level.

Learning outcomes

On completion of this unit the learner will be able to

This Unit is designed to present an application-oriented delivery of thermofluids, and enables candidates to:

1. *Develop the knowledge required to apply thermodynamic principles to hydrostatics, hydrodynamics and heat engines.*
2. *Understand how these principles are relevant in a Marine engineering environment.*
3. *Comply with the requirements stated in STCW code above.*

The Unit will also provide the candidates with a base from which future advance work in marine engineering may be undertaken.
Knowledge of the subject of thermo fluids will enable the learner to:

a) Understand and evaluate the parameters that explain the characteristics of thermodynamic systems.
b) Understand and evaluate the properties of steam with respect to efficient power plant operation.
c) Evaluate the thermodynamic performance of boilers, condensers and other power plant components
d) d)Understand effect of hydrostatic pressure on submerged and floating bodies

Outcome 1
Apply the Gas Laws to closed and open (non-flow and flow) systems and evaluate the work done.

Outcome 2

i) Determine steam conditions from the use of steam tables and solve related problems

ii) Study energy transfer principles for steam power plant components

Outcome 3

i) Explain the effects of hydrostatic pressure and solve problems related to hydrostatic pressure

ii) Apply energy, continuity and momentum principles to steady flow processes

ETMEC-406-1512: Engineering Dynamics

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

Note: This document adheres to the language, format, and content contained in the STCW Code and in the SQA Engineering Framework.

STCW Code Requirements
Excerpts from Standards of Training, Certification and Watch keeping Manual, published by International Maritime Organization.

(Reference: Table A-III/1 "Marine engineering at operational level" (page 148: STCW including 2010 Manila Amendments- STCW Convention and STCW Code- 2011 Edition)
Competence:
Maintenance and repair of shipboard machinery and equipment.
Knowledge, understanding and proficiency:

- Appropriate basic mechanical knowledge and skills
- Design characteristics and selection of materials in construction of equipment

Criteria for evaluating competence:

- Re-commissioning and performance testing is in accordance with manuals and good practice
- *Selection of materials and parts is appropriate.*

Dynamics studies the motion of bodies when forces are applied on them. The
Laws of dynamics predict the position, velocity and acceleration of these bodies at every instant in time. Dynamics also studies the transfer of energy from one form to another to produce the desired output such as work, fluid pressure, or velocity change.

In this section, the teaching should relate to shipboard examples, such as the dynamics of engine flywheels, components of diesel engines, compressors, and
other rotating/reciprocating machinery.
It is expected that the learner will understand from this unit the need for ships equipment to be designed and operated to produce the desired output safely and efficiently. It would be an advantage if candidates had a knowledge and understanding of physics and mathematics to the desired level.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Develop the knowledge required to apply the principles of dynamics to mechanical systems.*
2. *Understand how these principles are relevant in a Marine engineering environment.*
3. *Comply with the requirements stated in STCW code above.*

The Unit also provides the candidates with a base from which future advanced work in marine engineering may be undertaken

ETE&E-406-1501: Electrical Power and Electronics

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

This unit – Electrical Power – is designed to be delivered as an introductory course on electrical engineering. Electrical Power expects little familiarity with the electrical concepts. For most parts, the unit deals with theoretical aspects of the basics of electrical engineering. However, in parts the unit also intends to engage the learners by means of numerical problem solutions with the view of reinforcing the underlying concepts.

Initial part of this unit – the learning outcome 1 – initiates the learners in the very basic electrical concepts. Direct Current (DC), as is the common practice, is used hence. It is essential that all the concepts covered in this outcome are absorbed as this will form a crucial link when learning the basic and advanced alternating current (AC) circuits. Learning outcome 2 allows learners to solve numerical problems of resistive DC circuits.

Learning outcomes 3 and 4 deals in the basics of magnetism and electromagnetism respectively. Apart from theoretical concepts, learners will also be learning the numerical problem solving on these subject areas. It is important to note that these learning outcomes are absolutely important in learning the working principles of electrical machines.
Learning outcome 5 introduces learners with the basics of AC circuits in general and series AC circuits in particular. One important segment of this learning outcome is the phasor representation of the AC quantities. Phasors are also part of the learning outcome 6 which introduces the basics of AC transformers, construction, and solution of numerical problems.

Learning Outcomes

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

1. *Basic electrical concepts;*
2. *DC resistive networks;*
3. *Basics of magnetism;*
4. *Basics of electromagnetism;*
5. *Basic AC circuits;*
6. *Basics of transformer.*

ETELX-406-1517: Fundamentals of Control Systems and Transducers

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

This unit aims to give learners an understanding of basic principles of electronic control systems and circuits. It is delivered with a high practical content which will build learners' confidence in their ability to design, operate and test electronic control systems.
The learners are first introduced to the concept of an electronic system in terms of input, process and output.
The learners then move on to study the main components that constitute an electronic control system and the flow of signals through the system including the concept of feedback.
The operation and application of a range of analogue and digital sensors transducers and actuators used on the inputs and outputs of electronic systems are then introduced to the learner.
The operation and behaviour of open loop, closed loop and on / off control are then studied. Finally, the learners will be introduced to the construction and operation of simple control circuits using the sensors, transducers, actuators and control strategies previously studied.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Explain the purpose, structure and operation of an electronic system.*
2. *Explain the main components that constitute an electronic control system and the flow of signals through the system.*
3. *Explain the operation, technical characteristics and application of analogue and digital sensors, transducers and actuators.*
4. *Use simple mathematical modelling to describe the operation and behaviour of sequential, open loop, closed loop and on / off control systems.*
5. *Construct and operate simple control closed loop control circuits using sensors, transducers, actuators and control strategies to meet a given specification.*

ETMRN-406-1517: Ship Management

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

MCAST diploma in Mechanical Engineering at MQF level 4 provides learners with the opportunities of training, education, and career progression in the field of merchant shipping as a marine engineer. This unit – Ship Management – is designed to support articulation, at basic level, of this programme of studies with the maritime industry and merchant ships. Knowledge areas covered in this unit are considered to be rudimentary for a career in the merchant shipping with emphasis on the management of merchant ships, and therefore, the delivery of this unit anticipates very little or no familiarisation with the shipping industry. The unit contents and successful completion of its learning outcomes are hence deemed essential for career progression.

There are six learning outcomes of this unit. Generic constructional features of merchant ships are covered in learning outcome 1 followed by learning outcome 2 which deals with the most common types of deep sea and offshore vessels. Understanding pertaining to regulations of shipping business in general and ships in particular is covered in learning outcome 3. Economic aspects of world's merchant ships and shipping are touched in learning outcome 4 which should also prove helpful in understanding the economic significance of shipping at international and national level. Learning outcome 5 introduces the seaborne trade covering major trades such as bulk, specialised cargoes, and general cargoes in conjunction with the introduction to ship finances.

In the end, learning outcome 6 deals with the basics of quality and related topics which are essential for the commercial success of ship management.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Demonstrate understanding and knowledge of the constructional features of ships.*
2. *Demonstrate understanding and knowledge of different types of ships.*
3. *Demonstrate understanding and knowledge of the maritime regulatory and advisory bodies.*
4. *Demonstrate understanding and knowledge of maritime transportation.*
5. *Demonstrate understanding and knowledge of seaborne transportation system.*
6. *Demonstrate understanding and knowledge of quality management.*

ETPRJ-412-1514: Project Design Implementation and Evaluation

Unit Level (MQF/EQF): 4
Credits: 12
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 300

Unit description

The objectives of this unit are based on the understanding that projects, in their various forms, are encountered in every facet of the maritime sector. Engineers are often involved in identifying and putting plans of action in place, for a plethora of marine engineering situations.

The unit will bring together the knowledge and skills base from other subjects undertaken within the course. And apply these capabilities in addressing an area of topical interest within the marine engineering environment. This will take the form of a project undertaking which takes an identified area of consideration, through to the practical conclusion of objectives.

The areas from which the project area will be specified, are at the discretion of the institution supervising the project, but generally should relate to either of the topics noted below:

- Modification of marine engineering product / component
- Specification and design of an adapted marine related system.
- Alteration of plant layout or refinement of maintenance arrangements.
- Testing methodologies applied to marine engineering – system / component / product.

With effective reporting , control and feedback, throughout the life of the project. Students will have the reassurance that what they are delivering is technically meaningful, but in the same instance gives them the opportunity to increase their communications skills in a manner that benefits their level of professionalism in addressing a project in future.

A key point to note, whatever type of project is undertaken, it is important to realise that the actual topic must be deliverable and realistic in nature.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Interpret and use engineering drawings and specifications to consider feasibility for potential project topics.*
2. *Specify a project and confirm end objectives.*
3. *Plan and monitor the project.*
4. *Implement project plan within agreed timescales.*
5 *Analyse and present the project findings, using verbal, written and ICt skills in an engineering context.*

ETENG-406-1518: Installing and Commissioning Engineering Equipment

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

This unit identifies the basic principles, commonly used processes and elements that are essential to most maintenance, installation and commissioning activities. It takes into account the fact that some industries and organisations employ engineering staff who perform both of these activities, whereas others, particularly specialist contractors for installation and commissioning, may only cover a limited range. The content of this unit can be applicable to both situations as it is considered essential for all candidates to have a wide range of engineering knowledge and experience.

It covers basic maintenance, installation and commissioning requirements including the processes and organisations dealing with them. It also includes components, tools and equipment that are commonly associated with the installation and commissioning of plant and machinery and the ways in which they are used and applied.

The learner is expected to achieve a level of understanding of all maintenance, installation and commissioning strategies that will enable progression to higher level courses, and enable them to become familiar with the events terminology and practices that they will need as part of their normal work.

Finally, learners will be made aware that, as an installation or commissioning engineer, before leaving new equipment with an owner, a suitable handover must take place ensuring that owners are ready to be left with new equipment. The end of this unit will take learners through this process to ensure that they are knowledgeable and fully aware of this handover process.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Demonstrate the installation and commission of different mechanical equipment.*
2. *Demonstrate the installation and commission of different electrical and electronic equipment.*
3. *Install and commission different types of equipment commonly used on an engineered system.*
4. *Describe the handover process of new equipment.*

ETMEC-406-1514: Engineering Practice

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

This unit seeks to provide practical experience in applying basic engineering work practice across a range of workshop, maintenance and assembly skills.

The unit will provide the student with a range of practical competence in using hand tools, lathes, drilling and milling machinery and welding and jointing techniques and applications. This should complement other units being undertaken within the course. And provide students with an ability to deal with fabrication and repair operations typical on ships.

The assessment requirements of the unit will address stipulations set by the MNTB [Merchant Navy Training Board] for basic engineering workshop skills. All practical work undertaken, should be in accordance with relevant Health and Safety legislation. As it relates to dis-mantling, maintaining, repairing and re-assembling shipboard plant and fixtures and fittings

It is expected that by practising such skills, the future marine engineer, will display proficiency at a level that will allow a gradual increase in skills in unison with the students knowledge base.

The assessment requirements for the unit would be compiled into a form of log book, that would allow tutors to sign off compliant work and undertaken in each of the defined assessment criteria areas of work.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Use and care for hand and power tools within a marine engineering environment.*
2. *Work with measuring and calibration equipment in undertaking engineering tasks.*
3. *Operate drilling, vertical milling and central lathe machinery in undertaking engineering tasks.*
4. *Demonstrate an array of welding and jointing techniques in the production of marine engineering components.*

ETMEC-406-1518: Monitoring and Fault Diagnosis of Engineering Systems

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

Condition monitoring and diagnosing faults are both used to ascertain whether possible failure mechanisms exist in engineering systems. The methods used by engineers encompass automated monitoring systems all the way down to the use of human senses; touch, smell, sight, and hearing. This unit gives students an awareness of the basic principles of monitoring engineering systems and fault diagnosis and introduces students to the practice of condition monitoring.

This unit looks at monitoring engineering systems and diagnosing faults and examines how recent technological and environmental issues have had an impact on the maintenance of today's engineering world. The unit will give students an awareness of how and what is needed to protect them and their colleagues while working and concentrates on the measures of safety required when completing monitoring activities, especially activities for isolation of machinery and services.

Students will become familiar with the use of a wide range of tools used for monitoring activities and will gain the knowledge and skills needed for sourcing and identifying engineering system faults. Students must select the correct monitoring technique and equipment based on the conditions that they are set.

Students will set up the correct equipment to monitor and use it to diagnose condition monitoring on engineering systems. Students will utilise a range of methods and techniques to diagnose faults, and use a range of diagnostic apparatus and tooling. Following successful diagnosis students can then identify the fault and examine the likely cause.

Learning Outcomes

On completion of this unit the learner will be able to

1. *Identify relevant requirements under health and safety regulations used in monitoring and fault diagnosis of engineering systems.*
2. *Explain the importance of regularly monitoring systems and their reliability.*
3. *Gain experience using monitoring and test equipment.*
4. *Complete fault diagnosis on engineering systems.*

CDKSK-406-2320: Mathematics

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit provides a framework for students to develop mathematical thinking skills further to the level 3 unit specification to solve problems related to real-life situations. Students also develop skills, attributes and knowledge that contribute to their personal growth and effectiveness within their training and work environment and within the community.

The unit is designed to adapt for the needs of a particular field of study (business & finance or engineering & transport and others). To reach this goal the unit was divided into eight learning outcomes from which four learning outcomes are chosen and taught, which are related to statistics, algebra and graphical representation, geometry, areas and volumes, game theory and finance. Through these different areas students will be able to develop the effective skills for information processing, reasoning, evaluation creative thinking and enquiry, all fundamental skills for the problem-solving process. This will prepare students in applying and evaluating a range of strategies to solve real-life problems. Through this unit the learner will also learn to present and communicate results and conclusions effectively.

On successful completion of the unit the learner will be equipped with mathematical thinking skills which make them aware of and understand their thought process, to reassess and identify areas for development. Students learn to evaluate, reflect on their strategies, understand, and verify results to solve problems. These skills will equip students with managerial skills, to further their studies and for work employability.

Learning Outcomes

Learning Outcomes are electives out of which 4 are to be chosen

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

1. *Use algebraic techniques to simplify expressions and solve equations.*
2. *Identify how to simplify more complex expressions and solve harder equations.*
3. *Demonstrate visual and logical techniques in evaluating graphical representations and communication skills in presenting the results effectively.*
4. *Demonstrate skill in calculating angles, sides, areas, and volumes for any given situation.*
5. *Apply information processing skills to solve problems in a relevant statistical context.*
6. *Apply thinking skills and demonstrate evaluation skills to solve problems in a relevant game theory context.*
7. *Demonstrate evaluation and communication skills in solving and presenting problems applied to costing methods and techniques.*

CDKSK-406-2319: English

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit typically refers to English language skills needed for specific careers or vocational training programmes. The main objective of this unit is to prepare learners to understand and respond to spoken English on a variety of topics, including abstract or unfamiliar topics, to read and comprehend a variety of texts, including more extended and more complex texts, and to write in a more precise and structured way. Particular focus is given to summarising and paraphrasing.

At this level, learners should have a good understanding of English grammar, vocabulary and usage. They should be able to communicate effectively in written and spoken English, express opinions, and understand complex texts and conversations as required by various but often specific technical contexts within their selected field of study. Learners should also start acquainting themselves with researching reliable and authoritative sources of information. Moreover, they should also be able to cite this information and follow the conventions of the referencing style stipulated by their respective institute.

Learning Outcomes

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

1. *Read and understand written English effectively to improve knowledge of the subject area.*
2. *Understand extended speech and follow an argument provided the topic is related to one's own subject area.*
3. *Speak with a degree of fluency and spontaneity on topics related to one's own subject area.*
4. *Produce a research-based report or essay with appropriate choice of linguistic style and structure.*

CDKSK-404-2325: Entrepreneurship Essentials

Unit Level (MQF/EQF): 4
Credits: 4
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 100

Unit Description

One of the main policy goals for the EU and Member States over the past years has been the development of the entrepreneurial capacity of European individuals and organizations, since there is a growing understanding that entrepreneurial abilities and information, can be learned, which in turn spurs the development of an entrepreneurial mindset and culture that is advantageous to both people and society at large.

Entrepreneurship is a transversal skill that may be used to launch businesses as well as foster personal growth, actively participate in society, and (re)enter the job market as an employee or self-employed individual (cultural, social, or commercial). Hence, it encompasses a variety of entrepreneurial endeavours, such as intrapreneurship, social entrepreneurship, green entrepreneurship, and digital entrepreneurship. It relates to value creation, and it is applicable to both individuals and groups (teams or organizations), as outlined in the definition below:

'Entrepreneurship is when you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social' (FFE-YE, 2012)

Therefore, the main objective of this unit is to familiarize the learners with the above-mentioned concept of entrepreneurship, with a view on enhancing entrepreneurial skills by building a strong foundation in this area of studies. Through this unit, learners will be guided on various ideation and creativity techniques, which will enable them to recognize opportunities and/ or generate ideas that address needs which are not currently being met, whilst being driven by sustainability when making these decisions. For example, through the use of the global sustainable developmental goals (SDGs) the learners are encouraged to understand the importance of sustainable development and inspire them to create businesses that contribute to this cause.

Throughout the unit, learners will be encouraged to think critically, creatively, and ethically about entrepreneurship, and to consider the impact of their ventures on society and the environment, by utilising a variety of tools such as the Business Model Canvas (BMC) as a framework, and they will also have the opportunity to develop various other transversal skills such as communication and teamwork skills.

Upon completion of this unit, learners will have developed an appreciation for the role of entrepreneurship in society and acquired an entrepreneurial mindset that will enable them to identify and pursue opportunities for innovation and growth in their personal and professional lives.

Learning Outcomes

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

1. *Identify an entrepreneurial opportunity.*
2. *Apply creative thinking tool(s) and technique(s) to generate idea(s).*
3. *Develop an entrepreneurial idea through a strategic plan.*
4. *Use effective communication skills to persuade various stakeholders.*

CDKSK-402-2324: Community Social Responsibility

Unit Level (MQF/EQF): 4
Credits: 2
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 50

Unit Description

This unit focuses on Community Social Responsibility and provides an opportunity for learners to better understand themselves and others to establish life goals. Community social responsibility enables learners to understand their strengths, areas for improvement, opportunities offered to them during their lifespan and threats which can hinder their achievements. This unit will prepare students for life, employment and how to become active citizens in society.

Lectures will differ from traditional delivery of other units where learners will be empowered to take ownership of their learning process. This means that this unit will be delivered through a combination of discussions, presentations, debates and application of theory through voluntary work. The sessions will focus on students becoming more self-aware of their strengths and limitations and what can be done to improve themselves. Skills needed on working and interacting with other people in the community and the right work ethics when doing the voluntary work. These sessions will help them prepare themselves for life after college and also instil civic duty to become active citizens.

Learning Outcomes

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

1. *Discover oneself through personal reflection and planning personal goals.*
2. *Interact and cooperate with other people effectively.*
3. *Develop active participation and promote community work.*