MCAST

MQF Level 4

MS4-A4-21

Advanced Diploma in Marine Engineering

Course Specification

Course Description

This course is the first step for those who wish to embark in 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 the successful completion of the course, you will become a technical person with sound theoretical and practical competences.

Programme Learning Outcomes

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.

Entry Requirements

- MCAST Diploma in Mechanical Engineering; or
- MCAST Diploma in Engineering (Electronics); or
- MCAST Diploma in Aircraft Maintenance; or
- 4 SEC/O-Level/SSC&P (Level 3) passes
  Compulsory: One subject from Mathematics or Physics and One subject from Engineering Technology, Design and Technology, Chemistry, Mathematics, Physics

Current Approved Programme Structure

Unit Code	Unit Title	ECVET/ECTS	Year
ETMTH-406-1617	Mathematics for Mechanical and Construction Engineering	6	2
ETH&S-406-1508	Safety and Environment	6	1
ETMTS-406-1503	Materials Selection	6	1
ETMEC-406-1510	Pneumatics and Hydraulics	6	2
ETMTS-406-1504	Statics and Strength of Materials	6	2
ETCDN-406-1501	Computer Aided Design	6	1
ETMEC-406-1511	Thermofluids	6	3
ETMEC-406-1512	Engineering Dynamics	6	1
ETE&E-406-1501	Electrical Power and Electronics	6	2
ETELX-406-1517	Fundamentals of Control Systems and Transducers	6	3
ETMRN-406-1517	Ship Management	6	1
ETPRJ-412-1514	Project Design Implementation and Evaluation	12	3
ETMEC-406-1513	Installing and Commissioning Engineering Equipment	6	3
ETMEC-406-1514	Engineering Practice*	6	1&2
ETMEC-406-1508	Monitoring and Fault Diagnosis of Engineering Systems	6	2
CDKSE-406-1901	Mathematics for Electrical Engineering	6	1
CDKSK-406-2001	English	6	2
CDKSK-404-1915	Employability and Entrepreneurial Skills	4	2
CDKSK-402-2104	Community Social Responsibility	2	2
ETCMP-406-1622	**Apprenticeship Unit : Vocational Competences in Marine Engineering	6	2&3
Total ECVET/ECTS		120	

*closes during the second year

**closes during the third year

ETMTH-406-1617 Mathematics for Mechanical and Construction Engineering

Unit level (MQF): 4
Credits: 6

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): 4
Credits : 6

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): 4
Credits : 6

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): 4
Credits : 6

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): 4
Credits : 6

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): 4
Credits : 6

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): 4
Credits : 6

Unit description

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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): 4
Credits : 6

Unit description

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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): 4
Credits : 6

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): 4
Credits : 6

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): 4
Credits : 6

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): 4
Credits : 12

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): 4
Credits : 6

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): 4
Credits : 6

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-406-1508-Monitoring and Fault Diagnosis of Engineering Systems

Unit level (MQF): 4
Credits : 6

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.*