



MCAST

Malta College of Arts, Science & Technology

MQF Level 3

CE3-A3-19

Diploma in Heating, Ventilation and Air Conditioning

Course Specification

Course Description

This programme of study addresses the competences required as entry level to the Building and Construction Engineering sector. The achievement of the required underpinning knowledge and key skills will be accomplished through contextualising key skills and adopting a highly practical approach.

Programme Learning Outcomes

At the end of the programme the students is able to

1. *Carry out a risk assessment of the surrounding working environment before and after executing an assigned task;*
2. *Set out and form pipe runs for small commercial installations;*
3. *Set out equipment and accessories to fit for particular situations;*
4. *Follow working procedure to ensure quality during installations, servicing and maintenance.*

Entry Requirements

- MCAST Foundation Certificate ;or
- 2 SEC/O-Level/SSC&P (Level 3) passes
- A full “Secondary School Certificate and Profile” (SSC&P) at Level 2 will be accepted in lieu of one (1) O-Level pass.

Other Entry Requirements

A medical certificate for colour blindness is a necessary requirement to attend the course.

Current Approved Programme Structure

Unit Code	Unit Title	ECVET
ETHVA-306-1501	HVACR Technology	6
ETHVA-306-1502	HVACR Electric	6
ETHVA-306-1503	Domestic Hot Water, Central Heating and Ventilation Installation Practice	6
ETHVA-306-1504	Domestic Air Conditioning and Refrigeration Installation Practice	6
ETHVD-306-1401	Building Drawings and Setting Out	6
ETH&S-306-1404	Occupational Safety in the Construction Industry	6
CDKSK-304-1921	Mathematics	4
CDKSK-304-1922	English	4
CDKSK-304-1923	Maltese	4
CDKSK-304-1924	Information Technology	4
CDKSK-304-1913	Individual and Social Responsibility	4
CDKSK-304-1925	Science	4
Total ECVET		60

ETHVA-306-1501- HVACR Technology

Unit Level (MQF): 3

Credits: 6

Unit Description

This programme is designed to provide knowledge in the field of heating, ventilation, air conditioning and refrigeration.

Learners will learn about the functional principles of different heating systems, including solar heating systems for various uses. They will learn about the heating devices, pumps, components and accessories, including semi or fully automated devices.

They will identify all elements of a refrigeration system and understand the working principles of refrigeration, refrigerant types and the components of refrigeration systems.

They will gain knowledge of all elements and materials of an air conditioning system as well as an understanding of the procedure and equipment necessary for the installation and testing of air conditioning units.

At the same time learners will adopt the theoretical aspect of the air conditioning principles and air parameters that are changed and controlled in HVACR systems.

Learners will gain knowledge about practical refrigeration and air conditioning principles and their practical use in the environmental control of buildings. They will learn about elements of refrigeration, air condition systems, pipes fittings, accessories, insulation, refrigeration gases and heat pumps.

Basic knowledge of ventilation systems in domestic buildings, advantages and disadvantages of different systems, ducts, ventilators and other elements of a system will be adopted during this unit. They will also learn about the types of ventilators, ducting, automation, and regulation.

Learning Outcomes

Upon successful completion of this unit, learners will be able to:

1. *Identify the components required to assemble a refrigeration system;*
2. *Select the equipment, materials and procedures required to install a domestic air-conditioning system;*
3. *Analyse the methods of connecting and setting basic system controls and determining physical parameters associated with HVACR;*
4. *Describe the types and components of ventilation systems.*

ETHVA-306-1502- HVACR Electric

Unit Level (MQF): 3

Credits: 6

Unit Description

This programme is designed to provide knowledge in the field of electrical installations that is required to complement and support HVACR systems.

Learners will learn about all electrical principles that will include all definitions, formulae, laws and regulations that are related to domestic HVACR systems.

Learners will adopt the theoretical knowledge of electrical installations and an understanding of basic computations for working safely on circuits. They will use Ohm's law and other equations for series circuits, parallel circuits, resistivity, and power.

Learners will learn about the different types of electrical circuits and different types of instruments. Practical concepts will be carried out such as measuring electrical voltage, current and resistance of various components including temperature sensors.

The program also includes technology sessions such as power distribution, cable selection, protection devices, earthing and the importance of health and safety practices

Learners will learn the basic principles of magnetic field in relationship with motors, solenoid valves and transformers. During this course, learners will gain knowledge about electrical terminations and simple circuits.

Learning Outcomes

Upon successful completion of this unit, learners will be able to:

- 1. Solve theoretical problems related to DC and simple single-phase AC circuits;*
- 2. Know the safety precautions one should undertake when dealing with electrical installations;*
- 3. Practice different wiring techniques and testing procedures used in the distribution of electrical supply to domestic HVACR equipment.*

ETHVA-306-1503- Domestic Hot Water, Central Heating and Ventilation Installation Practice

Unit Level (MQF): 3

Credits: 6

Unit Description

Learners will gain basic skills in construction, which are not directly related to HVACR and will have the opportunity to select and use tools for specific applications. The basic skills in construction that are not directly connected to installation vocation include dealing with necessary openings, cuttings and other adjusting in construction elements like walls and slabs in order to make the installation in building.

This unit will also give learners practical knowledge and skills to install the elements of domestic hot water, central heating and ventilation systems.

The knowledge in heating systems includes covering sources, heat transfer and different types of heaters. It introduces the practice of the installation of domestic solar panels systems. Solar panels installation and maintenance will be included in practical exercises.

Learners will learn basic plumbing skills, such as cutting and making pipe joints. They will deal with the creation of simple pipework, measuring, cutting, bending and joining of pipes including an introduction to brazing techniques. They will fix pipework to wall and connect it to accessories, and install pipework insulation.

Learners' practice includes work out of the duct work systems including all component elements and fittings of ventilation in domestic buildings. They will create elements of ventilation ducts using different templates and they will use fittings, joining elements, suspended systems and fasteners.

Learners will carry out practice on the installation of axial and radial ventilators, fan cooling units and other heating emitters together with their basic routine maintenance.

Learning Outcomes

Upon successful completion of this unit, learners will be able to:

1. *Select and use basic hand tools in the construction sector;*
2. *Practice the basic types of joining systems and pipe work accessories;*
3. *Understand the domestic hot water and basic central heating systems and components;*
4. *Produce typical domestic ventilation systems.*

ETHVA-306-1504- Domestic Air Conditioning and Refrigeration Installation Practice

Unit Level (MQF): 3

Credits: 6

Unit Description

This unit provides learners with practical knowledge and skills of installing elements/units of air conditioning systems. Learners will carry out the installation and commissioning of domestic air conditioning units. They will gain the practical competence to install small air conditioning systems with a wall or ceiling mounted unit, pipe runs and external unit. They will adopt the knowledge about gauge manifold, pressure tests, vacuum tests, vacuum pump, and service cylinder of refrigerant, refrigerant balance, service tools, high pressure switch, low pressure switch, combined high/low pressure switch, and thermostat.

Learners will be engaged in servicing and maintenance of refrigeration compressors, condensers, evaporators and other accessories. They will gain practical skills in setting and installing refrigeration systems by following instructions and under supervision. They will deal with components like compressor, condenser, evaporator, expansion device, receiver, filter drier. They will practice connecting components by wiring and interconnecting pipework.

This unit includes working on the pipework systems including all component elements and fittings.

This unit covers the practical use of measuring devices of parameters that are relevant in air conditioning. Learners will understand wet and dry bulb temperatures, air stream velocity and they will learn how to use vane anemometer, and hot wire anemometer.

Learners will learn how to deal with hazards associated with refrigeration and air conditioning.

They will learn about toxicity, combustion, flammability, decomposition and pressure or refrigerants and will understand the importance of safety procedures when handling refrigerant in containers.

Learning Outcomes

Upon successful completion of this unit, learners will be able to:

- 1. Set out and install the components of a refrigeration system;*
- 2. Install wall mounted and ceiling cassette split system of air conditioning units;*
- 3. Measure physical parameters associated with HVAC;*
- 4. Work safely and handle appropriately the items directly related to HVACR.*

ETHVD-306-1401 - Building Drawings and Setting Out

Unit Level (MQF): 3

Credits: 6

Unit Description

This unit develops learners' knowledge and skills in using manual drawing equipment like a drawing board, rulers, pens etc. They will learn how to draw the geometrical elements like lines, angles, parallel and orthogonal line, angle translation, circle, tangent, triangle, rectangle, polygons, ellipse, hyperbole and parabola.

Learners will adopt basic geometrical constructions, orthographic projections and sections of geometrical solids. They will learn about the three-dimensional presentation of geometrical solids and technical objects. They will practice the development of surfaces and drawing the sections and intersection of solids.

Learners will adopt the technical drawing skills by drawing different mechanical elements: welds, rivets, bolts, nuts, springs, wedges, axles, shafts, pulleys, gears etc. They will use drawing scales, specific views, details, rotated views, and specific symbols and dimensioning. They will have master the use of the drawing equipment and media and adopt technical standards and symbols.

Learners will be familiar with workshop design, specific elements, tolerances and roughness. Symbols specific for different technical fields will be learned in the purpose of making or understanding sketches.

This unit will provide learners with the knowledge and skills to understand building construction drawings in orthographic projections or working sketches, understanding of space dimension, positional settings in the selected area and comparing the built environment with the elements of the structure as shown in the drawings.

In the construction industry different drawings are used for presenting the building, crafts-work, installations, details, sections etc. Learners will have to be familiar with these presentations in order to understand and participate in engineering communication.

The use of standard modern equipment and techniques is emphasised. Learners should also gain a basic understanding of computer-aided drawing. They will learn to adjust computer settings, adopt basic commands, draw the basic geometrical elements and comprehend the modelling principle.

Learners will learn how to prepare themselves and upgrade the knowledge using literature and the Internet.

Learning Outcomes

Upon successful completion of this unit, learners will be able to:

- 1. Draw the geometrical structures;*
- 2. Recognise and interpret projections, sections and three-dimensional drawings;*
- 3. Produce simple drawings of mechanical elements;*
- 4. Produce workshop drawings and sketches.*

ETH&S-306-1404 - Occupational Safety in the Construction Industry

Unit Level (MQF): 3

Credits: 6

Unit Description

This unit provides learners with the knowledge of risks that can arise in the construction process, how to evaluate and predict the necessary safety precautions to enable them to work safely, efficiently and effectively on the building site.

Learners should understand the importance of safety procedures at work to keep their health and safety and that of their colleagues, as well as third parties in the region in check.

They will demonstrate foresight and protection methods against harmful consequences in various situations, by making the right choice of appropriate personal protective equipment and the appropriate safety procedures.

Learners will gain the necessary skills for their appropriate behaviour related to the existence of danger at workplace in order to reduce health risks prior to going to work, during work and after work.

Learning Outcomes

Upon successful completion of this unit, learners will be able to:

- 1. Apply principles of occupational safety and health on the construction site and in the surrounding environment;*
- 2. Identify hazards and risks and assess their impact on the workplace;*
- 3. Apply occupational safety procedures in a caused situation.*