MCAST

Malta College of Arts, Science & Technology

MQF Level 3

CE3-A6-19

Diploma in Building Services Installations (Plumbing or Plumbing and Electrical) Course Specification

Course Description

This course comprises theoretical knowledge and extended practical training both offthe-job and on work placement. The practical training is carried out in workshops equipped to industry standards.

Students are expected to participate individually and in teams to install pipe systems/fittings including control systems with the use of actuators and solar panels installations. Practical handling of hand tools, power tools and typical trade tools, such as thread cutting machines, form an integral part of the course.

This course also provides students with the opportunity to further develop their knowledge of key skills subjects such as Mathematics, Science, English, Maltese, Information Technology and Individual and Social Responsibility.

Programme Learning Outcomes

At the end of the programme the students are able to

1. *Carry out a risk assessment of the surrounding working environment before and after executing an assigned task.*
2. *Identify materials for specific applications in plumbing and/or electrical installation.*
3. *Interpret drawings to carry out plumbing and/or electrical installation tasks.*
4. *Carry out installations, alterations, repair and planned maintenance of existing domestic systems.*

Entry Requirements

MCAST Foundation Certificate or
2 SEC/O-Level/SSC&P (Level 3) passes

Current Approved Programme Structure

Unit Title	ECVET
Safety at the Workplace	6
Building Drawings & Setting Out	6
Water Supply Technology	6
Sewerage Technology	6
Plumbing Practice-Water Supply	6
Plumbing Practice Sewerage*	6
HVACR Electric*	6
Mathematics	4
English	4
Maltese	4
Information Technology	4
Individual and Social Responsibility	4
Science	4
Total ECVET	60

*Students opting for the Plumbing Stream will follow the unit ETPLB-3061404 , whilst those opting for the Plumbing and Electrical Stream will follow ETHVA-306-1502

Safety at the Workplace

Unit level (MQF): 3

Credits: 6

Unit Description

The unit introduces learners to effective and safe work, focusing on learners' wellbeing, on prolonged life of tools and equipment, as well as on economic aspects of work. The primary goal of the unit is to introduce basic working practices in engineering and the potential hazards involved. EU regulation, adapted for engineering activities and for vocational training is a starting point.

This unit provides learners with the knowledge of material and equipment handling, as well as of the use of appropriate personal protective equipment (PPE) and its classifications: protection of respiratory organs, skin, eye and hearing, protective clothing and ensembles. Learners will get to know the hazards and risks associated with different engineering tasks, working environments, use of tools and equipment, use of ladders and scaffolding and working with dangerous materials and substances, hot work, pressurised containers etc. Responding correctly and swiftly in case of an incident is considered equally important as avoiding one, and thus is covered within the unit through both, theory and practice. It is important to emphasize that this represents useful knowledge that could be applied in everyday life.

Since completing a job might require team effort, this unit builds team spirit as well by delivering related communication skills. Finally, the unit will introduce some important soft skills in applying knowledge and in continued learning needed for a successful professional engineer.

Learning Outcomes

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

1. *Apply statutory regulation and organisational safety requirements.*
2. *Prepare PPE and working environment according to the task checklist.*
3. *Carry out engineering task according to safety standards.*

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 drawing board, rulers, pens, etc. They will learn to draw the geometrical elements like lines, angles, parallel and orthogonal line, angle translation, circle, tangent, triangle, rectangle, polygons, ellipse, hyperbola and parabola.

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

The 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 have to master the use of the drawing equipment and media and adopt technical standards and symbols. The learners will be familiar with workshop design, specific elements, tolerances and roughness. They will learn specific symbols for different technical fields with the purpose of making or understanding sketches. This unit will provide learners with knowledge and skills which will enable them to understand the building construction drawings in orthographic projections or working sketches, understand the space dimension and positional settings in the selected area, and compare the built environment with 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. The learners 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 the basic understanding of computer aided drawing. They will learn how to adjust computer settings, adopt basic commands, draw the basic geometrical elements and comprehend the modelling principle. The learners will learn to prepare themselves for upgrading the knowledge using literature and Internet.

Learning Outcomes

Upon completion of this unit the learner 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.*

Water Supply technology

Unit level (MQF): 3

Credits: 6

Unit Description

This unit is designed to provide knowledge in the field of water supply. The recognition and knowledge of properties of materials used in water supply installations are necessary to enable the upgrading of knowledge of pipes, pipes sizing, fittings, valves, and sanitary and other equipment used in water supply.

The learners will learn about water properties, potable water, 2nd class water, drinking water production, bacterial, chemical and physical filtration, reverse osmosis desalinisation. In this unit learners will also visit the plant for drinking water production and become familiar with reverse osmosis plants, filters and water softeners.

The learners will learn about reduction of water use and environmental issues. They will learn about rain water collection, gutters, downpipes and storage tanks. They will also learn about water pumps working principles and their application, and they will be taught how to choose the adequate pump.

This unit provides learners with the knowledge of water supply mains, house connection elements, storage tanks, building water supply installation elements, joining elements in the system, fittings recognition and election.

Learners will gain the knowledge of hot water preparation and hot water installation elements. The unit also covers the use of solar heating power for heating buildings, the supply of hot water for buildings and heating of swimming pools. The learners will learn about sanitary facilities rooms and they will adopt the rules of installing sanitary equipment.

Pool devices, disinfection, cleaning, water exchange and heating are also presented in this unit. For the agricultural purposes, learners will learn about plant irrigation devices and cattle drinkers. Finally, the learners will learn the basics of gas installations, and they will adopt basics of drawings, schematics, plans etc.

Learning Outcomes

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

1. *Identify and select materials for specific applications.*
2. *State and describe water supply installations.*
3. *State and describe basic properties of sanitary accessories, fittings and storage tanks.*
4. *Understand water treatment processes.*

Sewerage Technology

Unit level (MQF): 3

Credits: 6

Unit Description

This unit provides the learners with knowledge in the field of waste water disposal. The learners learn about environmental issues and the importance of wastewater collection, treatment and disposal. The environmental impact of sewage systems, sources of waste water, physical, chemical and biological pollutants from different sources, and consequences of sewage malfunction are the important issues that learners will deal with. They will be encouraged to act and promote environmental awareness during their professional work. They will also learn about building sewage installation elements, above and below ground, pipes fittings, siphons, and connection to public sewage system or septic tanks. Learners will adopt the elements and working principles of public sewage systems, elements and working principles of local sewage systems, current regulation for connection to public sewage system. They will learn about public mains types, sizes and properties, shafts, objects and equipment, septic tanks and disposal requirements.

Learners will gain theoretical aspect of building sewage installations, working principles, elements of sewage installation in a building, materials used for sewage installation in buildings, measurement and relation to drawings. They will learn to calculate the quantity of waste water and choose sizes of pipes, gradients, shafts, vertical and horizontal lines, fittings, gutters, traps and connections. They will learn the different types of sanitary facilities and methods of installation. They will learn about washing basins, sinks, bath tubs, toilets, urinals, bidets and other sanitary appliances. The learners will adopt the principle of waterproof installation as their contribution to the protection of the environment. This unit provides learners with the knowledge about grey and black water, waste water purification devices and the importance of correct selection of septic tank. Also, the learners will gain knowledge of devices and equipment for public toilets, big kitchens, hospitals and hotels.

Learning Outcomes

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

1. *Understand the importance of proper waste water disposal.*
2. *Interpret the sewage system, public and local and building connection elements.*
3. *Assess, evaluate and interpret all types of building sewage installations, elements and fittings.*

Plumbing Practice-Water Supply

Unit level (MQF): 3

Credits: 6

Unit Description

This unit is designed to provide knowledge and skills in plumbing skills through a combination of theory, practical learning and workshop experience. Learners will gain a wide range of practical plumbing skills as well as an understanding of plumbing theory, calculations, quantities, drawing and related studies. This unit includes the study of tools, machines, products and plumbing techniques. Learners will gain practical skills of mounting and joining elements in functional pipework from different pipe materials (cast iron, steel, copper, plastic etc.). They will learn to connect the system to public supply above and below ground, carry out pressure testing of installations, and prepare a report.

They will also be instructed how to mount and dismount certain circuits, work out joining of different pipes materials, and learn all actions in the welding techniques. They will practice mounting sanitary equipment and connect it to supply installation system. Learners will gain knowledge how to protect pipes and install insulation. They will practice installing new systems and alternate and repair existing systems.

In order to execute practical work, learners will work out necessary selection, specification of materials and material order. They will prepare detailed list of working operations for each task, detailed list of materials, list of tools and equipment required for each operation. They will carry out cost calculation using cost of materials and cost of working time. This will enable learners to understand their practical work from the economy aspect.

The learners will use hand and power tools with applied safety measures. They will learn how to use tools for cutting, drilling, bending, joining, grinding, threading etc. All operation will be followed with the working diary.

Learning Outcomes

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

1. *Work out water supply installation and connection to water supply system above and below ground.*
2. *Calculate quantities, cost and resources required for water supply installation.*
3. *Use hand tools and portable power tools to perform plumbing tasks.*

Plumbing Practice Sewerage

Unit level (MQF): 3

Credits: 6

Unit Description

This unit is designed to provide knowledge and skills in plumbing skills through a combination of theory, practical learning and workshop experience. Learners will gain a wide range of practical plumbing skills as well as an understanding of plumbing theory, calculations, quantities, drawing and related studies. This unit includes the study of tools, machines, products and plumbing techniques.

The learners will learn how to make parts of the pipeline, the mounting elements and sub-assemblies. They will work out sewage pipework by mounting and joining elements in functional pipework connected to public sewage system in line with working out drawing both above and below the ground.

Learners will gain the knowledge of sewage installation working principle. They will install traps to avoid foul smell, examine installation for leaking, and produce the testing report.

The learners will be able to select materials, tools and define working procedures. They will prepare detailed list of working operations for each task. It will be followed by detailed list of materials, tools and equipment required for each operation. Specification of materials and material order will be worked out, and the cost will be calculated from the use of materials and working time.

Learners will practice the selection and the use of necessary tools. They will be able to practice safe and efficient use of selected tools to complete practical task. The learners will practice using tools to cut, bend and join the pipes and fittings. They will learn how to use tools for cutting, drilling, bending, joining, grinding, etc. Learners will learn how to protect pipes and install insulation.

Learning Outcomes

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

1. *Work out sewage installation and connection to sewage system both above and below ground.*

2. *Calculate quantities, cost and resources required for sewage installation.*
3. *Use hand tools and portable power tools used to perform sewage plumbing tasks.*

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 completion of this unit the learner 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.*