Award in Principles of Electrical and Electronics Engineering

Applying for this course:

To apply for this course, you should be 16 years of age or older and have an MQF level 2 qualification in English and in Mathematics or Physics. If you do not have these qualifications but possess other qualifications or relevant experience, kindly contact us on qa.jobsplus@gov.mt stating your ID card number, attaching copies of your qualifications and a copy of your CV highlighting your work experience.

Course Duration

This course is of 180 hours duration and consists of four Modules:

- Module 1 is of 24 hours duration - (including 2-hour assessment)
- Module 2 is of 37 hours duration - (including 2-hour assessment)
- Module 3 is of 51 hours duration – (including 2-hour assessment)
- Module 4 is of 68 hours duration – (including 4-hour assessment)

General pedagogical guidelines and procedures for this course:

The delivery of this course will be mainly held through a series of discussions and hands-on exercises. The trainer will also be holding lessons with the learners which will consists of various presentations.

General assessment policy and procedures for this course:

The learner will be assessed through a written test for all Modules. Module 4 will also have a practical component.

- Module 1 assessment will have 2 sections: multiple choice and open-ended questions.
- Module 2 assessment will have 2 sections: multiple choice questions and mathematical and physics calculation questions.
- Module 3 assessment will have 1 section that includes multiple choice, calculation and open-ended questions.
- Module 4 assessment will have a written paper which includes calculations and open-ended questions, and a practical component where learners will need to perform a number of tasks.

The pass mark for all the assessments is 45%.

Module 1 Learning Outcomes – **Health and Safety Procedures related to Electronics / Electrical Engineering trade.**

a) Comply with the electronics / electrical trade's best health and safety practices and procedures; b) Mitigate or reduce the main hazards and risks of working with electricity by applying appropriate precautions before, during and after a given task; c) Implement basic precautionary measures at the place of work to ensure the safety of one's self, the safety of other persons and due care for third parties' property; d) Carry out tasks utilising best industry safe working practices to reduce health hazards when in contact with toxic materials, liquids, dust and fumes; e) Deal with the labelling storage and disposal of hazardous waste materials utilising best industry practices; f) Comply with the RoHS directive; g) Carry out tasks implementing the correct electrical protective devices found in electronic / electrical circuits;	h) Use correctly and consistently the required protective clothing and equipment; i) Perform proper maintenance of personal protective equipment typically used in the electronics / electrical trade; j) Carry out manual handling operations according to best industry standards; k) Deal with the safe movement of materials and components, observing best industry practice; l) Implement best industry practices when using electrical/soldering equipment; m) Comply with the correct procedures to isolate person/s who is/are in contact with a simulated live electrical supply; n) Deal with basic electrical / electronic industry work bench top minor fires by utilising the appropriate equipment; o) Comply with best industry practices when using, and maintaining equipment; p) Comply with evacuation and emergency procedures.

Module 1 Assessment: The assessment paper is divided into 2 sections:

• Section A – Multiple choice which all need to be answered.

• Section B – Open ended (long answer) questions

The duration of this assessment is of 2 hours and the pass mark is that of 45%.

Module 2 Learning Outcomes – **Basic Mathematics and Physics**

✓ Carry out arithmetic operations on algebraic / fractional algebraic expressions and functions on positive and negative numbers; ✓ Carry out basic arithmetic operations utilising algebraic expressions containing exponents; ✓ Solve linear equations exercises by correctly transposing appropriate formulae; ✓ Comply with the characteristics of the trigonometric functions of sine, cosine and tangent when utilised in mathematical operations; ✓ Produce correct mathematical results utilising the appropriate sine, cosine or tangent functions; ✓ Carry out mathematical tasks utilising numbers in the different radices or bases for the binary, decimal and hexadecimal mathematical notations; ✓ Solve simultaneous equations exercises by correctly transposing appropriate formulae ✓ Comply with the mathematical rules when dealing with the perimeter, circumference, area or volume of a given object;	✓ Calculate the perimeter, circumference, area and volume of various simple two- and three-dimensional profiles ✓ Use a scientific calculator to work out mathematical tasks related to the above learning outcomes ✓ Advise about the energy level properties for the various states of matter; ✓ Carry out tasks utilising the correct standard units for mass, weight and density; ✓ Carry out mathematical equations in accordance with the basic laws of motion; ✓ Carry out measuring tasks using suitable measuring instruments, in order to determine various dimensional / electrical parameter ranges; ✓ Carry out various tasks in full awareness of the Kinetic and Potential energy in a system; ✓ Deal correctly with the basic principles of energy, work and power; ✓ Deal correctly with the basic principles of momentum and torque.

Module 2 Assessment: The assessment paper will consist of 2 sections:

- Section A – Multiple choice questions which all need to be answered.
- Section B – Open-ended questions and Mathematical and physics calculation questions which all need to be answered

The duration of this assessment is of 2 hours and the pass mark is that of 45%.

Module 3 Learning Outcomes – **Electrical Engineering Technology**

✓ Carry out tasks in solving electrical circuits calculations utilising Ohm's law; ✓ Deal correctly with the different electrical terminologies: Work, Power and Energy according to the relevant scenario; ✓ Employ Kirchoff's Law (current and voltage) in mathematical calculations for given electrical task; ✓ Deal with solving series / parallel and combined circuits by calculate the resultant electrical values; ✓ Comply with the characteristics and properties of D.C and A.C. currents when carrying out electrical/electronic work ✓ Carry out tasks with D.C. and various A.C. wave forms according to their properties;	✓ Deal correctly with the different electrical terminologies: 'resistance, capacitance, inductance, admittance, conductance and susceptance'; ✓ Carry out tasks with various R C L circuits, by calculating the voltages, current and related electrical values; ✓ Select the most suitable testing and measuring electrical instruments for the particular applications, according to instrument's abilities and dis/advantages; ✓ Carry out tasks using various types of magnetic circuits according to their specific characteristics and properties. ✓ Carry out tasks using various types of transformers according to their specific characteristics and properties.

Module 3 Assessment: The assessment paper will consist of 1 section:

• Section A – Multiple choice, calculations and open ended (short answer) questions which all need to be answered.

The duration of this assessment is of 2 hours and the pass mark is that of 45%.

Module 4 Learning Outcomes – **Basic Electronics Principles**

✓ Carry out tasks involving the precise identification of various electronic components, their values and tolerances. ✓ Produce drawings utilising the various standard electrical and electronic component circuit symbols; ✓ Select the appropriate class / types of cables and wires that are utilised in a given electrical / electronic application; ✓ Apply the correct biasing of semiconductors, in compliance to their specific type; ✓ Produce circuits with various typical types of P-N junction diodes. ✓ Build half / full and bridge rectifiers for their required applications; ✓ Select the type of stabilized D.C. power supplies according to the particular circuit's power requirements; ✓ Produce accurately biased circuits, utilising the various typical configurations of bipolar junction transistors; ✓ Produce an inventory of the various different types of boards utilised in the assembly of electronic circuits;	✓ Produce schematic diagrams and utilise them to construct simple electrical and electronic circuits ✓ Carry out tasks utilising the correct sequencing of assembly process to construct simple electrical and electronic circuits; ✓ Carry out the appropriate pre-soldering processes on various electronic components; ✓ Carry out various types of soldering processes that are most suited to electrically bond different electronic components and solder wires; ✓ Deal with the inspection of soldering joints, repair 'dry joints and short circuits', to ensure a 'sound soldered' circuit; ✓ Carry out tasks by utilising instruments that are best suited for measuring and recording various electrical parameters in electrical / electronic circuits; ✓ Create electronic circuits by utilising various logic gates; ✓ Handle and mount integrated circuits correctly; ✓ Carry out tasks utilising the functions of function of Wave form generators; ✓ Advise about the correct handling and storage of fibre optic cables.

Module 4 Assessment: Module 4 assessment will have a written paper which includes calculations and open-ended questions, and a practical component where learners will need to perform a number of tasks.

- The written assessment paper will consist of calculations and open-ended (short answer) questions. Duration of the assessment is 2 hours.

- This module also will have a practical component where learners will need to perform a number of tasks. Duration of the assessment is 2 hours.

The total duration of this assessment is of 4 hours, 2 hours for the written assessment and 2 hours for the practical component, and the pass mark is that of 45% in each assessment.

The Malta Further and Higher Education Authority (MFHEA) deems this certificate to be at Level 3 of the Malta Qualifications Framework and the European Qualifications Framework for Lifelong Learning. This course comprises study modules to which a total of 11 ECTS points are assigned.