



# MCAST

Malta College of Arts, Science & Technology

**MQF Level 3**

**Diploma in Mechanical Engineering**

**ME3-A3-19**

## **Course Description**

If the student intends to embark on an engineering career specialising particularly in the mechanical sector, then this course is recommended. This MCAST programme is designed to provide basic theory and practice that can be further enhanced through work experience.

Learning takes place by attending lectures in the classroom, workshops and laboratories, and by completing projects and assignments that are often based on realistic workplace situations. The course covers the basic knowledge and practical skills, providing a good foundation for future career opportunities in engineering. The student is exposed to a deeper knowledge in related subjects such as Mathematics, Physics, Engineering Drawing and information Technology.

## **Programme Learning Outcomes**

At the end of the programme the students are able to:

- 1. Undertake basic mechanical engineering tasks in a safe and effective manner.*
- 2. Interpret mechanical engineering related information, such as drawings and diagrams.*
- 3. Perform basic machining and fabrication processes.*
- 4. Use own initiative to solve basic mechanical engineering problems.*

## **Entry Requirements**

- MCAST Foundation Certificate; or
- 2 SEC/O-Level passes from Mathematics, Physics, Graphical Communication, Design and Technology, BTEC L2 Extended Certificate in Engineering
- Compulsory: Mathematics or Physics

## **Other Entry Requirements**

N/A

**Current Approved Programme Structure**

<b>Unit Title</b>	<b>ECVET/ECTS</b>
Chemical, Mechanical & Electrical Engineering Science	6
Basic Principles & Safe Working Practice	6
Bench Fitting Techniques and Basic Machine shop Practice	6
Principles of engineering drawing and welding processes and technology	6
Basics of Metal and Plastics Forming	6
Introduction to Engineering Services and Principles of Maintenance Technology	6
Mathematics	4
English	4
Maltese	4
Information Technology	4
Individual and Social Responsibility	4
Science	4
<b>Total ECVET/ECTS</b>	<b>60</b>

# Chemical, Mechanical and Electrical Engineering Science

**Unit level (MQF): 3**

**Credits: 6**

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## Unit description

This unit is designed to give learners the opportunity to investigate the principles of mechanical and electrical engineering. Definition of units will be explained such as mass, weight, force, density, velocity and acceleration; electric charge, current, voltage, resistance and power. These units will be explained through mathematical relationship which may be experimentally investigated. This unit will also cover direct electrical current and magnetic fields. Learners will also learn about static and dynamic systems and the behaviour of fluids. This is a theory based unit; however, there is a scope for experimentation and practice to be carried in the laboratory.

## Learning Outcomes

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

1. *Upon completing the unit, learners should be able to.*
2. *Define concepts and principles applied to Basic Scientific Knowledge.*
3. *Define concepts and principles applied to Basic Chemistry Knowledge.*
4. *Apply mechanical principles to engineering concepts.*
5. *Apply electrical principles to engineering concepts.*

# Basic Principles and Safe Working Practices in Engineering

**Unit level (MQF): 3**

**Credits: 6**

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## Unit Description

The unit introduces basic principles and safe work in engineering, basics on working practices and the potential hazards involved, including EU regulation adapted for engineering activities. Topics like material and equipment handling will be covered, as well as the classification and use of appropriate personal protective equipment (PPE) for respiratory organs, skin, eyes and hearing.

Learners will be encouraged to learn about working in engineering by using available information to improve their skills and knowledge needed in engineering. This will include the need to apply safe working practices, consideration for the environment and working effectively as a part of a team. It also includes basic materials that engineers use in their everyday work, as well as the related information technology. After completing this unit, learners will be able to work safely using key engineering materials and applying basic engineering processes. They will also understand basic structural concepts in engineering and the importance of maintaining work relationships.

## Learning Outcomes

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

1. *Apply safe working practices in basic engineering sectors.*
2. *Prepare personal protective equipment and the working environment.*
3. *Know the key engineering materials and basic engineering processes.*
4. *Know the basic structural concepts in engineering.*
5. *Understand the importance of maintaining work relationships.*

# Bench Fitting Techniques and Basic Machine Shop Practice

**Unit level (MQF): 3**

**Credits: 6**

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## Unit Description

The basic knowledge of simple manufacturing techniques applied to basic engineering materials is covered, including principles of manufacturing processes, machinery, tools, instrumentation, and product quality. The basic skills and knowledge needed to produce mechanical parts complying with required accuracy and surface finish are also provided. Toward this end, measurement methods and equipment are applied in accordance with manufacturing techniques used. Learners will acquire basic production engineering knowledge, and be able to carry out simple manufacturing projects. After completing this unit learners will be able to classify and apply basic manufacturing techniques; as well as to select and use appropriate measurement methods and equipment.

## Learning Outcomes

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

1. *Understand and classify basic tools and tool materials.*
2. *Know and apply turning techniques.*
3. *Know and apply basic milling techniques.*
4. *Know and apply bench fitting techniques.*
5. *Apply measurement methods and use measurement equipment.*

# Principles of Engineering Drawing and Welding Processes and Technology

**Unit level (MQF): 3**

**Credits: 6**

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## Unit Description

Learners will be introduced to engineering communications systems such as drawings and CAD. The basic principles of welding processes and technology are explained as the most suitable way to produce complex constructions and to perform a variety of other jobs (repair, surfacing, cutting). The most common processes, Manual Metal Arc (MMA), Metal Inert/Active Gas (MIG/MAG), Tungsten Inert Gas (TIG) and Oxy-acetylene welding, will be learned and applied to the low carbon steel, as the most widely used structural material. A range of joints and simple welding positions, as used in industry, will be covered. Learners will be able to select the appropriate tools and working methods to achieve the desired outcome for each of the processes. After completing this unit learners will be capable of producing simple joints using MMA, MIG/MAG, TIG and Oxy-acetylene welding and state the risks involved, as well as how to mitigate them. This will include the safe use of equipment for MMA, MIG/MAG, TIG and Oxy-acetylene welding and application of quality assurance procedures. Learners will also learn CAD and its application to produce engineering drawings.

## Learning Outcomes

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

1. *Understand and apply the conventions as used in engineering communications systems and applied to principles of welding technology.*
2. *Prepare MMA, MIG/MAG, TIG or Oxy-acetylene welding equipment and tools for safe use.*
3. *Use equipment safely for MMA, MIG/MAG, TIG and Oxy-acetylene welding of low carbon steel.*
4. *Produce welded joints safely using MMA, MIG/MAG, TIG and oxy-acetylene welding of low carbon steel.*
5. *Carry out quality assurance procedures in welding.*
6. *Produce engineering drawings using CAD software.*

# Basics of Metal and Plastics Forming

Unit level (MQF): 3

Credits: 6

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## Unit Description

This unit will provide learners with the basic knowledge of a large group of modern manufacturing processes in which plastic deformation is used to change the shape of metal work pieces. In these processes the tools apply stresses that exceed the yield strength of the metal, and metal takes a shape determined by the geometry of the die which is held within a machine or a press. The fundamental knowledge of desirable material properties for metal forming and of basic types of deformation processes is covered. Special attention is given to sheet metalworking processes and accompanying bulk deformation. After completing this unit, learners will know about the principles of metal forming, machinery or presses used, tools and material used, sheet metalworking processes and bulk deformation, as well as about friction and lubrication in metal forming. The learner will also be provided with an introduction to the different types of plastics and the processes involving plastics forming.

The unit shall be covered in a descriptive manner only, excluding any calculations. In addition, given that this unit covers only industrially-based manufacturing processes; hence any workshop craft or artisan methods or related hand tools are excluded from scope.

## Learning Outcomes

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

1. *Know and understand the principal types of metal working and plastics forming processes.*
2. *Know the different materials and presses used in metal forming.*
3. *Know and understand sheet metalworking processes and associated tooling/gauging.*
4. *Know and understand bulk deformation processes and associated tooling.*
5. *Know about friction and lubrication in metal forming processes.*



# Introduction to Engineering Services and Principles of Maintenance Technology

Unit level (MQF): 3

Credits: 6

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## Unit Description

The learner will be introduced to engineering services as are normally found in manufacturing industries. These would include water systems, compressed air systems and steam. The basic principles of maintenance technology are provided and applied for regular maintenance of mechanical devices and equipment, so as to better understand the problems in maintenance, and processes like friction, lubrication and wear. On the other hand, dismantling, rebuilding and replacing device components are treated as more practical issues. Throughout this unit learners will be encouraged to assess safe and legal work procedures, as well as to operate tools and equipment safely and efficiently with regard to current legislative requirements. Learners will gain safe working practices and the knowledge of engineering environment in regard to routine inspection, lubrication, servicing and maintenance, and understand the importance of maintaining work relationships. Finally, basic knowledge and skills are provided to detect simple faults and carry out appropriate servicing/maintenance in accordance with information from fault finding.

## Learning Outcomes

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

1. *Understand maintenance objectives, types, and procedures as applied to elements of engineering services.*
2. *Understand the basics of friction, lubrication and wear.*
3. *Plan and prepare for routine maintenance of simple mechanical devices/systems.*
4. *Dismantle, rebuild and replace items.*
5. *Carry out simple servicing/maintenance in accordance with fault finding.*