



**MCAST**

**MQF/EQF Level 4**

**Advanced Diploma in Welding and Fabrication**

**AE4-A5-21**

## **Course Description**

This course combines theoretical knowledge and practical training carried out in College-based industrial workshops. Learners will be expected to participate individually and in teams to fabricate welded products. They will learn how to analyse and generate solutions related to typical fabrication using thin plates and pipes. Learners will also be given the opportunity to follow an Apprenticeship to improve their hands-on experience. In order to be able to appreciate the importance of good production management, supervised visits to complex production set-ups are organised during the course. Applicants need to be able to work within the industries concerned.

## **Programme Learning Outcomes**

At the end of the programme the learner will be able to:

- 1. Carry out a risk assessment of the surrounding working environment before and after executing an assigned task;*
- 2. Use tools and equipment related to steel fabrication;*
- 3. Use tools and equipment to prepare and weld steel by a suitable process;*
- 4. Identify and select common engineering materials fit for specific applications.*

## **Entry Requirements**

Any MQF Level 3 (minimum 60 ECTS) Diploma

OR

4 SEC/O-Level/SSC&P (Level 3) passes

## Key Information

Awarding Body - MCAST

Accreditation Status - Accredited via MCAST's Self Accreditation Process (MCAST holds Self-Accrediting Status as per 1st schedule of Legal Notice 296/2012)

Type of Programme: Qualification

MQF Level	Examples of Qualifications	'Qualification' Minimum Credits Required	'Award' Credits Required
Level 8	Doctoral Degree Third Cycle Bologna Process	NA	NA
Level 7	Masters Second Cycle Bologna Process	90-120	Less than 30
	Post-Graduate Diploma	60	
	Post-Graduate Certificate	30	
Level 6	Bachelor <sup>23</sup> /Bachelor (Hons.) <sup>24</sup> First Cycle Bologna Process	180-240	Less than 180
Level 5	Short Cycle Qualification	120	Less than 60
	Undergraduate Higher Diploma	90	
	Undergraduate Diploma	60	
	Undergraduate Certificate	30	
	VET Level 5 Programme <sup>25</sup>	60-120	
Level 4	Pre-Tertiary Certificate	30	Less than 120
	VET Level 4 Programme <sup>26</sup>	120	
	MATSEC Certificate	NA	
Level 3	VET Level 3 Programme <sup>27</sup>	60	Less than 60
	General and Subject Certificate	NA	
Level 2	VET Level 2 Programme <sup>28</sup>	60	Less than 60
	General and Subject Certificate	NA	
Level 1	VET Level 1 Programme <sup>29</sup>	40	Less than 40
	General and Subject Certificate	NA	
Introductory Level A	Preparatory Programme	30	Less than 30
Introductory Level B	Pre-entry Basic Skills Course	30	Less than 30

**Table 1: Minimum number of credits for 'Qualifications' and parameters for 'Awards'**

Fig. 1: p56, Ministry for Education and Employment & National Commission for Further and Higher Education Malta (2016). *Referencing Report, 4<sup>th</sup> Edition*. NCFHE.

Total number of Hours: 3000

Mode of attendance: Full Time

Duration: 2 Years

Target audience for MCAST full-time courses is 16 to 65+

Target group: Students exiting compulsory education

The official language of instruction at MCAST is English. All notes and textbooks are in English (except for language courses which will be in the respective language being instructed). International candidates will be requested to meet English language certification requirements for access to the course.

This course will be offered at

MCAST has four campuses as follows:

**MCAST Main Campus**

Triq Kordin, Paola, Malta

All courses except for the Institute for the Creative Arts, Centre of Agriculture, Aquatics and Animal Sciences are offered here.

**Institute for the Creative Arts**

Mosta Campus

Misraħ Għonoq Tarġa Gap,

Mosta

**Institute of Applied Sciences,  
Centre of Agriculture, Aquatics and Animal Sciences,  
Luqa Road, Qormi**

**Gozo Campus**

J.F. De Chambray Street

MCAST, Għajnsielem

Gozo

*Teaching, Learning and Assessment*

The programmes offered are vocational in nature and entail both theoretical lectures delivered in classes as well as practical elements that are delivered in laboratories, workshops, salons, simulators as the module requirements dictate.

Each module or unit entails a number of in person and/or online contact learning hours that are delivered by the lecturer or tutor directly (See also section 'Total Learning Hours').

Access to all resources is provided to all registered students. These include study resources in paper or electronic format through the Library and Resource Centre as well as tools, software, equipment and machinery that are provided by the respective institutes depending on the requirements of the course or module.

Students may however be required to provide consumable material for use during practical sessions and projects unless these are explicitly provided by the College.

All Units of study are assessed throughout the academic year through continuous assessment using a variety of assessment tools. Coursework tasks are exclusively based on the Learning Outcomes and Grading Criteria as prescribed in the course specification. The Learning Outcomes and Grading Criteria are communicated to the Student via the coursework documentation.

The method of assessment shall reflect the Level, credit points (ECTS) and the schedule of time-tabled/non-timetabled hours of learning of each study unit. A variety of assessment instruments, not solely Time Constrained Assignments/Exams, are used to gather and interpret evidence of Student competence toward pre-established grading criteria that are aligned to the learning outcomes of each unit of the programme of study.

Grading criteria are assessed through a number of tasks, each task being assigned a number of marks. The number of grading criteria is included in the respective Programme Specification.

The distribution of marks and assessment mode depends on the nature and objectives of the unit in question.

Coursework shall normally be completed during the semester in which the Unit is delivered.

Time-constrained assignments may be held between 8 am and 8 pm during the delivery period of a Unit, or at the end of the semester in which the Unit is completed. The dates are notified and published on the Institute notice boards or through other means of communication.

Certain circumstances (such as but not limited to the Covid 19 pandemic) may lead Institutes and Centres to hold teaching and assessment remotely (online) as per MCAST QA Policy and Standard for Online Teaching, Learning and Assessment (Doc 020) available via link <https://www.mcast.edu.mt/college-documents/>

The Programme Regulations referenced below apply. (DOC 004\* available at: link <https://www.mcast.edu.mt/college-documents/>

### Total Learning Hours

The total learning hours required for each unit or module are determined as follows:

Credits (ECTS)	Indicative contact hours	Total Student workload (hrs)	Self-Learning and Assessment Hours
1	5 - 10 hrs	25 hrs	20-15 hrs*
2	10 - 20 hrs	50 hrs	40-30 hrs*
3	15 - 30 hrs	75 hrs	60-45 hrs*
4	20 - 40 hrs	100 hrs	80-60 hrs*
6	30 - 60 hrs	150 Hrs	120-90 hrs*
9	45 - 90 hrs	225 hrs	180-135 hrs*
12	60 - 120 hrs	300 hrs	240-180 hrs*

\* The 'Self-Learning and Assessment Hours' amount to the difference between the contact hours and total student workload.

### Grading system

All MCAST programmes adopt a learner centred approach through the focus on Learning Outcomes. The assessment of MCAST programmes is criterion-referenced and thus assessors are required to assess learners' evidence against a pre-determined set of Learning Outcomes and assessment criteria.

For a student to be deemed to have successfully passed a unit, a minimum of 50% (grade D) must be achieved. In case of part time programmes, the student must achieve a minimum of 45% to successfully pass the unit.

All units are individually graded as follows:

A\* (90-100)

A (80-89)

B (70-79)

C (60-69)

D (50-59)

Unsatisfactory work is graded as 'U'.

Work-based learning units are graded on a Pass/Fail basis only.

Detailed information regarding the grading system may be found in the following document: DOC 004 available at: link <https://www.mcast.edu.mt/college-documents/>

### Intake Dates

- MCAST opens calls for application once a year between July and August of each year for prospective applicants residing in MALTA.
- Applications to full-time courses from international students not residing in MALTA are accepted between April and Mid-August.
- For exact dates re calls for applications please follow this link  
<https://www.mcast.edu.mt/online-applications-2/>

### Course Fees

MCAST course are free for Maltese and EU candidates. International candidates coming from outside the EU need to pay fees for the respective course. Course fees are set on a per-level and course duration basis. For access to course fee structure and payment methods please visit <https://www.mcast.edu.mt/fee-payments-for-non-eu-candidates/>.

### Method of Application

Applications to full-time courses are received online via the College Management Information System. Candidates can log in using Maltese Electronic ID (eID) or European eIDAS (electronic identification and trust services) to access the system directly and create an account as the identity is verified electronically via these secure services.

Non-EU candidates need to request account creation through an online form by providing proof of identification and basic data. Once the identity is verified and the account is created the candidate may proceed with the online application according to the same instructions applicable to all other candidates.

Non-EU candidates require a study visa in order to travel to Malta and join the course applied for. For further information re study-visa please access <https://www.identitymalta.com/unit/central-visa-unit/>.

For access to instructions on how to apply online please visit <https://www.mcast.edu.mt/online-applications-2/>

Contact details for requesting further information about future learning opportunities:

### MCAST Career Guidance

Tel: 2398 7135/6

Email: [career.guidance@mcast.edu.mt](mailto:career.guidance@mcast.edu.mt)

**Current Approved Programme Structure**

Unit Code	Unit Title	ECTS	Year	Semester
ETW&F-406-1505	MMA Welding Technology and Practice Plate 4G	6	1	YEAR
ETW&F-406-1502	Manual Metal Arc Welding Technology and Practice	6	1	YEAR
ETW&F-406-1503	TIG Welding Technology and Practice Part 1	6	1	YEAR
ETH&S-406-1502	Safety at Work and Handling Operations	6	1	YEAR
ETW&F-406-1512	Technical Drawing for Plate and Pipe Fabrication	6	1	YEAR
ETW&F-406-1508	Plate Fabrication	6	1	YEAR
ETW&F-406-1509	Pipe Fabrication	6	1	YEAR
ETW&F-406-1510	Fabrication Drawings	6	1	YEAR
CDKSK-406-2007	Mathematics	6	1	YEAR
CDKSK-406-2001	English	6	1	YEAR
ETPAM-406-1501	Planning and Administration	6	2	YEAR
ETW&F-406-1511	Power Tools , Marking and Cutting Technologies	6	2	YEAR
ETW&F-406-1504	TIG Welding Technology and Practice Part 2	6	2	YEAR
ETW&F-406-1506	MMA Welding Technology and Practice Pipe (1,2,5,6 G)	6	2	YEAR
ETW&F-406-1507	Material Science and Weldability of Materials	6	2	YEAR
ETPRJ-412-1505	Welding and Fabrication Synoptic Project	12	2	YEAR
ETW&F-406-1501	Metal Inter Gas Welding Technology and Practice	6	2	YEAR
CDKSK-404-1915	Employability and Entrepreneurial Skills	4	2	YEAR
CDKSK-402-2104	Community Social Responsibility	2	2	YEAR
ETCMP-406-1602	Vocational Competences : Apprenticeship in W&F	6	1/2	YEAR
<b>Total ECTS</b>		<b>120</b>	<b>/</b>	<b>/</b>



## **ETW&F-406-1505: Manual Metal Arc Welding Technology and Practice Plate (4G)**

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### **Unit Description**

This Unit is designed to allow learners to gain welding skills and knowledge to a level based upon acceptance standards ISO 5817 - Arc welded joints in steel - Guidance on quality levels for imperfections and BS EN 287 welder approval testing, which will enable them to carry out work in complex welding positions. Learners will combine and apply the technological theory experienced within unit number 2. Manual Metal Arc Welding Technology and Practice Part 1. Learners must be able to operate effectively at more than a basic level of competence before commencing this Unit.

On completion of the Unit learners will understand and know how to produce plate welds in 4G positions that may be more technically complex in practice, as well as developing the understanding, knowledge and skills required to produce them. This Unit will provide the Learner with the ability to identify material, cut, prepare, weld and test welded plate specimens inline with the above welding standards.

Finally, learners should have the underpinning knowledge and understanding to carry out and complete the learning outcomes including an on-line assessment.

### **Learning Outcomes**

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

- 1. Produce a single-vee butt weld from one side of a joint in the PC horizontal position;*
- 2. Produce a tee fillet weld on one side of the joint in the PD horizontal/overhead position;*
- 3. Produce a corner weld from one side of the joint in the PE overhead position;*
- 4. Produce a tee fillet weld on one side of the joint in the PE overhead position;*
- 5. Produce a single-vee butt weld from one side of the joint in the PE overhead position;*
- 6. Explain the health & safety and welding specific underpinning knowledge requirements for the process (MMA).*

# ETW&F-406-1502: Manual Metal Arc Welding Technology and Practice

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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## Unit Description

This unit sets out the requirements for manual metal arc welding in a modern engineering and Fabrication environment, in terms of what needs to be achieved by the learner, i.e., welding a series of challenging joint configurations across in a wide range of positions that are compliant to welding procedure specifications.

The unit is concerned with the technology and practices involved in the application of manual metal arc welding. The unit is demanding in terms of technological content and the complexity of the welding that candidates are expected to achieve. The unit is broadly divided into health and safety, welding equipment, welding consumables (i.e., electrodes) and the practicalities of producing a welded joint in relation to a welding procedure specification (WPS) and a quality specification. (EN and AWS).

The unit sets out to give a strong practical capability in the topic area of Manual Metal Arc Welding which supplements and strengthens the student's knowledge and practical capabilities in other associated units within the course provision.

It is anticipated that all practical work carried out within the workshop, will be do so in accordance with relevant Health and Safety legislation, to not only ensure the safety of the students and staff. But also to impart good working practice to the student at the beginning of their career, which can then be an integral platform from which their practical capabilities and technical understanding in the subject area can develop.

## Learning Outcomes

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

1. *Apply safe working practices to manual metal arc welding;*
2. *Prepare equipment for performing manual metal arc welding;*
3. *Perform manual metal arc welding operations to meet welding procedure specification requirements;*
4. *Evaluate welded joints for welding procedure specification conformance.*

# ETW&F-406-1503: Tungsten Inert Gas (TIG) Welding Technology and Practice - Part 1

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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## Unit Description

This unit is concerned with the technology and practices involved in the application of Tungsten Inert Gas (TIG) welding. The unit is demanding in terms of technological content and the complexity of the welding that learners are expected to achieve. The unit is broadly divided into health and safety, welding equipment, welding consumables and the practicalities of producing a welded joint in relation to a welding procedure specification (WPS) and a quality specification. Relevance will be made to the suitability of weld type to materials involved and environmental conditions.

It is anticipated that all practical work carried out within the workshop, this will be undertaken in accordance with relevant Health and Safety legislation, to not only ensure the safety of the learners and staff. But also to impart good working practice to the student at the beginning of their career, which can then be an integral platform from which their practical capabilities and technical understanding in the subject area can develop.

On completion of the unit learners will understand how to produce welded joints that are more complex, as well as developing the understanding, knowledge and skills required to produce them. This unit forms one part of an overall competence in welding technologies and practice required for individuals working within this industry.

## Learning Outcomes

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

1. *Know safe working practices related to TIG welding;*
2. *Apply TIG weld equipment for a range of welded joints;*
3. *Describe the organizational quality systems used and weld standards to be achieved;*
4. *Explain the weld inspection and test procedures used including destructive and non-destructive methods.*

## **ETH&S-406-1502: Safety at Work and Handling Operations**

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### **Unit Description**

This unit is concerned with the requirements that are essential to enable engineering activities to be carried out safely and effectively. It includes dealing with statutory and organisational requirements in accordance with approved regulations, codes of practice and procedures. It covers responsibilities relating to accident reporting and the identification of hazards and risks.

Students will be introduced to the skills and knowledge to ensure that their own actions do not create any health and safety risks, they do not ignore hazards with significant risk in the workplace and that they take sensible action to put things right.

There are many potential hazards within the welding and fabrication industry. This unit is designed to ensure that those that work within it are aware of the potential dangers, likely hazards and where to source: safety information, appropriate regulations and apply them to the workplace and the people who operate within it.

This unit is about identifying the hazards and risks that are associated with the job. Typically, these will focus on the working environment, the tools and equipment that are used, materials and substances that are used, working practices that do not follow laid-down procedures, manual lifting and carrying techniques.

The level at which the unit is aimed is to address vocational application needs and as students gain more workplace experience, their comprehension and implementation of safety matters will improve.

## Learning Outcomes

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

- 1. Understand compliance with statutory health and safety regulations and organisational requirements;*
- 2. Understand compliance with statutory environmental regulations and organisational requirements;*
- 3. Know how to implement accident and emergency procedures;*
- 4. Understand safe working practices and procedures;*
- 5. Understand the reasons for safe manual handling, how manual handling risk assessments contribute to improving health and safety and the principles, types of equipment and testing requirements associated with manual handling safety.*

# ETW&F-406-1512: Technical Drawing for Plate and Pipe Fabrication

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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## Unit Description

This unit allows the student to develop skills required to produce developed patterns to obtain flat layouts of 3 Dimensional form. These flat layouts can then be used in the production of templates to mark off plate and pipe to shape such as Square to Round, Rectangle to Square, Offset Pipe to Pipe and Conical Frustum.

The application of drawing techniques and practices is crucial to the fabrication process, with students learning basic drawing skills to be adapted to produce suitably sized templates. A range of different geometrical shapes will allow the student to be familiar with the main patterns they will be liable to encounter in practice.

The unit is obviously a combination of theoretical and practical, with demonstrations forming a platform from which students can individually practice and ultimately be assessed.

It is anticipated that all practical work carried out within the workshop, this will be undertaken in accordance with relevant Health and Safety legislation, to not only ensure the safety of the students and staff. But also, to impart good working practice to the student at the beginning of their career, which can then be an integral platform from which their practical capabilities and technical understanding in the subject area can develop.

## Learning Outcomes

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

1. *Determine lines of intersection;*
2. *Develop patterns using Parallel Line Techniques;*
3. *Develop patterns using Radial Line Techniques;*
4. *Develop patterns using Triangulation;*
5. *Produce templates of developed patterns.*

## ETW&F-406-1508: Plate Fabrication

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### Unit Description

This unit is designed to allow the student to develop the skills and knowledge to undertake the fabrication of plate in the thickness regions of 6mm to 25mm of various metals such as low carbon steels, medium carbon and austenitic stainless steels and to include the following sections. Bolted fabrications, welded fabrications, developed plates-work in conjunction with the unit “Pattern Development”, tubular connections, boxed girder sections and boiler/pressure vessels.

Health and safety applicable to fabrication of plate for example COSHH, Management of Health and Safety, HASAWA, Asbestos Regs. Working at Heights etc. will also be considered as will the planning of the assemblies to include cost of equipment, suitability of equipment, accuracy and quality of cut, use of templates such as wood, paper and sheet metal, marking off using for example chalk lines and plate squares, cutting using thermal (oxy-fuel gas cutting) and non-thermal processes using mechanical/hydraulic guillotines, rotary shears, forming of plate using the following, brake press, pyramid rolls, vertical rolls, section rolls, conical rolls in the production and manufacture of plate work assemblies.

### Learning Outcomes

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

1. *Apply safe working practices to plate-work fabrication;*
2. *Prepare equipment for plate-work cutting;*
3. *Prepare the equipment for plate-work forming;*
4. *Produce fabrications using plate-work techniques.*

## ETW&F-406-1509: Pipe Fabrication

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### Unit Description

This unit is concerned with the underlying technology related to the fabrication of pipe work assemblies using the following processes: cutting of pipe, forming of pipe and joining of thick plate and rolled sections of pipe. Health and safety will also be covered as will the risks and hazards pertinent to cutting using oxy-fuel gas, forming, assembly and the joining of the pipe work assemblies.

The following jointing methods will also be used to include non-thermal techniques, mechanical techniques - bolting, screwing and thermal such as soldering, MMA, MIG and TIG welding processes.

In completing this unit, the student would be able to apply themselves to some or all of the following areas of associated work:

- Able to read and interpret isometric and piping drawings, plot plans and P & ID's;
- Fabricates from spool or isometric drawings pipe spool pieces and associated supports and fitments to meet pre and final assembly, in a variety of material and alloys;
- Selects, measures, cuts and installs underground and above ground piping systems, joints and connections, including concrete pipe, carbon steel pipe, fiberglass and thermoplastic pipe, using hand and power tools and aided by slings and aligning dogs;
- Prepares pipe lengths and fittings for fit-up and sets up all types of weld joints prior to completion by welding;
- Selects, inspects and uses rigging aids such as block and tackle, chain hoist, come-along, jack and tagger. Aligns piping against thrust blocks;
- Completes final installation of piping system with required fabricated spools, pipe, fittings, valves, gaskets, bolts, supports and hangers;
- Prepare completed pipe system for testing in accordance with approved test packages.



## Learning Outcomes

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

1. *Prepare equipment, tools and materials for cutting pipe work;*
2. *Use equipment and tools to fabricate pipe work;*
3. *Produce pipe work assemblies using joining techniques;*
4. *Test fabricated pipe work assemblies.*

## ETW&F-406-1510: Fabrication Drawings

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### Unit Description

This unit is fundamental to the fabrication student. It allows the student to be able to produce engineering drawings as a form of communication and be familiar with the terminology in the fabrication industry.

This unit should also be delivered in conjunction with “Technical drawing for Plate and Pipe Fabrication” unit. The unit will also enhance the marking out skills of the student by ensuring accuracy in the construction of the drawings.

Drawing skills will take in - scales, drawing set-up, plans, elevations, cross-sections, details, projections, annotation and symbols. By giving this grounding much of what the student requires throughout the course will be addressed.

It is anticipated that much of the time allocation of the unit will be directed towards the student developing their skills, after initial instruction and demonstration in particular areas. And once manual drawings skills have been mastered, the student will then be introduced to suitable CAD software to develop their graphical skills on a medium and in a way familiar to industry. The unit should therefore be relatively methodical and structured in its approach to ensure that concepts and skills are being suitably demonstrated before transitions between manual and computer based drawing.

### Learning Outcomes

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

1. Describe and use a range of equipment, media and techniques used in fabrication drawing;
2. Identify standards of fabrication engineering drawings and pictorial views;
3. Interpret dimensional graphical information from fabrication drawings;
4. Produce graphical details using traditional manual and CAD techniques.

## **ETPAM-406-1501: Planning and Administration**

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### **Unit Description**

This unit identifies the knowledge and competences needed to contribute to the development and maintenance of positive working relationships with other people, in accordance with organisational and workplace requirements.

This unit covers the different roles and responsibilities within organisations and the workplace. The learner will be able to identify the current and mandatory legislation, regulations and policies which are required to be complied with in an organisation.

The learner will be able to apply and use the correct planning and administration methods to organise and understand work programmes and the requirements of different trades. The learner will be able to demonstrate the use of formal and informal communication with other persons within a workplace and be able to apply a methodical approach to labour and material estimates.

The learner will understand the use of different communication methods throughout regarding the different personnel and their individual requirements within a workplace. The unit will demonstrate the different types of methods used to ensure all persons within a working environment are informed about work plans and activities that affect them.

The unit will demonstrate how persons within a workplace should know how they can develop and maintain positive working relationships with relevant people. The learner should understand the importance of appearance and behaviour, the feelings and expectations of others, and effective communications.

## Learning Outcomes

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

1. *Identify and understand the members of the construction team and their role within the Building / Engineering / Fabrication Industries;*
2. *Identify and understand how to apply information sources in the Building / Engineering/ Fabrication Industries;*
3. *Communicate with other persons within the Building / Engineering / Fabrication Industries;*
4. *Apply the correct Planning and Administration methods within a working environment.*

## **ETW&F-406-1511: Power Tools, Marking and Cutting Technologies**

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### **Unit Description**

This unit enables the candidate to develop the skills and the underlying process technologies required for the marking, cutting and fabrication of platework, including bolted and welded fabrications, developed platework and tubular construction. It covers health and safety aspects of fabrication, necessary planning and template development lay outs, marking out, cutting and forming and joining for the production of platework and tubular fabrications.

The Unit is relevant to learners wishing to further develop their skills and the underlying process technology and the power tools required for the marking, cutting and fabrication of platework, bolted and welded fabrication, pipework fabrication and tubular construction.

On completion of the Unit learners will understand relevant health and safety regulations, how to select the appropriate power tools required for marking, cutting and fabrication of platework and tubular construction taking into consideration the materials being used as well as developing the understanding, knowledge and skills required to produce them.

This Unit will provide the learner with the ability to develop the skills and the underlying process technology required for the fabrication of platework, including bolted and welded fabrications, developed platework and tubular construction. It covers health and safety aspects of fabrication, necessary planning and template development lay outs, marking out, cutting and forming and joining for the production of platework fabrications.

Learners will identify, select and safely use the appropriate power tool for carrying out a task involving marking, cutting and fabrication of platework, including bolted and welded fabrications, developed platework and tubular construction.

## Learning Outcomes

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

1. *Prepare equipment, tools and materials for cutting of thick plate, bar and rolled sections;*
2. *Be able to use equipment and tools for thick plate, bar and rolled sections;*
3. *Produce fabrications using thick plate and rolled bar sections joining techniques;*
4. *Apply safe working practices to plate-work fabrication.*

## **ETW&F-406-1504: Tungsten Inert Gas (TIG) Welding Technology and Practice - Part 2**

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### **Unit Description**

This unit sets out the requirements for tungsten inert gas (TIG) welding in a modern engineering environment, in terms of what needs to be achieved by the student, i.e. welding a series of challenging joint configurations across in a wide range of positions that are compliant to welding procedure specifications. The unit is concerned with the technology and practices involved in the application of TIG welding. The unit is demanding in terms of technological content and the complexity of the welding that students are expected achieve. The unit is broadly divided into health and safety, welding equipment, welding consumables and the practicalities of producing a welded joint in relation to a welding procedure specification (WPS) and a quality specification.

It is anticipated that all practical work carried out within the workshop, this will be undertaken in accordance with relevant Health and Safety legislation, to not only ensure the safety of the students and staff. But also, to impart good working practice to the student at the beginning of their career, which can then be an integral platform from which their practical capabilities and technical understanding in the subject area can develop.

On completion of the unit learners will understand how to produce welded joints that are more complex, as well as developing the understanding, knowledge and skills required to produce them. This unit forms one part of an overall competence in welding technologies and practice required for individuals working within this industry.

### **Learning Outcomes**

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

- 1. Apply safe working practices to TIG welding;*
- 2. Prepare equipment for performing TIG welding;*
- 3. Perform TIG welding operations to meet welding procedure specification requirements;*
- 4. Evaluate welded joints for welding procedure specification conformance.*

## **ETW&F-406-1506: Manual Metal Arc Welding Technology and Practice Pipe (1,2,5,6G)**

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### **Unit Description**

This Unit is designed to allow learners to gain welding skills and knowledge to a level based upon acceptance standards ISO 5817 - Arc welded joints in steel - Guidance on quality levels for imperfections and BS EN 287 welder approval testing, which will enable them to carry out work in complex welding positions. Learners will combine and apply the technological theory experienced within unit number 2. Manual Metal Arc Welding Technology and Practice Part 1. Learners must be able to operate effectively at more than a basic level of competence before commencing this Unit.

On completion of the Unit learners will understand and know how to produce pipe welds in 1,2,5,6G positions that may be more technically complex in practice, as well as developing the understanding, knowledge and skills required to produce them. This Unit will provide the Learner with the ability to identify material, cut, prepare, weld and test welded pipe specimens in line with the above welding standards.

All practical work will be undertaken in accordance with relevant Health and Safety legislation to ensure the safety of students and staff members, during practical demonstrations and practical exercises.

Finally, learners should have the underpinning knowledge and understanding to carry out and complete the learning outcomes including an on-line assessment.

### **Learning Outcomes**

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

- 1. Produce a single-vee pipe butt weld in the PA flat-rotated (ASME 1G) position;*
- 2. Produce a single-vee pipe butt weld in the PC horizontal (ASME 2G) position;*
- 3. Produce a single-vee pipe butt weld in the PF vertical-upwards (ASME 5G) position;*
- 4. Produce a single-vee pipe butt weld in the H-LO45 inclined (ASME 6G) position;*
- 5. Explain the health & safety and welding specific underpinning knowledge requirements for the process (MMA).*



# **ETW&F-406-1507: Material Science and Weldability of Materials**

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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## **Unit Description**

The properties of common materials used in fabrication engineering are analysed and evaluated. The student will investigate typical mechanical properties of different types of materials e.g. metallic, polymers and composites. The grain structure of different materials will be examined in relation to the resulting properties that arise.

The student will investigate the processes that may be carried out on materials to improve certain desirable properties for specific applications e.g. annealing, tempering of steels etc.

Weld symbols and dimensioning along with weld terminology will be applied to a selection of fabrication designs so that the student will become familiar with the standards used.

Weld defects will be investigated along with methods and procedures to minimise these defects e.g., distortion, residual stress etc. The distribution of heat and the resulting possible effects will be investigated. Weld cracking and also dilution on fully fused joints in dissimilar metals will be examined to prevent or minimise either of these two possible problems in welded structures.

The iron-carbon thermal equilibrium diagram for plain carbon steels and welded joints will be analysed both in the classroom and in the workshop/metallurgical laboratory environment. This will allow the student to fully understand the grain structures possible and the resulting material properties achieved e.g. ferrite, pearlite etc.

Weld NDT (Non-Destructive Testing) investigation methods will be examined and compared and analysed. Student participation in the workshop/metallurgical laboratory or material testing laboratory would be desirable during this part of the unit. Mechanical material testing equipment and methods used augmented by suitable demonstration would also be advantageous for the student.

## Learning Outcomes

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

1. *Describe, compare and contrast the properties of a range of common materials used in fabrication engineering;*
2. *Apply and describe welding symbols for a range of applications;*
3. *Analyse and assess the metallurgical effects of welding in terms of possible defects that occur e.g., distortion and residual stresses;*
4. *Apply and describe techniques for testing welded joints e.g., ultrasonic testing.*

# ETPRJ-412-1505: Welding and Fabrication -Synoptic Project

Unit Level (MQF/EQF): 4

Credits: 12

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 300

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## Unit Description

This unit aims to enable learners to develop the skills needed to specify, plan and implement a project relating to welding and fabrication sector, and then present the project outcomes to an audience.

This unit will enable learners to complete a realistic project relating to welding and fabrication using low carbon steel and other common steels to meet apprenticeship work placement particular requests.

Learners will have the opportunity to develop skills relating to the process and procedures that are required to take a project from inspection to completion, using appropriate technology. Learners will be encouraged to bring together their knowledge, learning and understanding from other units of study in order to develop solutions for a project that has been negotiated and agreed with the tutor.

Projects may take into consideration recent ideas, developments and reports affecting the welding and construction sector. Learners who are following the apprenticeship scheme may carry out a project that is directly related to their workplace, in which case the project outcomes may be designed to be direct use to the employer.

A presentation of the project to a selected audience will be prepared and delivered by learners.

The scale of agreed project should be achievable and yet challenging, and in keeping with the learner ability level. After completing this unit, learners should feel confident in carrying out a project within the level of this programme.

## Learning Outcomes

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

1. *Create a specification for a 'welding and fabrication' project;*
2. *Plan and monitor a 'welding and fabrication' project;*
3. *Implement a 'welding and fabrication' project;*
4. *Present the outcome of the 'welding and fabrication' project.*

# ETW&F-406-1501: Metal Inert Gas Welding Technology and Practice - Part 1

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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## Unit Description

This unit sets out the requirements for metal inert gas (MIG) welding in a modern engineering environment, in terms of what needs to be achieved by the learner. This Unit is designed to allow learner to develop a deeper understanding of what's involved in welding a series of challenging joint configurations across in a wide range of positions that are compliant to welding procedure specifications. The unit is concerned with the technology and practices involved in the application of MIG welding. The unit is demanding in terms of technological content and the complexity of the welding that learners are expected achieve. The unit is broadly divided into health and safety, welding equipment, welding consumables (i.e., electrodes) and the practicalities of producing a welded joint in relation to a welding procedure specification (WPS) and a quality specification.

It is anticipated that all practical work carried out within the workshop, will be do so in accordance with relevant Health and Safety legislation, to not only ensure the safety of the students and staff. But also, to impart good working practice to the student at the beginning of their career, which can then be an integral platform from which their practical capabilities and technical understanding in the subject area can develop.

On completion of the Unit learners will understand how to produce welded joints that are more complex, as well as developing the understanding, knowledge and skills required to produce them.

## Learning Outcomes

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

1. *Apply safe working practices to MIG welding;*
2. *Prepare equipment for performing MIG welding;*
3. *Perform MIG welding operations to meet welding procedure specification requirements;*
4. *Evaluate welded joints for welding procedure specification conformance.*

## CDKSK-406-2007: Mathematics

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### Unit Description

This unit provides a framework for students to develop mathematical thinking skills further to the level 3-unit specification to solve problems related to real-life situations. Students also develop skills, attributes and knowledge that contribute to their personal growth and effectiveness within their training and work environment and also within the community.

The unit is designed to adapt for the needs of a particular field of study (business & finance or engineering & transport and others).

To reach this goal the unit was divided into four learning outcomes which are related to statistics, graphical representation, game theory and finance. Through these different areas students will be able to develop the effective skills for information processing, reasoning, evaluation creative thinking and enquiry, all fundamental skills for the problem solving process. This will prepare students in applying and evaluating a range of strategies to solve real-life problems. Through this unit the learner will also learn to present and communicate results and conclusions effectively.

On successful completion of the unit the learner will be equipped with mathematical thinking skills which make them aware of and understand their thought process, to reassess and identify areas for development. Students learn to evaluate, reflect about their strategies, understand and verify results to solve problems. These skills will equip students with managerial skills, to further their studies and for work employability.

### Learning Outcomes

On completion of this unit the student will be able to

1. *Demonstrate visual and logical techniques in evaluating graphical representations and communication skills in presenting the results effectively.*
2. *Apply information processing skills to solve problems in a relevant statistical context.*
3. *Demonstrate evaluation and communication skills in solving and presenting problems applied to costing methods and techniques.*
4. *Apply creative thinking skills and demonstrate evaluation skills to solve problems in a relevant (game theory) context.*

## CDKSK-406-2001: English

Unit Level (MQF/EQF): 4

Credits: 6

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 150

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### Unit Description

The main objective of this unit is to prepare students to use the English language to understand, analyse, organise and communicate specific technical knowledge by inferring meaning from, and using, embedded information, being able to evaluate information critically and communicate through different types of texts, as required by various but often specific technical contexts within the selected field of study.

The emphasis is on the processes needed to transition from use of the English language in General Education to that required for access to Higher Education.

In particular, L4 Key Skills English is targeted at learners who have completed Foundation College programmes (Levels 1 to 3) and seek to further their studies at Technical or Degree level.

In this respect, this unit recognises the necessity to meet two linguistic demands at this threshold level; strengthening students' linguistic competences to be able to communicate more specifically within their vocational area and stream and to prepare them for more rigorous academic thinking, research and writing as necessitated by degree courses.

Being introduced at this level are core and elective unit outcomes. Reading and writing outcomes are core components in this syllabus while listening and speaking are elective components. Every L4 programme must deliver the two core outcomes and any one of the two elective learning outcomes. The elective criteria to be assessed cannot be selected from and across both outcomes.

### Learning Outcomes

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

- 1. Read technical texts effectively to improve knowledge of the subject area.*
- 2. Understand information presented orally in the form of recordings, or talks, discussions, seminars, interviews or presentations.*
- 3. Demonstrate own understanding of the subject matter via oral presentation, mock interviews or similar oral delivery.*
- 4. Write a research paper or technical report demonstrating cohesion, structure and appropriate style.*

## **CDKSK-404-1915: Employability and Entrepreneurial Skills**

Unit Level (MQF/EQF): 4

Credits: 4

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 100

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### **Unit Description**

This unit complements the vocational and key skill units at Level 4 and provides an opportunity for learners to enhance their employability and entrepreneurial skills.

Quite often, learners tend to focus most on technical skills and competences required in a certain trade which enable them to access employment. On the other hand, employers expect employees to be appropriately skilled to follow instructions, take initiative, work effectively in a team, take a lead when necessary and more. In view of this the unit starts with an introduction to the 4<sup>th</sup> industrial revolution and proceeds to the transversal skills necessary to find employment, retain employment and advance at the place of work. Learners will be able to highlight their strengths and identify the areas that require improvement.

The rest of the unit focuses on entrepreneurial skills, a skill which is one of the most important transversal skills identified by UNESCO. Learners are introduced to methods which can be used to generate new and innovative business ideas and methods which help them evaluate ideas and choose the most feasible. Furthermore, learners will cover the various stages of product and/or service development, including market analysis, processes, pricing strategy, promotion and resources required.

Learners will work in a small team and by the end of the unit they will have the opportunity to develop a business idea which is commercially viable. Furthermore, they will present the idea to prospective investors/stakeholders.

### **Learning Outcomes**

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

- 1. Understand the employability skills required for Industry 4.0*
- 2. Use idea generation techniques to come up with ideas and evaluate chosen ideas*
- 3. Understand the various stages of product and/or service development*
- 4. Work in a team to develop a business idea which is commercially viable*

## **CDKSK-402-2104: Community Social Responsibility**

Unit Level (MQF/EQF): 4

Credits: 2

Delivery Mode: Fully Face-to-Face Learning

Total Learning Hours: 50

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### **Unit Description**

This unit focuses on Community Social Responsibility and provides an opportunity for learners to better understand themselves and the others and to establish goals in life. Community social responsibility enables learners to understand their strengths and areas for improvement and prepares them for life, employment and to become active citizens in society.

Moving away from traditional delivery of other units, learners will be empowered to take ownership of their learning process. Hence, community social responsibility will be delivered through a combination of workshops, small-group sessions with mentors and various opportunities to reflect.

The set of sessions will tackle community social responsibility skills and will mostly focus on the self, the ability to work independently and important values in life. The second set of sessions will address interpersonal skills and will focus on working with others, dealing with diversity and conflicts. Furthermore, at the end of the sessions, the learners will be introduced to the importance of active citizenship in life.

### **Learning Outcomes**

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

- 1. Identify personal goals through self-reflection.*
- 2. Evaluate how collaboration with others can be more effective.*
- 3. Explain the importance of giving and receiving feedback.*
- 4. Contribute actively to make a difference in society.*