**The Further Education and Training Awards Council (FETAC) was set up as a statutory body on 11 June 2001 by the Minister for Education and Science. Under the Qualifications (Education & Training) Act, 1999, FETAC now has responsibility for making awards previously made by NCVA.**

FETAC
Further Education and Training Awards Council
Comhairle na nDámhachtainí Breisoideachais agus Oiliúna

## Module Descriptor

# Control Systems

## Level 5 C20015

**www.fetac.ie**

# Level 5 Module Descriptor

## Summary of Contents

## Introduction

A module is a statement of the standards to be achieved to gain an FETAC award. Candidates are assessed to establish whether they have achieved the required standards. Credit is awarded for each module successfully completed.

The standards in a module are expressed principally in terms of specific learning outcomes, i.e. what the learner will be able to do on successful completion of the module. The other elements of the module - the purpose, general aims, assessment details and assessment criteria - combine with the learning outcomes to state the standards in a holistic way.

While FETAC is responsible for setting the standards for certification in partnership with course providers and industry, it is the course providers who are responsible for the design of the learning programmes. The duration, content and delivery of learning programmes should be appropriate to the learners' needs and interests, and should enable the learners to reach the standard as described in the modules. Modules may be delivered alone or integrated with other modules.

The development of learners' **core skills** is a key objective of vocational education and training. The opportunity to develop these skills may arise through a single module or a range of modules. The core skills include:

- taking initiative
- taking responsibility for one's own learning and progress
- problem solving
- applying theoretical knowledge in practical contexts
- being numerate and literate
- having information and communication technology skills
- sourcing and organising information effectively
- listening effectively
- communicating orally and in writing
- working effectively in group situations
- understanding health and safety issues
- reflecting on and evaluating quality of own learning and achievement.

Course providers are encouraged to design programmes which enable learners to develop core skills.

| | | |
|---|---|---|
| **1** | **Module Title** | **Control Systems** |
| **2** | **Module Code** | **C20015** |
| **3** | **Level** | **5** |
| **4** | **Credit Value** | **1 credit** |
| **5** | **Purpose** | This module is designed so that the learner will understand the vital role that microprocessor control plays in modern industrial processes.<br><br>The module is designed so that the learner will learn how to use a microprocessor based device as a controller.<br><br>This module is one of the two mandatory vocational modules on the Level 5 Certificate in Control Technology award. |
| **6** | **Preferred Entry Level** | Level 4 Certificate, Leaving Certificate or equivalent qualifications and/or relevant life and work experiences. |
| **7** | **Special Requirements** | For certification purposes, leading to an award, this module **must** be combined with the module Electronics (C20016). |

## 8 General Aims

***Learners who successfully complete this module will:***

| | |
|---|---|
| **8.1** | develop safe working practices |
| **8.2** | be aware of common hazards in the workplace |
| **8.3** | connect different types of devices to a controller |
| **8.4** | understand the relationship between input, output and controller |

| | |
|---|---|
| **8.5** | know the role of microprocessor* control in industry and its relationship with other control technologies |
| **8.6** | devise appropriate software to monitor and switch devices |
| **8.7** | understand the importance of port isolation |
| **8.8** | design and build a control system, needing a number of inputs and outputs, combined with feedback to solve a practical problem. |

* a PLC or a microcomputer with suitable interface, etc.

## 9 Units

**The specific learning outcomes are grouped into 2 units.**

**Unit 1** **Health and Safety**
**Unit 2** **Control**

## 10 Specific Learning Outcomes

**Unit 1** **Health and Safety**

***Learners should be able to:***

| | |
|---|---|
| **10.1.1** | identify the adverse physical, chemical, biological and psychological effects of common hazards on the human body |
| **10.1.2** | recognise common hazard symbols and labels |
| **10.1.3** | know the rights and responsibilities of employers and employees as specified in the Safety, Health and Welfare at Work Act. |

**Unit 2** **Control**

***Learners should be able to:***

| | |
|---|---|
| **10.2.1** | describe the main features of a control system |
| **10.2.2** | differentiate between analogue and digital signals |
| **10.2.3** | recognise that a microprocessor can only monitor signals that are in digital form |
| **10.2.4** | produce a digital signal using a switch and a resistor in series |

| | |
|---|---|
| **10.2.5** | explain the need for changing an analogue signal from transducers such as LDRs and thermistors to a digital signal |
| **10.2.6** | explain how digital signals from transducers can be processed by decision makers (i.e. logic gates, computer interfaces, PLCs, microprocessors) |
| **10.2.7** | use a range of optoelectronic devices: opto switches, opto isolators, infra red emitter and receiver pairs |
| **10.2.8** | use an interface circuit to increase the power output from a microprocessor to operate output devices |
| **10.2.9** | monitor and display/count the digital output from a variety of sensing devices using the microprocessor |
| **10.2.10** | demonstrate a knowledge of port isolation techniques |
| **10.2.11** | write and demonstrate the software for a microprocessor to control output devices (e.g. traffic light sequence; speed/ direction control of a model train; simulate a washing machine programme) |
| **10.2.12** | design, write the software for a microprocessor and build a control system to solve a problem, which requires **at least** 2 outputs to be controlled and **at least** 3 inputs to be monitored. The solution must incorporate feedback, timing and/or counting. |

## 11 Portfolio of Assessment

Please refer to the glossary of assessment techniques and the note on assessment principles at the end of this module descriptor.
All assessment is carried out in accordance with FETAC regulations.
Assessment is devised by the internal assessor, with external moderation by FETAC.

| | | |
|---|---|---|
| **Summary** | **Project** | **60%** |
| | **Skills Demonstration** | **40%** |

### 11.1 Project

The internal assessor will devise a project brief that requires candidates to demonstrate

- understanding and application of concepts in control systems
- use of relevant research
- mastery of tools and techniques
- ability to design, assemble and test control systems
- ability to evaluate the finished product.

Candidates will design, write the software and build a control system to solve a problem.

Evidence presented will include:

- relevant research documentation
- circuit diagrams and working drawings of the control system
- a completed control system
- evaluation of the system.

Adherence to safe working practices will be an integral part of the project.

The project may be undertaken as a group or collaborative project. The individual contribution of each candidate must be clearly identified.

**11.2 Skills Demonstration**

In one or more skills demonstrations, candidates will be observed carrying out at least 4 practical tasks.

The practical tasks will cover a broad range of practical skills and knowledge as outlined in the specific learning outcomes.

Candidates will demonstrate adherence to safe working practices throughout the skills demonstrations.

The candidate will maintain a record of measurements and/or observations or other relevant information as part of the skills demonstration.

The skills can be assessed at any time throughout the learning process.

# 12 Grading

| | |
|---|---|
| Pass | 50 - 64% |
| Merit | 65 - 79% |
| Distinction | 80 - 100% |

| Individual Candidate Marking Sheet | Control Systems<br>C20015<br>Project 60%<br>Skills Demonstration 40% |
|---|---|

**Candidate Name:** _____ **PPSN:** _____

**Centre:** _____ **Centre No.:** _____

| Assessment Criteria | Maximum Mark | Candidate Mark |
|---|---|---|
| **Project**<br>• thorough investigation of topic using appropriate research<br>• comprehensive circuit diagrams, working drawings of control system including instructions on how to use the system<br>• excellent working control system produced showing mastery of tools and techniques<br>• critical evaluation including appropriate testing throughout development | **30**<br>**40**<br>**80**<br>**30** | |
| **Subtotal** | **180** | |
| **Skills Demonstration**<br>• appropriate preparation and planning of task<br>• effective carrying out of the task demonstrating mastery of tools and techniques<br>• safe use and careful maintenance of tools and equipment<br>• relevant supporting documentation | **20**<br>**60**<br>**20**<br>**20** | |
| **Subtotal** | **120** | |
| **TOTAL MARKS**<br>*This mark should be transferred to the Module Results Summary Sheet* | **300** | |

***Internal Assessor's Signature:*** _____ ***Date:*** _____

***External Authenticator's Signature:*** _____ ***Date:*** _____

# FETAC Module Results Summary Sheet

**Module Title:** **Control Systems**
**Module Code:** **C20015**

| *Candidate Surname* | *Candidate Forename* | **Total Marks** **300** | **Total ¸ 3 100%** | **Grade*** |
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*Signed:*

*Internal Assessor:* _____ *Date:* _____

**This sheet is for internal assessors to record the overall marks of individual candidates. It should be retained in the centre. The marks awarded should be transferred to the official FETAC Module Results Sheet issued to centres before the visit of the external Authenticator.**

Grade*
D: 80 - 100%
M: 65 - 79%
P: 50 - 64%
U: 0 - 49%
W: candidates entered who did not present for assessment

## Glossary of Assessment Techniques

**Assignment**

*An exercise carried out in response to a brief with specific guidelines and usually of short duration.*

Each assignment is based on a brief provided by the internal assessor. The brief includes specific guidelines for candidates. The assignment is carried out over a period of time specified by the internal assessor.

Assignments may be specified as an oral presentation, case study, observations, or have a detailed title such as audition piece, health fitness plan or vocational area profile.

**Collection of Work**

*A collection and/or selection of pieces of work produced by candidates over a period of time that demonstrates the mastery of skills.*

Using guidelines provided by the internal assessor, candidates compile a collection of their own work. The collection of work demonstrates evidence of a range of specific learning outcomes or skills. The evidence may be produced in a range of conditions, such as in the learning environment, in a role play exercise, or in real-life/work situations.

This body of work may be self-generated rather than carried out in response to a specific assignment eg art work, engineering work etc.

**Examination**

*A means of assessing a candidate's ability to recall and apply skills, knowledge and understanding within a set period of time (time constrained) and under clearly specified conditions.*

Examinations may be:

- practical, assessing the mastery of specified practical skills demonstrated in a set period of time under restricted conditions
- oral, testing ability to speak effectively in the vernacular or other languages
- interview-style, assessing learning through verbal questioning, on one-to-one/group basis
- aural, testing listening and interpretation skills
- theory-based, assessing the candidate's ability to recall and apply theory, requiring responses to a range of question types, such as objective, short answer, structured, essay. These questions may be answered in different media such as in writing, orally etc.

**Learner Record**

*A self-reported record by an individual, in which he/she describes specific learning experiences, activities, responses, skills acquired.*

Candidates compile a personal logbook/journal/diary/daily diary/ record/laboratory notebook/sketch book.
The logbook/journal/diary/daily diary/record/laboratory notebook/sketch book should cover specified aspects of the learner's experience.

**Project**

*A substantial individual or group response to a brief with guidelines, usually carried out over a period of time.*

Projects may involve:

research – requiring individual/group investigation of a topic
process – eg design, performance, production of an artefact/event

Projects will be based on a brief provided by the internal assessor or negotiated by the candidate with the internal assessor. The brief will include broad guidelines for the candidate. The work will be carried out over a specified period of time.

Projects may be undertaken as a group or collaborative project, however the individual contribution of each candidate must be clearly identified.

The project will enable the candidate to demonstrate: (*some of these – about 2-4*)

- understanding and application of concepts in (specify area)
- use/selection of relevant research/survey techniques, sources of information, referencing, bibliography
- ability to analyse, evaluate, draw conclusions, make recommendations
- understanding of process/planning implementation and review skills/ planning and time management skills
- ability to implement/produce/make/construct/perform
- mastery of tools and techniques
- design/creativity/problem-solving/evaluation skills
- presentation/display skills
- team working/co-operation/participation skills.

**Skills Demonstration**

*Assessment of mastery of specified practical, organisational and/or interpersonal skills.*

These skills are assessed at any time throughout the learning process by the internal assessor/another qualified person in the centre for whom the candidate undertakes relevant tasks.

The skills may be demonstrated in a range of conditions, such as in the learning environment, in a role-play exercise, or in a real-life/work situations.

The candidate may submit a written report/supporting documentation as part of the assessment.

Examples of skills: laboratory skills, computer skills, coaching skills, interpersonal skills.

## FETAC Assessment Principles

**1** Assessment is regarded as an integral part of the learning process.

**2** All FETAC assessment is criterion referenced. Each assessment technique has **assessment criteria** which detail the range of marks to be awarded for specific standards of knowledge, skills and competence demonstrated by candidates.

**3** The mode of assessment is generally local i.e. the assessment techniques are devised and implemented by internal assessors in centres.

**4** Assessment techniques in FETAC modules are valid in that they test a range of appropriate learning outcomes.

**5** The reliability of assessment techniques is facilitated by providing support for assessors.

**6** Arising from an extensive consultation process, each FETAC module describes what is considered to be an optimum approach to assessment. When the necessary procedures are in place, it will be possible for assessors to use other forms of assessment, provided they are demonstrated to be valid and reliable.

**7** To enable all learners to demonstrate that they have reached the required standard, candidate evidence may be submitted in written, oral, visual, multimedia or other format as appropriate to the learning outcomes.

**8** Assessment of a number of modules may be integrated, provided the separate criteria for each module are met.

**9** Group or team work may form part of the assessment of a module, provided each candidate's achievement is separately assessed.

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