

**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.**



Module Descriptor

Software Development

Level 5 C20054

www.fetac.ie

Level 5 Module Descriptor

Summary of Contents

Introduction	Describes how the module functions as part of the national vocational certificate framework.
Module Title	Indicates the module content. This title appears on the learner's certificate. It can be used to download the module from the website www.fetac.ie .
Module Code	An individual code is assigned to each module; a letter at the beginning denotes a vocational or general studies area under which the module is grouped and the first digit denotes its level within the national vocational certificate framework.
Level	Indicates where the module is placed in the national vocational certificate framework, from Level 3 to Level 6.
Credit Value	Denotes the amount of credit that a learner accumulates on achievement of the module.
Purpose	Describes in summary what the learner will achieve on successfully completing the module and in what learning and vocational contexts the module has been developed. Where relevant, it lists what certification will be awarded by other certification agencies.
Preferred Entry Level	Recommends the level of previous achievement or experience of the learner.
Special Requirements	Usually 'none' but in some cases detail is provided here of specific learner or course provider requirements. There may also be reference to the minimum safety or skill requirements that learners must achieve prior to assessment.
General Aims	Describe in 3-5 statements the broad skills and knowledge learners will have achieved on successful completion of the module.
Units	Structure the learning outcomes; there may be no units.
Specific Learning Outcomes	Describe in specific terms the knowledge and skills that learners will have achieved on successful completion of the module.
Portfolio of Assessment	Provides details on how the learning outcomes are to be assessed.
Grading	Provides details of the grading system used.
Individual Candidate Marking Sheets	List the assessment criteria for each assessment technique and the marking system.
Module Results Summary Sheet	Records the marks for each candidate in each assessment technique and in total. It is an important record for centres of their candidate's achievements.
Appendices	Can include approval forms for national governing bodies.
Glossary of Assessment Techniques	Explains the types of assessment techniques used to assess standards.
Assessment Principles	Describes the assessment principles that underpin FETAC approach to assessment.

Introduction

A module is a statement of the standards to be achieved to gain a 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	Software Development
2	Module Code	C20054
3	Level	5
4	Credit Value	1 credit
5	Purpose	This module has been designed to introduce the learner to the programming concepts and techniques associated with the processing and storage of data records. It is designed as a follow-on to the Computer Programming (C20013) module. This module is language independent and includes only concepts which are fundamental to the imperative style of programming.
6	Preferred Entry Level	Level 4 Certificate, Leaving Certificate or equivalent qualifications and/or relevant life and work experiences.
7	Special Requirements	None.
8	General Aims	<p><i>Learners who successfully complete this module will:</i></p> <p>8.1 develop good programming practices and understand and appreciate the need for good design practices</p> <p>8.2 design data records to model real world entities</p> <p>8.3 acquire techniques for processing data records</p> <p>8.4 manage stored data records on magnetic media</p> <p>8.5 learn software design principles for information processing systems</p> <p>8.6 use procedures to structure program code</p> <p>8.7 write general procedures which can be used with multiple instances of data</p> <p>8.8 appreciate the use of software libraries in the development of information systems.</p>

9 Units **The specific learning outcomes are grouped into 4 units.**

Unit 1	Static Data Structures
Unit 2	Procedures, Functions and Parameters
Unit 3	Records and File Management
Unit 4	Development of Software Applications

10 Specific Learning Outcomes

Unit 1 **Static Data Structures**

Learners should be able to:

- 10.1.1** define the boolean operators: and, or, not
- 10.1.2** construct compound boolean expressions
- 10.1.3** evaluate the truth value of compound boolean expressions
- 10.1.4** solve problems using boolean expressions
- 10.1.5** explain the need to keep data sorted
- 10.1.6** write a sort program (e.g. selection sort or bubble sort or insertion sort)
- 10.1.7** distinguish between a linear search strategy and a binary search strategy
- 10.1.8** write a binary search algorithm for a sorted array of data
- 10.1.9** write a program to read a list of data, sort it and use a binary search routine to search for elements in the sorted list
- 10.1.10** define a two-dimensional array
- 10.1.11** outline schema to process the data in a two-dimensional array on a row by row basis and a column by column basis
- 10.1.12** write programs to solve simple data processing problems using a two-dimensional array
- 10.1.13** design relevant test data for each problem solved and test the program with it
- 10.1.14** explain the need for data validation
- 10.1.15** develop strategies and write associated test programs to address the issue of data verification.

Unit 2

Procedures, Functions and Parameters

Learners should be able to:

- 10.2.1 explain the need for parameters
- 10.2.2 distinguish between value and variable parameters
- 10.2.3 explain when to use the different type of parameter
- 10.2.4 explain the scope rules for parameters
- 10.2.5 write procedures which involve the use of each type of parameter
- 10.2.6 write programs to test procedures with parameters
- 10.2.7 explain how to pass data structures (e.g. an array) as parameters
- 10.2.8 write procedures which have data structures as parameters
- 10.2.9 write programs to test procedures with such parameters
- 10.2.10 write functions which require the use of parameters
- 10.2.11 write programs to test functions
- 10.2.12 distinguish between functions and procedures
- 10.2.13 construct programs using the top-down method which will involve a combination of functions and procedures.

Unit 3

Records and File Management

The learner should be able to:

- 10.3.1 explain the need for structures to cater for mixed data types
- 10.3.2 outline a syntactic structure for records
- 10.3.3 distinguish between a field and a record
- 10.3.4 establish record structures for particular items
(e.g. book, employee, exam result, etc.)
- 10.3.5 write code to manipulate individual fields in a record
- 10.3.6 write procedures which have records as parameters
- 10.3.7 write programs to test such procedures
- 10.3.8 define an array of records
- 10.3.9 process an array of records
- 10.3.10 distinguish between internal and external data structures
- 10.3.11 define the concept of a file
- 10.3.12 distinguish between a text file and a binary file
- 10.3.13 construct programs to process text files
(e.g. read a text file and display it on the screen)
- 10.3.14 construct programs to:
 - create sequential files of data

- update the data in a given file
- retrieve data from a given file

10.3.15 explain why it is important to keep data sorted in a file

10.3.16 explain the difficulties of keeping data sorted
(e.g. cost of updating versus the cost of retrieval)

10.3.17 discuss ways of resolving the dilemma in 10.3.16.

Unit 4 Development of Software Applications

Learners should be able to:

10.4.1 explain software life cycle

10.4.2 list the important stages in the construction of a software system

10.4.3 explain the need for system design

10.4.4 explain the role played by software tools in making systems

10.4.5 distinguish between different types of tools (i.e. database tools, interface tools and report generating tools).

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	70%
	Assignment	30%

11.1 Project

The internal assessor will devise a project brief that requires candidates to demonstrate understanding and application of concepts in software development, use of relevant research and mastery of equipment and techniques.

Candidates will be required to design, construct, test and evaluate a record structure to solve a database problem. This will include the following:

- designing a user interface for the system and a database to support it
- implementing the system in a programming language
- testing the system with relevant data
- carrying out data validation and developing a data input form

- producing a binary file to store data
- documenting the system and developing a user manual for it.

Evidence presented will include:

- relevant research documentation
- a functional finished system
- an evaluation of the system
- a user's manual.

The project may be undertaken as a group or collaborative project. The individual contribution of each candidate must be clearly identified. Adherence to safe working practices will be an integral part of the project.

The project may be presented using a variety of media, including written, oral, graphic, audio, visual or any combination of these. Any audio or video evidence must be provided on tape.

11.2 Assignment

The internal assessor will devise a brief that requires candidates to produce evidence that demonstrates an understanding and application of a range of specific learning outcomes.

Candidates will be required to design, write and test a programme to solve a specific problem based on the concepts in unit 2.

Evidence for the assignment will include the finished programme, documentation of the code and relevant test data.

12 Grading

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

Individual Candidate Marking Sheet	Software Development C20054 Project 70% Assignment 30%
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Candidate Name: _____ **PPSN:** _____

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

Assessment Criteria	Maximum Mark	Candidate Mark
Project		
• effective planning, research and design to support the system	10	
• excellent technical quality to the finished system	30	
• critical evaluation and testing of the system	15	
• comprehensive user's manual presented	15	
Subtotal	70	
Assignment		
• excellent technical quality to the finished programme	15	
• effective use of code to write the programme	5	
• thorough testing and evaluation of the programme	10	
Subtotal	30	
TOTAL MARKS	100	
<i>This mark should be transferred to the Module Results Summary Sheet</i>		

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

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

FETAC Module Results Summary Sheet

Module Title: Software Development
Module Code: C20054

<i>Candidate Surname</i>	<i>Candidate Forename</i>	Total 100%	Grade*

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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