

**COMHAIRLE NÁISIÚNTA NA
gCÁILÍOCHTAÍ GAIRMOIDEACHAIS**

**NATIONAL COUNCIL FOR
VOCATIONAL AWARDS**



Draft Module Descriptor

Computer Architecture and Systems

Level 2 C20012

September 1999

Introduction

A module is a statement of the standards to be achieved to gain an NCVA 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 in terms of learning outcomes i.e. what the learner will be able to do on successful completion of the module.

While the NCVA 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	Title	Computer Architecture and Systems
2	Code	C20012
3	Level	2
4	Value	1
5	Purpose	<p>This module is a statement of the standards to be achieved to gain an NCVA credit in <i>Computer Architecture and Systems</i> at Level 2.</p> <p>This module is designed to provide the learner with an understanding and appreciation of the fundamental role played by computing systems in modern society.</p> <p>It is designed to encourage the learner to understand how the components in a computing system function and how these components communicate to provide a user environment.</p> <p>This module is one of the two mandatory vocational modules on the National Vocational Certificate Level 2 Information Technology.</p>
6	Preferred Entry Level	Leaving Certificate or National Vocational Certificate Level 1, or equivalent.
7	Special Requirements	For certification purposes leading to an award, this module cannot be combined with the module Information Systems (B20015) .

8 General Aims

This module aims to enable the learner to:

- 8.1 understand and appreciate the fundamental role played by computing systems in the modern world of industry, education, communications and business
- 8.2 discuss the role of computing systems in Irish society
- 8.3 acquire knowledge of the role played by Information Technology systems
- 8.4 identify and explain the role played by different components in a computer system
- 8.5 understand how hardware and system software combine to provide a working environment for system users
- 8.6 develop safe working practices.

9 Units

This module comprises 5 units.

- Unit 1 **Introduction to Computer Systems**
- Unit 2 **Computer Architecture**
- Unit 3 **Data Communications**
- Unit 4 **Operating Systems**
- Unit 5 **System Applications**

10 Specific Learning Objectives

- Unit 1 **Introduction to Computer Systems**

The learner should be able to:

- 10.1.1 list the main components of a computer system
- 10.1.2 state the function of each of these components
- 10.1.3 distinguish between hardware and software
- 10.1.4 list common examples of the use of a computing system
- 10.1.5 list the main types of computer
- 10.1.6 list uses of each type of computer

- 10.1.7** know the main elements of an information system (a typical business system)
- 10.1.8** list two examples of information systems
- 10.1.9** explain how the computer can be used as a means of communication
- 10.1.10** outline the historical development of computers.

Unit 2 Computer Architecture

CENTRAL PROCESSING UNIT (CPU)

The learner should be able to:

- 10.2.1** explain the role of the CPU in a computer
- 10.2.2** list the component parts in the CPU e.g. ALU, registers, decoder
- 10.2.3** explain the role of each component
- 10.2.4** explain the purpose of the instruction pointer
- 10.2.5** outline the steps involved in processing an instruction
- 10.2.6** explain the fetch – execute cycle.

MEMORY

The learner should be able to:

- 10.2.9** describe the purpose of a memory cell
- 10.2.10** distinguish between random access memory (RAM) and read only memory (ROM)
- 10.2.11** list the different types of read only memory
- 10.2.12** distinguish between bit, byte, word, kilobyte and megabyte
- 10.2.13** distinguish between primary and secondary memory
- 10.2.14** explain the term *cache memory*
- 10.2.15** explain how cache memory can be used to improve the performance of the CPU

- 10.2.16 define a bus
- 10.2.17 distinguish between internal buses and external buses
- 10.2.18 list the different buses, which connect the CPU to the computer's main memory chips.

COMPUTER PERIPHERALS

The learner should be able to:

- 10.2.19 distinguish between different types of character recognition devices
- 10.2.20 list applications of character recognition devices
- 10.2.21 explain bar codes and list their uses
- 10.2.22 give examples of different types of user interface devices
- 10.2.23 explain the purpose of a magnetic tape
- 10.2.24 list advantages and disadvantages of using tapes
- 10.2.25 explain the purpose of a magnetic disk
- 10.2.26 explain the terms: *track* and *sector*
- 10.2.27 distinguish between hard disks and floppy disks
- 10.2.28 outline the basic disk structure
- 10.2.29 draw a diagram of a floppy disk, outlining its main components
- 10.2.30 draw a diagram of a hard disk, outlining its main components
- 10.2.31 explain the terms: *access time*, *seek time* and *latency*
- 10.2.32 list the advantages of hard disks over floppy disks
- 10.2.33 explain how direct memory access (DMA) improves the transfer of data from disks to main memory
- 10.2.34 explain the purpose of optical disks
- 10.2.35 explain how data is stored on optical disks
- 10.2.36 explain how data compression works

- 10.2.37 explain what voice recognition software does
- 10.2.38 list the uses of voice recognition software
- 10.2.39 explain how voice recognition makes computer systems accessible to those with a disability
- 10.2.40 list devices used to produce computer output
- 10.2.41 list the different classifications of printers
- 10.2.42 describe how images are displayed on a visual display unit
- 10.2.43 describe specialised types of input/output devices, e.g. scanners, digital cameras, etc.
- 10.2.44 describe how special purpose storage devices such as smart cards can be used.

Unit 3 Data Communications

The learner should be able to:

- 10.3.1 define the term *communications*
- 10.3.2 list examples of how communications technology is used to-day
- 10.3.3 list the components that make up a communications system
- 10.3.4 describe the different types of transmission media used for communications channels
- 10.3.5 describe the ways in which the transmission media are connected
- 10.3.6 explain how data is transmitted
- 10.3.7 describe the communications equipment used in a communications system
- 10.3.8 list the functions performed by communications software
- 10.3.9 list the categories of network
- 10.3.10 describe the most common network layouts
- 10.3.11 explain the use of communications protocols
- 10.3.12 describe the Internet and how it works

10.3.13 list services provided by the Internet (e-mail, ftp, etc.)

10.3.14 explain how to connect to the Internet and WWW.

Unit 4 Operating Systems

The learner should be able to:

10.4.1 list the functions of an operating system

10.4.2 explain how an operating system makes the computer hardware usable

10.4.3 explain the different types of operating system architecture:

- single-user
- multi-tasking
- multi-user
- networks

10.4.4 name and describe the major operating systems in use to-day

10.4.5 list some services provided by an operating system to a user

10.4.6 use the operating system user interface

10.4.7 give examples of different user interfaces

10.4.8 list the advantages and disadvantages of different types of user interface.

Unit 5 System Applications

The learner should be able to:

10.5.1 outline the main features of the Data Protection Act

10.5.2 discuss the role of computing systems in modern society

10.5.3 list the advantages of computing technology

10.5.4 identify examples of this technology in the local environment

10.5.5 list the advantages of electronic mail

10.5.6 list the advantages of modern telecommunications

10.5.7 describe a computerised office.

11	Assessment	See the note on Assessment Principles inside the back page.	
	Summary	Portfolio of Coursework	60%
		Written Examination	40%
11.1	Technique	Portfolio of Coursework	
	Mode	Locally devised with external moderation by the NCVA.	
	Weighting	60%	
	Components	The portfolio will consist of the following:	
		Research Project	30%
		The research project agreed in consultation with the candidate should be designed to allow the learner to demonstrate understanding and application of the subject area incorporated in the module.	
		Case study	30%
		The learner must carry out a Case Study of the computer system in a specific business. The report should cover the software, operating system, hardware, hardware architecture, advantages to the business, plans for future development of a specific business.	
11.2	Technique	Written Examination	
	Mode	Centre based with external moderation by the NCVA.	
	Weighting	40%	
	Duration	2 hours	
	Format	Section A 12 short questions based on all units. 10 questions to be answered.	
		Section B 5 structured questions based on all the units. Any three questions to be answered.	
12	Performance Criteria		
12.1	Portfolio of		

Coursework

The performance criteria for each component of the portfolio are detailed in the accompanying Individual Candidate Marking Sheets 1-2.


All written reports submitted for assessment should be typed/word processed.

12.2 Written Examination

The tutor must devise an examination paper and a detailed marking scheme in accordance with the format above.

13 Grading

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

Individual Candidate Marking Sheet 1		Computer Architecture and Systems C20012 Research Project Weighting 30%
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Candidate Name: _____ **NCVA Exam. No.:** _____

School/Centre: _____ **Roll No:** _____

Performance Criteria	Maximum Mark	Candidate Mark
Planning <ul style="list-style-type: none"> Purpose is specified Potential sources of information are identified Storage and organisation of information are effective Realistic work programme is established 	10	
Methodology <ul style="list-style-type: none"> Specific aims and objectives are identified Required information/data is produced: <ul style="list-style-type: none"> legally safely within an agreed timeframe within resource constraints Reliable data is produced 	30	
Content/Discussion <ul style="list-style-type: none"> Comprehension, originality and creativity are demonstrated Content/discussion is relevant Level of detail is appropriate 	40	
Results/Recommendations/Conclusions <ul style="list-style-type: none"> Consistent with acquired information/data Effective collation of information Effective analysis of information Conclusions are justified Recommendations are appropriate 	30	
Structure/Bibliography/Glossary <ul style="list-style-type: none"> Effective report layout is used: <ul style="list-style-type: none"> Title page Contents page Summary sheet Appropriate presentation of data Language conforms to conventions for report writing Grammatical accuracy Conciseness Logical organisation Referencing of sources used is complete and accurate Technical terms used are accurately defined 	10	
TOTAL	120	
<i>This mark should be transferred to the Module Results Summary Sheet</i>		

Teacher's Signature: _____ **Date:** _____

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

Individual Candidate Marking Sheet 2		Computer Architecture and Systems C20012 Case Study Weighting 30%
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Candidate Name: _____ **NCVA Exam. No.:** _____

School/Centre: _____ **Roll No:** _____

Performance Criteria	Maximum Mark	Candidate Mark
Planning <ul style="list-style-type: none"> Purpose is specified Potential sources of information are identified Storage and organisation of information are effective Realistic work programme is established 	10	
Methodology <ul style="list-style-type: none"> Specific aims and objectives are identified Required information/data is produced: <ul style="list-style-type: none"> legally safely within an agreed timeframe within resource constraints Reliable data is produced 	30	
Content/Discussion <ul style="list-style-type: none"> Comprehension, originality and creativity are demonstrated Content/discussion is relevant Level of detail is appropriate 	40	
Results/Recommendations/Conclusions <ul style="list-style-type: none"> Consistent with acquired information/data Effective collation of information Effective analysis of information Conclusions are justified Recommendations are appropriate 	30	
Structure/Bibliography/Glossary <ul style="list-style-type: none"> Effective report layout is used: <ul style="list-style-type: none"> Title page Contents page Summary sheet Appropriate presentation of data Language conforms to conventions for report writing Grammatical accuracy Conciseness Logical organisation Referencing of sources used is complete and accurate Technical terms used are accurately defined 	10	
TOTAL <i>This mark should be transferred to the Module Results Summary Sheet</i>	120	

Teacher's Signature: _____ **Date:** _____

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

Individual Candidate Marking Sheet 3		Computer Architecture and Systems C20012 Written Examination Weighting 40%
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Candidate Name: _____ **NCVA Exam. No.:** _____

School/Centre: _____ **Roll No:** _____

Performance Criteria	Maximum Mark	Candidate Mark
Section A 10 questions to be answered (4 marks each)		
Question 1	4	
Question 2	4	
Question 3	4	
Question 4	4	
Question 5	4	
Question 6	4	
Question 7	4	
Question 8	4	
Question 9	4	
Question 10	4	
Sub-total	40	
Section B Any three questions to be answered		
Question 1	40	
Question 2	40	
Question 3	40	
Question 4	40	
Question 5	40	
Sub-total	120	
TOTAL <i>This mark should be transferred to the Module Results Summary Sheet</i>	160	

Teacher's Signature: _____ **Date:** _____

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

NCVA Module Results Sheet

Module: Computer Architecture & Systems

Module Code: C20012[illegible]

Signed:

Teacher/Tutor: _____ **Date:** _____

This sheet is for teachers/tutors to record the overall marks of individual candidates. It should be retained in the centre. The marks awarded should be transferred to the official NCVA Module Results Sheet issued to centres before the visit of the external examiner.

Grade*

D: 80 - 100%

M: 65 - 79%

P: 50 - 64%

U: 0 - 49%

W: candidates entered who did not present for assessment

NCVA Assessment Principles

- 1 Assessment is regarded as an integral part of the learning process.
- 2 All NCVA assessment is criterion referenced. Each assessment technique has **performance 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 assessors (teachers/tutors/trainers) in centres.
- 4 Assessment techniques in NCVA 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 Each NCVA module describes one approach to assessment. It is 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.