



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATES (VOCATIONAL)

SUBJECT GUIDELINES

INTRODUCTION TO COMPUTERS NQF Level 2

April 2008

INTRODUCTION TO COMPUTERS - LEVEL 2

CONTENTS

INTRODUCTION

1 DURATION AND TUITION TIME

2 SUBJECT LEVEL FOCUS

3 ASSESSMENT REQUIREMENTS

3.1 Internal assessment

3.2 External assessment

4 WEIGHTED VALUES OF TOPICS

5 CALCULATION OF FINAL MARK

6 PASS REQUIREMENTS

7 SUBJECT AND LEARNING OUTCOMES

7.1 Define, explain and apply binary logic terminology

7.2 Identify, describe and connect a basic PC

7.3 Explain an operating system, troubleshoot and repair a personal computer

7.4 Produce documents and process data

7.5 Use the internet, send and receive e-mails and develop a presentation

8 RESOURCE NEEDS FOR THE TEACHING OF INTRODUCTION TO COMPUTERS -

LEVEL 2

8.1 Physical resources

8.2 Human resources

8.3 Other resources

INTRODUCTION

A. What is the subject Introduction to Computers about?

This subject covers the basics of connecting basic computer hardware and solving basic personal computer problems. It is designed to be an introduction to the processing of data and production of relevant documents used in the technical field. This subject will equip student with fundamental information technology related operational skills to use IT related equipment, to use data to gather information, and to produce the relevant information to inform the making of decisions in the mechatronic manufacturing arena.

B. Why is the subject Introduction to Computers important in the Mechatronics learning programme?

This subject contains trade specific skills, knowledge, attitudes and values so that students are able to assist in informed maintenance, repair and installation of basic mechatronic systems in practice.

C. The link between this subject and the Critical and Developmental Outcomes

The application of this subject is OBE orientated and relates to the following critical and developmental outcomes:

- Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made
- Work effectively with others as a member of a team, group organization or community
- Organise and manage oneself and ones activities responsibly and effectively. Collect, analyse, organise and critically evaluate information
- Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation
- Use science and technology effectively and critically, showing responsibility towards the environment and the health of others
- Demonstrate an understanding of the world as a set of related systems by recognizing that problem-solving contexts do not exist in isolation
- Contribute to the full personal development of the learner.

D. Factors that contribute to achieving Introduction to Computers Learning Outcomes

- An understanding of the PC being an essential part of future mechatronic systems
- Ability to connect and troubleshoot on a PC
- Ability to use the computer to gather, process and communicate information
- Analytical ability
- Ability to do mathematical calculations and manipulations
- Hand-skills (specifically assembly work)
- Practical improvisation abilities.

1 DURATION AND TUITION TIME

This is a one-year instructional programme comprising 200 teaching and learning hours. The subject may be offered on a part-time basis provided the student meets all the assessment requirements.

Students with special education needs (LSEN) must be catered for in a way that eliminates barriers to learning.

2 SUBJECT LEVEL FOCUS

- Define, explain and apply binary logic terminology
- Identify, describe and connect a basic PC
- Explain an operating system, troubleshoot and repair a personal computer
- Produce documents and process data
- Use the internet, send and receive e-mails and develop a presentation.

3 ASSESSMENT REQUIREMENTS

3.1 Internal assessment (50 percent)

3.1.1 Theoretical component

The theoretical component forms 40 percent of the internal assessment mark.

Internal assessment of the theoretical component in Introduction to Computers Level 2 takes the form of observation, class questions, group work, informal group competitions with rewards, individual discussions with students, class, topic and semester tests and internal examinations. Lecturers can observe students when marking exercises from the previous day and asking class questions.

Assignments, case studies and tests can be completed at the end of a topic. Tests and internal examinations must form part of the internal assessment.

3.1.2 Practical component

The practical component forms 60 percent of the internal assessment mark.

Practical components include applications and exercises. All practical components must be indicated in a Portfolio of Evidence (PoE).

Internal assessment of the practical component in Introduction to Computers Level 2 takes the form of assignments, practical exercises, case studies and practical examinations in a simulated business environment.

Students may complete practical exercises daily. Assignments and case studies can be completed at the end of a topic. Practical examinations can form part of internal practical assessment.

• **Some examples of practical assessments include, but are not limited to:**

- A. Presentations (lectures, demonstrations, group discussions and activities, practical work, observation, role-play, independent activity, synthesis and evaluation)
- B. Exhibitions by students
- C. Visits undertaken by students based on a structured assignment task
- D. Research
- E. Task performance in a "Structured Environment"

• **Definition of the term "Structured Environment"**

For the purposes of assessment, "Structured Environment" refers to a simulated workplace or workshop environment. Activities in the simulated workplace or environment must be documented in a logbook with a clear listing of the competencies to be assessed.

The following information must be contained in the logbook:

- Nature of department or environment in which practical component was achieved
- Learning Outcomes
- Activities in the environment with which to achieve the Learning Outcomes
- Time spent on activities
- Signature of facilitator or supervisor and student.

For the logbook to be regarded as valid evidence, it must be signed by an officially assigned supervisor.

• Evidence in practical assessments

All evidence pertaining to evaluation of practical work must be reflected in the student's PoE. The tools and instruments used for the purpose of conducting these assessments must be part of the evidence contained in the PoE.

3.1.3 Processing of internal assessment mark for the year

A year mark out of 100 is calculated by adding the marks of the theoretical component and the practical component of the internal continuous assessment (ICASS).

3.1.4 Moderation of internal assessment mark

Internal assessment is subjected to internal and external moderation procedures as set out in the *National Examinations Policy for FET College Programmes*.

3.2 External assessment (50 percent)

A national examination is conducted annually in October or November by means of a paper(s) set and moderated externally. The practical component will also be assessed.

External assessment details and procedures are set out in the *Assessment Guidelines: Introduction To Computers Level 2*.

4 WEIGHTED VALUES OF TOPICS

TOPICS	WEIGHTED VALUE
1 Define, explain and apply binary logic terminology	30
2 Identify, describe and connect a basic PC	25
3 Explain an operating system, troubleshoot and repair a personal computer	25
4 Produce documents and process data	10
5 Use the internet, send and receive e-mails and develop a presentation	10
TOTAL	100

5 CALCULATION OF FINAL MARK

Internal assessment mark: Student's mark/100 x 50 = a mark out of 50 (a)

Examination mark: Student's mark/100 x 50 = a mark out of 50 (b)

Final mark: (a) + (b) = a mark out of 100

All marks are systematically processed and accurately recorded to be available as hard copy evidence for, amongst others, reporting, moderation and verification purposes.

6 PASS REQUIREMENTS

A student must obtain at least fifty percent in ICASS and fifty percent in the examination.

7 SUBJECT AND LEARNING OUTCOMES

On completion of Introduction to Computers Level 2, the student should have covered the following topics:

- Topic 1: Define, explain and apply binary logic terminology
- Topic 2: Identify, describe and connect a basic PC
- Topic 3: Explain an operating system, troubleshoot and repair a personal computer
- Topic 4: Produce documents and process data
- Topic 5: Use the internet, send and receive e-mails and develop a presentation

7.1 Topic 1: Define, explain and apply binary logic terminology.

7.1.1 Subject Outcome 1: Define and explain binary logic terminology

Learning Outcomes

The student should be able to:

- Explain the logic “AND” decision and the logic “OR” decision.
- Explain the inverter “NOT Gate”, the “NOR” Gate and the “NAND” gate.
- Explain the terms binary logic, bits, bytes, word and nibble.
- Define and explain the binary system in terms of voltage levels and memory storage components.
- Explain binary as a form of a control signal.
- Explain how logic can be used in mechatronic safety related circuits and how binary logic is used.

7.1.2 Subject Outcome 2: Apply binary logic

Learning Outcomes

The student should be able to:

- Demonstrate an understanding of binary number systems using switching logic.
- Develop gating networks from written expressions.
- Develop gate networks using switching logic.
- Determine truth tables and Boolean expressions from logic gates.
- Demonstrate the ability to perform binary arithmetic.

7.2 Topic 2: Identify, describe and connect a basic PC.

7.2.1 Subject Outcome 1: Identify and describe an overview of a basic PC system.

Learning Outcomes

Range: Input devices: Mouse, keyboard, pointers. Output devices: Monitor, printers (dot matrix, ink jet, laser), scanners, modems. Processor: Mother board (CPU, ALU). Memory (RAM, ROM), Expansion cards: sound, graphics and interface devices. Memory devices: Floppy disk, CD-ROM, Hard disk, flash drives (memory stick).

The student should be able to:

- Describe
 - what a computer is, the various uses of the computer and related applications.
 - the differences between analogue, digital and hybrid computers.
 - the computer as a system and the terms hardware and software.
 - the uses with regard to processing, control and development.
 - the computer broadly in the context of arithmetic, comparison and storage.
 - the various parts and the function of the CPU.
 - primary storage, registers and buffers, control bus, address bus and data bus.
 - how data is moved by execution of an instruction.
 - how data is represented in computers.
 - how data is transferred using serial, parallel and USB interfaces.
- List and describe various input and output methods and devices.
- Name and describe several forms of secondary storage.

- Explain various forms of networking systems.
- Demonstrate the ability to identify and explain hardware type and parameters for connectivity.

7.2.2 Subject Outcome 2: Identify and connect PC hardware.

Range: CPU, monitor, keyboard, mouse, printers, scanner, hard-drives, and related driver software.

Learning Outcomes

The student should be able to:

- Identify
 - hardware, and explain connectivity procedure and related safety precautions. Identify relevant software and explain function and related computer parameters.
 - correct cable types for connectivity.
- Connect hardware and load related software in accordance with procedure, and in a safe aware manner.
- Explain
 - hardware specifications and parameters.
 - the various cable types and their connections (serial, parallel, USB).
 - various extension cards that are available by their function (video, printer, sound).
 - the importance of hardware conditions when setting up a PC.
 - principles of computer networks.
- Describe
 - antivirus procedures and identify methods of protecting the computer against viruses.
 - data communication and related elements (computer, sender, receiver and transmission media).
 - the differences between LAN and WAN.
 - the differences between medium of transmission systems (twist pair, coaxial, optic fibre, wireless).
 - LAN system configurations (star, bus, ring)
- Use check lists to verify physical connection between computer components.
- Consider environment conditions when setting up a computer.
- Use antivirus software to protect the computer.
- Set up security protocols (access codes).
- Connect network system components.

7.3 Topic 3: Explain an operating system, troubleshoot and repair a personal computer.

7.3.1 Subject Outcome 1: Operate a file management system.

Range: Booting up process; the windows desk top ;the start button; Windows explorer; maximise, minimise and resizing; installing programs; files and folders; drag and drop; customising your desk top; Windows application and tools; formatting and clipboard viewer; security; deleting files; icons and file extensions; fonts; printing .

Learning Outcomes

The student should be able to:

- Explain the
 - booting up process when turning on the PC.
 - function and purpose of the windows desk top.
 - purpose of the recycle bin.
 - purpose of the start button and related applications.
 - function of windows explorer.
 - function of *My Computer*.
- Describe how
 - to maximise, minimise and resize windows/objects.
 - programs are installed using windows.
 - programs, folders, files and documents are opened and closed.
 - to create files and folders.
 - the desk top can be customised.
 - files can be deleted.
 - printing is achieved from windows.

- Explain what is meant by
 - formatting a disk.
 - security in the context of a personal computer.
- Explain what and how window applications can be used (scan disk, backing up, compression, disk clean up, disk defragmenter).
- Boot up and shut down a PC system (cold and warm start).
- Navigate around the windows desk top to perform basic computer operations such as (creating a file, saving a file, deleting a file, printing contents from a file, installation of application programs/drivers).
- Identify error messages and take appropriate action.
- Format a removable disc / memory stick and copy files to and from a disk.
- Change the active disk drive.
- Run and quit a menu driven program.
- Manage computer files (directories & folders are created, located and their contents displayed, files are located and contents displayed, files are copied , renamed, moved to different directories and deleted, files are backed up).
- Print documents.

7.3.2 Subject Outcome 2: Troubleshoot and repair common PC faults and perform related maintenance.

Range: Windows, display, memory, disk drive, modems, keyboard, printer, scanner. maintenance (heat, dust, magnetic fields, power surges and electrostatic electricity).

Learning Outcomes

The student should be able to:

- Explain
 - user incurred problems and their related solutions (shutting down, uninstalling/installing programs, connecting peripherals, over extending PC capabilities).
 - Windows related problems with respect to cause and solution/s (invalid system, general protection fault, will not shut down, lock up/freeze, restarting defragmenter, CD auto-play, slow running PC, programs will not run at all, lost task bar, icons damaged or mixed up).
 - display problems from cause to solution (blank monitor screen, goes blank after inactivity, garbled text is displayed, incorrect size is displayed, parallel lines displayed).
 - memory related problems from cause to solution (out of memory message).
 - disk drive related problems from cause to solution (drives not being recognised by the system, unable to access removable drive and CD-ROM drive, rapid memory loss in hard drive).
 - memory related problems from cause to solution (modem not recognised by the system, software reporting no dial tone, does not work at specified speed, internet periodically broken, on-line connections occasionally pause before picking up again).
 - keyboard related problems from cause to solution (keyboard error at start up, slow keyboard response, characters not corresponding to keyboard).
 - printer related problems from cause to solution (completely dead, power light on printer not working, software indicates printer is off line, appears correct but nothing printed, print quality is poor).
 - scanner related problems from cause to solution (operation causes PC to crash, TWAIN error reported, scanned image does not have the scanned information, long time taken to display image on screen).
 - ongoing maintenance and care that applies to using a PC (heat, dust, magnets, power surges, electro-static electricity, EMC).
- Apply trouble shooting knowledge to rectify PC problems in the workplace.
- Apply maintenance to personal computers in the workplace.
- Identify simple hardware faults (power off, loose or disconnected plugs).
- Isolate hardware faults to a module/component.
- Identify simple printer faults and rectify (paper, ink, loose cable/plug, no power).

7.4 Topic 4: Produce documents and process data.

Range: Functions: Import text and graphics, set tabs, headings, footnotes, insert page numbers, set margins, grammar checks, spelling, select fonts, tables.

Documents: Curriculum Vitae, letters, tables, material lists, accident/incident reports, process cards, fault finding reports.

7.4.1 Subject Outcome 1: Produce documents on word processing applications programmes.

Learning Outcomes

The student should be able to:

- Explain the uses and features of a word processing programme and how these functions can be achieved.
- Open a word processing programme, open an existing document and/or create a new document.
- Save a modified and/or new document to a removable disc, memory stick, or hard drive.
- Use application help functions.
- Close a document.
- Adjust basic settings on a document set up (page orientation, page size, page margins, tabs, leaders (left, right, centred)).
- Change page display modes.
- Use page view magnification tool/zoom.
- Modify the toolbar display.
- Modify document setup.
- Insert, copy, select and move data (words/ phrases).
- Move text on a document or between documents.
- Format a document and text (font type, size, style, colour, alignment, justification hyphenation, indentation, line spacing).
- Preview and print a document.

7.4.2 Subject Outcome 2: Process information using a spreadsheet application programme.

Learning Outcomes

The student should be able to:

- Explain what a spreadsheet is.
- List basic functions that can be performed by means of a spread sheet application program.
- List the advantages of using spreadsheets.
- Name spreadsheet programs available commercially.
- List the applications and purposes of spreadsheets in the manufacturing industry.
- Use spreadsheets to input data to obtain relevant information required at this level.
- Open a spreadsheet application programme.
- Demonstrate the methods of moving the cell cursor about the spreadsheet.
- Produce a computer spreadsheet file.
- Enter data using labels and values.
- Format data to produce a spreadsheet in terms of cell width, alignment, text, number.
- Apply spreadsheet formulae in order to add, multiply, divide and subtract.
- Audit values in accordance with original information, audit formulae and check totals.
- Manage spreadsheet files (create, save, copy, rename, abandon changes, locate folder, display folder contents, locate file).
- Format basic cells using formatting and editing techniques such as column width, text font, style and size.
- Preview created document and print using page orientation keeping the required layout.

7.5 Topic 5: Use the internet, send and receive e-mails and develop a presentation.

7.5.1 Subject Outcome 1: Use the World Wide Web.

Learning Outcomes

The student should be able to:

- Explain what is meant by
 - the term World Wide Web.
 - the term Hyper Text Markup Language (HTML).
 - an internet service provider (ISP).
 - surfing the web.
- Describe
 - different types of connection to the internet.
 - the features of the web browsing programme.
 - the make up structure of a web address (universal resource locator - URL).
 - uses and features of the web browser.
 - types of software available.
- Log onto the internet.
- Open and start browser and access and display a web page.
- Identify the features of the web browser.
- Use application help functions.
- Close web browser.
- Access a web address.
- Open a URL and collect data.
- Open a hyper link or image link.
- Use a search engine to search for information/data using a keyword.
- Print a web page or search report.
- Log off the internet.

7.5.2 Subject Outcome 2: Use e-mail to send and receive information.

Learning Outcomes

The student should be able to:

- Describe the basic uses of e-mail software.
- Explain what is meant by
 - Simple Mail Transfer Protocol (SMTP) and Post Office Protocol (POP).
 - internet security.
- Establish connection with an ISP.
- Open an e-mail application programme.
- Open a mail inbox.
- Open mail message.
- Create and send a message.
- Insert address (mail to field, insert title in subject field add automatic signature, set priority).
- Use spelling check if available.
- Attach a file to the message.
- Use copy, past, delete and cut tools.
- Send a message.
- Read and reply to messages.
- Use addressing functions and manage messages.

7.5.3 Subject Outcome 3: Use a presentation programme to create a presentation.

Learning Outcomes

The student should be able to:

- Explain the
 - uses of a power point software application programme.
 - basic features of a presentation program.
- Open presentation application program.
- Create a presentation using a wizard.
- Open an existing presentation, make modifications and save.
- Save a newly created presentation.
- Customise the presentation using add/format text, slide views, colour schemes, format painter, insert pictures, use hyperlinks.
- Run the presentation.
- Print the presentation.

8 RESOURCE NEEDS FOR THE TEACHING OF INTRODUCTION TO COMPUTERS - LEVEL 2.

8.1 Physical resources

Mechatronics (Vocational Training) Level 2		
1	MECHANICAL FUNDAMENTALS LAB/WORKSHOP	20 learners
1a	Classroom Facilities	
	Workplaces	20
	Teaching	20
	General facilities	20
1b	Hand Tools	
	Workbenches, double	10
	Technical drawing	20
	Basic handtools	20
	Safety and house keeping	20
	Measurement and marking	10
	Sheet metal work	10
1c	Power Tools	
	Work benches, double	10
	Cutting and forming	10
	Drilling and tapping	10
	Welding and joining	10
	Electrical soldering	10
1d	Machining	
	Drilling	1
1c	Materials testing	
	Material testing	1
2	ELECTRICAL INSTALLATION AND MACHINE LAB	
2a	Classroom Facilities	
	Workplace	20
	Teaching	20
	General	1
	Computer hardware	1
2b	Electrical installation	
	Safety and protection	2
	Industrial installation and control	2
	Domestic circuit installation and testing	2
2c	Electrical Machines	
	Transformers	2

3	MOTION AND CONTROL LAB	
3a	Classroom Facilities	
	Workplace	20
	Teaching	20
	General	1
	Computer hardware	10
3b	Pneumatics	
	Basic pneumatics	5
	Workstation pneumatics	2
	Software pneumatics	20
3c	Electro-pneumatics	
	Basic electro-pneumatics	5
	Workstation – electro-pneumatics	2
	3d	Hydraulics
3e	Sensor Technology	
	Proximity sensors	2
	Distance & displacement sensors	2
	Force and pressure sensors	2
	Workstation sensor technology	2
3f	Basic and Advanced PLC	
	Basic PLC	7
4	ELECTRONIC AND SOFTWARE LAB	
4a	Classroom Facilities	
	Workplace	20
	Teaching	20
	Computer hardware	20
4b	Courses	
	Desktop laboratory	20
	Electrical engineering	20
	Electronics	20
	Project work	20
	Communication technology	3
4d	E-learning	
	Electronics	3
	Mechatronics	12

6	COMPUTER LABORATORY	
6a	Classroom facilities	
	Workstations	20
	Computer hardware	20
	Software (Microsoft office)	20
	Internet access	20

8.2 Equipment and machinery

The Mechatronic equipment as indicated above is the suggested minimum and other equipment can be used to obtain the same outcomes. Access by the learner and facilitator to the above listed equipment and machinery is essential. Machinery and laboratory equipment as listed above is essential in the delivery of vocational training for Mechatronics.

8.3 Stationery

Files for Portfolio of Evidence and assessments, notes and learner materials are required.

8.3 Human resources

The lecturer should ideally be a registered educator on post level 1 or higher at and FET Institution, be a qualified electrician or IT specialist with knowledge and experience in commercial and industrial PC's and related networking (bus) systems.

8.4 Financial resources

The institution should make provision for workshop practice consumables during practical work, maintenance of physical resources, purchasing of new equipment and finance to hire external providers.