Higher National Unit Specification

General information for centres

Unit title: Computer Operating Systems 1

Unit code: DH33 34

Unit purpose: This Unit is designed to enable candidates to gain an understanding of typical desktop computer operating systems. Candidates will learn how to use and install both operating system and applications software. Candidates will also gain experience of installing and configuring system-level software, (eg device drivers) within the operating environments as well as applications software. It is intended for candidates on any computing or IT course who require knowledge and skills in operating system function and operation.

On completion of this Unit the candidate should be able to:

1. Describe the structure and function of an operating system.
2. Use a graphical environment to operate a computer.
3. Install and configure an operating environment.
4. Install and configure system and application software.

Credit value: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. There are no specific recommendations but candidates would benefit from having experience of using application programs on a PC, or from having achieved relevant National Units or Courses in Computing or IT.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: This Unit is included in the framework of a number of HNC and HND group awards. It is recommended that it should be taught and assessed within the context of the particular group award to which it contributes. If this Unit is to be used in a UNIX based environment, it is recommended that it also be delivered in tandem with HN Unit DH3A 34: *Multi User Operating Systems*.

General information for centres (cont)

Assessment: Outcome 1 will be assessed by a number of multiple choice questions testing knowledge and/or skills. The assessment will be closed book. The other three Outcomes are practical in nature, and could be assessed either by a separate instrument of assessment for each Outcome or by a single, workbook-style instrument containing a number of assessment tasks. Candidates will be required to submit a log of each assessment task and should be observed by an assessor to ensure the work is valid ie the candidate's own work. Assessment 2, 3 and 4 should therefore also be carried out in supervised conditions.

Some of the evidence requirements may be produced using e-assessment. This may take the form of e-testing (for knowledge and understanding) and/or e-portfolios (for practical abilities). There is no requirement for you to seek prior approval if you wish to use e-assessment for either of these purposes so long as the normal standards for validity and reliability are observed. Please see the following SQA publications for further information on e-assessment: (1) "SQA Guidelines on Online Assessment for Further Education" (March 2003) and (2) "Assessment & Quality Assurance in Open & Distance Learning" (Feb. 2001).

If a centre is presenting Outcome 1 on-line the following assessment methods, where appropriate, may be selected –

♦ Multiple-choice
♦ Drag and drop
♦ Multiple response
♦ Mix and match
♦ A combination of the above

It is expected that the questions will be of the multi-choice variety. Centres may consider the use of alternative questions types, particularly if using Computer Assisted Assessment approaches. However, care should be taken that the questions are valid and at an appropriate level. The use of simple true/false question responses is unlikely to achieve this.

Higher National Unit specification: statement of standards

Unit title: Computer Operating Systems 1

Unit code: DH33 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the structure and function of an operating system

Knowledge and/or skills

♦ The main functional elements of a computer operating system
♦ The function of the user interface
♦ The function of the file system
♦ The function of device drivers
♦ The function of memory management
♦ The function of the operating system (OS) kernel
♦ The function of utility programs

Evidence Requirements

Evidence for all the knowledge and/or skills in this Outcome will be assessed using 20 multiple-choice questions. All knowledge and skills bulleted points must be covered from **each** area **at least twice**. The questions presented must change on **each** assessment occasion.

Assessment must be undertaken in supervised conditions and is closed book. A candidate should complete this assessment within one hour. Candidates may not bring to the assessment event any notes, textbooks, handouts or other material (calculators are not allowed).

Candidates must answer at least 60% of the questions correctly.

Higher National Unit specification: statement of standards (cont)

Unit title: Computer Operating Systems 1

Assessment Guidelines

There is an opportunity for a candidate to be assessed on-line subject to meeting the prescribed assessment conditions.

If a centre is presenting this assessment on-line the following assessment methods, where appropriate, may be selected –

♦ Multiple-choice
♦ Drag and drop
♦ Multiple response
♦ Mix and match
♦ A combination of the above

Outcome 2

Use a graphical environment to operate a computer

Knowledge and/or skills

♦ Starting up and shutting down the system
♦ Exploring and creating hierarchical file storage structures
♦ Copying, moving and renaming files and folders
♦ Using file and folder attributes to protect files
♦ Starting and stopping programs
♦ Controlling printing
♦ Using online help facilities

Evidence requirements

Evidence to satisfy this Outcome will take the form of an observation checklist signed by the assessor confirming that each task is the candidate's own work. Assessment must be under supervised conditions. The candidate must successfully complete each assessment task on at least two different occasions.

A candidate's performance can be judged to be satisfactory where s/he:

♦ Demonstrates ability to start up a graphical environment and log in correctly and properly closes files and applications which are open before correctly and safely shutting down a graphical environment

♦ Demonstrates ability within a graphical environment to navigate effectively within a hierarchical file structure and create folders as required

Higher National Unit specification: statement of standards (cont)

Unit title: Computer Operating Systems 1

♦ Demonstrates ability within a graphical environment to copy, move and rename individually specified files, groups of files and folders

♦ Demonstrates ability within a graphical environment to locate and start programs as specified, and to effectively open files and stop programs

♦ Demonstrates ability within a graphical environment to control printing effectively by starting and then cancelling, pausing and re-ordering print jobs within the print queue

♦ Demonstrates ability within a graphical environment to use the online help system effectively in order to accomplish a task not previously taught

The assessment must be accompanied by a pro-forma which requires the candidate to detail the exact commands/procedures and/or steps for ALL operations. The pro-forma must show the candidate name and the date which the assessor must endorse to confirm that the work is the candidate's own.

Assessment is open book under supervised conditions. Assessors must assure themselves of the authenticity of each candidate's submission.

Assessment guidelines

Elements may be assessed individually as specific tasks or may be combined as appropriate into more complex exercises.

Where the candidate is learning in a workplace situation, care should be taken to ensure that it could provide sufficient opportunity to meet the evidence requirements of the Unit. It may be appropriate for the assessor concerned to ensure beforehand that a particular workplace will allow candidates to generate sufficient and suitable evidence. Arrangements for adequate supervision will also be required.

Outcome 3

Install and configure an operating environment

Knowledge and/or skills

♦ Installing a graphical environment
♦ Configuring a graphical environment to meet user and policy requirements

Higher National Unit specification: statement of standards (cont)

Unit title: Computer Operating Systems 1

Evidence requirements

Evidence for the knowledge and skills in this Outcome will be provided by a candidate submitting evidence to demonstrate his/her ability to install and configure a graphical user interface environment. This evidence will take the form of a log of all work done in response to each assessment task. The candidate must be provided with a pro-forma to complete the assessment tasks; each log must be approved as satisfactory and certified by the assessor as an accurate record of the candidate's own work. Assessment will therefore be under supervised conditions.

As a minimum, each log entry must be properly titled with the candidate's name, the date and task, and include:

♦ note of the work carried out, commands and actions used and any installation or configuration choices selected

♦ note of problems encountered (if any) and their solutions

♦ any relevant printouts, lists, tables or sketch diagrams, (eg Configuration settings, changes to system files, file storage hierarchies implemented)

A candidate's evidence can be judged to be satisfactory where it meets the following requirements relevant to the environment used:

♦ Demonstrates ability to install correctly and efficiently a graphical operating environment to a stand-alone computer. Basic install time configuration options should be selected and implemented correctly, including support for all installed hardware devices; locale, keyboard and language support and an appropriate printer driver installation with test printout attached to the candidate's log. This procedure will include manual hard disk preparation by partitioning and formatting to a given specification.

♦ Evidence should be included in the log of testing to ensure that software support for all main sub-systems is installed, configured and operating correctly. It is not a requirement that any networking configuration be carried out by the candidate, although if a modem is fitted or attached then support for this should be included in the installation.

♦ Demonstrates ability to configure a graphical environment for effective use in terms of a provided policy that defines user and institutional requirements. This should include customisation of user specific items; the candidate should also demonstrate ability to enforce system wide configuration settings using whatever tools are provided with the environment used.

Higher National Unit specification: statement of standards (cont)

Unit title: Computer Operating Systems 1

The assessment must be accompanied with a pro-forma which requires the candidate to detail the exact commands for operations, where appropriate. The pro-forma must show the candidate name and the date which the assessor must endorse to confirm that the work is the candidate's own.

Assessment is open book under supervised conditions.   Assessors must assure themselves of the authenticity of each candidate's submission.

Assessment guidelines

Where the candidate is learning in a workplace situation, care should be taken to ensure that it could provide sufficient opportunity to meet the evidence requirements of the Unit. It may be appropriate for the assessor concerned to ensure beforehand that a particular workplace will allow candidates to generate sufficient and suitable evidence.   Arrangements for adequate supervision will also be required.

Part of Outcome 4 (device driver installation) may be assessed as part of the configuration elements of this Outcome.

Outcome 4

Install and configure system and application software

Knowledge and/or skills

♦ Installing system software in a graphical environment
♦ Installing application software in a graphical environment

Evidence requirements

The candidate will submit evidence to demonstrate her/his ability to install and configure system and application software in a graphical environment. The candidate will submit evidence to satisfy this Outcome in the form of a hand written log of all work done in response to each assessment task. The candidate must be provided with a pro-forma to complete each assessment task; each log must be approved as satisfactory and certified by the assessor as an accurate record of the candidate's own work. The candidate may be told in advance which type of system they will be required to work on but assessment must be under supervised conditions.

As a minimum, each log entry must be properly titled with the candidate's name, the date and task, and signed by the assessor confirming that each task is the candidate's own work. Each Log should record:

♦ a brief outline of the task set

Higher National Unit specification: statement of standards (cont)

Unit title: Computer Operating Systems 1

♦ note of the work carried out, commands and actions used and any installation or configuration choices selected

♦ note of problems encountered (if any) and their solutions

♦ any relevant printouts, lists, tables or sketch diagrams.

A candidate's evidence can be judged to be satisfactory where it meets the following requirements relevant to the environment used:

♦ Demonstrates ability within a graphical environment to install correctly at least one additional or updated device driver and any other associated software, **and** at least one utility program
♦ Demonstrates ability within a graphical environment to install correctly at least **one** commercial software application

The assessment must be accompanied by a pro-forma which requires the candidate to detail the exact commands for operations, where appropriate. The pro-forma must show the candidate name and the date which the assessor must endorse to confirm that the work is the candidate's own.

Assessment is open book under supervised conditions. Assessors must assure themselves of the authenticity of each candidate's submission.

Assessment guidelines

Part of the first element of this Outcome (device driver installation) may be assessed as part of the configuration elements of Outcome 3.

Where the candidate is learning in a workplace situation, care should be taken to ensure that it could provide sufficient opportunity to meet the evidence requirements of the Unit. It may be appropriate for the assessor concerned to ensure beforehand that a particular workplace will allow candidates to generate sufficient and suitable evidence. Arrangements for adequate supervision will also be required.

Device driver installation within the GUI may include either installing a driver for a new piece of hardware or updating and existing driver to remedy problems or provide enhanced functionality. This would provide a good opportunity to introduce candidates to the use of the Internet for locating and obtaining driver software.

Configuring a GUI application could include selecting correct printer and paper type, redefining page layout to meet a specification, modifying a toolbar or menu.

Administrative Information

Unit code: DH33 34

Unit title: Computer Operating Systems 1

Superclass category: CD

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History of changes:

Version	Description of change	Date
02		27/4/07

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

Higher National Unit specification: support notes

Unit title: Computer Operating Systems 1

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the Centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

The first Outcome requires candidates to demonstrate a good working understanding of the structure and function of a modern operating system. It is important that candidates be provided with a sufficient range and depth of knowledge to ensure their understanding of work later in the Unit, but this is intended to be delivered as an introductory level course in the subject area and Centres should avoid using this Unit to deliver an in-depth operating system theory course.

It is recommended that Centres teach this Outcome within the context of modern operating systems, eg describing elements and then investigating and comparing their differing operation under Windows and UNIX for example. Suitable content for the elements in this Outcome would be:

♦ Outline the main functional elements of a computer system, ie:
  - introduce candidates to a simple layered model for an OS. For example, the 5-layer structure (UI, File system, I/O, Memory management, kernel), explaining the function and role of each element and the relationships between them.

♦ Define the function of the user interface, ie:
  - the basic role of the UI in providing users the facilities to run programs and manage the system should be explained, and candidate should be able to differentiate between the main feature of CLI and GUI.

♦ Define the function of the file system, ie:
  - concepts and methods of storing data on disk should be explained, and different files systems compared and contrasted.

♦ Define the function of device drivers, ie:
  - the role and structure of the input/output layer of the basic model should be explained, with particular reference to modular drivers/handlers and their operation.

♦ Define the function of memory management, ie:
  - the need to segment and protect for different purposes should be explained, and virtual memory described.

Higher National Unit specification: support notes (cont)

Unit title: Computer Operating Systems 1

♦ Define the function of the OS kernel, ie:
- basic kernel tasks should be outlined, including multi-processing techniques (co-operative and pre-emptive), a simplified, (eg three state) process-control model, exception and interrupt processing.

♦ Define the function of utility programs, ie:
- the use of stand-alone tools to augment or implement OS control and management functions should be explained, and a range of typical utilities demonstrated and described for the system being studied. Anti-virus software should be included in this range.

The operating systems used in the practical Outcomes of this Unit are not specified and the evidence requirements have been made general. In principle, any suitable operating systems can be chosen, however unless there is a specific reason, it would be most appropriate to use mainstream, industry standard systems rather than those with a more niche appeal.

For example, the current version of Windows may be the most common environment adopted, but centres may instead use any form of modern UNIX- such as Linux with a KDE or gnome GUI – so long as candidates are not required to understand or work with networking.

This Unit is designed as a general introduction to the practical use and installation of operating systems, and is intended for any candidates undertaking an IT course at this level.

This Unit is intended as an introduction to the basic principles involved in understanding and working with computer operating systems. It has been contextualised for the HNC Games Development award, where the emphasis is on developing skills appropriate to a digital entertainment domain. All of the standard good practice criteria are stressed throughout the module, but with a games development flavour.

It forms part of the HNC Games Development Group Award and should be delivered within the context of the Group Award.

Instruments of assessment

Outcome 1: Describe the structure and function of an operating system.
Outcome 2: Use a graphical environment.
Outcome 3: Install and configure an operating environment.
Outcome 4: Install and configure system and operating software.

All Outcomes, with the exception of Outcome 1, are open-book and of a practical nature.
Outcome 1 is a closed-book test.

Higher National Unit specification: support notes (cont)

Unit title: Computer Operating Systems 1

Assessors must ensure that all candidate submissions for the practical assessments are the work of the candidate. The level of work required for the assessments is inherent in the evidence requirements.

The closed-book Outcome 1 will test basic OS knowledge and be assessed via a twenty question multiple choice test. The reassessment test will be based on entirely different questions to the first assessment test.

The clearest impact of contextualisation is in Outcome 4 where the examples are appropriate to a games environment: a joystick driver, animation player and a customisable game.

Guidance on the delivery and assessment of this Unit

This Unit is likely to form part of a group award that is primarily designed to provide candidates with technical or professional knowledge and skills related to a specific occupational area. It introduces candidates to the effective use of a personal computer (PC) and does not require a significant level of prior competence from candidates; it could therefore be delivered at the start of a group award.

Evidence for all the knowledge and/or skills in Outcome 1 will be assessed using 20 multiple-choice, drag and drop, multiple response, mix and match questions or a combination of the foregoing (where appropriate). All knowledge and skills bulleted points must be covered AT LEAST twice. Closed book conditions apply. Candidates must answer at least 60% of the questions correctly. The other three Outcomes are practical in nature, and could be assessed either by a separate instrument of assessment for each Outcome or by a single, workbook style instrument containing a number of assessment tasks. Candidates will be required to submit a log of each assessment task and should be observed by an assessor to ensure the work is valid. The Assessment guidelines given for each Outcome provide sufficient detail on assessment of the Unit. All assessment for the Unit should be carried out in supervised conditions.

Higher National Unit specification: support notes (cont)

Unit title: Computer Operating Systems 1

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance.
A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (**www.sqa.org.uk**).

General information for candidates

Unit title: Computer Operating Systems 1

This Unit is designed to enable you to use and install typical PC operating systems, and to install both system and applications software. You will gain experience of operating within a graphical user interface such as Microsoft Windows or X-windows.

You will also gain experience of installing and configuring system level software (eg device drivers) as well as applications software.

On completion of the Unit you should be able to:

♦ describe the structure and function of an operating system
♦ use a graphical environment to operate a computer
♦ install and configure an operating environment
♦ install and configure system and application software

The first two Outcomes cover the effective basic operation and control of a computer using a graphical environment such as Microsoft Windows or a UNIX based GUI such as X-windows.

The third Outcome covers the installation and configuration of operating systems. You will gain experience of installing and setting up graphical operating system such as Windows. Alternatively, this could cover the installation of a UNIX system under X-windows.

The final Outcome covers the effective installation of different types of system and user software, including device drivers, utility programs and generic applications programs.

The first Outcome is mostly theoretical, and ensures you develop knowledge of the structure of a modern operating system and understand the functions and relationships between the main functional elements of such a system.   Evidence for all the knowledge and/or skills in Outcome 1 will be assessed using either 20 multiple-choice, drag and drop, multiple response, mix and match questions or a combination of the foregoing.   All knowledge and skills bulleted points must be covered.   Closed book conditions apply. Candidates must answer at least 60% of the questions correctly.

General information for candidates (cont)

Unit title: Computer Operating Systems 1

The other Outcomes are practical in nature, although all contain some elements of required knowledge that will be presented to you. You must demonstrate a satisfactory level of performance in a number of practical tasks that cover these Outcomes. You will provide evidence of the work you carry out by completing a concise but accurate hand written log of each assessment task. As a minimum, each log entry must be properly titled with your name, the date and task, and include:

♦ a brief outline of the task set

♦ note of all work carried out, ie commands and actions used and installation or configuration choices selected

♦ note of problems encountered, (if any), and details of the solution of each

♦ any relevant lists, tables or sketch diagrams

You will receive more detailed guidance on the content, style and quality required for your log entries during your progress though the Unit.

Your assessor will observe you carrying out the assessment tasks, and will certify on each of your logs that it is your own work and whether it is satisfactory.