

Higher National Unit Specification

General information for centres

Unit title: Systems Development: Structured Design Methods

Unit code: D77F 35

Unit purpose: This Unit is about developing an awareness of different approaches that can be taken to systems development and applying current structured techniques. This Unit should develop the candidates' awareness of important issues such as project management, people management, quality assurance and documentation. It is primarily intended to prepare candidates who expect to gain employment in an IT/Computing-related post at technician or professional level in a software development role.

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

1. Compare and evaluate the strengths and weaknesses of systems development methodologies
2. Plan for systems analysis and design
3. Perform structured systems analysis
4. Perform structured systems design
5. Plan a testing, training and implementation strategy

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8)

SCQF (the Scottish Credit and Qualifications Framework) brings Scottish qualifications into a single framework of 12 levels ranging from SQA Access 1 to doctorates. The SCQF includes degrees; HNC/Ds; SQA National Qualifications; and SVQs. Each SQA Unit is allocated a number of SCQF credit points at a specific level. 1 SCQF point = 10 hours of learning. HN candidates are normally expected to input a further number of hours, matched to the credit value of the Unit, of non-contact time or candidate-led effort to consolidate and reinforce learning.

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre, however it is desirable that the candidate should have demonstrated an aptitude for systems development, either through workplace experience or training at an appropriate level. This may be evidenced by the possession of HN Units such as D77D 34: *Systems Development: Introduction*, (Code): *Computing: Project Management* and a software development programming Unit. The achievement of National Courses such as (Code): *Information Systems* at Higher or Advanced Higher Units such as D308 13: *Systems Analysis and Design* would be an advantage. Workplace experience in, for example, data flow modeling, entity modeling or normalisation would also provide evidence of suitable prior knowledge and skills.

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.

Higher National Unit Specification: General information for centres (cont)

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes. Although the emphasis of this Unit is on effective systems analysis and design, the relationship with software development should be emphasised. For this reason it would be beneficial to integrate this Unit with either (Code): *Software Development: Applications Development* or *D76S 35: Software Development: Fourth Generation Environment*.

Assessment: An essay or extended response questions can be used to assess Outcome 1 where candidates are required to evaluate and describe several systems development methodologies. Outcome 2, 3, 4 and 5 can be assessed using a realistic case study, or a work-based situation, where the candidates are given a number of written and practical assignments.

An Assessment Exemplar has been produced to indicate the national standard of achievement required at SCQF level 8.

Higher National Unit specification: statement of standards

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

Where evidence for an Outcome 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

Compare and evaluate the strengths and weaknesses of systems development methodologies

Knowledge and/or skills

- Up-to-date systems development methodologies
- Structured analysis techniques and Rapid Application Development (RAD) techniques and prototyping
- Methods used for systems development, eg Dynamic System Development Method (DSDM)
- Evaluation of most appropriate methodology for a given system

Evidence requirements

The candidates will need evidence to demonstrate his/her knowledge and/or skills by showing that s/he can correctly:

- Describe the main stages in a structured systems development methodology such as Structured Systems Analysis and Design Methodology (SSADM) and one other contrasting methodology such as an object oriented methodology or soft systems methodology
- Explain the main features of a rapid application development (RAD) method
- Compare and evaluate the strengths and weaknesses of both a structured methodology and an object oriented methodology.

The candidate must attain 60% of the available marks in order to achieve this Outcome.

Assessment guidelines

A range of assessment methods can be used, eg a number of extended response questions or an essay. An essay of a minimum of 600 words excluding diagrams would be acceptable.

Higher National Unit specification: statement of standards (cont)

Unit title: Systems Development: Structured Design Methods

Outcome 2

Plan for systems analysis and design

Knowledge and/or skills

- The project management process and the terminology used
- The factors affecting the level of monitoring required and the process of investigations
- The factors giving rise to risks and difficulties during investigations
- The factors affecting the success of a system development project

Evidence requirements

The candidate will need evidence to demonstrate his/her knowledge and/or skills by showing that s/he can:

- Manage a system development project by producing the following documentation using agreed organisational standards:
 - Project Initiation Document, describing the scope of an investigation, including constraints and with whom it should be agreed
 - Project plan listing main stages and sub stages, and illustrating effective project planning and co-ordination and appropriate choice of investigative methods
- Describe a minimum of three ways to involve users effectively in the different stages of the system development process from the following: in the project development team, by participating in fact-finding, by participation in review, in evaluation of a prototype.

Assessment guidelines

A range of assessment methods can be used, however, a number of written and practical assignments based on a case study scenario or work-based situation is recommended. The assignments for this Outcome should relate to the work being undertaken for Outcomes 3, 4 and 5 and, where possible, be based on the same case study.

Higher National Unit specification: statement of standards (cont)

Unit title: Systems Development: Structured Design Methods

Outcome 3

Perform structured systems analysis

Knowledge and/or skills

Problem solving and analysis, to include:

- Identification and documentation of system requirements
- Data Flow Diagram (DFD)
- The difference between current physical, current logical, required logical and required physical DFDs
- Entity Relationship (ER) Model

Evidence requirements

The candidate will need evidence to demonstrate his/her knowledge and/or skills by showing that s/he can:

- Produce a requirements' specification, using agreed organisational standard listing:
 - Functional requirements
 - Non-functional requirements, and prioritisation of requirements
 - User Interface requirements
- Construct Data Flow Diagrams, using agreed organisational standards, showing processes, external entities, data stores and data flows as follows:
 - Current Physical (Context and Level 1)
 - Current Logical (Context and Level 1)
 - ONE of the above taken to Level 2 as appropriate
- Construct an ER Model, using agreed organisational standards, showing entities and one-to-many relationships
- Construct a Required Logical Data Flow Diagram (Level 1 and Level 2 if necessary) to meet agreed functional requirements.

The candidate must attain 60% of the above available marks in order to achieve this Outcome.

Assessment guidelines

A range of assessment methods can be used, however, a number of written and practical assignments based on a case study scenario or work-based situation is recommended. The assignments for this Outcome should relate to the work being undertaken for Outcomes 2, 4 and 5 and, where possible, be based on the same case study.

Higher National Unit specification: statement of standards (cont)

Unit title: Systems Development: Structured Design Methods

Outcome 4

Perform structured systems design

Knowledge and/or skills

Problem solving and analysis skills, to include:

- Normalisation
 - Primary key, Foreign key, Compound key
 - Elimination of addition, deletion and update anomalies by normalisation
- Prototyping
 - The process of designing forms and reports
 - General guidelines for formatting forms and reports
 - Characteristics of good dialogue design
 - ◆ consistency
 - ◆ appropriate user support
 - ◆ adequate feedback
 - ◆ minimal user input
- Designing physical files and databases

Evidence requirements

The candidate will need evidence to demonstrate his/her knowledge and/or skills by showing that s/he can:

- Normalise necessary data input/output(s) (a minimum of three) to Third Normal Form (3NF), using agreed organisational standards, and construct a Data Model derived from the 3NF relations
- Document all normalised relations using agreed organisational standards defining attributes, type, format, default values, range and volume
- Design physical input/output forms and reports
- Create physical data/file design definitions to include: name, data type, format, default value, range, integrity rules, index, primary key, foreign key as required.

The candidate must attain 60% of the available marks in order to achieve this Outcome.

Assessment guidelines

A range of assessment methods can be used, however, a number of written and practical assignments based on a case study scenario or work place situation are recommended. The assignments for this Outcome should relate to the work being undertaken for Outcome 2, 3 and 5 and, where possible, be based on the same case study.

Higher National Unit specification: statement of standards (cont)

Unit title: Systems Development: Structured Design Methods

Outcome 5

Plan a testing, training and implementation strategy

Knowledge and/or skills

- The testing process
- Training
- Implementation
- Changeover methods

Evidence requirements

The candidate will need evidence to demonstrate his/her knowledge and/or skills by showing that s/he can:

- Produce an Implementation plan that describes:
 - an appropriate test strategy, including system testing, alpha testing, beta testing and acceptance testing
 - a training plan, describing who is to be trained, what training is to be done, where and when the training is to be done
 - Implementation strategy for a given system, and to include plans for:
 - ◆ installation
 - ◆ data conversion
 - ◆ testing
 - ◆ documentation
 - ◆ training
 - ◆ changeover – at least one method from direct, parallel, phased, pilot.

The candidate must attain 60% of the available marks in order to achieve this Outcome.

Assessment guidelines

A range of assessment methods can be used, however, a written assignment based on a case study scenario or work place situation is recommended. The assignment for this Outcome should relate to the work being undertaken for Outcome 2, 3 and 4 and, where possible, be based on the same case study.

Administrative Information

Unit code: D77F 35

Unit title: Systems Development: Structured Design Methods

Superclass category: CB

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Higher National Unit specification: support notes

Unit title: Systems Development: Structured Design Methods

Unit code: D77F 35

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 80 hours.

Guidance on the content and context for this Unit

This Unit is primarily intended to allow candidates to learn the skills and knowledge required to undertake structured systems analysis and design. Although no systems development methodology is prescribed the techniques studied could be introduced within the context of a suitable methodology. This in turn would provide the necessary diagram and documentation standards, which are important to adhere to. This Unit will benefit those who wish to enter a career in system analysis and design or who already work in an IT organisation where they have been involved in some system development work. Candidates undertaking this Unit may be working towards HND Computing: Software Development:

Outcome 1 should be used to present a range of popular systems development methodologies, such as SSADM, OOAD, RAD and DSDM. Candidates should study the content, tools and techniques of each in relation to appropriate system development scenarios. They should be able to make a clear and reasoned comparison between the different methodologies.

Outcome 2 is designed to emphasise the importance of planning in a systems development project. Candidates should be guided in effective project planning and how to create appropriate documentation to agreed organisational standards. It would be beneficial if candidates were undertaking the HN Unit (Code) *Project Management* in tandem with this Unit. Candidates should cover the need for quality assurance and how to undertake regular review of documentation/progress.

For Outcomes 3, 4 and 5 candidates should be presented with a series of practical exercises to illustrate the modelling and diagramming techniques as they are introduced. Ideally the same case study context should be used for Outcomes 2, 3, 4 and 5 in order that the candidate appreciates the progression through a typical structured systems development cycle.

Where suitable facilities exist, the use of CASE tools to provide automated generation and storage of diagrams and models should be encouraged.

Guidance on the delivery and assessment of this Unit

This Unit forms part of the group award HND Computing: Software Development, which is primarily designed to prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role. The Unit is likely to be delivered towards the end of the group award, by which time candidates should have undertaken HN Unit D77D 34: *Systems Development: Introduction* and one or more software development programming Units. This should allow the Unit to be delivered in a way that

enables candidates to appreciate its relevance in the occupational area concerned and have the appropriate prior knowledge and skills.

Higher National Unit specification: support notes (cont)

It would also be beneficial if candidates were undertaking the HN Unit (Code): *Computing: Project Management* in tandem with this Unit.

Although the emphasis of this Unit is on effective systems and analysis and design, the relationship with software development should be emphasised. For this reason it would be beneficial to integrate this Unit with either (Code) *Software Development: Applications Development* or D76S 35: *Software Development: Fourth Generation Environment*.

The Unit should be delivered in as candidate-centred, resource-based way as possible. Candidates should get opportunities to practise the techniques covered before being assessed at an appropriate point.

There is no closed book assessment in this Unit and reference to textbooks, handouts or other material that the candidate has prepared will be permitted. Candidates should be encouraged to use at least one CASE tool or other appropriate software to create diagrams.

Links to Vocational Qualifications

The knowledge and understanding elements for the following VQ Units may have been covered in this Unit:

VQ	VQ Unit no.	VQ Element no.	Outcome in this Unit
Developing IT Systems Level 4	405	1, 2, 3	2
Developing IT Systems Level 4	406	1, 2, 3	2, 3, 4

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).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For example, some candidates may require a longer period for the single assessment or may require that it be split into more than one event.

For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs and Candidates for whom English is an Additional Language* (SQA, 2000).

General information for candidates

Unit title: Systems Development: Structured Design Methods

This Unit is about developing an awareness of different approaches that can be taken to systems development and applying current structured techniques. Furthermore, it is about developing an awareness of important issues such as project management, people management, quality assurance and documentation. On completion of this Unit you should be able to:

1. Compare and evaluate the strengths and weaknesses of systems development methodologies
2. Plan for systems analysis and design
3. Perform structured systems analysis
4. Perform structured systems design
5. Plan a testing, training and implementation strategy.

In this Unit you will study several different systems development methodologies and then be able to compare and evaluate the most appropriate method for a given scenario. An essay of approximately 600 words or a number of extended response questions will assess this as part of Outcome 1.

For Outcomes 2, 3, 4 and 5 you will learn how to apply various structured systems development techniques, such as data flow diagrams, entity modelling, normalisation, form and file design, as well as gain an understanding of the importance of project planning, quality assurance and documentation in the system development process. These Outcomes will be assessed using a realistic case study where you are given a number of written and practical assignments.