

National Unit Specification: general information

UNIT Database Analysis and Design (Advanced Higher)

NUMBER DV4X 13

COURSE Information Systems (Advanced Higher)

SUMMARY

This Unit is designed to develop knowledge and understanding of systems analysis and design, including the systems analysis and design cycle, systems analysis techniques, modelling techniques and database design, and to develop practical skills in applying analysis and design techniques to database related problems.

On completion of the Unit, the candidate should be able to apply this knowledge and understanding, and these skills to solve practical problems.

It is designed for candidates undertaking the Advanced Higher Information Systems Course, but it is also suitable for anyone wishing to extend and deepen their experience of systems analysis and design beyond Higher level.

OUTCOMES

- 1 Demonstrate knowledge and understanding of the principles of systems analysis and design.
- 2 Demonstrate practical skills in the application of systems analysis and design techniques to complex database related problems.

Administrative Information

Superclass: CB

Publication date: October 2005

Source: Scottish Qualifications Authority

Version: 02 (March 2006)

© Scottish Qualifications Authority 2005, 2006

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this specification (including Unit specifications) can be purchased from the Scottish Qualifications Authority for £7.50. **Note:** Unit specifications can be purchased individually for £2.50 (minimum order £5).

National Unit Specification: general information (cont)

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following or equivalent:

- ◆ Higher Relational Database Systems Unit
- ◆ Higher Information Systems

CREDIT VALUE

1 credit at Advanced Higher (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.*

CORE SKILLS

There is no automatic certification of Core Skills or Core Skill components in this Unit.

National Unit Specification: statement of standards

UNIT Database Analysis and Design (Advanced Higher)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding of the principles of systems analysis and design

Performance criteria

- (a) A range of advanced systems analysis and design terminology is used appropriately.
- (b) Technically accurate descriptions and explanations are related to a range of familiar and unfamiliar contexts.
- (c) Conclusions, predictions and generalisations are made from knowledge and understanding.

Evidence Requirements

Written or oral evidence that the candidate can describe and explain the principles of systems analysis and design accurately and concisely.

Evidence should be obtained using questions in a closed book test, under supervision, lasting no more than 45 minutes. The test must sample across the range of the Unit content (see Information Systems (Advanced Higher) Course content) in each of the following areas:

- ◆ overview of the systems analysis and design cycle
- ◆ techniques involved in systems analysis
- ◆ modelling techniques
- ◆ database design

(The content statements are reproduced for convenience as a table in the support notes for this Unit.)

The standard to be applied and the breadth of coverage is illustrated in the National Assessment Bank items available for this Unit.

If a centre wishes to design its own assessments for this Unit, they should be of a comparable standard.

OUTCOME 2

Demonstrate practical skills in the application of systems analysis and design techniques to complex database related problems.

Performance criteria

- (a) Appropriate hardware is used effectively and efficiently.
- (b) A wide range of appropriate features of software is used effectively and efficiently.
- (c) Practical tasks are planned and organised independently.
- (d) Practical tasks are undertaken in an appropriate range of familiar and unfamiliar contexts.

National Unit Specification: statement of standards (cont)

UNIT Database Analysis and Design (Advanced Higher)

Evidence Requirements

An observation checklist is completed showing that the candidate has carried out practical activities, demonstrating all of the following practical skills, as defined in the content statements for this Unit (see Information Systems (Advanced Higher) Course content):

- ◆ creation of system specification
- ◆ normalisation (to 3NF)
- ◆ entity-relationship modelling
- ◆ creation of Data Dictionary
- ◆ entity-event modelling
- ◆ dataflow modelling
- ◆ database design using structured English
- ◆ database design using a graphical design notation
- ◆ user interface design

Hard copy evidence should be provided of **one** modelling technique and **one** design activity.

These practical skills may all be demonstrated in a single extended task, or in a number of smaller tasks, or during the process of completing the Coursework Project.

The candidate will be allowed access to books, notes and on-line help while completing the task(s).

(The content statements are also reproduced for convenience as a table in the support notes for this Unit.)

The standard to be applied and the breadth of coverage are illustrated in the National Assessment Bank items available for this Unit.

If a centre wishes to design its own assessments for this Unit, they should be of a comparable standard.

National Unit Specification: support notes

UNIT Database Analysis and Design (Advanced Higher)

This part of the Unit specification is offered as guidance.

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 content for this Unit is detailed below (and also in the National Course Specifications: Course details).

Content statements in the left-hand column describe the content covered in the Relational Database Systems Unit at Higher level, and are included here to clarify the context for the new learning for this Unit. They indicate the prior learning required by the candidate before undertaking the new and assessable learning for this Unit. Content in the right-hand column is the new and assessable content of this Unit.

Content Statements: Overview of the Systems Analysis and Design cycle	
<i>Higher</i>	Advanced Higher
	Description of the stages of the systems analysis and design life cycle as applied to the development of complex information systems <ul style="list-style-type: none">◆ analysis (including investigation)◆ design◆ implementation (including documentation and evaluation)◆ testing◆ maintenance Explanation of iterative nature of the cycle.

Content Statements: The techniques involved in systems analysis	
<i>Higher</i>	Advanced Higher
	Explanation of a feasibility study <ul style="list-style-type: none">◆ economic◆ legal◆ technical◆ time
	Description and exemplification of project planning: <ul style="list-style-type: none">◆ importance of plan◆ elements in plan including time, resources, and costs Application and monitoring of plan.

National Unit Specification: support notes (cont)

UNIT Database Analysis and Design (Advanced Higher)

Content Statements: The techniques involved in systems analysis	
	Identification and explanation of investigative techniques <ul style="list-style-type: none"> ◆ observation ◆ document sampling ◆ questionnaires ◆ interviewing
	Description of results from investigation, including: <ul style="list-style-type: none"> ◆ background information ◆ departmental objectives ◆ description of components in existing system ◆ organisation procedures
	Description and exemplification of systems specification based on results of investigation and modelling <ul style="list-style-type: none"> ◆ functional requirements ◆ restrictions on development

Content Statements: Modelling techniques	
<i>Higher</i>	Advanced Higher
<i>Definitions of normal forms: UNF, first normal form (1NF), second normal form (2NF), third normal form (3NF)</i> <i>Creation of UNF from source documents.</i> <i>Normalisation to 1NF, by identifying and eliminating repeating groups.</i> <i>Description of problems of 1NF.</i> <i>Normalisation to 2NF by identifying partial key dependency</i> <i>Description of problems of 2NF.</i> <i>Normalisation to 3NF by identifying non-key dependency.</i>	Description and exemplification of normalisation. Creation of un-normalised form (UNF) from complex source document(s). First normal form <ul style="list-style-type: none"> ◆ identifying repeating groups ◆ dealing with repeating groups ◆ problems with first normal form (1NF) Second normal form <ul style="list-style-type: none"> ◆ functional dependency ◆ problems with second normal form (2NF) Third normal form <ul style="list-style-type: none"> ◆ transitive dependency

National Unit Specification: support notes (cont)

UNIT Database Analysis and Design (Advanced Higher)

Content Statements: Modelling techniques	
<p><i>Implementation of database system based on a data model, including entity/relationship diagram and data dictionary.</i></p> <p><i>Description of need for, and exemplification of data dictionaries including name, type, size, validation, index/key.</i></p>	<p>Description and exemplification of entity-relationship modelling.</p> <p>Translation of third normal form (3NF) into E/R diagrams</p> <ul style="list-style-type: none"> ◆ entities (weak entity, strong entity) ◆ relationships (mandatory, optional, strong/weak)
	<p>Description and exemplification of a Data Dictionary.</p>
	<p>Description and exemplification of entity / event modelling</p> <p>Entity/Event Matrix</p> <ul style="list-style-type: none"> ◆ add ◆ modify ◆ delete ◆ read <p>Entity Life Histories</p> <ul style="list-style-type: none"> ◆ sequence ◆ iteration ◆ selection
	<p>Description and exemplification of dataflow modelling using level 0 and level 1 data flow diagrams</p> <ul style="list-style-type: none"> ◆ system boundary ◆ environment ◆ data flow ◆ physical flow ◆ data store ◆ external entity ◆ process

Content Statements: Database Design	
<i>Higher</i>	Advanced Higher
	<p>Description of system refinement using modelling techniques.</p> <p>Description of logical and physical design.</p> <p>Description of processes using structured English and one graphical design notation.</p> <p>Description and exemplification of screen layout and user interfaces using graphical techniques or rapid application development (RAD) tools.</p>

National Unit Specification: support notes (cont)

UNIT Database Analysis and Design (Advanced Higher)

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Candidates will require individual access to appropriate computer hardware and software throughout this Unit.

The two Outcomes should be delivered in an integrated way rather than sequentially. For Outcome 2, the practical activities should be taught and used to illustrate and exemplify the knowledge and understanding required for Outcome 1. These practical activities can be used to generate evidence for Outcome 2.

The main purpose of the Unit is to develop knowledge and understanding of systems analysis and design and to develop practical skills in applying analysis and design techniques to database related problems. For those candidates undertaking the Information Systems Course, this Unit will provide a suitable basis for undertaking the analysis and design stages of the Coursework Project.

The amount of time spent on each content area will vary depending on the teaching methodology used and the ability and prior experience of the candidates. However, the following times are suggested as a rough guide:

Overview of the systems analysis and design cycle	2 hours
Techniques used in systems analysis	4 hours
Modelling techniques	10 hours
Database design	10 hours
Application of systems analysis and design techniques	10 hours

Where this Unit is taught as part of the AH Information Systems Course, the time allocated for application of systems analysis and design techniques can be used for analysis and design activities which will contribute towards the Coursework Project.

1½ hours should be set aside to:

- ◆ administer the Outcome 1 test
- ◆ gather evidence for Outcome 2

A further 2 ½ hours is allowed for remediation and re-assessment if required.

If the Unit is delivered as part of a Course, the Course documentation will provide further information on teaching and learning in a Course context, including the identification of a number of 'themes' to facilitate holistic learning across the Course.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

National Assessment Bank tests have been created specifically to assess Outcome 1 of the Unit. This assessment consists of a closed book test, and must be conducted under supervision. In order to complete this Outcome, the candidate must achieve at least the cut-off score for the test. If a centre wishes to design its own assessments for this Unit, they should be of a comparable standard.

National Unit Specification: support notes (cont)

UNIT Database Analysis and Design (Advanced Higher)

Outcome 2 requires the candidate to demonstrate practical skills in database analysis and design. These skills will normally be demonstrated by the candidate during the analysis and design of a problem to be used as the basis of the coursework project. The candidate will be allowed access to books, notes and on-line help while completing the task(s).

The assessment of Outcome 2 is based on a record of work produced by the candidate, which may include hand-written notes and diagrams, or screen shots demonstrating user interface design. A formal report is not required for Unit assessment.

To complete this Outcome, the candidate must demonstrate practical skills in the following contexts and at an appropriate level as defined by the content statements (see Information Systems (Advanced Higher) Course content):

- ◆ creation of system specification
- ◆ normalisation (to 3NF)
- ◆ entity-relationship modelling
- ◆ creation of Data Dictionary
- ◆ entity-event modelling
- ◆ dataflow modelling
- ◆ database design using structured English
- ◆ database design using a graphical design notation
- ◆ user interface design

A pro-forma observation checklist for Outcome 2 is provided in the National Assessment Bank materials.

Hard copy evidence should be provided of one modelling technique and one design activity; this need not be formal documentation - it could include hand-written notes and diagrams, or screen shots demonstrating user interface design.

All evidence must be retained by the centre. The assessment of this Unit is subject to moderation by SQA.

CANDIDATES WITH ADDITIONAL SUPPORT NEEDS

This Unit Specification is intended to ensure that there are no artificial barriers to learning or assessment. 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. For information on these, please refer to the document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (SQA, 2004).