

**INFORMATION SYSTEMS**  
**(Intermediate 2)**

**Second Edition – published 2006**

**NOTE OF CHANGES TO ARRANGEMENTS  
SECOND EDITION PUBLISHED NOVEMBER 2006**

**COURSE TITLE:** **INFORMATION SYSTEMS**

**COURSE NUMBER:** **C216 11**

**National Course Specification**

**Course Details** No changes

**National Unit Specification(s):**

*DM4C 11 Using Information (Intermediate 2)*

Core skills statement amended to reflect core skill information in both Units.

*DM4H 11 Expert Systems (Intermediate 2)*

## National Course Specification

### INFORMATION SYSTEMS (Intermediate 2)

**COURSE CODE** C216 11

#### COURSE STRUCTURE

This Course has two mandatory Units and one optional Unit:

##### Mandatory Units:

<i>Unit Title</i>	<i>Credit and Duration</i>
<i>DM4C 11 Using Information (Intermediate 2)</i>	<i>1 credit (40 hours)</i>
<i>DM4A 11 Database Systems (Intermediate 2)</i>	<i>1 credit (40 hours)</i>

##### Optional Units — one selected from:

<i>Unit Title</i>	<i>Credit and Duration</i>
<i>DM4D 11 Applied Multimedia (Intermediate 2)</i>	<i>1 credit (40 hours)</i>
<i>DM4H 11 Expert Systems (Intermediate 2)</i>	<i>1 credit (40 hours)</i>
<i>DM4F 11 The Internet (Intermediate 2)</i>	<i>1 credit (40 hours)</i>

All Courses include 40 hours over and above the 120 hours for the Units. This may be used for induction, extending the range of learning and teaching approaches, support, consolidation, integration of learning and preparation for external assessment.

#### 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:

- ◆ Intermediate 1 Computing Studies
- ◆ Standard Grade Computing Studies at General level

#### PROGRESSION

This Course or its Units may provide progression in the following way:

- ◆ progression to Higher Information Systems
- ◆ exit to further education
- ◆ exit to employment

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#### Administrative Information

**Publication date:** November 2006

**Source:** Scottish Qualifications Authority

**Version:** 02

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## **National Course Specification: (cont)**

### **INFORMATION SYSTEMS (Intermediate 2)**

#### **CORE SKILLS**

This Course gives automatic certification of the following:

**Complete Core Skills for the Course**                                      Information Technology    Int 2

**Additional Core Skill components for the Course**                      Critical Thinking                      Int 2  
Planning and Organising    Int 2

#### **CREDIT VALUE**

The Intermediate 2 Information Systems Course is allocated 24 SCQF credit points at SCQF level 5.

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

# National Course Specification: Course details

## INFORMATION SYSTEMS (Intermediate 2)

### RATIONALE

Information and its associated technologies are having an ever increasing role in many aspects of modern life affecting work, home and leisure activities. This is recognised in the inclusion of information technology as a core skill within many contemporary qualifications and a centre piece to numerous activities. Technological developments in hardware and software permit a wide range of data types to be stored and processed in digital form to provide useful information. Such information is used extensively by individuals and organisations when making decisions and is becoming increasingly integrated into everyday practice and thinking across many disciplines.

Developments in communication technologies and the Internet have ensured that information is widely accessible. Such developments are themselves generating demand for further access to information. This inclusiveness has led to the development of an e-culture relying on information systems. In parallel with these developments has come the recognition of the need to adopt a systematic approach to using information and working with information systems. For example, disciplined approaches to the provision of information to meet user requirements have long been recognised and are well established in database design. Methodical approaches should be underpinned by technical considerations in collecting, storing, processing and communicating data in a meaningful form.

Information is a vital resource to the requirements of individuals and organisations and, as such, is worthy of detailed study and lifelong learning. The Information Systems Courses offer a progressive study from Intermediate 2, through Higher, to Advanced Higher, building on the generic skills offered within the SQA framework (Intermediate 1 and Standard Grade Computing Studies), and other awarding bodies. The Courses examines what is meant by information, how that information is produced, what purpose it serves, and, what value the information has. The Courses develop candidates' database and information skills and allow them to focus on specific aspects of Information Systems such as the Internet, Multimedia and Expert Systems.

The development of the candidate's knowledge and understanding of contemporary database systems and information skills is of primary importance, so these are the basis of the two mandatory Units in all Information Systems Courses. The Courses also focus on the value and characteristics of information in a variety of contexts, including personal, professional and educational applications. Information Systems is more than using computing tools: it develops candidate fluency and literacy in areas of critical skills, understanding of concepts, problem solving abilities, and the use of vast amounts of information with analytical skill.

Underlying the study of Information Systems are a number of **unifying themes** which will be developed and exemplified throughout the Units of the Course.

These themes are:

- ◆ the characteristics of information
- ◆ information in decision making
- ◆ an ethos of practical problem solving
- ◆ technological developments in information systems
- ◆ social, professional, ethical and legal implications associated with information systems

## **National Course Specification: Course details (cont)**

### **INFORMATION SYSTEMS (Intermediate 2)**

#### **RATIONALE (cont)**

#### **AIMS**

The aims of the Course are:

- ◆ to provide candidates with knowledge and understanding of Information Systems
- ◆ to develop candidates understanding of Information Systems design
- ◆ to develop critical skills, practical problem solving abilities and analytical skills in the use of a range of Information Systems
- ◆ to develop an awareness of modern trends in Information Systems
- ◆ to foster an appreciation and awareness of the social, professional, ethical, and legal implications of Information Systems
- ◆ to foster an appreciation of the value of information as a resource
- ◆ to foster the use of Information Systems and associated technologies

The knowledge and skills gained as part of this Course should enable the candidate to play a full and active role within the e-culture of the information society.

The Course is designed to build on prior learning at Intermediate 1 and Standard Grade General level (or their equivalents) and to provide progression to Higher Information Systems and related subjects.

## **National Course Specification: Course details (cont)**

### **INFORMATION SYSTEMS (Intermediate 2)**

#### **COURSE CONTENT**

The Course is made up of two mandatory Units, *Using Information* and *Database Systems*, and a choice of one from three optional Units.

The *Using Information* Unit develops an understanding of information, what it is, how it is used, how it is stored and when it is appropriate to use it. It builds on the foundations laid down in the corresponding Unit at Intermediate 1 level, and in Standard Grade Computing Studies, or other equivalent experience. The *Database Systems* Unit develops the candidate's knowledge and skills in using and creating databases. Because Information Systems is such a wide and rapidly developing field of study, a choice of three optional Units is offered, each one allowing the candidate to relate their learning in the mandatory Units to a contemporary aspect of Information Technology — *Applied Multimedia*, *Expert Systems* and *The Internet*.

To ensure consistency of terminology, the meanings of the technical terms used throughout this documentation (including the Unit Specifications) were taken from the British Computer Society's publication *A Glossary of Computing Terms*, 10<sup>th</sup> edition, pub. Addison-Wesley, 2002. This glossary of terms will be used as a reference for all internal and external assessments, and its use is encouraged in all teaching and learning activities.

The Unit Specifications have been fully developed and proved detailed support notes to assist assessors in their understanding of Outcomes and Performance Criteria. The detailed content for each Unit is provided in the form of a table in the content/context section of each Unit Specification.

## National Course Specification: Course details (cont)

### INFORMATION SYSTEMS (Intermediate 2)

#### Content statements

The following pages of content statements describe in detail the knowledge and understanding which a candidate should be able to demonstrate in the external Course assessments, which will sample across these content statements. In order to achieve a Course award, candidates must also demonstrate an appropriate level of problem solving skills (application, analysis, synthesis and evaluation) based on these content statements.

This table defines the terms ‘knowledge and understanding’ and ‘problem solving’ as used in these arrangements in terms of the terminology used in Bloom’s Taxonomy of Learning:

Arrangements	Bloom’s Classification	Typical skills/words
<i>Knowledge and Understanding</i>	<i>Knowledge</i>	<i>recall of information (list, state, define, label, describe, name, identify)</i>
	<i>Comprehension</i>	<i>interpreting information in own words, grasping meaning (interpret, explain, discuss, predict, summarise, classify)</i>
<i>Problem Solving</i>	<i>Application</i>	<i>application to new situations (apply, demonstrate, show, relate, explain)</i>
	<i>Analysis</i>	<i>identification of patterns, recognising relationships (analyse, arrange, order, explain, connect, infer, compare, categorise)</i>
	<i>Synthesis</i>	<i>generalise, create new ideas, bring together from different sources, draw conclusions, predict (integrate, modify, design, compose, plan, arrange)</i>
	<i>Evaluation</i>	<i>make judgements, assess ideas, compare ideas, evaluate data (judge, evaluate, recommend, justify)</i>

Throughout the Course, candidates should be made aware of common hardware and software and should be able to resolve common problems as they occur.



## **National Course Specification: Course details (cont)**

### **Intermediate 2 Information Systems: Using Information (mandatory Unit)**

The candidate must demonstrate knowledge and understanding, practical skills and problem solving based on the following content statements:

#### **Data and Information**

- ◆ Definitions and exemplification of the following terms in the context of an information system: data, information.

#### **Organisational Information Systems**

- ◆ Explanation of the following concepts in relation to Information Systems: speed, accuracy, efficiency, volume.
- ◆ Descriptions and exemplification of the functions of organisational information systems: gathering information, storing information, processing information, outputting information.
- ◆ Explanation of the need for organisational information systems management strategies: network strategy, security strategy, backup strategy, software strategy.
- ◆ Description of the impact and advantages of a centralised database within an organisation.

#### **Information Management Software**

- ◆ Description and exemplification of personal and organisational uses of the following types of applications software: Word Processing, Spreadsheet, Database, Graphics Design, Browsers, E-mail clients, chat clients, DTP, Presentation, Financial, Reference, Web Authoring.
- ◆ Description of standard word processing software in terms of data objects, operations and formatting functions.
- ◆ Description of standard spreadsheet software in terms of data objects, operations and formatting functions.
- ◆ Evaluation of software in terms of: range of data objects, range of operations, formatting functions, HCI (including use of keyboard commands, menus and toolbars/icons), online help and online tutorials.

#### **Implications of ICT**

- ◆ Description and exemplification of the social implications of ICT in terms of: ease of access and availability of IS, information rich/poor and the impact of IS on social structures, educational qualifications and the need for citizens to be ICT aware, the range of jobs in industries that employ knowledge worker, online retail and changing shopping habits.
- ◆ Description and exemplification of the legal implications of:
  - Data Protection Act (1998): data protection principles; rights of data subject; responsibilities of data controller; role of the Information Commissioner
  - Computer Misuse Act (1990): offences
  - Copyright, Designs & Patents Act (1988): works covered; copyright ownership; use of copyrighted material
  - Health & Safety regulations: seating, lighting, RSI, eye strain and radiation
- ◆ Description and exemplification of the economic implications of ICT in terms of: the type of jobs and associated costs within various modern organisations, the effect of new ICT on business and individuals productivity and profitability.
- ◆ Description and exemplification of the ethical implications of ICT in terms of: netiquette in both personal and business contexts, Information Intellectual Property Rights.

## **National Course Specification: Course details (cont)**

### **Intermediate 2 Information Systems: Database Systems (mandatory Unit)**

The candidate must demonstrate knowledge and understanding, practical skills and problem solving based on the following content statements:

#### **Database Fundamentals**

- ◆ Description of the benefits of an electronic database system in comparison with manual data storage, including searching and sorting, data retrieval, data storage and updating, data analysis and reporting.

#### **Entities and Data Relationships**

- ◆ Description and exemplification of simple data entities, in terms of the following attributes: name, multi-valued or single valued, data type (text, integer, real, object, date, time).

#### **Data Modelling Concepts**

- ◆ Design and creation of data tables, including consideration of: table names, fields (name and type), keys (primary and foreign), validation (presence, restricted choice).
- ◆ Description and exemplification of the following field types: text, number, object, link, date, time, Boolean.
- ◆ Identification of the limitations of flat file databases, and the advantages of linked tables (relational databases).

#### **Normalisation**

- ◆ Explanation of normalisation.
- ◆ Identification of entities with a single one-to-many relationship between them in a single source document.
- ◆ Identification and removal of multi-valued fields in records.

#### **Implementation**

- ◆ Implementation of database system based on data table.
- ◆ Description and implementation of simple queries including: sorting (two fields, ascending/descending), searching (two fields).
- ◆ Description and implementation of data input forms and simple reports.
- ◆ Implementation of consistent, user-friendly user interface and screen design.

## **National Course Specification: Course details (cont)**

### **Intermediate 2 Information Systems: Applied Multimedia (optional Unit)**

The candidate must demonstrate knowledge and understanding, practical skills and problem solving based on the following content statements:

#### **Contemporary Uses and Means of Delivery**

- ◆ Simple description and exemplification of how multimedia applications are used in the following areas:
  - business (advertising and selling products, presentations)
  - education (CAL, reference materials)
  - home (games, leisure pursuits)
  - public places (information points)
- ◆ Exemplification of appropriate uses for delivery media: CD-ROM/DVD-ROM, kiosk, WWW
- ◆ Comparison of delivery media in terms of: data capacity, ease of update

#### **Stages of Development — Analysis**

- ◆ Identification of the following aspects of the analysis stage: purpose, user/audience, content, delivery media, budget, timescale.

#### **Stages of Development — Design of navigation structures and HCI**

- ◆ Simple representation using navigation maps of the different types of navigation structures to include: linear, hierarchical, web.
- ◆ Description and use of complex search facilities (AND).
- ◆ Description of user interfaces: CLI, menu, form fill-in, direct manipulation (GUI).

#### **Stages of Development — Design of screens and media elements**

- ◆ Description and use of storyboarding to represent the design of screens including: layout of screen elements, user interface, transitions, navigation.
- ◆ Description and use of general design principles (text): quantity of text, choice of font(s), alignment and size, consistency in headings/subheadings/body, use of lists and tables, use of white space.
- ◆ Description and use of general design principles (graphics): number of graphics per screen, captions, text wrap.
- ◆ Description and use of general design principles (audio): advantages/disadvantages of background music, sound effects, user controlled (volume, on/off), voice output.

#### **Stages of Development — Implementation (general)**

- ◆ Description of the basic functions and features of software for creating multimedia applications: presentation, authoring (icon-based and scripting), web-page.
- ◆ Comparison of the different types of software for creating multimedia applications in terms of: ease of use, cost, programming requirements.
- ◆ Basic description of personnel and their role: project manager, multimedia designer, subject expert, media specialists (graphic, audio), multimedia programmer, webmaster.

#### **Stages of Development — Implementation (media elements)**

- ◆ Explanation of how colour depth and resolution affect the file size and clarity of graphics.
- ◆ Explanation of how sampling rate and sampling depth (sampling resolution) affect the file size and audio quality.
- ◆ Explanation of the need for compression.
- ◆ Definition of the terms node, link and anchor.

## **National Course Specification: Course details (cont)**

### **Intermediate 2 Information Systems: Applied Multimedia (optional Unit) (cont)**

#### **Stages of Development — Testing**

- ◆ Explanation of the need for testing.
- ◆ Simple description and exemplification of different tests that should be carried out including: screen tests, navigation tests.

#### **Stages of Development — Documentation**

- ◆ Identification of the contents and purpose of user documentation including: hardware and software system requirements, user instructions.
- ◆ Description of need for clearly documented copyright licenses including Copyright, Design & Patents Act.

#### **Stages of Development — Evaluation**

- ◆ Evaluation of a multimedia application in terms of fitness for purpose.

## National Course Specification: Course details (cont)

### Intermediate 2 Information Systems: Expert Systems (optional Unit)

The candidate must demonstrate knowledge and understanding, practical skills and problem solving based on the following content statements:

#### Expert Systems in context

- ◆ Description of the purpose of an expert system: to represent the knowledge of one or more domain experts; to provide advice to a user via a consultation; to provide explanations of why certain questions are being asked and how conclusions have been reached.
- ◆ Definition of an 'expert system shell'.
- ◆ Identification of applications for expert systems, including medical, legal and financial advice.
- ◆ Distinction between knowledge (created by the application of inference rules to known facts), data and information.
- ◆ Identification of the components of an expert system: knowledge base, inference engine, user interface.
- ◆ Identification of the categories of expert system: planning, advice, classification, diagnosis.
- ◆ Classification of example expert systems into these categories.

#### Characteristics of Expert Systems

- ◆ Description of the main features of the knowledge base: contains facts and rules.
- ◆ Representation of knowledge as rules and factor tables.
- ◆ Description of the main features of the inference engine: to determine the order in which rules are applied, and hence questions are asked.
- ◆ Identification of inferencing methods: forward and backward chaining.
- ◆ Description of advantages and disadvantages of forward and backward chaining.
- ◆ Description of the main functions of the user interface: to ask questions and obtain answers from the user; to display advice; to justify questions and answers.

#### Development, use and evaluation of Expert Systems

- ◆ Identification of the principal personnel in the development of an expert system: domain expert, knowledge engineer, programmer, user.
- ◆ Identification of the stages of development of an expert system: knowledge acquisition/elicitation, knowledge representation, system validation.
- ◆ Querying of the expert system to answer simple structured questions.
- ◆ Testing of an expert system using a set of structured test cases.
- ◆ Use of How and Why justification facilities.
- ◆ Evaluation of an expert system, in terms of: purpose (type of expert system, domain of expertise); range and coverage of rules; quality of user interface (structure/syntax/order of questions asked, presentation of conclusion; quality of explanation facilities).

#### Construction of a working Expert System

- ◆ Description and demonstration of techniques of analysis, design, implementation, testing and evaluation of an expert system.
- ◆ Derivation of suitable attribute-value pairs, from a short piece of structured text, not involving multi-valued attributes.
- ◆ Representation of attribute-value pairs as a factor table and as a decision tree.
- ◆ Derivation of structured rules involving multiple (up to three) conditions to represent knowledge.
- ◆ Construction of forward or backward chaining rules (in pseudocode or appropriate KRL).
- ◆ Construction of a rule base of 5—10 rules, leading to direct conclusions without rule chaining.
- ◆ Production of structured questions, including some multi-response.

## **National Course Specification: Course details (cont)**

### **Intermediate 2 Information Systems: Expert Systems (optional Unit) (cont)**

- ◆ Entry of rules into an expert system shell.
- ◆ Debugging of rules to produce a working system.
- ◆ Testing of expert system using a given set of structured test cases.

## **National Course Specification: Course details (cont)**

### **Intermediate 2 Information Systems: The Internet (optional Unit)**

The candidate must demonstrate knowledge and understanding, practical skills and problem solving based on the following content statements:

#### **Internet Fundamentals**

- ◆ Description and explanation of the following concepts in relation to Internet operation and usage: Internet hosting, packets, TCP/IP, IP addresses and routing, bandwidth, hardware components (router, switch, multiplexer), physical structure and topology of the Internet.
- ◆ Description of the need for protocols.
- ◆ Description of the purpose of the following protocols: http, FTP, POP/SMTP.
- ◆ Description and explanation of the social, ethical and legal implications of the Internet including effects on: family, employment, information rich and poor.
- ◆ Explanation of issues related to censorship and privacy.

#### **Services and resources provided by the Internet**

- ◆ Description of the main features of the following Internet services and resources, or contemporary replacements: World Wide Web (WWW), e-mail (web and client based), conferencing and newsgroups, file transfer and file updating, chat/instant messaging.
- ◆ Exemplification of the uses of these services in business, educational and personal contexts.
- ◆ Description and effective use of internet browser software, including navigation, search and save facilities.
- ◆ Description and effective use of search engines, including Boolean searching.
- ◆ Description of main features and uses of a range of Internet advanced search services.
- ◆ Explanation of the need for and use of virus protection, including the need for regular updating of virus protection software.

#### **Internet Developments**

- ◆ Description of current trends in Internet development with regard to the influence of the following on system performance: communications hardware, browsing software, security software.

#### **Construction of Internet web pages**

- ◆ Description of the main features of web authorising packages (icon based, web tools, scripting tools, hyperlinks, file structure).
- ◆ Description and exemplification of: absolute page addressing, relative page addressing, picture compression.
- ◆ Explanation of the problems associated with absolute addressing, and the need for picture compression.
- ◆ Demonstration and exemplification of the creation of web page with links to other pages on same site.

## **National Course Specification: Course details (cont)**

### **INFORMATION SYSTEMS (Intermediate 2)**

#### **ASSESSMENT**

To achieve the Course award the candidate must pass the Units as well as the Course assessment. The candidate's grade is based on the Course assessment.

The Course is made up of two mandatory Units and one from a choice of three optional Units.

#### **Unit assessment**

Unit assessment consists of knowledge tests and a practical skills checklist. The knowledge test is a closed book test, under supervision, lasting no more than 45 minutes. The practical skills can be demonstrated through a single extended task or a number of smaller tasks.

Further details about the Unit assessment can be found in each of the Unit Specifications.

#### **DETAILS OF THE INSTRUMENTS FOR COURSE ASSESSMENT**

Course assessment provides opportunities to demonstrate:

- ◆ retention of knowledge, understanding and skills over a longer period of time
- ◆ integration of knowledge, understanding and skills acquired in the Units
- ◆ application of knowledge, understanding and skills in more complex contexts
- ◆ application of knowledge, understanding and skills in less familiar contexts

The Course assessment for Information Systems at Intermediate 2 level will consist of two components:

- ◆ practical coursework task
- ◆ question paper

The purpose of the question paper is to assess the candidate's competence to integrate and retain knowledge and understanding and demonstrate higher order cognitive abilities across the contents of all the Units, and in varied contexts, and to demonstrate the ability to communicate computing concepts clearly.

The practical coursework task provides candidates with the opportunity to demonstrate and integrate the practical skills, knowledge and understanding from the Units, and apply these in a more complex practical context.

#### **Practical coursework task**

Candidates will undertake a practical coursework task provided by SQA. The task may be undertaken in 'open book' conditions, but under supervision, to ensure that the work presented is the candidate's own work. The task will be marked internally, using a marking scheme provided by SQA, but be subject to moderation. The marking scheme will provide a mark out of 30, which will be submitted directly to SQA.



## National Course Specification: Course details (cont)

### INFORMATION SYSTEMS (Intermediate 2)

#### Question paper

The question paper will comprise a single paper of 1 hours and 30 minutes duration. The total marks available will be 70. The examination will be set and marked by SQA. The paper will be composed of three sections:

#### **SECTION 1 (15 marks)**

This will consist of objective and short response questions which sample across the content statements of the two mandatory Units. These questions will test both knowledge and understanding and problem solving. Approximately 2/3 of the marks will be for knowledge and understanding, and 1/3 for problem solving. The problem solving will be based in familiar contexts and be of a fairly straightforward nature. Candidates will be expected to tackle all questions.

#### **SECTION 2 (30 marks)**

This will consist of questions requiring extended responses requiring structuring and reasoning. These questions will involve both knowledge and understanding and problem solving, and will be set in less familiar and more complex contexts than those in Section 1. Approximately 1/3 of the marks will be for knowledge and understanding and 2/3 for problem solving. The questions will sample across the content statements associated with the mandatory Units, and will require some integration of knowledge across the two Units. Candidates will be expected to tackle all questions.

#### **SECTION 3 (25 marks)**

This will have three sub-sections, one for each of the optional Units. Candidates will be expected to tackle all the questions within one sub-section. The questions will require extended responses from candidates. Approximately 1/3 of the marks will be for knowledge and understanding, and 2/3 for problem solving as in Section 2, and the questions, which will sample across the content statements for the optional Unit, will also require some integration of knowledge from the mandatory Units.

*Note: refer to the table on page 6 of these arrangements for guidance on the meaning of the terms 'knowledge and understanding' and 'problem solving' in this context.*

Further details about assessment for this Course can be found in NAB materials, the Course Assessment Specification, the Specimen Question Paper and the specimen coursework task.

## National Course Specification: Course details (cont)

### INFORMATION SYSTEMS (Intermediate 2)

#### GRADE DESCRIPTIONS AT A AND C

The candidate's grade will be based on the total score obtained from the Course assessment by adding the marks from the practical coursework task and the question paper. The descriptions below indicate the nature of achievement required for the award at grade C and A in the Course.

GRADE C	GRADE A
<b>♦ retention of knowledge, understanding and skills over a longer period of time</b>	
Candidates are able to describe and explain <b>some</b> of the facts and concepts to the standard defined by the Performance Criteria.	Candidates are able to describe and explain <b>most</b> of the facts and concepts to the standard defined by the Performance Criteria.
Candidates are able to demonstrate <b>some</b> practical skills to the standards defined by the Performance Criteria.	Candidates are able to demonstrate <b>most</b> of the practical skills to the standards defined by the Performance Criteria.
<b>♦ integration of knowledge, understanding and skills acquired in component Units</b>	
Candidates are able to demonstrate their knowledge and understanding in the context of specific Units.	Candidates are able to demonstrate the <b>integration</b> of knowledge and understanding from more than one Unit.
Candidates are able to demonstrate their practical skills in the context of specific Units.	Candidates are able to demonstrate the <b>integration</b> of practical skills from more than one Unit.
<b>♦ application of knowledge, understanding and skills in more complex contexts</b>	
Candidates are able to apply knowledge and understanding to solve problems in straightforward contexts relating to a single Unit.	Candidates are able to apply knowledge and understanding to solve problems in <b>more complex contexts relating to more than one Unit</b> .
Candidates are able to apply practical skills to solve problems in straightforward contexts relating to a single Unit.	Candidates are able to apply practical skills to solve problems in <b>more complex contexts relating to more than one Unit</b> .
<b>♦ application of knowledge, understanding and skills in less familiar contexts</b>	
Candidates are able to apply knowledge, understanding and skills to solve problems in familiar contexts.	Candidates are able to apply and <b>transfer</b> knowledge, understanding and skills to solve problems in <b>less familiar contexts</b> .
Candidates are able to carry out defined tasks to the standards defined in the Performance Criteria.	Candidates are able to <b>resolve non-routine problems</b> that arise during practical activity, <b>by independent research</b> .

## National Course Specification: Course details (cont)

### INFORMATION SYSTEMS (Intermediate 2)

#### ESTIMATES AND APPEALS

##### Estimates

In preparing estimates, evidence of performance should be considered across the breadth of coverage of the content of the Course and must take account of performance in both of the Course components, the coursework task and the question paper. Further advice on the preparation of estimates is given in the Course Assessment Specification.

##### Appeals

Evidence used to support appeals for the Question Paper component must come from an integrated test (or tests) adequately reflecting the Course content and Grade Descriptions.

Although a “prelim” examination is not mandatory, it can provide the opportunity for a candidate to demonstrate problem solving skills, integration across Units, and the application of knowledge in more complex and less familiar contexts as in the external examination. Any prelim should replicate the style, level of demand and mark allocation of the Specimen SQA examination.

Centres that submit an integrated test or prelim that only covers the knowledge and understanding of Units 1 and 2 should also submit an additional test covering the knowledge and understanding of Unit 3. Furthermore, this additional test must integrate some knowledge and understanding from Unit 1 and Unit 2.

The coursework task which has been completed and marked internally (with the mark submitted to SQA by the due date) is expected to represent a candidate’s best practical work. Additional evidence of problem solving in practical contexts does not require to be submitted for appeals.

While it is acceptable for centres generating their own test materials to draw on past SQA question papers or commercial papers from previous years, such papers **must not** be used in their entirety. Where material from past papers is used, a judicious selection of items and/or appropriate adaptation is required to make this acceptable as evidence to support an appeal. Items from past SQA papers may also be supplemented or replaced by internally devised materials.

Whatever approach is taken to the creation of prelim papers or other assessment items, centres must be certain that the material has not been seen previously by the candidates.

NABs are designed to allow candidates to demonstrate the knowledge and understanding and practical skills required to pass the Units. NABs do not provide opportunities for the candidate to demonstrate problem solving skills, integration across Units, and application of knowledge in more complex and less familiar contexts, and therefore do not provide sufficient evidence for appeals.

#### QA STATEMENT

All National Courses are subject to external marking and/or moderation. External markers, visiting examiners and moderators are trained by SQA to apply national standards. SQA is currently seeking to assist centres by preparing exemplification of standards materials in a number of subject areas. This will be rolled out to all subjects in due course.

The Units of all Courses are subject to internal moderation and may also be chosen for external moderation. This is to ensure that national standards are being applied across all subjects.

## **National Course Specification: Course details (cont)**

### **INFORMATION SYSTEMS (Intermediate 2)**

Courses may be assessed by a variety of methods. Where marking is undertaken by a trained marker in their own time, markers meetings are held to ensure that a consistent standard is applied. The work of all markers is subject to scrutiny by the Principal Assessor and a PA report is published for all subjects.

## **National Course Specification: Course details (cont)**

### **INFORMATION SYSTEMS (Intermediate 2)**

#### **APPROACHES TO LEARNING AND TEACHING**

The main aims of the Course are:

- ◆ to provide candidates with knowledge and understanding of Information Systems
- ◆ to develop candidates understanding of Information Systems design
- ◆ to develop critical skills, practical problem solving abilities and analytical skills in the use of a range of Information Systems
- ◆ to develop an awareness of modern trends in Information Systems
- ◆ to foster an appreciation and awareness of the social, professional, ethical, and legal implications of Information Systems
- ◆ to foster an appreciation of the value of information as a resource
- ◆ to foster the use of Information Systems and associated technologies

There is no prescriptive ‘best way’ to approach the teaching and learning of this Course. However, a holistic approach is recommended which relates each of these aims to the computing facts and concepts being studied. Within each Unit, there is a combination of knowledge and understanding with practical problem solving skills. Those delivering the Course are encouraged to provide learning experiences which blend together the acquisition of knowledge and understanding, the development of practical skills and opportunities to apply these to solve problems.

Throughout the Course, reference should be made to professional, social, ethical and legal implications where appropriate, and to ‘real world’ applications. Candidates should be encouraged to develop the use of appropriate computing terminology to communicate their understanding.

Related to the Course aims, a number of unifying themes have been identified which should be used to bring a coherence to the Course. Most of these themes can be illustrated and exemplified in each of the component Units of the Course. These themes include:

- ◆ the characteristics of information
- ◆ information in decision making
- ◆ an ethos of practical problem solving
- ◆ technological developments in information systems
- ◆ social, professional, ethical and legal implications associated with information systems

The Course has been designed to articulate with the Intermediate 2 Information Systems Course. The content/context grids in the support notes for each Unit show how the content and contexts at Higher extend and deepen the Intermediate 2 Unit content. This should assist teachers and lecturers who have to work with bi-level classes to design an appropriate Course plan.

Candidates will require individual access to appropriate computer hardware and software throughout the Course. More detailed guidance is given within the support notes for each Unit.

Those delivering the Course are encouraged to make use of the wide range of teaching and learning materials (both paper-based and electronic) which have been developed to support this Course.

## National Course Specification: Course details (cont)

### INFORMATION SYSTEMS (Intermediate 2)

#### APPROACHES TO TEACHING AND LEARNING (cont)

The Units of the Course may be taught sequentially or in parallel (or a combination of these). When taught sequentially the *Using Information* Unit should be taught before the *Database Systems* and optional Units. The latter Units are designed to build on and exemplify key concepts of *Using Information* within contemporary developing areas of Information Systems. The practical coursework task is designed to allow candidates to demonstrate and integrate practical skills and knowledge they have developed within component Units, and so should not be undertaken until at least the two mandatory Units have been covered.

A typical Course plan might, therefore, take the form:

August – October	Using Information
October – December	Database Systems
January	practical coursework task
January	preparation for prelim examination (s)
February – March	optional Unit
April	flexible time

Preliminary examinations, if used, should be timed to allow maximum coverage of the three Course Units. This can be achieved by holding the prelim as late as possible (end of March), or by having an early prelim covering two Units, with a supplementary prelim later covering the third Unit and integration with the mandatory Units.

The teaching and learning and internal assessment of the three component Units of the Course is designed to be completed within 120 hours. This includes practical activities in preparation for the practical Coursework task. As centres are advised to allow 160 hours for the delivery of a National Course, this leaves up to 40 hours of flexible time.

#### Use of the additional 40 hours

Appropriate activities for this time include:

- ◆ an introduction to the Course
- ◆ revision of required prior learning
- ◆ consolidation and integration of learning
- ◆ remediation and re-assessment
- ◆ formative assessment (class tests)
- ◆ preliminary examination(s)
- ◆ preparation for external assessment
- ◆ completion of the practical coursework task
- ◆ extending the range of study

## National Course Specification: Course details (cont)

### INFORMATION SYSTEMS (Intermediate 2)

#### SPECIAL NEEDS

This Course 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 alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September, 2003).

#### INFORMATION SYSTEMS IN A BROADER CONTEXT

A number of national initiatives and programmes have been designed to promote themes that are important to contemporary society such as citizenship and enterprise. These themes contribute to individual subjects and Courses by making connections beyond the subject boundaries and enrich the learning experience. Similarly, the specialist knowledge and skills developed through study of a particular subject contributes to the understanding of these themes.

There are opportunities within Information Systems (Intermediate 2) for assessors to help candidates make links to cross-curricular themes. Some suggestions are given below.

<b>Cross-curricular theme</b>	<b>Course content</b>
Enterprise in Education	Focused career education through understanding of careers information handling with ICT
	Understanding how multimedia is being used in business, education and leisure
	Focussed career education through understanding of careers in expert system development and multimedia design
Education for Citizenship	Understanding how the use of Internet services can support business, education and leisure
	Understanding and respecting the legal requirements of using ICT to manage information
	Developing skills to locate, handle, use and compile information using ICT as appropriate
Financial Education	Understanding the rights, responsibilities and protection offered by copyright law
	Issues relating to shopping around for the best deal when using the internet as a consumer
Health Education	Importance of netiquette in maintaining good relationships when using ICT communications
	Understanding the elements of screen design which impact well or badly on the user
	Understanding that relationships developed through the internet must be based on a respect for the social, ethical and legal implications of using the internet

## National Unit Specification: general information

<b>UNIT</b>	Using Information (Intermediate 2)
<b>NUMBER</b>	DM4C 11
<b>COURSE</b>	Information Systems (Intermediate 2)

### SUMMARY

This Unit is designed to develop knowledge and understanding of the principles, features and purposes of information and the systems used to retrieve, create and manipulate information. It also develops knowledge and understanding of the wide-ranging implications of the growing use of information systems within society. It provides an opportunity to develop practical skills in the use of contemporary information handling. Candidates may then apply this knowledge and skills to solve practical problems. The Unit is designed for candidates undertaking the Intermediate 2 Information Systems Course, but is also suitable for anyone wishing to develop a basic understanding of the use of computer applications in a variety of contexts.

### OUTCOMES

1. Demonstrate knowledge and understanding of the principles, features and purposes of information, organisational information systems, information management software, and the social, legal, ethical and economic implications of information systems.
2. Demonstrate practical skills in the use of contemporary hardware and software in the context of creating, storing, processing and retrieving information.

### 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:

- ◆ Intermediate 1 Information and the Internet Unit
- ◆ Intermediate 1 Computing Studies Course
- ◆ Standard Grade Computing Studies at General level

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### Administrative Information

<b>Superclass:</b>	CY
<b>Publication date:</b>	November 2006
<b>Source:</b>	Scottish Qualifications Authority
<b>Version:</b>	02

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## National Unit Specification: general information (cont)

**UNIT** Using Information (Intermediate 2)

### **CREDIT VALUE**

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5\*).

*\* 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**

This Unit gives automatic certification of the following:

<b>Core Skill components for the Unit</b>	Critical Thinking	Int 2
	Planning and Organising	Int 2

## **National Unit Specification: statement of standards**

### **UNIT**      Using Information (Intermediate 2)

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, features and purposes of information, organisational information systems, information management software, and the social, legal, ethical and economic implications of information systems.

#### **Performance Criteria**

- a) Basic terminology is used appropriately.
- b) Simple descriptions and explanations are related to practical and familiar contexts.
- c) Simple conclusions, predictions and generalisations are made from knowledge and understanding.

#### **Evidence Requirements**

Written or oral evidence that the candidate can describe, explain and apply the principles, features and techniques of information systems 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 content (see Information Systems (Intermediate 2) Course Content) in each of the following areas:

- ◆ data and information
- ◆ organisational information systems
- ◆ information management software
- ◆ implications of information and communications technology

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

The standard to be applied 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.

## **National Unit Specification: statement of standards (cont)**

### **UNIT**      Using Information (Intermediate 2)

#### **OUTCOME 2**

Demonstrate practical skills in the use of contemporary hardware and software in the context of creating, storing, processing and retrieving information.

#### **Performance Criteria**

- a) A range of appropriate hardware is used effectively.
- b) Common features of software are selected and used effectively.
- c) Practical tasks are planned and organised with detailed guidance.
- d) Practical tasks are undertaken in an appropriate range of simple contexts.

#### **Evidence Requirements**

Observation checklist showing that the candidate has carried out practical activities in each of the following contexts:

- ◆ Use of basic functions and features of an appropriate standard application package in the context of processing and retrieving information.
- ◆ Use of basic functions and features of an appropriate standard application package in the context of creating and storing information.

Hard copy evidence should be provided for both of these activities, involving two different types of application package.

These practical skills may all be demonstrated in a single extended task, or in a number of smaller tasks.

The practical skills should be demonstrated in the context and at a level defined by the content statements (see Information Systems (Intermediate 2) Course Content).

The candidate will be allowed access to books, notes and online help while completing the tasks.

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

The standard to be applied 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.

## National Unit Specification: support notes

### UNIT Using Information (Intermediate 2)

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

<b>Content Statements: Data and Information</b>
Definitions and exemplification of the following terms in the context of an information system: <ul style="list-style-type: none"><li>◆ data</li><li>◆ information</li></ul>

<b>Content Statements: Organisational Information Systems</b>
Explanation of the following concepts in relation to organisational information systems: <ul style="list-style-type: none"><li>◆ speed</li><li>◆ accuracy</li><li>◆ efficiency</li><li>◆ volume</li></ul>
Descriptions and exemplification of the functions of organisational information systems: <ul style="list-style-type: none"><li>◆ gathering information</li><li>◆ storing information</li><li>◆ processing information</li><li>◆ outputting information</li></ul>
Explanation of the need for organisational information systems management strategies: <ul style="list-style-type: none"><li>◆ network strategy</li><li>◆ security strategy</li><li>◆ backup strategy</li><li>◆ upgrade strategy</li><li>◆ software strategy</li></ul>
Description of the impact and advantages of a centralised database within an organisation.

## National Unit Specification: support notes (cont)

### UNIT Using Information (Intermediate 2)

<b>Content Statements: Information Management Software</b>
<p>Description and exemplification of personal and organisational uses of the following types of applications software:</p> <ul style="list-style-type: none"> <li>◆ word processing</li> <li>◆ spreadsheet</li> <li>◆ database</li> <li>◆ graphics design</li> <li>◆ browsers</li> <li>◆ email clients</li> <li>◆ chat clients</li> <li>◆ DTP</li> <li>◆ presentation</li> <li>◆ financial</li> <li>◆ reference</li> <li>◆ web authoring</li> </ul>
<p>Descriptions of standard word processing software in terms of data objects, operations and formatting functions.</p>
<p>Description of standard spreadsheet software in terms of data objects, operations and formatting functions.</p>
<p>Evaluation of different types of application software in terms of:</p> <ul style="list-style-type: none"> <li>◆ range of data objects</li> <li>◆ range of operations</li> <li>◆ formatting functions</li> <li>◆ HCI (including use of keyboard commands, menus and toolbars/icons)</li> <li>◆ online help and online tutorials</li> </ul>

<b>Content Statements: Implications of ICT</b>
<p>Description and exemplification of the social implications of ICT in terms of:</p> <ul style="list-style-type: none"> <li>◆ ease of access and availability of IS</li> <li>◆ information rich/poor and the impact of IS on social structures</li> <li>◆ educational qualifications and the need for citizens to be ICT aware</li> <li>◆ the range of jobs in industries that employ knowledge worker</li> <li>◆ online retail and changing shopping habits</li> </ul>
<p>Description and exemplification of the legal implications of information systems in terms of:</p> <ul style="list-style-type: none"> <li>◆ Data Protection Act (1998): data protection principles; rights on data subject; responsibilities of data controller; role of the Information Commissioner</li> <li>◆ Computer Misuse Act (1990) offences</li> <li>◆ Copyright, Designs &amp; Patents Act (1988): works covered; copyright ownership; use of copyrighted material</li> <li>◆ health and safety regulations: seating, lighting, RSI, eye strain and radiation</li> </ul>
<p>Description and exemplification of the economic implications of ICT in terms of :</p> <ul style="list-style-type: none"> <li>◆ the type of jobs and associated costs within various modern organisations</li> <li>◆ the effect of new ICT on business and individuals productivity and profitability</li> </ul>
<p>Description and exemplification of the ethical implications of ICT in terms of:</p> <ul style="list-style-type: none"> <li>◆ netiquette in both personal and business contexts</li> <li>◆ Information Intellectual Property Rights</li> </ul>

## National Unit Specification: support notes (cont)

### UNIT Using Information (Intermediate 2)

#### 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. For Outcome 2 the practical activities should be taught and used to illustrate and exemplify the knowledge and understanding required for Outcome 1.

Those delivering the Course should choose appropriate contexts to exemplify the concepts of the Course. Suitable contexts might include financial institutions, educational establishments, small and large businesses, manufacturing and retail, service industries.

The amount of time spent on each area of content 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:

Data and Information	2 hours
Organisational Information Systems	6 hours
Information Management Software	18 hours
Implications of Information and Communications Technology	10 hours

1½ hours should be set aside to:

- a) administer the Outcome 1 test
- b) gather evidence for Outcome 2

A further 2½ 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.

## National Unit Specification: support notes (cont)

### UNIT Using Information (Intermediate 2)

#### 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 examination conditions. In order to gain success in 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.

Outcome 2 requires the candidate to demonstrate practical skills while using contemporary hardware and software. These practical skills will normally be demonstrated in the context of a number of relatively short tasks. However, they may be demonstrated in the context of a single extended task. The tasks will normally be demonstrated by the candidate during the teaching and learning activities of the Unit, rather than as separate formal assessment activities. The candidate will be allowed access to books, notes and online help while completing the tasks.

To gain success in this Outcome, the candidate must demonstrate practical skills at an appropriate level in each of the following contexts, as defined in the content statements (see Information Systems (Intermediate 2) Course Content):

- ◆ Use of basic functions and features of an appropriate standard application package in the context of processing and retrieving information.
- ◆ Use of basic functions and features of an appropriate standard application package in the context of creating and storing information.

Hard copy evidence should be provided for both of these activities, involving two different types of application package.

An observation checklist for Outcome 2 is provided in the National Assessment Bank materials.

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

#### 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 information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September, 2003).

## National Unit Specification: general information

<b>UNIT</b>	Database Systems (Intermediate 2)
<b>NUMBER</b>	DM4A 11
<b>COURSE</b>	Information Systems (Intermediate 2)

### SUMMARY

This Unit is designed to develop knowledge and understanding of the principles of database systems and provides an opportunity to apply this knowledge to solve problems through the use of contemporary hardware and software. It is designed for candidates undertaking the Intermediate 2 Information Systems Course, but is also suitable for anyone wishing to develop a basic understanding of Database Systems.

### OUTCOMES

1. Demonstrate knowledge and understanding of the principles, features and techniques of database systems.
2. Demonstrate practical skills using contemporary hardware and software in the context of database systems.

### 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:

- ◆ Intermediate 1 Computer Applications Unit
- ◆ Intermediate 1 Computing Studies Course
- ◆ Standard Grade Computing Studies at General level

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### Administrative Information

<b>Superclass:</b>	CD
<b>Publication date:</b>	August 2005
<b>Source:</b>	Scottish Qualifications Authority
<b>Version:</b>	01

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## National Unit Specification: general information (cont)

**UNIT** Database Systems (Intermediate 2)

### CREDIT VALUE

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5\*).

*\* 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

This Unit gives automatic certification of the following:

<b>Core Skill components for the Unit</b>	Critical Thinking	Int 2
	Planning and Organising	Int 2

## **National Unit Specification: statement of standards**

### **UNIT Database Systems (Intermediate 2)**

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, features and techniques of database systems.

#### **Performance Criteria**

- a) Basic database terminology is used appropriately.
- b) Simple descriptions and explanations are related to practical and familiar contexts.
- c) Simple conclusions, predictions and generalisations are made from knowledge and understanding.

#### **Evidence Requirements**

Written or oral evidence that the candidate can describe, explain and apply the principles, features and techniques of database systems 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 a content (see Information Systems (Intermediate 2) Course Content) in each of the following areas:

- ◆ database fundamentals
- ◆ entities and data relationships
- ◆ data modelling concepts
- ◆ normalisation
- ◆ implementation

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

The standard to be applied 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.

## **National Unit Specification: statement of standards (cont)**

### **UNIT Database Systems (Intermediate 2)**

#### **OUTCOME 2**

Demonstrate practical skills using contemporary hardware and software in the context of database systems.

#### **Performance Criteria**

- a) A range of appropriate hardware is used effectively.
- b) Common features of software are selected and used effectively.
- c) Practical tasks are planned and organised with detailed guidance.
- d) Practical tasks are undertaken in an appropriate range of simple contexts.

#### **Evidence Requirements**

Observation checklist showing that the candidate has carried out practical activities in each of the following contexts:

- ◆ design of data table from source document
- ◆ design of user interface/screen design
- ◆ creation of database (including interface) from design
- ◆ implementation of queries
- ◆ creation of simple forms and reports

Hard copy evidence should be provided of the database implementation.

These practical skills may all be demonstrated in a single extended task, or in a number of smaller tasks.

The practical skills should be demonstrated in the context and at a level defined by the content statements (see Information Systems (Intermediate 2) Course Content).

The candidate will be allowed access to books, notes and online help while completing the tasks.

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

The standard to be applied 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.

## National Unit Specification: support notes

### UNIT Database Systems (Intermediate 2)

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).

<b>Content Statements: Database fundamentals</b>
Description of the benefits of an electronic database system in comparison with manual data storage, including: <ul style="list-style-type: none"><li>◆ searching and sorting</li><li>◆ data retrieval</li><li>◆ data storage and updating</li><li>◆ data analysis and reporting</li></ul>
<b>Content Statements: Entities and data relationships</b>
Description and exemplification of simple data entities, in terms of the following attributes: <ul style="list-style-type: none"><li>◆ name</li><li>◆ multi-valued or single valued</li><li>◆ data type (text, integer, real, object, date, time)</li></ul>
<b>Content Statements: Data Modelling</b>
Design and creation of data tables, including consideration of: <ul style="list-style-type: none"><li>◆ table names</li><li>◆ fields (name and type)</li><li>◆ keys (primary and foreign)</li><li>◆ validation (presence, restricted choice)</li></ul> <p>Description and exemplification of the following field types: text, number, object, link, date, time, Boolean.</p> <p>Identification of the limitations of flat file databases, and the advantages of linked tables (relational databases).</p>
<b>Content Statements: Normalisation</b>
Explanation of normalisation.
Identification of entities with a single one-to-many relationship between them in a single source document.
Identification and removal of multi-valued fields in records.

## National Unit Specification: support notes (cont)

### UNIT Database Systems (Intermediate 2)

Content Statements: Implementation
Implementation of database system based on data table.
Description and implementation of simple queries including. <ul style="list-style-type: none"><li>◆ sorting (two fields, ascending/descending)</li><li>◆ searching (two fields)</li></ul>
Description and implementation of data input forms and simple reports.
Implementation of consistent, user-friendly user interface and screen design.

#### 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. Appropriate practical activities should be taught and used to illustrate and exemplify the knowledge and understanding required for Outcome 1.

Candidates who have completed the *Computer Applications* Unit at Intermediate 1 level will have some limited experience of database systems but may well need to revise this before progressing to Intermediate 2 content.

The intention of this Unit is to provide candidates with the requisite skills and knowledge to allow them to produce a database system consisting of two tables or files. The candidates will be presented with data in a familiar context which will clearly breakdown into two constituent parts. There will be a single one-to-many relationship between the constituent parts of the database.

Examples of an appropriate context would be recording artists and albums, provided each recording artist and each album is given a predefined unique identifier in the data presented to the candidates. Other appropriate contexts include car manufacturers and car models, ski resorts and pistes/trails, mobile phone manufacturers and mobile phone models and countries and political leaders. Candidates must be provided predefined unique identifiers in the data. Candidates are not expected to introduce surrogate keys or work with compound keys. Candidates are expected to produce a design for the database system based on the data structures produced. This will include details of tables, fields, data type and validation.

Implementation will require candidates to demonstrate practical skill and an awareness of the various views of the data stored in the database system and the construction of these views. The database system produced should include all the features of the implementation content grid. Candidates should be able to construct an appropriate user interface for the database system based on a design which has been created prior to the implementation. Such a design would usually be completed on a screen layout chart or other similar document.

In addition to the production of a working database system, candidates must be able to demonstrate knowledge and understanding of: the need for the database model, data modelling, data structures and aspects of implementation.

## National Unit Specification: support notes (cont)

### UNIT Database Systems (Intermediate 2)

The amount of time spent on each area of content 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:

Database Fundamentals	4 hours
Entities and data relationships	4 hours
Data Modelling concepts	6 hours
Normalisation	6 hours
Implementation	16 hours

1½ hours should be set aside to:

- a) administer the Outcome 1 test
- b) gather evidence for Outcome 2

A further 2½ 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 examination conditions. In order to gain success in 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.

Outcome 2 requires the candidate to demonstrate practical skills while using contemporary hardware and software. These practical skills will normally be demonstrated in the context of a number of relatively short tasks. However, they may be demonstrated in the context of a single extended task. Skills will normally be demonstrated by the candidate during the teaching and learning activities of the Unit, rather than as separate formal assessment activities. The candidate will be allowed access to books, notes and online help while completing the tasks.

To gain success in this Outcome, the candidate must demonstrate practical skills at an appropriate level in four of the following contexts, as defined in the content statements (see Information Systems (Intermediate 2) Course Content):

- ◆ design of data table from source document
- ◆ design of user interface/screen design
- ◆ creation of database (including interface) from design
- ◆ implementation of queries
- ◆ creation of simple forms and reports

Hard copy evidence should be provided of the database implementation.

## **National Unit Specification: support notes (cont)**

### **UNIT        Database Systems (Intermediate 2)**

An observation checklist for Outcome 2 is provided in the National Assessment Bank materials.

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

#### **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 information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September, 2003).

## National Unit Specification: general information

**UNIT** Applied Multimedia (Intermediate 2)

**NUMBER** DM4D 11

**COURSE** Information Systems (Intermediate 2)

### SUMMARY

This Unit is designed to develop knowledge and understanding of the principles of multimedia applications and practical skills related to the development of multimedia applications through the use of contemporary hardware and software. This knowledge, understanding and practical skills, may then be applied by the candidate to solve practical problems related to multimedia applications. It is designed as an option for candidates undertaking the Intermediate 2 Information Systems Course, but is also suitable for anyone wishing to develop a basic understanding of multimedia applications and design.

### OUTCOMES

1. Demonstrate knowledge and understanding of the principles, features and purposes of multimedia applications.
2. Demonstrate practical skills in the context of multimedia applications using contemporary hardware and software.

### 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:

- ◆ Intermediate 1 Multimedia Applications Unit
- ◆ Intermediate 1 Computing Studies
- ◆ Standard Grade Computing Studies at General level

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### Administrative Information

**Superclass:** CE

**Publication date:** August 2005

**Source:** Scottish Qualifications Authority

**Version:** 01

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## National Unit Specification: general information (cont)

### CREDIT VALUE

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5\*).

*\* 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

This Unit gives automatic certification of the following:

<b>Core Skill components for the Unit</b>	Critical Thinking	Int 2
	Planning and Organising	Int 2

## National Unit Specification: statement of standards

### UNIT Applied Multimedia (Intermediate 2)

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, features and purposes of multimedia applications.

#### Performance Criteria

- a) Basic terminology related to multimedia applications is used appropriately.
- b) Simple descriptions and explanations are technically correct and concise.
- c) Simple 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, features and purposes of multimedia applications 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 content (see Information Systems (Intermediate 2) Course Content) in each of the following areas:

- ◆ contemporary uses and means of delivery
- ◆ stages of development
  - analysis
  - design of navigational features and HCI
  - design of screens and media elements
  - implementation (general)
  - implementation (media elements)
  - testing
  - documentation
  - evaluation

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

The standard to be applied 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.

## **National Unit Specification: statement of standards (cont)**

### **UNIT**      Applied Multimedia (Intermediate 2)

#### **OUTCOME 2**

Demonstrate practical skills in the context of multimedia applications using contemporary hardware and software.

#### **Performance Criteria**

- a) A range of appropriate hardware is used effectively.
- b) An appropriate range of features of software is used effectively.
- c) Practical tasks are planned and organised with detailed guidance.
- d) Practical tasks are undertaken in an appropriate range of simple contexts.

#### **Evidence Requirements**

Observation checklist showing that the candidate has demonstrated practical skills at an appropriate level in all of the following contexts:

- ◆ analysis of a project brief
- ◆ design of a navigation map and series of storyboards
- ◆ implementation of a 'linear' multimedia application
- ◆ testing of a multimedia application
- ◆ documentation of a multimedia application
- ◆ evaluation of a multimedia application

Hard copy evidence should be provided of implementation and one other of these skills.

These practical skills may all be demonstrated in a single extended task, or in a number of smaller tasks.

The practical skills should be demonstrated in the context defined in the content statements (see Information Systems (Intermediate 2) Course Content).

The candidate will be allowed access to books, notes and on-line help while completing these tasks.

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

The standard to be applied 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.

## National Unit Specification: support notes

### UNIT Applied Multimedia (Intermediate 2)

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.)

<b>Content Statements: Contemporary uses and means of delivery</b>
Simple description and exemplification of how multimedia applications are used in the following areas: <ul style="list-style-type: none"><li>◆ business<ul style="list-style-type: none"><li>○ advertising and selling products</li><li>○ presentations</li></ul></li><li>◆ education<ul style="list-style-type: none"><li>○ CAL</li><li>○ reference materials</li></ul></li><li>◆ home<ul style="list-style-type: none"><li>○ games</li><li>○ leisure pursuits</li></ul></li><li>◆ public places<ul style="list-style-type: none"><li>○ information points</li></ul></li></ul>
Exemplification of appropriate uses for delivery media: <ul style="list-style-type: none"><li>◆ CD-ROM/DVD-ROM</li><li>◆ kiosk</li><li>◆ WWW</li></ul>
Comparison of delivery media in terms of: <ul style="list-style-type: none"><li>◆ data capacity</li><li>◆ ease of update</li></ul>

<b>Content Statements: Stages of development — analysis</b>
Identification of the following aspects of the analysis stage: <ul style="list-style-type: none"><li>◆ purpose</li><li>◆ user/audience</li><li>◆ content</li><li>◆ delivery media</li><li>◆ budget</li><li>◆ timescale</li></ul>

## National Unit Specification: support notes (cont)

### UNIT Applied Multimedia (Intermediate 2)

<b>Content Statements: Stages of development — design of navigation structures and HCI</b>
Simple representation using navigation maps of the different types of navigation structures to include: <ul style="list-style-type: none"><li>◆ linear</li><li>◆ hierarchical</li><li>◆ web</li></ul>
Description and use of complex search facilities (AND).
Description of user interfaces <ul style="list-style-type: none"><li>◆ CLI</li><li>◆ menu</li><li>◆ form fill-in</li><li>◆ direct manipulation (GUI)</li></ul>

<b>Content Statements: Stages of development — design of screens and media elements</b>
Description and use of storyboarding to represent the design of screens including: <ul style="list-style-type: none"><li>◆ layout of screen elements</li><li>◆ user interface</li><li>◆ transitions</li><li>◆ navigation</li></ul>
Description and use of general design principles (text): <ul style="list-style-type: none"><li>◆ quantity of text</li><li>◆ choice of font(s)</li><li>◆ alignment and size</li><li>◆ consistency in headings/subheadings/body</li><li>◆ use of lists and tables</li><li>◆ use of white space</li></ul>
Description and use of general design principles (graphics): <ul style="list-style-type: none"><li>◆ number of graphics per screen</li><li>◆ captions</li><li>◆ text wrap</li></ul>
Description and use of general design principles (audio): <ul style="list-style-type: none"><li>◆ advantages/disadvantages of background music, sound effects</li><li>◆ user controlled (volume, on/off)</li><li>◆ voice output</li></ul>

## National Unit Specification: support notes (cont)

### UNIT Applied Multimedia (Intermediate 2)

<b>Content Statements: Stages of development — implementation (general)</b>
Description of the basic functions and features of software for creating multimedia applications: <ul style="list-style-type: none"><li>◆ presentation</li><li>◆ authoring (icon-based and scripting)</li><li>◆ web-page</li></ul>
Comparison of the different types of software for creating multimedia applications in terms of: <ul style="list-style-type: none"><li>◆ ease of use</li><li>◆ cost</li><li>◆ programming requirements</li></ul>
Basic description of personnel and their role: <ul style="list-style-type: none"><li>◆ project manager</li><li>◆ multimedia designer</li><li>◆ subject expert</li><li>◆ media specialists (graphic, audio)</li><li>◆ multimedia programmer</li><li>◆ webmaster</li></ul>

<b>Content Statements: Stages of development — implementation (media elements)</b>
Explanation of how colour depth and resolution affect the file size and clarity of graphics.
Explanation of how sampling rate and sampling depth (sampling resolution) affect the file size and audio quality. Explanation of the need for compression.
Definition of the terms node, link and anchor.

<b>Content Statements: Stages of development — testing</b>
Explanation of the need for testing.
Simple description and exemplification of different tests that should be carried out including: <ul style="list-style-type: none"><li>◆ screen tests</li><li>◆ navigation tests</li></ul>

## National Unit Specification: support notes (cont)

### UNIT Applied Multimedia (Intermediate 2)

<b>Content Statements: Stages of development — documentation</b>
Identification of the contents and purpose of user documentation including: <ul style="list-style-type: none"><li>◆ hardware and software system requirements</li><li>◆ user instructions</li></ul>
Description of need for clearly documented copyright licenses including Copyright, Design & Patents Act.

<b>Content Statements: Stages of development — evaluation</b>
Evaluation of a multimedia application in terms of: <ul style="list-style-type: none"><li>◆ fitness for purpose</li></ul>

### **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 may be delivered in an integrated way. Appropriate practical activities should be taught and used to illustrate and exemplify the knowledge and understanding required for Outcome 1.

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

Contemporary uses and delivery media	6 hours
Stages of development	
analysis	3 hours
design	8 hours
implementation	14 hours
testing	2 hours
documentation	2 hours
evaluation	1 hour

1½ hours should be set aside to:

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

A further 2½ 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.

## National Unit Specification: support notes (cont)

### UNIT Applied Multimedia (Intermediate 2)

#### 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 examination conditions. In order to gain success in 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.

Outcome 2 requires the candidate to demonstrate practical skills while using contemporary hardware and software. These practical skills will normally be demonstrated in the context of a number of relatively short tasks. The tasks will normally be undertaken by the candidate as part of the teaching and learning activities of the Unit, rather than as separate formal assessment activities. The candidate will be allowed access to books, notes and online help while completing the tasks.

To gain success in this Outcome, the candidate must demonstrate practical skills at an appropriate level in all of the following contexts, defined in the content statements (see Information Systems (Intermediate 2) Course Content):

- ◆ analysis of a project brief
- ◆ design of a navigation map and series of storyboards
- ◆ implementation of a 'linear' multimedia application
- ◆ testing of a multimedia application
- ◆ documentation of a multimedia application
- ◆ evaluation of a multimedia application

Hard copy evidence should be provided for implementation and one other of these skills. Note that this need not be formal documentation — print outs, screen shots and handwritten notes on analysis and design would all be examples of suitable evidence.

An observation checklist for Outcome 2 is provided in the National Assessment Bank materials.

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

#### 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 information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September, 2003).



## National Unit Specification: general information

<b>UNIT</b>	Expert Systems (Intermediate 2)
<b>NUMBER</b>	DM4H 11
<b>COURSE</b>	Information Systems (Intermediate 2)

### SUMMARY

This Unit is designed to develop knowledge and understanding of the principles of expert systems and practical skills related to expert systems through the use of contemporary hardware and software. This knowledge and understanding, and these practical skills, may then be applied by the candidate to solve practical problems related to expert systems. It is designed for candidates undertaking the Intermediate 2 Information Systems Course, but is also suitable for anyone wishing to develop a basic understanding of expert systems. It is also appropriate as an extension for those who have studied Artificial Intelligence at Intermediate 2.

### OUTCOMES

1. Demonstrate knowledge and understanding of the basic principles, techniques and applications of expert systems.
2. Demonstrate practical skills by applying knowledge and understanding of the basic principles, techniques and applications of expert systems using contemporary hardware and software.

### RECOMMENDED ENTRY

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

- ◆ Intermediate 1 Computing Studies
- ◆ Standard Grade Computing Studies at General level

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### Administrative Information

<b>Superclass:</b>	CB
<b>Publication date:</b>	November 2006
<b>Source:</b>	Scottish Qualifications Authority
<b>Version:</b>	02

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## National Unit Specification: general information (cont)

### CREDIT VALUE

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5).

*\* 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

This Unit gives automatic certification of the following:

<b>Core Skill components for the Unit</b>	Critical Thinking	Int 2
	Planning and Organising	Int 2

## **National Unit Specification: statement of standards**

### **UNIT**      Expert Systems (Intermediate 2)

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 basic principles, techniques and applications of expert systems.

#### **Performance Criteria**

- a) Basic principles and techniques of expert systems are explained using appropriate terminology.
- b) Descriptions of applications are technically accurate and concise.
- c) Simple conclusions, predictions and generalisations are made from knowledge and understanding.

#### **Evidence Requirements**

Written or oral evidence that the candidate can describe, explain and apply the principles, techniques and applications of expert systems. Evidence could be obtained using questions in a closed book test, under supervision, lasting no more than 45 minutes. The test must sample the content (see Information Systems (Intermediate 2) Course Content) in each of the following areas:

- ◆ expert systems in context
- ◆ characteristics of expert systems
- ◆ development, use and evaluation of expert system
- ◆ construction of a working expert system

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

The standard to be applied 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.

## National Unit Specification: statement of standards (cont)

### UNIT Expert Systems (Intermediate 2)

#### OUTCOME 2

Demonstrate practical skills by applying knowledge and understanding of the basic principles, techniques and applications of expert systems using contemporary hardware and software.

#### Performance criteria

- a) A range of appropriate hardware is used effectively.
- b) An appropriate range of features of software is used effectively.
- c) Practical tasks are planned and organised with detailed guidance.
- d) Practical tasks are undertaken in an appropriate range of simple contexts.

#### Evidence Requirements

Observation checklist showing that the candidate has demonstrated practical skills in the following contexts:

- ◆ finding solutions to given problems by consultation of expert systems for advice, classification, diagnosis or planning
- ◆ testing and evaluation of an expert system
- ◆ representation of a limited domain of knowledge in a structured form
- ◆ construction of a working expert system given a limited domain of knowledge

Hard copy evidence should be provided of the expert system constructed.

These practical skills may be demonstrated in a single extended task, or in a number of smaller tasks.

The practical skills should be demonstrated in the context defined in the content statements (see Information Systems (Intermediate 2) Course Content).

The candidate will be allowed access to books, notes and online help while completing the tasks.

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

The standard to be applied 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.

## National Unit Specification: support notes

### UNIT Expert Systems (Intermediate 2)

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.)

<b>Content Statements: Expert systems in context</b>
Description of the purpose of an expert system: to represent the knowledge of one or more domain experts; to provide advice to a user via a consultation; to provide explanations of why certain questions are being asked and how conclusions have been reached. Definition of an 'expert system shell'. Identification of applications for expert systems, including medical, legal and financial advice.
Distinction between knowledge (created by the application of inference rules to known facts), data and information.
Identification of the components of an expert system: knowledge base, inference engine, user interface.
Identification of the categories of expert system: planning, advice, classification, diagnosis. Classification of example expert systems into these categories.

<b>Content Statements: Characteristics of expert systems</b>
Description of the main features of the knowledge base: contains facts and rules.
Representation of knowledge as rules and factor tables.
Description of the main features of the inference engine: to determine the order in which rules are applied, and hence questions are asked. Identification of inferencing methods: forward and backward chaining. Description of advantages and disadvantages of forward and backward chaining.
Description of the main functions of the user interface: to ask questions and obtain answers from the user; to display advice; to justify questions and answers.

## National Unit Specification: support notes (cont)

### UNIT Expert Systems (Intermediate 2)

<b>Content Statements: Development, use and evaluation of expert systems</b>
Identification of the principal personnel in the development of an expert system: <ul style="list-style-type: none"> <li>◆ domain expert</li> <li>◆ knowledge engineer</li> <li>◆ programmer</li> <li>◆ user</li> </ul> Identification of the stages of development of an expert system: <ul style="list-style-type: none"> <li>◆ knowledge acquisition/elicitation</li> <li>◆ knowledge representation</li> <li>◆ system validation</li> </ul>
Querying of the expert system to answer simple structured questions.
Testing of an expert system using a set of structured test cases.
Use of How and Why justification facilities.
Evaluation of an expert system, in terms of: purpose (type of expert system, domain of expertise); range and coverage of rules; quality of user interface (structure/syntax/order of questions asked, presentation of conclusion; quality of explanation facilities).

<b>Content Statements: Construction of a working expert system</b>
Description and demonstration of techniques of analysis, design, implementation, testing and evaluation of an expert system.
Derivation of suitable attribute-value pairs, from a short piece of structured text, not involving multi-valued attributes.
Representation of attribute-value pairs as a factor table and as a decision tree.
Derivation of structured rules involving multiple (up to three) conditions to represent knowledge. Construction of forward or backward chaining rules (in pseudocode or appropriate KRL). Construction of a rule base of 5—10 rules, leading to direct conclusions without rule chaining.
Production of structured questions, including some multi-response.
Entry of rules into an expert system shell. Debugging of rules to produce a working system. Testing of expert system using a given set of structured test cases.

### **GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT**

Candidates will require individual access to appropriate computer hardware and software throughout this Unit. In particular, candidates will require access to an expert system shell which will enable them to construct and test a working expert system. In addition to commercial software, there are a wide variety of free expert system shells available. However, centres should note that these are very often research vehicles and are provided ‘as is’, without support, and may be aimed at a university level audience. Nevertheless, some shells have active user groups which can provide useful backup.

Candidates will also benefit from the opportunity to consult and evaluate a range of expert systems.

Possible sources of software are easily available by searching on the World Wide Web.

The two Outcomes should be delivered in an integrated way. Appropriate practical activities, both computer and non-computer based, should be taught and used to illustrate and exemplify the knowledge and understanding required for Outcome 1.

## National Unit Specification: support notes (cont)

### UNIT Expert Systems (Intermediate 2)

The amount of time spent on each area of content 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:

Expert systems in context	4 hours
Characteristics of expert systems	9 hours
Development, use and evaluation of expert systems	8 hours
Construction of a working expert system	15 hours

1½ hours should be set aside to:

- a) administer the Outcome 1 test
- b) gather evidence for Outcome 2

A further 2½ 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 examination conditions. In order to gain success in 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.

Outcome 2 requires the candidate to demonstrate practical skills while using contemporary hardware and software. These practical skills will normally be demonstrated in the context of a number of relatively small tasks. The task(s) will normally be undertaken by the candidate as part of the teaching and learning activities of the Unit, rather than as separate formal assessment activities. The candidate will be allowed access to books, notes and online help while completing the task(s).

To gain success in this Outcome, the candidate must demonstrate practical skills in the following contexts and at an appropriate level as context defined by the content statements (see Information Systems (Intermediate 2) Course Content):

- ◆ finding solutions to given problems by consultation of expert systems for advice, classification, diagnosis or planning
- ◆ testing and evaluation of an expert system
- ◆ representation of a limited domain of knowledge in a structured form
- ◆ construction of a working expert system given a limited domain of knowledge

Note: this expert system should involve 5—10 rules, some involving multiple conditions, but not requiring chaining).

Hard copy evidence should be provided of the expert system constructed; note that this need not be formal documentation — hard copy of the rule base is sufficient.

## National Unit Specification: support notes (cont)

### UNIT Expert Systems (Intermediate 2)

An observation checklist for Outcome 2 is provided in the National Assessment Bank materials.

All evidence for Outcome 2 should be gathered under ‘open book’ conditions and must be retained by the Centre. The assessment of this Unit is subject to moderation by SQA.

The assessment of this Unit will require candidates to be familiar with, and able to correctly use in context, the following technical terms:

<ul style="list-style-type: none"> <li>◆ advice</li> <li>◆ classification</li> <li>◆ conclusion</li> <li>◆ consultation</li> <li>◆ domain</li> <li>◆ domain expert</li> <li>◆ expert system</li> <li>◆ expert system shell</li> <li>◆ explanation: how, why</li> <li>◆ factor table</li> <li>◆ forward/backward chaining</li> </ul>	<ul style="list-style-type: none"> <li>◆ inference engine, inferencing</li> <li>◆ justification</li> <li>◆ knowledge</li> <li>◆ knowledge acquisition/elicitation</li> <li>◆ knowledge base/rule base</li> <li>◆ knowledge engineer</li> <li>◆ knowledge representation</li> </ul>	<ul style="list-style-type: none"> <li>◆ knowledge representation language (KRL)</li> <li>◆ query</li> <li>◆ question</li> <li>◆ rule</li> <li>◆ type of expert system: advice; classification; diagnosis; planning</li> <li>◆ user</li> <li>◆ user interface</li> <li>◆ validation</li> </ul>
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### 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 information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September, 2003).



## National Unit Specification: general information

<b>UNIT</b>	The Internet (Intermediate 2)
<b>NUMBER</b>	DM4F 11
<b>COURSE</b>	Information Systems (Intermediate 2)

### SUMMARY

This Unit is designed to develop knowledge and understanding of the operating principles of the Internet, Internet services and web page design and provides an opportunity to apply this knowledge to solve practical problems through the use of contemporary hardware and software. It is designed as an option for candidates undertaking the Intermediate 2 Information Systems Course, but is also suitable for anyone wishing to develop a basic understanding of the underlying technology of the Internet.

### OUTCOMES

1. Demonstrate knowledge and understanding of the Internet with regard to operating principles, services, resources and web page construction.
2. Demonstrate practical skills using contemporary hardware and software in the context of Internet use and web page instruction.

### 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:

- ◆ Intermediate 1 Computing Studies
- ◆ Standard Grade Computing Studies at General level

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### Administrative Information

<b>Superclass:</b>	CB
<b>Publication date:</b>	August 2005
<b>Source:</b>	Scottish Qualifications Authority
<b>Version:</b>	01

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## **National Unit Specification: general information (cont)**

### **CREDIT VALUE**

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5\*).

*\* 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**      The Internet (Intermediate 2)

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 Internet with regard to operating principles, services, resources and web page construction.

#### **Performance Criteria**

- a) Basic terminology is used appropriately.
- b) Simple descriptions and explanations are related to practical and familiar contexts.
- c) Simple 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, features and purposes of the Internet accurately and concisely. Evidence could be obtained using questions in a closed book test, under supervision, lasting no more than 45 minutes. The test must sample the content (see Information Systems (Intermediate 2) Course Content) in each of the following areas:

- ◆ Internet fundamentals
- ◆ services and resources provided by the Internet
- ◆ Internet developments
- ◆ construction of Internet web page

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

The standard to be applied 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.

## National Unit Specification: statement of standards (cont)

### UNIT        The Internet (Intermediate 2)

#### OUTCOME 2

Demonstrate practical skills using contemporary hardware and software in the context of Internet use and web page construction.

#### Performance Criteria

- a) A range of appropriate hardware is used effectively.
- b) Common features of software are selected and used effectively.
- c) practical skills are planned and organised with detailed guidance.
- d) Practical tasks are undertaken in an appropriate range of simple contexts.

#### Evidence Requirements

Observation checklist showing that the candidate has demonstrated practical skills at an appropriate level in four of the following contexts:

- ◆ accessing the Internet for WWW Boolean searching and email
- ◆ use of main functions and features of an appropriate standard application package for web page construction
- ◆ use of relative page addressing
- ◆ creation of web page with links to other pages on same site

Hard copy evidence should be provided demonstrating two of these skills.

These practical skills may all be demonstrated in a single extended task, or in a number of smaller tasks.

The practical skills should be demonstrated in the context defined in the content statements (see Information Systems (Intermediate 2) Course Content).

The candidate will be allowed access to books, notes and online 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 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.

## National Unit Specification: support notes

### UNIT The Internet (Intermediate 2)

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

<b>Content Statements: Internet fundamentals</b>
Description and explanations of the following concepts in relation to Internet operation and usage: <ul style="list-style-type: none"><li>◆ Internet hosting</li><li>◆ packets</li><li>◆ TCP/IP</li><li>◆ IP addresses</li><li>◆ routing</li><li>◆ bandwidth</li><li>◆ hardware components (router, switch, multiplexer)</li><li>◆ physical structure and topology of the Internet</li></ul>
Description of the need for protocols. Description of the purpose of the following protocols: <ul style="list-style-type: none"><li>◆ http</li><li>◆ FTP</li><li>◆ POP/SMTP</li></ul>
Description and explanation of the social, ethical and legal implications of the internet including effects on: family, employment and information rich and poor.  Explanation of issues related to censorship and privacy.

## National Unit Specification: support notes (cont)

### UNIT The Internet (Intermediate 2)

<b>Content Statements: Services and resources provided by the Internet</b>
Description of the main features of the following Internet services and resources, or contemporary replacements: <ul style="list-style-type: none"><li>◆ World Wide Web (WWW)</li><li>◆ email (web and client based)</li><li>◆ conferencing and newsgroups</li><li>◆ file transfer and file updating</li><li>◆ chat/instant messaging</li></ul>
Exemplification of uses of these services in business, educational and personal contexts.
Description and effective use of internet browser software, including navigation, search and save facilities.
Description and effective use of search engines, including Boolean searching.
Description of main features and uses of a range of Internet advanced search services.
Explanation of the need for and use of virus protection, including the need for regular updating of virus protection software.

<b>Content Statements: Internet developments</b>
Description of current trends in Internet development with regard to the influence of the following on system performance: <ul style="list-style-type: none"><li>◆ communications hardware</li><li>◆ browsing software</li><li>◆ security software</li></ul>

<b>Content Statements: Construction of Internet web page</b>
Description of the main features of web authoring packages: <ul style="list-style-type: none"><li>◆ icon based</li><li>◆ web tools</li><li>◆ scripting tools</li><li>◆ hyperlinks</li><li>◆ file structure</li></ul>

## National Unit Specification: support notes (cont)

### UNIT The Internet (Intermediate 2)

Description and exemplification of:

- ◆ absolute page addressing
- ◆ relative page addressing
- ◆ picture compression

Explanation of

- ◆ problems associated with absolute addressing
- ◆ the need for picture compression

Description and exemplification of the creation of web page with links to other pages on same site.

## National Unit Specification: support notes (cont)

### UNIT        The Internet (Intermediate 2)

#### **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. Appropriate 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 amount of time spent on each area of content 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:

Internet fundamentals	10 hours
Services and resources provided by the Internet	8 hours
Internet developments	6 hours
Construction of Internet web page	12 hours

1½ hours should be set aside to:

- a) administer the Outcome 1 test
- b) gather evidence for Outcome 2

A further 2½ 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.



## National Unit Specification: support notes (cont)

### UNIT        The Internet (Intermediate 2)

#### **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 examination conditions. In order to gain success in 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.

Outcome 2 requires the candidate to demonstrate practical skills while using contemporary hardware and software. These practical skills will normally be demonstrated in the context of a number of relatively small tasks. The task(s) will normally be undertaken by the candidate as part of the teaching and learning activities of the Unit, rather than as separate formal assessment activities. The candidate will be allowed access to books, notes and online help while completing the task(s). The practical skills should be demonstrated in the context defined in the content statements (see Information Systems (Intermediate 2) Course Content).

To gain success in this Outcome, the candidate must demonstrate practical skills at an appropriate level in four of the following contexts, defined in the content statements (see Internet Intermediate 2 Course content):

- ◆ accessing the Internet for WWW Boolean searching and email
- ◆ use of main functions and features of an appropriate standard application package for web page construction
- ◆ use of relative page addressing
- ◆ creation of web page with links to other pages on same site

Hard copy evidence should be provided demonstrating two of these skills. Note that this need not be formal documentation — print outs and screen shots showing appropriate activities are adequate — and that a single item of evidence could provide evidence of more than one skill.

An observation checklist for Outcome 2 is provided in the National Assessment Bank materials.

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

#### **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 information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September, 2003).