Higher National Unit Specification

General information for centres

Unit title: Software Development: Developing for the World Wide Web

Unit code: D76P 35

Unit purpose: This Unit is designed to introduce candidates to scripting for web pages. The aim of the Unit is to develop candidates' skills in designing and building interactive web based applications while illustrating the similarities between scripting and traditional/Object Oriented Programming (OOP) languages.

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

1. Describe the factors affecting the production of Web-based applications
2. Design and implement a web-based application using the principles of software engineering
3. Use appropriate tools and techniques to enhance Web based applications
4. Utilise server side scripting and database accessing

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

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

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre, however it is recommended that the candidate should have achieved one of the following HN Units: HN Unit D76X 35: *Software Development*: *Procedural Programming,* HN Unit D76V 35: *Software Development: Object Oriented Programming* or HN Unit D76S 35: *Software Development: Fourth Generation Environment.*

Core skills: This Unit gives automatic certification of the following Problem Solving elements:

Critical Thinking at Higher
Planning and Organising at Higher

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

General information for centres

Assessment: This Unit could be assessed with a minimum of two assessments. Outcome 1 could be assessed separately by means of an essay/report style question. Outcomes 2 to 4 could be integrated into one assessment.

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

Higher National Unit specification: statement of standards

Unit title: Software Development: Developing for the World Wide Web

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

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

Outcome 1

Describe the factors affecting the production of Web-based applications

Knowledge and/or skills

- Document Object Model (DOM)
- Client-side scripting versus server-side scripting
- Scope of 'plug-ins' in relation to their role in the development of Web-based applications
- Security issues associated with scripting languages

Evidence requirements

To achieve this Outcome the candidate will need to demonstrate his/her knowledge by producing a 1500 word essay. This essay should include the following broad points:

- a description of the DOM which should include a review of its implementation by major browsers, highlighting any major differences or discrepancies
- the differences between client and server side scripting including the uses of each, eg client side – validation of form data prior to sending, and server side – database accessing and browser independent as they reside on the server. Mention should also be made of the various languages in use, eg Java, JSP, JavaScript, ASP, PHP, Perl
- a list of the current 'plug-ins' and their benefits and drawbacks, eg slow download times versus professional level presentation
- how various security loopholes have occurred and how they have been fixed, (JavaScript's inability to access the users local disk, Java's security sandbox and the use of cookies to track user movement through the Internet).

Assessment guidelines

The candidate should complete the essay with the minimum of assistance. The idea behind the essay is to enhance the candidate's research skills. The candidate should be directed towards the main areas of the knowledge and skills section mentioned above but left to draw his/her own conclusions.

Higher National Unit specification: statement of standards (cont)

Unit title: Software Development: Developing for the World Wide Web

Outcome 2

Design and implement a web-based application using the principles of software engineering

Knowledge and/or skills

- Produce a suitable design specification given a specific set of user requirements
- Apply a structured methodology in the production of code:
  - use the basic building blocks of sequence, selection and iteration
  - use modularity of code
  - internal comments
- Features specific to Web-based applications including:
  - client-side validation of data presented in a form format
  - dynamic production of HTML code based on user input
  - output to new browser window
  - use of prompts and alerts to create simple user interaction

Evidence requirements

Integrated with Outcomes 3 and 4; please see the evidence requirements for Outcome 4.

Assessment guidelines

Integrated with Outcomes 3 and 4; please see the assessment guidelines for Outcome 4.

Outcome 3

Use appropriate tools and techniques to enhance Web-based applications

Knowledge and/or skills

- Generate code to handle events
- Declare an object
- Call an instance of an object
- Generate code to create a cookie
- Generate code to read a cookie
- Generate code to manipulate a cookie

Evidence requirements

Integrated with Outcomes 2 and 4; please see the evidence requirements for Outcome 4.

Assessment guidelines

Integrated with Outcomes 2 and 4; please see the assessment guidelines for Outcome 4.

Higher National Unit specification: statement of standards (cont)

Unit title: Software Development: Developing for the World Wide Web

Outcome 4

Utilise server side scripting and database accessing

Knowledge and/or skills

- Generate code to read data from a database
- Generate code to insert data into the database
- Generate code to update data in a database

Evidence requirements

In order to achieve Outcomes 2, 3 and 4 the candidate will need to produce the following evidence:

- a detailed design including algorithms
- a test plan and test history showing expected and actual results
- a fully working set of scripts, which:
  - can be in any language
  - show sequence, selection and iteration
  - contain modularity (functions / procedures)
  - are well documented with regard to internal comments
  - able to generate HTML code based on user interaction
- form data which should be pre-processed/validated at the client side. Data should be transferred using the POST or GET method
- use of alerts to inform users
- events which should include:
  - Mouse Events
  - Page Events
  - Click Event
  - Change Event
  - Submit Event
- simple cookie to store the users name or other relevant details, eg score
- the code generated as specified in Outcome 4

Assessment guidelines

Outcomes 2, 3, and 4 should be assessed by means of a project. The project should be given to the candidate in the form of a project brief from which the candidate produces the design documentation, subsequently producing the code. The project may take the form of an online quiz, an e-commerce type application or a viable proposal from the candidate. The candidate should be made fully aware of the criteria, outlined above, required for a pass.

Administrative Information

Unit code: D76P 35

Unit title: Software Development: Developing for the World Wide Web

Superclass category: CB

Date of publication: November 2004

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

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

Higher National Unit specification: support notes

Unit title: Software Development: Developing for the World Wide Web

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

While the exact time allocated to this Unit is at the discretion of the Centre, the notional design length is 80 hours.

Guidance on the content and context for this Unit

This Unit has been developed with a view towards scripting rather than towards the more formal languages such as Java. The intention of the Unit is to keep the Outcomes as generic as possible to allow the Unit to be delivered using any of the scripting languages that are available.

It should be stressed to the candidate that this style of project can still benefit from the traditional principles of software engineering. Areas that may be covered could include: browser detection, date and time manipulation, clocks, calendars, passwords etc.

Guidance on the delivery and assessment of this Unit

Delivery of the Unit would be best served by completing Outcome 1 first. Outcome 1 should be assessed by means of a 1500 word report. The remaining Outcomes should be assessed via a project. Integration of Outcomes 2, 3 and 4 will provide a more holistic approach more akin to the production of a software product.

Centres may wish to use Personal Web Server running locally on each PC to accommodate Active Server Pages or equivalent.

Database access can be done by giving the candidate a predefined database or by the candidate composing a database relevant to their chosen project. The actual database package used does not matter so long as it is at least ODBC compliant.

The type of project undertaken by the candidate may include an e-commerce style ‘shopping cart’ which accesses a database of products. If this style of project was undertaken the candidate would not be required to activate any means of credit or debit card payment. Another type of project may be an online quiz where a database of questions can be accessed randomly.

Open learning

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

Candidates with additional support needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements for Candidates with Additional Support Needs* (BA 2399, SQA, due 2004).

General information for candidates

Unit title: Software Development: Developing for the World Wide Web

This Unit is designed to introduce you to the skills required for developing on line applications. The Unit begins by introducing the factors which can affect the production of on-line applications. You will be introduced to the key concepts of: the Document Object Model; client-side scripting versus server-side scripting; an appreciation of the scope of 'plug-ins' in relation to their role in the development of Web-based applications; the occurrence of security holes in the various scripting languages and how they are dealt with.

Outcomes 2, 3 and 4 are practical in nature. For Outcome 2 you will be required to produce a simple web-based application using the principles of software engineering. This Outcome will also introduce you to some of the dynamic aspects of html and the basics of a web scripting language.

Outcome 3 will introduce you to the aspects of event handling, the use of objects and the use of cookies for enhancing the users stay at your web site. You will also learn that cookies are useful for customising the users web pages and for passing information from page to page.

Outcome 4 will introduce you to server side scripting and database accessing.

On completion of this Unit you should feel suitably confident to extend what you have learnt into full blown e-commerce applications suitable for use by any company.