National Unit specification: general information

Unit title: Computer Games: Programming (SCQF level 6)

Unit code: H2CD 12

Superclass: CB

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Source: Scottish Qualifications Authority

Version: 01

Summary

The purpose of this Unit is to provide candidates with the knowledge and understanding of programming to progress within the computer games industry. Candidates will acquire fuller knowledge of programming concepts, coding best practice and coding techniques. In particular, candidates will develop practical skills in the use of programming constructs and algorithms which allow them to develop simple game programs and to solve practical problems.

This Unit can be undertaken as part of a National Certificate in Computer Games Development at SCQF level 6. It is suitable for candidates who wish to develop their programming skills with a view to working in the computer games industry or within other STEM (Science, Technology, Engineering and Maths) subject areas.

Outcomes

1   Demonstrate and apply the principles of software development appropriate to the computer games industry.
2   Identify and apply a range of computer games programming techniques.
3   Create a working computer game demonstration using a recognised programming language.

Recommended Entry

While entry is at the discretion of the centre, it would be beneficial if candidates have attained the following:

F3GC 12   *Information and Communications Technology* or equivalent

General information (cont)

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Credit point and level

1 National Unit credit at SCQF level 6: (6 SCQF credit points at SCQF level 6*)

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

Achievement of this Unit gives automatic certification of the following Core Skills component:

Complete Core Skill   None

Core Skill component   Critical Thinking at SCQF level 5

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of this Unit specification.

National Unit specification: statement of standards

Unit title: Computer Games: Programming (SCQF level 6)

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 SQA.

Outcome 1

Demonstrate and apply the principles of software development appropriate to the computer games industry.

Performance Criteria

(a)   Identify and apply naming conventions as appropriate within the programming language used.
(b)   Apply the use of indentation and comments appropriately throughout the code.
(c)   Apply appropriate variable declarations and initialisations.

Outcome 2

Identify and apply a range of computer games programming techniques.

Performance Criteria

(a)   Identify and apply data structures, control structures and operators appropriate to the creation of a game.
(b)   Identify and apply suitable programming constructs to manipulate graphics in a game.
(c)   Incorporate the use of arrays (dynamics or 2D) into a game.
(d)   Identify and apply suitable methods for passing arguments within a game.
(e)   Implement the appropriate use of libraries within a game environment.

Outcome 3

Create a working computer game demonstration using a recognised programming language.

Performance Criteria

(a)   Design and demonstrate a game concept.
(b)   Produce a working game demonstration using original code.
(c)   Evaluate the game demonstration.

National Unit specification: statement of standards (cont)

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Evidence Requirements for this Unit

Written and/or oral evidence and product evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria. Evidence should be obtained under supervised conditions.

Outcomes 1 and 2 are assessed within the game code. Evidence must include:

♦ appropriate use of comments through the code segments
♦ appropriate use of indentation in code segments
♦ correct naming conventions and variable declarations
♦ identification and use of at least two data structures
♦ identification and use of at least two appropriate control structures specific to the language used, from the following list:
  — sequence
  — selection
  — repetition
♦ identification and use of at least two appropriate operators specific to the language used, from the following list:
  — arithmetic operators
  — logical operators
♦ identification and use of at least two appropriate programming constructs to manipulate graphics
♦ identification and use of an array
♦ appropriate use of argument passing
♦ appropriate use of Libraries

Evidence for Outcome 3 should consist of:
♦ a detailed design concept which includes
  — game layout
  — sample graphics
♦ a working games program
♦ code listings
♦ screenshots of the working game
♦ demonstration of the game
♦ evaluation of the game which includes:
  — issues encountered and how these were overcome
  — areas for improvement
  — recommendations for future development
  — lessons learned

National Unit specification: support notes

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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

It is envisaged that this Unit is delivered in a computer games development context appropriate to the candidate, whether as part of the National Certificate in Computer Games Development or as a free-standing Unit.

This Unit is aligned to the following Skillset National Occupational Standards (NOS):

♦ IM21 Program Electronic Games to Develop Functionality
♦ IM22 Test Electronic Games

Outcome 1 covers identifying techniques used when constructing games programs and good coding practice. The appropriate use of comments, indentation, naming conventions, variable declaration and initialisation should be covered. Where possible, examples should relate to real-life working games programs or scenarios. Candidates should be shown examples of good and bad technique and the implications in an industry context.

Outcome 2

Outcome 2 covers identifying and applying appropriate data types within the candidate's code segments. This will vary depending on the language being taught, eg in C++ the following should be covered:

♦ char
♦ double
♦ DWORD
♦ float
♦ int

If Java is the language of choice the following should be covered:

♦ integer
♦ short
♦ long
♦ byte
♦ float

Candidates should become familiar with a range of control structures and implement at least two within their code segment — while, do-while, if-else, switch. Again this would depend on the language being taught and appropriate control structures specific to the language should be covered.

National Unit specification: support notes (cont)

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The use of graphics is paramount within games programming. Candidates should be taught in the use of bitmap or jpeg graphics. They should load graphics into their game and be able to manipulate them by resizing or moving them around the screen. Candidates should have a good understanding of the screen co-ordinate system and knowledge of 2D graphics. Drawing of boxes and lines should also be covered.

Candidates should become familiar with appropriate array types and should implement at least one within their code (dynamic, 2-dimensional, etc). At this level candidates are required to demonstrate their knowledge and skill in games programming by appropriately passing arguments within their code. The use of Libraries and game engines is essential in the context of this Unit and candidates should understand and apply Libraries as appropriate to their game environment.

In Outcome 3 candidates should design and create a game concept. They should work in the given language to produce a working game demo — this should be created from scratch but may include segments researched and sourced from the internet or other means and unique code created by the individual candidate. Emphasis should be placed on the creation of the game and the working aspects. Candidates must demonstrate the game to their assessor.

Guidance on learning and teaching approaches for this Unit

In this Unit candidates should be introduced to the enjoyment of games programming and encouraged to find appropriate pieces of codes which they can amend and add to their own code segments. A wide range of programming languages could be used but it is advised that a suitable games programming language such as C++, C# or Java are taught.

The learning within this Unit could be facilitated as a group project and evaluated by peer review.

Completion of the project work would be during class time under supervised conditions to ensure the authenticity of each game produced.

Guidance on approaches to assessment for this Unit

The Evidence Requirements for this Unit is best presented as a digital game which candidates should design, create and present. This could be facilitated as a group project and evaluated by peer review. Tutors must ensure that each candidate taking part in the group project has accomplished all the Evidence Requirements. This may be carried out by observation or candidate logbooks or diaries.

All three Outcomes could be covered by means of a single project which incorporates the following:

♦ a game demo which includes comments and indentation
♦ game code produced with little assistance
♦ a finished demo which matches the original plans
♦ a demonstration and evaluation of the produced game

National Unit specification: support notes (cont)

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Whilst candidates are encouraged to use information from the internet, assessors should assure themselves of the authenticity of candidates' evidence.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

In this Unit candidates will learn about programming concepts, coding best practice and coding techniques. Candidates will analyse code examples and build a working computer game using graphics.

Candidates will identify techniques used when constructing games programs and best coding practice. They will apply naming conventions, comments, indentation and spacing and implement variable declarations and initialisations. Candidates will also identify and apply data structures, control structures, operators and suitable programming constructs. They will design and demonstrate a game concept, produce a working game demo and evaluate the game demo.

As candidates complete this Unit they will develop aspects of Core Skills in *Problem Solving, Communication, ICT* and *Numeracy*.

This Unit has the Critical Thinking component of Problem Solving embedded in it. This means that when candidates achieve the Unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking at SCQF level 5.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

History of changes to Unit

Version	Description of change	Date