



Higher National Unit Specification

General information for centres

Unit title: Structured Programming for Games

Unit code: F8HC 34

Unit purpose: This Unit is designed as an introduction to programming using a structured approach. It will enable candidates to develop an understanding of the concepts and principles of programming and gain practical experience in applying fundamental programming techniques in the context of the computer games environment.. The Unit forms part of the mandatory element of the HND Computer Games Development award but can be delivered as a stand alone Unit to candidates wishing to gain generic programming skills through a games based approach. The three credits allocated to this Unit will allow for a greater focus on problem solving and hands-on programming experience.

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

- 1 Demonstrate an understanding of structured programming concepts.
- 2 Implement a solution for a given game design.
- 3 Test and debug a completed solution.
- 4 Demonstrate and evaluate a completed solution.

Credit points and level: 3 HN credits at SCQF level 7: (24 SCQF credit points at SCQF level 7*)

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

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre, however, it is highly recommended that candidates are proven to be computer literate through completion of an National Certificate (NC) in Digital Media Computing, a relevant HN Unit in Computer Applications, or having used computers in a work environment.

Core Skills: There are opportunities to develop the Core Skill of *Problem Solving* at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

General information for centres (cont)

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

Assessment: Outcome 1 will be assessed by a series of open-book practical assignments to test the candidate's ability to develop, write and implement suitable programming elements within a games context. This evidence can be generated over a period of time into a candidate portfolio. The achievement requirements are inherent in the Evidence Requirements. Assessors must assure themselves of the authenticity of each candidate's submission.

Outcome 2 will be assessed with one project to be completed open-book. The project may be completed without supervision but candidates will be required to demonstrate and explain their coding under supervised conditions.

Outcome 3 will be assessed by the candidate testing and debugging the solution for Outcome 2.

Outcome 4 will be assessed by giving a physical demonstration of the completed game to the assessor and provide a brief written or oral report evaluating the project.

An exemplar instrument of assessment and marking guidelines have been produced to show the national standard of achievement required at SCQF level 7.

Higher National Unit specification: statement of standards

Unit title: Structured Programming for Games

Unit code: F8HC 34

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

Demonstrate an understanding of structured programming concepts

Knowledge and/or Skills

- ◆ Concepts and techniques of structured programming

Evidence Requirements

Candidates will need to provide evidence to demonstrate their knowledge of structured programming concepts by showing that they can produce suitable segments of program code, covering examples of all of the following, by means of a series of open-book practical assignments, forming a small portfolio:

- ◆ Datatypes
- ◆ Variables
- ◆ Operators
- ◆ Sequence
- ◆ Selection
- ◆ Nested Selection
- ◆ Iteration — Test before
- ◆ Iteration — Test after
- ◆ Arrays
- ◆ Functions

Assessment must be undertaken in supervised, open-book conditions. Assessors must assure themselves of the authenticity of each candidate's submission.

Assessment Guidelines

Outcome 1 assesses the understanding of the programming theory and concepts and practical programming skills.

The practical assignments should aim to develop the skills needed to progress to subsequent Outcomes.

Higher National Unit specification: statement of standards (cont)

Unit title: Structured Programming for Games

Outcome 2

Implement a solution for a given game design

Knowledge and/or Skills

Candidates should use examples of the following:

- ◆ Datatypes
- ◆ Variables
- ◆ Operators
- ◆ Objects
- ◆ Properties
- ◆ Selection
- ◆ Nesting
- ◆ Iteration
- ◆ Methods
- ◆ Arrays
- ◆ Parameter passing
- ◆ Input/output
- ◆ Comments

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and Skills by showing that they can produce a completed solution in the form of a game with a clear objective that has user interaction and a scoring system. The project is to be completed under open-book conditions. The game must satisfy the given specification requirements and include the following programming techniques:

- ◆ Declaration and Initialisation of variables
- ◆ Use of a minimum of two arithmetical operators
- ◆ Use of a minimum of two comparators
- ◆ Use of sequence and selection
- ◆ At least one predefined method
- ◆ At least one loop
- ◆ At least one array
- ◆ User defined function with parameter passing
- ◆ Comments that aid readability and understanding of code
- ◆ Indentation to improve readability of code

Assessment Guidelines

The list of Evidence Requirements is the minimum needed to gain a pass on this Outcome. Outcome 2 and 3 are assessed with the same project. Authenticity of the candidate's original work can be gained through the Evidence Requirements of Outcome 4. Assessors are advised to refer to the Guidance on the content and context for this Unit

Higher National Unit specification: statement of standards (cont)

Unit title: Structured Programming for Games

Outcome 3

Test and debug a completed solution

Knowledge and/or Skills

- ◆ Methods of debugging a program
- ◆ Methods of testing a program

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and Skills by showing that they can undertake the following:

- ◆ Creation of a Test Plan
- ◆ Recoding of test plan results and any changes made to the program throughout the implementation of the Test Plan

Assessment Guidelines

Candidates will test and debug the game as it is being constructed and will be required to note problems in the process of building the game. The Test Strategy will cover the key points of the game noting the results and alterations made to the code. Candidates will not be required to use an extensive test strategy, but will be required to provide evidence that testing has taken place.

Higher National Unit specification: statement of standards (cont)

Unit title: Structured Programming for Games

Outcome 4

Demonstrate and evaluate a completed solution

Knowledge and/or Skills

- ◆ Evaluate the solution against requirements.
- ◆ Reflect on the work that has been carried out and any changes made
- ◆ Make recommendations for improvement

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and Skills by showing that they can undertake the following:

- ◆ Demonstration of the completed game supported by a checklist of main requirements
- ◆ Evaluation report which is appropriate to the demonstration and contains reflection of work carried out with any changes made and recommendations for improvement

Assessment Guidelines

This Outcome is assessed using a combination of written and oral evidence. Much of the evidence can be obtained by questioning the candidate during the demonstration of the completed game. The candidate will, however, be required to provide a short written evaluation of the game with reference to testing performed in Outcome 3 and the demonstration in Outcome 4. The candidates will be questioned during the demonstration of the game to confirm authenticity of the candidate's original work. A pass will be awarded where the candidate has shown consistency in the oral and written evidence in relation to the functionality of the finished project.

Administrative Information

Unit code:	F8HC 34
Unit title:	Structured Programming for Games
Superclass category:	CB
Original date of publication:	August 2009
Version:	02 (June 2014)

History of Changes:

Version	Description of change	Date
02	Removal of 'Pointers' as Knowledge point and 'Input from and/or output to an external file' from Evidence Requirements for Outcome 2.	12/06/14

Source: SQA

© Scottish Qualifications Authority 2009, 2014

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

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: Structured Programming for Games

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 120 hours.

Guidance on the content and context for this Unit

This Unit has been developed as a mandatory three credit Unit for the first year of the HND Computer Games Development award. The Unit is designed to introduce candidates to the fundamental concepts of programming and no previous programming experience is expected. Although the Unit is delivered in the context of a games environment the skills gained are generic to software development and is therefore suitable for candidates who wish to gain programming skills not necessarily for the Games Industry. The Unit may act as a stand alone Unit for candidates in areas such as Web Development or Interactive Media who are not seeking a career in Software Development but would benefit from having programming skills.

The Unit is intended to give as much practical experience to the candidate as possible and the amount of paper based evidence has deliberately been reduced to a minimum. The three credits are required to allow the candidate enough practical experience to become proficient and confident in using a programming language. The idea of this Unit is to concentrate on the hands-on experience of coding and not to over-burden the candidate with consideration of the planning and testing stages of project development. For this reason it is recommended that the candidate should be assessed with a given project specification, or ideally a choice of project from a given range of specifications, that are realistic and achievable. It is not the scope of this Unit to assess the candidate on project planning. The importance of testing should be emphasised but not heavily assessed. The Unit should allow the candidate to become confident in using Structured Programming in order to appreciate the need for planning and testing which will be assessed in other units. The Unit should give the candidate enough practical experience to gain the confidence to progress to F86A 35 *Games Development: Object Oriented Programming* in the second year of the HND.

It is strongly recommended that project should be a graphical game. If this is the case then graphics may be supplied to the candidate or the candidate may source or create their own graphical content or they may be created in the delivery of another Unit. The Unit must however concentrate on coding and although it is recommended that a graphical content is used, it is at the discretion of the Centre whether 2D or 3D graphics and sound are used. It is envisaged that a 2D style arcade game would be best suited for assessing this Unit.

The language used for this Unit is at the discretion of the Centre. Although the Unit is about Structured Programming for Games it is intended to prepare the candidate to progress to F86A 35 *Games Development: Object Oriented Programming* within the second year. It is recommended that the Centre should use a language with a C style syntax to ease progression onto the F86A 35 *Games Development: Object Oriented Programming* Unit in year two of the Games Development HND.

Higher National Unit specification: support notes (cont)

Unit title: Structured Programming for Games

Guidance on the delivery and assessment of this Unit

Outcome 1

Demonstrate an understanding of structured programming concepts

Delivery

Outcome 1 consists of a series of open-book practical assignments forming a small portfolio, which aim to develop the skills needed to progress to subsequent Outcomes. The Assessor must assure themselves of the authenticity of each candidate's submission.

Assessment should not take place until the candidate has had the opportunity to gain experience of coding covering all the requirements of this Outcome:

- ◆ Datatypes
- ◆ Variables
- ◆ Operators
- ◆ Sequence
- ◆ Selection
- ◆ Nested Selection
- ◆ Iteration — unconditional.
- ◆ Iteration — conditional
- ◆ Arrays
- ◆ Functions

Candidates should first be introduced to the theory of programming but should then be introduced to hands-on programming at the earliest opportunity. The concepts of each topic should be explained then followed up with simple practical exercises. The delivery of Outcome 1 is likely to take up 60% of delivery time on the Unit and is the preparation of all four Outcomes.

Assessment

The criteria for Outcome 1 may also be evident in the submission of Outcome 2

Outcome 2

Implement a solution for a given game design

Higher National Unit specification: support notes (cont)

Unit title: Structured Programming for Games

Delivery

Outcome 2 is about putting into practice what has been learned in Outcome 1. All the criteria below should be featured in practical exercises that are relevant to the games environment before the student is presented with the assessment project. Candidates at this stage should be given problem solving exercises that require the use of more than one of the below criteria.

- ◆ Datatypes
- ◆ Variables
- ◆ Operators
- ◆ Objects
- ◆ Properties
- ◆ Selection
- ◆ Nesting
- ◆ Iteration
- ◆ Methods
- ◆ Arrays
- ◆ Parameter passing
- ◆ Input/output
- ◆ Comments

The assessment portfolio for Outcome 1 should aid the candidate in understanding how to tackle the project assessment for Outcome 2, but not relate directly to the project specification. For example, the candidate would not be expected to figure out how to move a character using keyboard input by themselves, but rather, would have been given an exercise that covers this feature. The exercise however would not emulate the exact requirements of what the assessment uses the keyboard input for.

Assessment

It is recommended that the project specification will allow the candidates enough flexibility to customise the game. The project should not be too regimented in terms of physical appearance and sound features, but must be precise in its operational requirements. Candidates must not be distracted from the programming requirements by the need to adhere to non-programming related material. For example, if the specification is for a Space Invaders type game, the appearance of the characters, or the actual sounds that are emitted should not be too specific, however, the manner in which the game is operated, such as keyboard input, and the role of the characters must be clear.

Outcome 3 and 4

Test and debug a completed solution
Demonstrate and evaluate a completed solution

Higher National Unit specification: support notes (cont)

Unit title: Structured Programming for Games

Delivery

The need to debug and test will be an on-going feature of the delivery of this Unit. Previous units have required the candidate to create test strategies and produce much paper documentation. It is one of the aims of this Unit to allow the candidate to gain enough practical experience to appreciate why a testing strategy would be desirable in future products. Candidates may be introduced to Step-in and Step-through features of the IDE and making use of commenting features to isolate code.

Assessment

The candidate is required to demonstrate the finished game to the assessor and provide a brief written evaluation. It is recommended that candidate takes notes on problems that have occurred during the building of their project for use in their presentation and evaluation. It is recommended that the presentation is informal allowing the candidate to explain the problems that were encountered and solved during the building of the project. The assessor may ask questions to prompt the user to ensure that the candidate has been given the best opportunity to talk about the testing and problem solving techniques that were employed. The written submission should be of around 300 words and reflect the evidence gained from the demonstration.

Opportunities for developing Core Skills

There are opportunities to develop the Core Skill of *Problem Solving* at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

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.

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

General information for candidates

Unit title: Structured Programming for Games

This is an introductory Unit to programming and assumes no prior knowledge or experience of programming. It introduces the fundamental concepts of programming within the context of a games environment and is therefore ideally suited, but not confined to, candidates studying Computer Games Development at a Higher National level.

In this Unit you will be introduced to the concepts and principles of structured programming and have ample opportunity to practice those skills. You will be required to problem solve and implement solutions to basic games scenarios starting from fundamental programming techniques then graduating towards implementation of a working game.

This will involve the following areas of learning:

- ◆ Understanding the principles of computer programming and learning how to work with a high level programming language
- ◆ Working on practical exercises that require problem solving skills and hands-on programming experience
- ◆ Testing and evaluating a finished completed computer game

Achievement of the Unit is assessed by successful completion of a computer game from a given specification and by one short multiple choice assessment.