National 4
Course
Specification

National 4 Computing Science Course Specification (C716 74)

Valid from August 2013

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Please refer to the note of changes at the end of this Course Specification for details of changes from previous version (where applicable).

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Course outline

Course title: National 4 Computing Science

SCQF: level 4 (24 SCQF credit points)

Course code: C716 74

Mandatory Units

H223 74 Software Design and Development (National 4) 9 SCQF credit points
H226 74 Information System Design and Development (National 4) 9 SCQF credit points

Added Value Unit
H227 74 Computing Science Assignment (National 4) 6 SCQF credit points
This Course includes six SCQF credit points for the assessment of added value in the Added Value Unit. Further information on this Unit is provided in the Assessment section.

Recommended entry

Entry to this Course is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by the following or equivalent qualifications and/or experience:

- National 3 Computing Science Course or relevant Units
- National 3 Numeracy

In terms of prior learning and experience, relevant experiences and outcomes may also provide an appropriate basis for doing this Course. Further information on relevant experiences and outcomes is given in the *Course Support Notes*.

Core Skills

Achievement of this Course gives automatic certification of the following:

Complete Core Skill	Information and Communication Technology at SCQF level 4

Progression

This Course or its Units may provide progression to

- other qualifications in Computing Science or related areas
- further study, employment and/or training

Further details are provided in the Rationale section.

Equality and inclusion

This Course Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the *Course Support Notes.*

Rationale

All new and revised National Courses reflect Curriculum for Excellence values, purposes and principles. They offer flexibility, provide more time for learning, more focus on skills and applying learning, and scope for personalisation and choice.

In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.

This Course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities as well as skills for learning, skills for life and skills for work.

All Courses provide opportunities for learners to develop breadth, challenge and application, but the focus and balance of the assessment will be appropriate for the subject area.

Relationship between the Course and Curriculum for Excellence values, purposes and principles

The Course provides an understanding of the technologies that underpin our modern digital world and develops transferrable skills. It brings together elements of technology, science and creative digital media and has wide-ranging social implications providing an excellent opportunity for cross-curricular learning in the senior phase.

At this level, the Course will cover a common core of concepts which underpin the study of Computing Science, and provide insight into the challenge, excitement and reward to be found in these areas.

The Course encourages learners to become successful, responsible and creative and to continue to acquire and develop the attributes and capabilities of the four capacities, including: creativity, flexibility and adaptability; enthusiasm and a willingness to learn; perseverance, independence and resilience; responsibility and reliability; and confidence and enterprise.

The Course provides progression from the National 3 Computing Science Course and the relevant experiences and outcomes.

Purpose and aims of the Course

Computing science is vital to everyday life — socially, technologically and economically; it shapes the world in which we live and its future. Computing is embedded in the world around us, from systems and devices in our homes and places of work, to how we access education, entertainment, transportation and communication. Understanding computational processes and thinking is also vital to many other fields, including science, economics, business and industry. While many learners will want to become computing professionals, all will benefit from the development of these foundational skills and the underpinning knowledge necessary to meet the needs of society today and for the future.

The aims of the Course are to enable learners to:

- introduce and develop aspects of computational thinking across a range of contemporary contexts
- develop knowledge and understanding of key facts and ideas in computing science
- apply skills and knowledge in analysis, design, implementation and testing to a range of digital solutions
- communicate computing concepts clearly and concisely using appropriate terminology
- develop an understanding of the impact of computing science in changing and influencing our environment and society

Related to these aims, and underlying the study of computing science, are a number of unifying themes, including technological progress and trends, the relationship between software, hardware and system performance and information representation and transfer as a core component of any computation. These are used to explore a variety of specialist areas through practical and investigative tasks.

Information about typical learners who might do the Course

The Course is designed to be of value to all learners, especially those considering further study or a career in computing science and related disciplines. It provides sufficient breadth, flexibility, personalisation and choice to meet the needs of all learners.

Learners will develop an appreciation of the central role of computation in the modern world and gain an understanding of the many functions of computing systems, concepts and processes. They will gain an insight into the capacities of computing professionals as problem-solvers and designers, able to design, implement and operate hardware and software systems, and the far-reaching impact of information technology on our environment and society. They will also develop a range of transferable skills for learning, skills for life and skills for work, opening up a wide range of career and study opportunities and enabling them to develop as global citizens who can contribute effectively to their communities, society and the world.

On completing the Course, the learners will have developed their skills in analysis and problem-solving, designing, developing, implementing and testing digital solutions.

Course activities also provide opportunities for learners to enhance generic and transferable skills in planning and organising, working independently and in teams, critical thinking and decision making, research, communication and self-and peer-evaluation, in a range of contexts.

Course structure and conditions of award

Course structure

The Course enables learners to develop a range of basic computing and computational thinking skills, including skills in analysis and problem-solving, design and modelling, developing, implementing and testing digital solutions across a range of contemporary contexts.

The Course also enables learners to develop knowledge and understanding of key computing concepts and processes, and the ability to apply this to a variety of problems; and an awareness of the impact of computing technologies on the environment or society.

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a number of ways.

The Course has three mandatory Units including the Added Value Unit. The first two Units listed below are designed to provide progression from the related Unit at National 3, and to the corresponding Unit at National 5.

Software Design and Development (National 4)
The aim of this Unit is for the learner to develop basic knowledge, understanding and practical problem-solving skills in software design and development. Learners will develop basic computational thinking and programming skills through practical tasks using appropriate software development environments across a range of contemporary contexts. These tasks will involve simple features and straightforward contexts. They will also develop an understanding of how data and instructions are stored in binary form and how programming underpins computer applications.

Information System Design and Development (National 4)
The aim of this Unit is for the learner to develop basic knowledge, understanding and practical problem-solving skills in information system design and development. Learners will implement practical solutions using appropriate development tools to create databases, web-based information systems, multimedia information systems (and/or hybrids of these). These tasks will involve simple features and straightforward contexts. Learners will also develop an understanding of basic computer hardware, software, connectivity and security issues through a range of practical and investigative tasks.

Computing Science Assignment (National 4)
This Unit requires the learner to apply skills and knowledge from the other Units to analyse and solve an appropriate challenging computing science problem.

Conditions of award

To achieve the National 4 Computing Science Course, learners must pass all of the required Units including the Added Value Unit. The required Units are shown in the Course outline section.

National 4 Courses are not graded.

Skills, knowledge and understanding

Full skills, knowledge and understanding for the Course are given in the *Added Value Unit Specification*. A broad overview of the mandatory subject skills, knowledge and understanding that will be assessed in the Course is given in this section. This includes:

- applying, with guidance, aspects of computational thinking across a range of straightforward contexts
- analysing, with guidance, straightforward problems within computing science across a range of contemporary contexts
- designing, implementing and testing, with guidance, digital solutions (including computer programs) to straightforward problems across a range of contemporary contexts
- developing skills in computer programming and the ability to communicate how a program works by being able to read and interpret code
- communicating basic understanding of key concepts related to software design and development and information system design and development clearly and concisely, using appropriate terminology
- basic knowledge of the impact of contemporary software-based applications on the environment or society
- applying basic computing science concepts and techniques to create solutions

Skills, knowledge and understanding to be included in the Course will be appropriate to the SCQF level of the Course. The SCQF level descriptors give further information on characteristics and expected performance at each SCQF level (www.sqa.org.uk/scqf).

Assessment

Information about assessment for the Course is included in the *Course Support Notes* and the *Added Value Unit Specification.*

Unit assessment

All Units are internally assessed against the requirements shown in the Unit Specification.

They can be assessed on an individual Unit basis or by using other approaches which combine the assessment for more than one Unit.

They will be assessed on a pass/fail basis within centres. SQA will provide rigorous external quality assurance, including external verification, to ensure assessment judgments are consistent and meet national standards.

The assessment of the Units in this Course will be as follows:

Software Design and Development (National 4)
For this Unit, the learner will be required to provide evidence of:

- skills in software design and development
- knowledge and understanding of software design and development

Information System Design and Development (National 4)
For this Unit, the learner will be required to provide evidence of:

- skills in information system design and development
- knowledge and understanding of information system design and development
- understanding of the security risks involved in digital communication

Added Value Unit

Courses from National 4 to Advanced Higher include assessment of added value[1]. At National 4, added value will be assessed in an Added Value Unit. The Added Value Unit will address the key purposes and aims of the Course as defined in the Course Rationale. It will do this by addressing one or more of breadth, challenge or application.

In the National 4 Computing Science Course, the Added Value Unit will focus on:

- challenge
- application

The learner will draw on, extend and apply the skills and knowledge they have developed during the Course. These will be assessed through an assignment[2] which involves the application of skills and knowledge from the other Units to analyse and solve an appropriately challenging computing science problem.

[1] Definitions can be found here: www.sqa.org.uk/sqa/58409.html
[2] Definitions can be found here: www.sqa.org.uk/sqa/58409.html

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Course. The skills that learners will be expected to improve on and develop through the Course are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Course where there are appropriate opportunities.

2 Numeracy

2.1 Number processes
2.3 Information handling

4 Employability, enterprise and citizenship

4.2 Information and communication technology (ICT)

5 Thinking skills

5.3 Applying

Amplification of these skills is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills will be appropriate to the level of the Course. Further information on building in skills for learning, skills for life and skills for work for the Course is given in the *Course Support Notes*.

Employability, enterprise and citizenship skills shown in this National Course provide automatic certification of Core Skill: Information and Communication Technology at SCQF level 4.

Administrative information

Published: June 2015 (version 1.2)

History of changes to National Course Specification

Version	Description of change	Authorised by	Date
1.1	Core skills information added	Qualifications Development Manager	June 2013
1.2	Evidence requirement 'understanding of the impact of software-based applications on the environment or society' has been deleted to reflect the removal of Outcome 3 from the Software Design and Development Unit.	Qualifications Manager	June 2015

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