Advanced Higher Computing Science — draft Course rationale and summary

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Course rationale

Background

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 key technologies that underpin our modern, digital world and develops a wide range of transferable skills. It brings together elements of technology, science, and creative digital media and applies these to real-world contexts and challenges. It explores the social, environmental legal and ethical impact of technology and provides an excellent opportunity for making links across learning in the senior phase.

At this level, the Course will explore advanced concepts, ideas and themes which inform 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 in their use of digital technologies 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 Higher Computing Science Course.

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 professionals play key roles in meeting the needs of society today and for the future, in fields which include science, communications, economics, education, entertainment, business and industry.

Our society needs more computing professionals and for all young people to have an informed view of the IT industry and its contribution to the economy and our society. The Course provides a broad and challenging exploration of the use and development of digital technologies. Because of its relevance and its focus on developing transferable skills, it will be valuable to many learners, particularly those considering a career or further study in computing science or information technology.

The purpose of the Course is to build on the knowledge, understanding and practical skills developed by the learner in the Higher Computing Science Course and to provide a useful bridge towards study of computing science and related disciplines in higher education. This is achieved by consolidating and extending candidates' depth and breadth of learning, providing opportunity for independent and investigative work, while encouraging team work, and requiring candidates to develop and report on a significant computing-based project.

The aims of the Course are to enable learners to:

- understand and apply aspects of computational thinking in a range of contexts
- extend and apply knowledge and understanding of advanced concepts and processes in computing science
- apply analysis, design, development, implementation and evaluation to a range of digital solutions with increasingly complex aspects
- apply creative problem-solving skills across a range of computing contexts
- develop knowledge and understanding of the project development process
- develop autonomous learning, investigative and research skills
- communicate advanced computing concepts clearly and concisely using appropriate terminology
- develop an informed understanding of role and impact of computing science in transforming and influencing our environment and society, including legal and ethical implications

Related to these aims, and underlying the study of computing science, are a number of unifying themes, including computational thinking, 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 activities.

Information about typical learners who might do the Course

The Course is designed for all learners who can respond to a level of challenge, especially those considering further study or a career in computing science and related disciplines. It provides sufficient breadth, flexibility and choice to meet the needs of all learners.

Learners will develop a deeper understanding of the central role of computing professionals as creative problem-solvers and designers, able to design, implement and operate complex hardware and software systems, and of the far-reaching impact of information technology on our society and the environment. They will also continue to 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.

On completing the Course, learners will have developed greater skills in analysis and problem-solving, and in software and information system design, development, implementation, testing and evaluation. They will have developed deeper computational thinking skills with ability to apply this to a range of contexts.

Course activities also provide opportunities 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 technological context.

This Course or its components may provide progression to:

- degrees in computing science and related disciplines
- careers as a computing professional in a wide range of industries
- employment, apprenticeships and/or training as an IT professional in a range of industries
- a range of computing-related Higher National Diplomas (HNDs)

Course summary

Course title: Advanced Higher Computing Science

SCQF level 7 (32 SCQF credit points)

Course outline

Mandatory Units
The Course comprises the following mandatory Units:

Software Design and Development (Advanced Higher)	**8 SCQF credit points**
Information Systems Design and Development (Advanced Higher)	**8 SCQF credit points**
Computing Science Project Management (Advanced Higher)	**8 SCQF credit points**
Course assessment	**8 SCQF credit points**

This Course includes eight SCQF credit points to allow additional time for preparation for Course assessment. The Course assessment covers the added value of the Course. Further information on the Course assessment is provided in the Assessment section.

Course structure and conditions of award

Course structure

The Course enables learners to develop and extend a range of skills related to the design and development of software and information systems, including skills in analysis and problem-solving, design and modelling, developing, implementing, testing and evaluating digital solutions across a range of contemporary contexts.

The Course also enables learners to develop and extend knowledge and understanding of advanced concepts and processes, the ability to apply these to a variety of problems, and an awareness of the impact of computing science and information technology on society and the environment.

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

Software Design and Development (Advanced Higher)
This Unit explores a range of advanced concepts and processes relating to software design and development, including complex algorithms, data handling and high-level programming. Learners will develop skills in creative problem solving, computational thinking, modelling and evaluating through practical tasks, using appropriate programming languages and/or environments in a range of contemporary contexts. These tasks will involve complex features and both familiar and unfamiliar contexts which will require interpretation on the part of the learner. This Unit provides learners with a growing understanding of contemporary software development technologies, processes and challenges.

Information Systems Design and Development (Advanced Higher)
This Unit explores a range of advanced concepts, facts and processes relating to information system design and development. Learners will develop thier knowledge and understanding of information system hardware, security, database systems, web-based information systems, multimedia information systems (and/or hybrids of these) through a range of practical and investigative tasks. These tasks will involve complex features and both familiar and unfamiliar contexts which will require interpretation on the part of the learner. This Unit provides learners with a growing understanding of contemporary information systems applications, opportunities and challenges.

Computing Science Project Management (Advanced Higher)
In this Unit, learners will develop knowledge and understanding of the project development process, lifecycle and management as it applies to a computing-based project. Learners will investigate a requirement for a contemporary computing-based system or solution (or similar) and consider its economic, social, legal, ethical and environmental impact. They will research and analyse the requirements, and respond with a specification, a design proposal, and

development, implementation and test plans to meet the requirements. The learner will develop a presentation on the completed project. The design may be carried forward, implemented and evaluated as part of the Course assessment.

Conditions of award

To gain the award of the Course, the learner must pass all of the Units as well as the Course assessment. The required Units are shown in the Course outline section. Course assessment will provide the basis for grading attainment in the Course award.

Assessment

Information about assessment standards for the Course is included in the *Course Assessment Specification*, which provides full details including advice on how a learner's overall attainment for the Course will be determined.

Unit assessment

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

They can be assessed on a Unit-by-Unit basis or by combined assessment.

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.

Exemplification of possible assessment approaches for these Units is provided in the *National Assessment Resource.*

Course assessment

Courses from National 4 to Advanced Higher include assessment of added value[1]. At National 5, Higher and Advanced Higher, the added value will be assessed in the Course assessment. The added value for the Course must 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 and application.

In the Advanced Higher Computing Science Course, added value will focus on:

- breadth
- 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 a combination of a project[2] and a question paper[3].

The Computing Science project adds value by requiring challenge and application. Learners will apply knowledge and skills from the Units to analyse, plan, develop, implement, test and evaluate a digital solution to a significant and appropriately challenging computing-based problem. This project may be an

[1] Definitions can be found here: www.sqa.org.uk/sqa/45528.html
[2] Definitions can be found here: www.sqa.org.uk/sqa/45528.html
[3] See link above for definition.

individual or group project, and may involve partnerships with industry or further or higher education.

The question paper introduces breadth to the assessment. It requires depth of understanding and application of knowledge from across the Units.