

## Computing Science – Course Outlines

**\*Geared towards those pupils who have an interest in programming.**

Further information can be found here:

<https://www.sqa.org.uk/sqa/56921.html>

### National 3

The Course enables learners to develop, across contemporary contexts, a range of skills, including problem-solving, creating and implementing digital solutions. The Course also enables learners to develop knowledge and understanding of key concepts and processes and the ability to apply this to a variety of problems.

Each of the component Units of the Course is designed to provide progression to the related Unit at National 4. **Building Digital Solutions (National 3)**. In this Unit, learners will become familiar with the features of development software to build digital solutions such as computer games, animation and other applications. **Information Solutions (National 3)**. In this Unit, learners will become familiar with a range of applications, such as databases and web page creation software.

### National 4

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.

### National 5

This course is designed for learners who are considering further study or a career in computing science and related disciplines. It provides opportunities to enhance 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. The course covers the following units:

**Software design and development** - Learners develop knowledge, understanding and practical problem-solving skills in software design and development, through a range of practical and

investigative tasks using appropriate software development environments. This develops their programming and computational-thinking skills by implementing practical solutions and explaining how these programs work. Tasks involve some complex features (in both familiar and new contexts), that require some interpretation by candidates. They are expected to analyse problems, and design, implement, test and evaluate their solutions.

**Computer systems** - Learners develop an understanding of how data and instructions are stored in binary form and basic computer architecture. They gain an awareness of the environmental impact of the energy use of computing systems and security precautions that can be taken to protect computer systems.

**Database design and development** - Learners develop knowledge, understanding and practical problem-solving skills in database design and development, through a range of practical and investigative tasks. This allows candidates to apply computational-thinking skills to analyse, design, implement, test, and evaluate practical solutions, using a range of development tools such as SQL. Tasks involve some complex features (in both familiar and new contexts), that require some interpretation by candidates.

**Web design and development** - Learners develop knowledge, understanding and practical problem-solving skills in web design and development, through a range of practical and investigative tasks. This allows candidates to apply computational-thinking skills to analyse, design, implement, test and evaluate practical solutions to web-based problems, using a range of development tools such as HTML, CSS and Javascript. Tasks involve some complex features (in both familiar and new contexts), that require some interpretation by candidates.

## Higher

The course is suitable for candidates interested in exploring the role and impact of contemporary computing technologies. It provides an insight into the challenge, excitement and rewards found in these areas.

**Software design and development** - learners develop knowledge and understanding of advanced concepts and practical problem-solving skills in software design and development. They do this by using appropriate modular software development environments. Learners develop modular programming and computational-thinking skills by analysing, designing, implementing, testing, and evaluating practical solutions and explaining how these programs work. They use their knowledge of data types and constructs to create efficient programs to solve advanced problems.

**Computer systems** – Pupils develop their understanding of how data and instructions are stored in binary form and factors affecting system performance. They gain an awareness of the environmental impact of intelligent systems, as well as the security risks, precautions and laws that can protect computer systems.

**Database design and development** - Pupils develop knowledge, understanding and advanced practical problem-solving skills in database design and development. They do this through a range of practical tasks, using a minimum of three linked tables and implemented in SQL. Candidates apply computation

and thinking skills to analyse, design, implement, test, and evaluate practical solutions, using a range of development tools. Pupils apply interpretation skills to tasks involving some complex features in both familiar and new contexts.

**Web design and development** - Pupils develop knowledge, understanding and advanced practical problem-solving skills in web design and development. They do this through a range of practical and investigative tasks. Pupils apply computational-thinking skills to analyse, design, implement, test, and evaluate practical solutions to web-based problems, using a range of development tools including HTML, Cascading Style Sheets (CSS) and JavaScript. Pupils apply interpretation skills to tasks involving some complex features in both familiar and new contexts.

### **Advanced Higher**

The course is suitable for candidates interested in exploring the role and impact of contemporary computing technologies. It provides a pathway for those who want to progress to more specialised training, further education, or entry into a diverse range of occupations and careers, such as software programming and/or engineering, databases, and web design and development. The skills in the course are transferable to all areas of computing-related study including robotics, artificial intelligence, e-commerce, networking, cyber security, and systems analysis and testing.

### **National Progression Award (NPA) – Cyber Security**

The NPAs in Cyber Security at SCQF levels 4, 5 and 6 provide foundation knowledge and skills in data security, digital forensics and ethical hacking — and provide a skills pipeline into the cyber security industry.

These awards are designed to raise awareness of cyber security and fill the current skills gap in this field. They will encourage learners to improve their cyber hygiene and enable them to identify security weakness safely, legally and ethically. They will also help learners to contribute more safely to virtual communities.

They are the first school-based national qualifications in cyber security to be developed and will prepare learners for further studies and future employment in this area.

Ethics and the law are fundamental aspects of these awards. Ethical considerations are included in every component Unit, and legislative considerations are included in all appropriate Units. The aim of the awards is to produce knowledgeable and skilled individuals who are aware of the potential misuses of, and unauthorised access to, computer systems but who use these competences for legal and ethical purposes.