COMPUTER SCIENCE

Course content

We are living in the midst of a revolution powered by computers. This revolution has brought changes to all aspects of society. AQA have worked closely with universities and industry to develop this new A level specification.

Computer Science can provide a student with the necessary education to innovate in extraordinary ways. Computer technology is at the heart of many endeavours to make a meaningful difference in the world, whether through scientific research, medical advances, helping disabled people lead more fulfilling lives, improved communication and transportation or many other areas. These advances generally happen not by applying existing technology to a new problem, but by collaborating with experts in other fields and developing innovative solutions.

Computational thinking can bring careful, logical approaches to problem solving and an understanding of the power of abstraction to many fields of human endeavour. The ability to think logically and to develop solutions is applicable even if one does not ultimately write those solutions in a programming language.

Skills

The AQA A Level specification in Computer Science encourages students to develop:

- An understanding of, and the ability to apply, the fundamental principles and concepts of computer science, including abstraction, decomposition, logic, algorithms and data representation.
- The ability to analyse problems in computational terms through practical experience of solving such problems, including writing programs to do so.
- The capacity for thinking creatively, innovatively, analytically, logically and critically.
- The capacity to see relationships between different aspects of Computer Science.
- Mathematical skills related to: Boolean algebra, comparison and complexity of algorithms, number representations and bases.

Syllabus

Fundamentals of programming

- Fundamentals of data structures
- Fundamentals of algorithms
- Theory of computation
- Fundamentals of data representation
- Fundamentals of computer systems
- Fundamentals of computer organisation and architecture
- Consequences of uses of computing
- Fundamentals of communication and networking
- Fundamentals of databases
- Big Data

Assessment

Paper 1 - Assessed
- On-screen exam: 2 hours 30 minutes
- 40% of A-level

Paper 2 - Assessed
- Written exam: 2 hours 30 minutes
- 40% of A-level

Non-exam assessment - Assessed
- 75 marks
- 20% of A-level

The computing practical project

The project allows students to develop their practical skills in the context of solving a realistic problem or carrying out an investigation. Students have the opportunity to work independently on a problem of interest over an extended period, to improve their programming skills and deepen their understanding of computer science.

The most important skill that should be assessed through the project is a student's ability to create a programmed solution to a problem or investigation. This is recognised by allocating 42 of the 75 available marks to the technical solution. A lower proportion of marks is awarded for identifying a problem, analysing it and designing a solution or plan for further investigation, testing and evaluation.

Some examples of the types of problem to solve or investigate are:
- a simulation, of a business or scientific nature, or an investigation of a well-known problem such as the game of life
- a solution to a data processing problem for an organisation, such as membership systems
- an investigation into machine learning algorithms
- the solution of an optimisation problem, such as production of a rota, shortest-path problems or route finding
- a computer game
- an application of artificial intelligence
- a control system, operated using a device such as an Arduino board
- a website with dynamic content, driven by a database back-end
- an investigation into an area of computing, such as rendering a three-dimensional world onscreen