Computer Science A Level

Board: AQA, Specification 7517

Contact Mr P Sullivan psullivan@robertsmyth.tgacademy.org.uk

The course

Experience of a high level programming language is beneficial although no specific language is required beforehand. Programming tasks will be carried out using Python version 3.

Computer science helps us to understand how computers can solve problems. It could be that you have already experimented in some type of programming, either making interactive web pages or other personal projects.

Computer science has an emphasis on abstract thinking, general problem solving, algorithmic and mathematical reasoning, scientific and engineering-based thinking. These are all useful skills not just for future programmers but for anyone following a scientific, technical, engineering or mathematical career.

Course content and assessment

The A Level specification comprises three units, the first of which involves an on-screen programming assessment using the Python programming language.

The second is assessed by a written exam of short, medium and extended answers and the third is assessed through a practical project for which students will prepare a portfolio of evidence.

Paper 1 (on-screen)
Problem Solving, Programming, Data structures, Algorithms and the theory of computation (40%)

You will be taught how to design, write and test programs in Python, a high level programming language that is widely used in industry by the business, arts, scientific and engineering communities. A "skeleton" program will be provided by the exam board which you will be expected to modify and extend. Programming techniques will be learned such as subroutines; string manipulation including use of regular expressions; use of arrays and records; data types such as stacks, queues, trees, dictionaries and vectors; recursion; object oriented and event driven programming. Standard searching and sorting algorithms will be explored and evaluated for speed and memory efficiency. The theory of abstraction, problem solving and the limits of computation will also be discussed to aid you in developing algorithms.

Paper 2 (written)
Data representation, computer systems and architecture, networking, databases, Big Data and the consequences of computing (40%)

This theory based unit covers the computers representation of numbers, instructions, images and sound. It introduces binary and hexadecimal number systems, uses and conversions including negative numbers and those with a fractional part. Encryption and compression are explored along with their use in networking this also extends to networking protocols and the internet.

Hardware including processor architecture and logic gates is explored as is software including systems software. Databases are a software focus, taking in SQL, database design and normalisation. Finally the individual, social, legal and cultural issues and opportunities of computing are investigated.

The practical project (20%)

You will need to demonstrate a full understanding of the systems development lifecycle by analysing, designing, building, testing and documenting a programmed solution for a real end user. Projects can range from database driven websites to mobile phone applications or interactive simulations. You will prepare a report of your experiences detailing each step of the cycle along with user manuals and self-evaluation of your project.
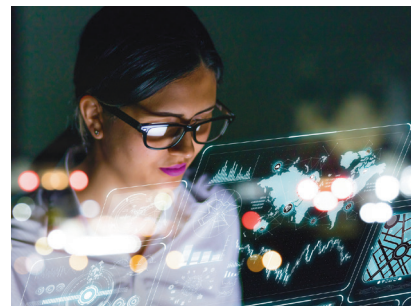
robertsmyth.tgacademy.org.uk @RSAPrincipal