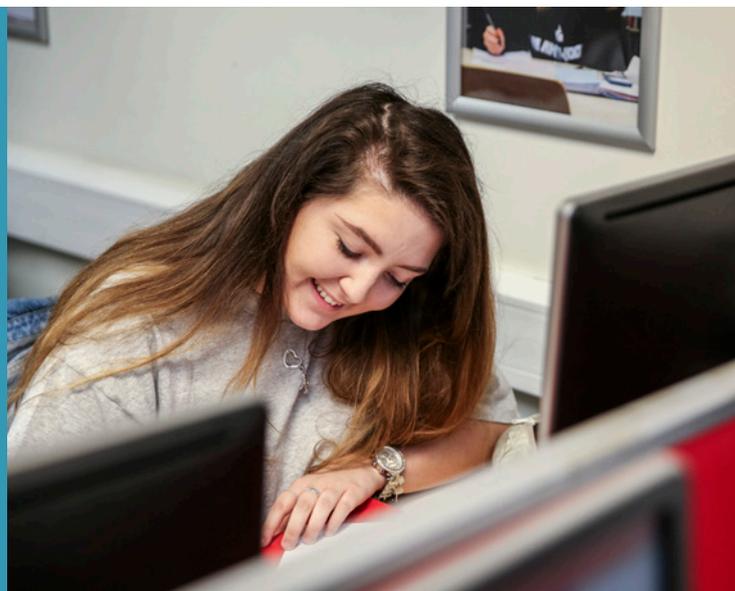# computer science

## A Level

**Head of department:** Jonathan Poole

**Email:** jpoole@esher.ac.uk

**Teacher in charge:** Robert Woollins

**Email:** rwoollins@esher.ac.uk

**Exam board:** AQA

## What is this subject about?

Computer Science is at the heart of an information processing revolution. It can be split into two halves – programming and theory. You must be just as interested in the architecture of a computer as you are in programming, as both are key parts of the course. Programming is all about solving problems. Computer scientists concern themselves with solving problems. These problems must be modelled and analysed, a solution designed and then finally implemented. The theory side of things is all about exactly how data can be represented, and the procedures that can transform this data into other forms of information. It delves into some of the specifics such as how this data is accessed from main memory, including the fetch-execute cycle.

## What will I study over the two years?

A large portion of the course is programming based. A key part of the A Level is object-oriented programming, the most common approach to programming in business and commercial situations. The course promotes good programming practices such as modularisation and avoiding unnecessary global variables, sensible variable naming conventions, proper commenting and much more. As you learn how to program you will learn the relevant computer architecture, such as how computers store and represent different data types, including images, videos and sounds. You will also learn about networking protocols, and study the moral, ethical, legal and cultural issues and opportunities surrounding computers.

## How is the course assessed?

The course is assessed through two exams worth 40% each and a coursework project worth 20%. The first exam is sat on a computer and will test both practical programming skills and your knowledge of theory. The second paper is a traditional exam testing your theoretical knowledge of computer systems, how they are formed, and communicate and so on. This paper includes extended writing in the form of full essay responses. The coursework is a programming project, requiring a full write up which must include analysis of a problem and documentation of the design, testing and evaluation processes. The project is written in the second year, after students have had a chance to gain the necessary programming skills.

## What skills will I need and develop in this course?

There is a strong emphasis on problem solving skills. Problem solving is the key skill required for programming. A computer is stupid... It will only do exactly what you tell it to and therefore you must be able to solve the problems yourself. You will start knowing what you want the computer to do, but only when you have figured out how best to do it will you be able to write a piece of code that carries out the operations required. You will also learn how to communicate clearly as you produce a full written documentation of your project in the second year.

**ESHER COLLEGE**

## What can the course lead to in terms of higher education and future careers?

A Level Computer Science can naturally lead to study Computer Science at degree level. However, most University courses do not require it, while A Level Mathematics is generally required to study Computer Science at University. Beyond Computer Science itself, there are many related courses that can be studied at University. Courses such as Information Systems or Information Technology may benefit from A level Computer Science, but there are a huge variety of courses, from Animation to Software Engineering to Ethical Hacking.

## What are the formal entry requirements for this course?

In addition to the College's general entry criteria, you will need to achieve a minimum of:

- Grade 6 in GCSE Maths
- Grade 4 in GCSE English Language

GCSE Computer Science is not a requirement to study the A level. However, if GCSE Computer Science has been sat, a minimum of grade 4 must have been achieved.

We would envisage that if you take A level Computer Science you are likely to be taking A level Mathematics as well. We would also ideally expect you to have averaged at least a grade 6 in your GCSEs overall.

## Subject combination advice:

Mathematics and Physics are natural pairings for Computer Science. All three subjects place a heavy emphasis on problem solving skills, and Mathematics is generally required to study Computer Science at University, with some universities accepting Physics.

It is important to note that A Level Computer Science is not required to study Computer Science at University, whereas Mathematics is. Some leading Universities require (or strongly encourage) students to have studied A level Further Mathematics in addition to A level Mathematics.

## How does A level Computer Science differ from BTEC Information Technology?

Overall approach: A level Computer Science deals with the "behind the scenes" work of developing and implementing various sets of instructions to enable a computer to do a particular task. BTEC Information Technology focuses on the "user side" of computers and on understanding how to operate a range of software to get tasks completed, often in the context of a particular organisation or business.

Content of the course: A level Computer Science focuses on computer theory and programming, consisting of the fundamentals of programming, data structures, algorithms, and object-orientated programme design. You learn about the detail of the internal workings of a computer, right down to the basics of how all data is stored using binary, covering aspects of computer architecture, showing the specifics of the fetch-execute cycle and exactly how data is accessed from main memory using assembly language instructions. BTEC Information Technology has a broader variety of content which enables students to focus on particular computing interests and plans they have for next steps into further study, an apprenticeship, or employment. It works through units to understand user theory and how to produce documents, files, presentations, spreadsheets, databases etc to perform day to day tasks.

Assessment: In A level Computer Science 80% of the marks go on two formal exams and 20% of the marks on a coursework project. In BTEC Information Technology 1/3 of the marks go on a formal exam and the other 2/3 of the marks are for coursework and a task done in the classroom under controlled conditions over a period of a week.