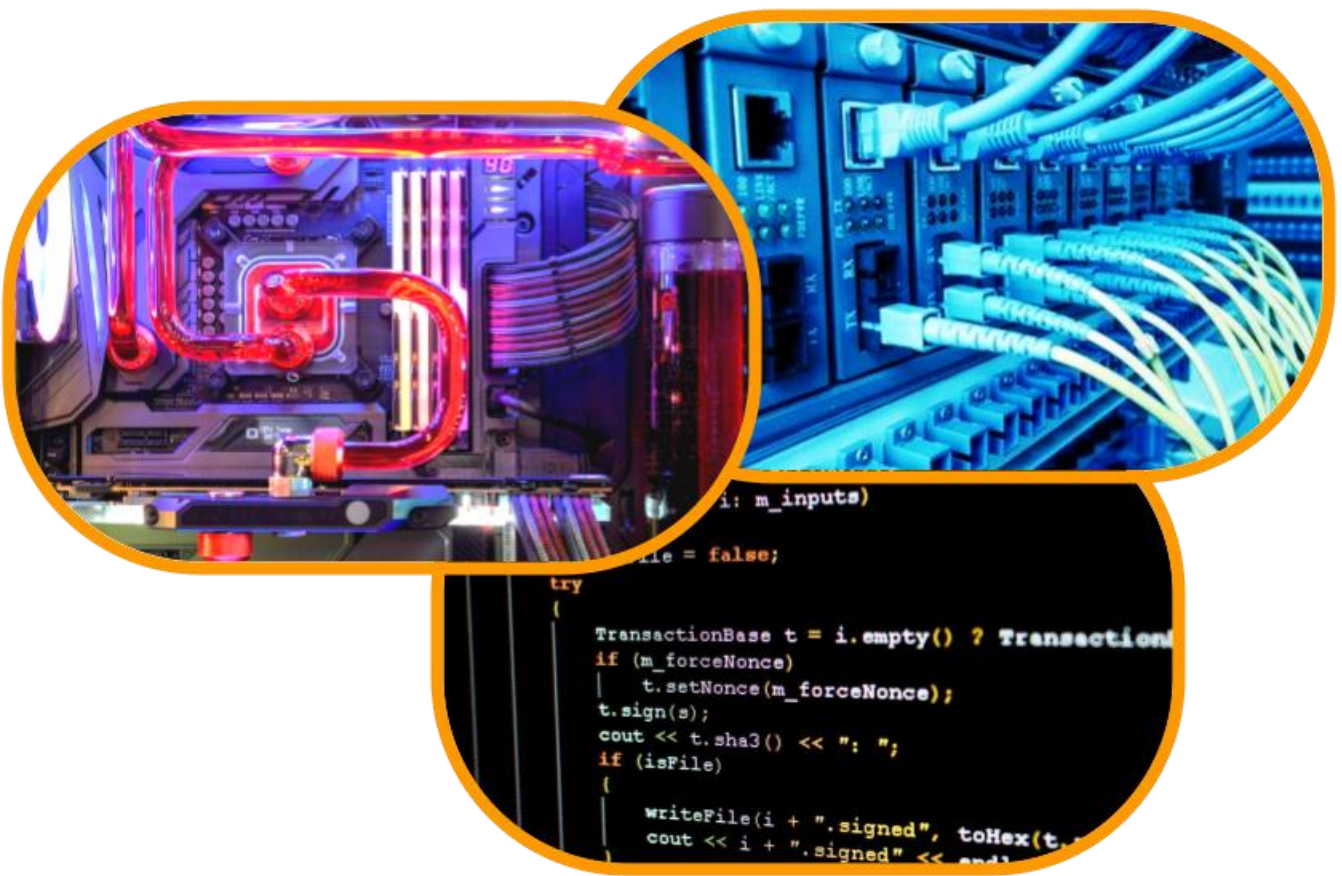


VI

Hartismere  
College



Computer Science



# **A STUDENT'S GUIDE TO THE A LEVEL IN COMPUTER SCIENCE**

## **What do I need to know or be able to do before taking this course?**

In order to study this subject, students should have achieved at least a grade 6 in maths GCSE or grade 7 in computer science GCSE. It would be highly beneficial to have studied computer science at GCSE level but not essential. The course focuses on the study of how computers are used to solve a range of problems. You will learn about different types of computer systems, how they work and how they communicate. You will investigate the parts that make-up a computer system including software, hardware and people and develop your own computer programs through programming, mainly with the language C#. The course will also teach the importance of following a systematic methodology when creating a system to ensure it meets the requirements of the client and end-user.

## **What will I learn on this A level course?**

The course will enable you to:

- develop your interest and enjoyment of using computer programming to solve problems
- develop as a creative, analytical and logical thinker
- develop a clear philosophy of the consequences of increased reliability on computers
- understand the importance of analysis, design, testing and evaluation when developing a system
- understand the organisation of computer systems, including software, hardware, data, communications and people

## **What kind of student is this course suitable for?**

This course will appeal to students who:

- have an interest in developing their own software through programming
- enjoy problem solving and understanding how and why computer operate
- want to study in the area of computer science, mathematics or engineering

## **What examinations will I have to take to get my qualification?**

AS is short for Advanced Subsidiary. This is a standalone qualification studied for one year. All Hartismere students will sit AS exams so that they can have as much choice as possible about the subjects they continue with in year 13. All work in year 12 is preparation for the full A level qualification which is taken at the end of year 13.

### **AS Computing (OCR)**

#### **Unit 1      Computing Principles**

**1½ hour exam**

**50% of AS marks**

In this unit you gain an understanding of the fundamentals of computing, including processors, software, software development, data, networking and wider the wider effects of computer use. For processors, we look at the structure, the different types and how they interact with memory. You will study different types of operating systems and how they operate, programming technique and assembly language. There will be an introduction to databases and web standards, such as HTML, CSS and JavaScript. We will also look into the operations of networks, studying the TCP/IP model, DNS and the use of packets. The course looks closely at the use of data types in computer programs, the use of binary, hexadecimal and floating point binary, character sets and data structures such as arrays and stacks. You will be expected to discuss in detail the impact computer use has had on the world, including the legal changes (e.g. Data Protection Act, Regulation of Investigatory Powers Act, etc.), changes in working patterns, use of AI, environmental impacts, censorship and piracy.

#### **Unit 2      Algorithms and Problem Solving**

**1½ hour exam**

**50% of AS marks**

This unit is all about the theory of software development, which we believe is best taught and experienced through actual programming. You will get plenty of time to program, with assistance from the teacher and other students, in lesson. The aim of the unit is to develop an understanding of designing and creating algorithms to solve problems. You will gain an understanding of what is meant by computational thinking. You will look in depth into programming techniques and some of the methodologies used for software development. You will solve a range of problems using programming and learn standard algorithms such as bubble sorts, insertion sorts, binary search and linear search.

## **Advanced Level (A Level) (OCR)**

### **Unit 1      Computer Systems** **2 hour exam**

**40% of A Level marks**

In this unit we look in great detail at the characteristics of modern processors, the workings of input, output and storage devices and how they interact with the processor. We study a range of different systems software, the development process and different types of programming languages. You will understand how data moves through computers through topics such as compression, encryption, hashing, databases, networks and web technologies. You will have deep knowledge of the use of data types, data structures and Boolean algebra.

### **Unit 2      Algorithms and Programming** **2 hour exam**

**40% of A Level marks**

This topic is all about software development. The topics covered include:

- Elements of computational thinking
- Problem solving and programming
- Algorithms

### **Unit 3      Programming Project** **Coursework**

**20% of A Level marks**

This unit will require you to design and produce a working piece of software for a specific purpose and client of your choice. The project will follow the path of the agile development approach and will be handed in as a written report. This is a substantial project that will be presented as a report.

While working on the project, you will:

- analyse the problem;
- develop a thorough set of designs for the system;
- implement the software using an appropriate programming language (most use C#)
- fully test the system to ensure it works as expected;
- produce a detailed and thorough evaluation of the final system.

Time and work management is an important factor for this topic as it is mostly completed independently. You will be expected to work on the project outside of lesson time and complete your own research on how to solve problems.

## **What could I go on to do at the end of my course?**

Short answer: employment, apprenticeship, degree apprenticeship, further specific training (college) or university.

Students with AS or A Level computer science have a wide range of possible career and higher education opportunities. You will learn and use a variety of transferable skills during the course. These include software and programming skills for use in the work place and personal use, the ability to create creative and innovative products using computers, the ability to problem solve, think logically and communicate effectively and an understanding of how computers operate and why. These skills are in demand from employers, universities and colleges and are also valuable in their own right.

Computer science can be studied at further education, but will also form a great basis for studying any information technology subject such as web design, artificial intelligence, games design and information systems or computational science areas such as bioinformatics. The skills used in A Level computer science would also benefit those looking to study mathematics and engineering.

Many students will also use their qualification to go straight into employment to begin an apprenticeship. In recent years, a few of our students have successfully enrolled in degree apprenticeships at organisations such as BT. A wide range of occupations are open to students with AS or A Level computer science. This can also include the opportunity to receive further training in areas such as software development, cyber security, database management, IT technician, office administration or web design and administration.

## Examples of Computer Science related degree courses:

3D Modelling & Animation	Digital & Technology Solutions
Artificial Intelligence & Machine Learning	Digital Marketing
Artificial Intelligence & Robotics	Digital Media & Information Studies
Business Information Technology	Electronic & Information Engineering
Business Management & Information Systems	Electronic & Software Engineering
Cloud Computing	Electronic Music, Computing & Technology
Computer & Data Science	Games Design
Computer Forensics	Games Programming
Computer Games Technology	Information Technology
Computer Graphics, Imaging & Multimedia	Information Technology Management for Business
Computer Networks	Innovation Engineering
Computer Science	Intelligent Systems
Computer Systems Engineering	Network Engineering
Computing & Smart Devices	Software Engineering
Cyber Security	Technology, Health & Wellbeing Sciences
Cyber Security & Digital Forensics	Web Development

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