

## The Sheffield Sixth Form – Computer Science Pre-induction Summer Project

### Welcome

We very much look forward to seeing you in September and to help your transition from GCSE to A Levels the following guide and task have been developed.

### **A bit about your study with us**

A Level Computer Science is an exciting but demanding subject that will help you develop an analytical, problem-solving approach, which is sometimes called 'computational thinking'. The course will equip you with the fundamentals of problem-solving, which you will put into practice by developing computer programs using Visual Basic .NET. It is crucial that you spend time every week developing your programming skills outside lessons. In the second year of the course, you will undertake a significant programming project which you will choose yourself.

In A Level Computer Science, students learn the principles of computation and algorithms, computer programming, machine data representation, computer systems (hardware and software), computer organisation and architecture, communications and networking, databases and the consequences of using computing. Computer Science is a discipline which requires thinking both in abstract and in concrete terms. On a higher level, computer science is concerned with problem solving: modelling and analysing problems, designing solutions, and implementing them. Problem solving requires precision, creativity, and careful reasoning.

This OCR A Level Computer Science can be studied alongside Maths, Physics and Economics.

### **About the course**

Computer Science is a practical subject where students can apply the academic principles learned in the classroom to real-world systems. It's an intensely creative subject that combines invention and excitement, and can look at the natural world through a digital prism.

The aims of this qualification are to enable learners to develop:

- An understanding and 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 to think creatively, innovatively, analytically, logically and critically
- The capacity to see relationships between different aspects of computer science
- Mathematical skills.

### **Course content**

The A Level Computer Science includes the following topics: The characteristics of contemporary processors, input, output and storage devices • Software and software development • Exchanging data • Data types, data structures and algorithms • Legal, moral, cultural and ethical issues • Elements of computational thinking • Problem solving and programming • Algorithms to solve problems and standard algorithms.

The content of this A Level in Computer Science is divided into three components: • Computer systems component (01), which contains the majority of the content of the specification and is assessed in a written paper recalling knowledge and understanding of algorithms and programming.

Component (02) relates principally to problem solving skills needed by learners to apply the knowledge and understanding encountered in Component 01. •

Finally learners will complete a Programming project, which is a practical portfolio based assessment with a task that is chosen by the teacher or learner and is produced in an appropriate programming language of the learner's or teacher's choice.

### **Where does this lead?**

The course will prepare you for continued study at university degree level and various possible career pathways thereafter. Degree programmes include Computer Science, Information Systems, Software Engineering, Artificial Intelligence, Health Informatics, Motion Graphics and Computing. Degrees can also include a one-year industrial placement to give you industrial knowledge and practical understanding.

The Sheffield College offer a variety of Higher Education courses including degree courses. This A Level can lead onto these higher level programmes. It can also lead you onto Degree Apprenticeships such as Cyber Intrusion Specialist, Cyber Security Technologist, Data Analyst, Software Developer / Tester, Network Engineer.

### **Future opportunities**

There are a variety of career opportunities including Software Developer, Information Security Analysts, Computer Systems Analysts, Computer and Information Systems Manager, Computer and Information Research Scientists, Computer Network Architect, Network and Computer Systems Administrators, Database Administrator, Web developers and Computer Support Specialists, Cybersecurity Consultant, Games Developer.

### **Assessment**

Learners must take three components to be awarded the OCR A Level in Computer Science. This includes Exam 1 – Computer Systems, Exam 2 – Algorithms and Programming and a Programming Project. The External exams are worth 40% each and are 2 hours and 30 minutes. The Programming Project is worth 20% of the total marks and is a non-exam assessment.

### **How to prepare for A Level Computer Science**

One of the topics that we will cover is Compression, encryption and hashing. This is increasingly becoming important today and in the future.

### **TASK**

Prepare notes around the following question. This work will take you around 15 hours and should be handed in during your first week at college. You may wish to use the website information below and / or your own research.

**1) Identify what symmetric and asymmetric encryption is and the differences between them.**

<https://www.ssl2buy.com/wiki/symmetric-vs-asymmetric-encryption-what-are-differences>

<https://support.microsoft.com/en-us/help/246071/description-of-symmetric-and-asymmetric-encryption>

<https://techdifferences.net/difference-between-symmetric-and-asymmetric-encryption/>

<https://www.clickssl.net/blog/symmetric-encryption-vs-asymmetric-encryption>

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