



Curriculum Overview

Year 10 – Computer Science 2021-2022

Rationale for Year 10 Computer Science

With technology becoming ever more advanced within the work place, it is important for students to be equipped with the necessary skills for employment within the 21st century economy. Furthermore, a GCSE in Computer Science is highly sought after and a necessary prerequisite for level 3 Computer Science qualifications. The national curriculum for Computer Science was introduced in 2013 and is recognised as an EBACC subject, counting as a science subject in this regard. The new OCR syllabus (J277) has been implemented for first teaching September 2020, and first examination in Summer 2022. This is a well-recognised course which aims to: develop computational thinking using abstraction, decomposition and algorithmic thinking with the aim to improve problem solving; develop understanding of legal, ethical and cultural issues in relation to computers; develop understanding of digital systems, including how the Central Processing Unit (CPU) works, and how the different components communicate; and improve digital literacy in order to help students to improve future aspirations.

What will students learn and why?

Students will learn a mixture of theory and practical topics from the OCR GCSE syllabus. For example, we look at the architecture of a CPU (the core system of any computer) and how to optimise it to work as fast as possible. Students will also look at the different types of memory (primary/secondary), as well as how the computer stores data in the memory devices, with the aim of deepening their understanding of the inner workings of computers. As well as the theory work, students will also learn many practical skills, such as computational thinking and algorithms. This allows students to widen their lateral thinking skills by looking at techniques used for problem solving. Finally, we put to use our computational thinking skills developed to look at programming techniques, which is a vital skill in the modern day, and will allow students to broaden their aspirations for a future career.

How will students learn?

The GCSE is split into 2 components. Component 1 (Computer systems) focusses on how the computer runs, and is relatively content based. The topics covered under this component are the CPU, Memory & Storage, Data Storage, Networks, Software, Threats and Issues around Technology. Component 2 (Computational thinking, algorithms and programming) is very much skills based, and looks at solving problems using computational thinking and programming. Here we study algorithms and Computational Thinking, Programming (using Python), Programming Languages and Translators, and Logic Circuits. In terms of sequencing and in line with guidance from OCR, students will start by learning about logic. We will cover the three basic logic gates, and look at truth tables and circuit diagrams of logic expressions. From here, we learn all about data and how data is stored in the computer. Within these topics, the concept of binary units will be interleaved, allowing the skills to be developed throughout. From here, students will be learning about algorithms, and about the steps taken to perform specific algorithms, which then leads into programming. We will look at the fundamental skills of programming, using Python (a common programming language) as our tool of choice. During the programming tasks, students will be taught using PRIMM programming, a sequence of steps to take in order to allow skills to be developed effectively. In the Spring term, we will move to topics on computational systems, learning about the CPU: how it works, and how to improve performance. We will also look at primary & secondary storage, as well as types of Networks, network protocols. We will use a mixture of written tasks and practical/computer based activities throughout the topics.

How will students be assessed?

Students will be assessed using OCR exam questions to create custom practice exams for intermediate assessments periodically, which will assess students on topics covered, in addition to practical programming challenges for appropriate topics. At the end of the academic year, a mock exam will be set, covering all topics covered in the year. A customised version of a past paper will be used for this. Students will also be assessed using low stakes tests for retrieval practice when studying component 1. Multiple-choice quizzes will be used at the start or end of lessons to assess learning.

What is the aim for learners by the end of the year in comparison to the previous year?

Students are going to have deepened their understanding of the inner workings of a computer. By the end of the year, we will have covered two thirds of the course, with the rest to be delivered in Year 11. Many of the topics lead into Year 11, including the programming skills we have developed, and the algorithmic thinking. They will have a better knowledge of how computers communicate with each other and with other devices. Students will also have a wider understanding of the dangers and issues surrounding computers, and they will have developed their problem solving skills making use of computational thinking.