

KS4 Computer Science Curriculum



	Autumn	Spring	Summer
Year 10	Architecture of the CPU Data Representation	Networks Network Security Impacts of Digital Technology	Logic and Languages Algorithms
	Programming and Programming Project		
Year 11	Recap on CPU, Data Representation, Networks	Recap on Network Security, Impacts of Digital Technology, Logic and Language & Algorithms	Exam and Revision Technique
	Programming, Revision and Exam Technique		

How will you be assessed?

- Knowledge of topics and programming ability
- Understanding of the topics throughout the curriculum and the ability to analyse, decompose and write algorithms
- Application of knowledge and understanding to interpret, analyse and evaluate programming problems providing effective solutions .

Intent	What new knowledge/content do we introduce?				
By the end of KS4 students are able to...	Year 10		Year 11	Choices	How does this curriculum incorporate the National Curriculum and go beyond? How does going beyond the NC ensure challenge?
<ul style="list-style-type: none"> • approach algorithm problems with a critical and analytical eye. They will be capable of abstracting the key elements of the problem and abstracting the core parts that need to be coded • recall topic knowledge whilst simultaneously being able to articulate answers from a variety of perspectives • understand how computer systems are set up in real life and the ways in which technology will shape their lives beyond the classroom topics • develop social skills through group work and paired work whether this be in programming or more lengthy multi-lesson projects 	Autumn	How a computer is constructed, how computer execute programs, how data is stored and used in calculations as well how images, text and sound are stored	Students recap on similar topics from last year. Additional activities develop students understanding with real life tasks based on their understanding.	<p>Within year 10, the programming project allows the student to program a project based on specific stages that utilise as many of the topic that they will have come across at that point. They are given choice over three potential projects choices, previously used by OCR or they have the ability to make project idea, with our support. Students have to complete a number of different tasks within the project that, again, utilise the topic areas that are covered within year 10</p>	<p>We utilise our own in school IT department to support topics, where applicable, to give a real-life practical understanding of how computers work in real businesses. Students have the chance to see how topics such as network security, servers and firewalls work within the school environment.</p> <p>KS4 students are actively encouraged to take part in the programming and robotic competitions that are held within the year, to further develop their coding, social and project skills.</p>
	Spring	How networks are used both locally and throughout the world, together with how the internet works. Standards of data formatting are introduced together with the ways in which networks can be securely maintained. Environmental, legal and cultural issues are discussed	Students recap on similar topics from last year. Additional activities develop students understanding with real life tasks based on their understanding.		
	Summer	Logic gates, how code is written professionally together how data is searched and sorted are examined	Students are focused on revision and exam technique in this final half term to ensure their proficiency in completing both papers		
	Rationale for this sequence	<p>We take students on a perceptual understanding that, in the first term, looks at minutiae of how computers work. From this point, students have a base of understanding how each topic is fundamentally underpinned by the concepts such as the CPU, the FDE cycle and binary data storage and calculation. Students refer back to this understanding to allow them to conceptualise more abstract ideas that are encountered as we progress through the terms.</p> <p>As the year progresses, we move further away from the computer itself, looking at its position within the network and how networks are managed to allows them to conceptualise the issues that are presented (and have to be managed) when a computer is connected to a network or the internet.</p> <p>Programming is taught throughout the year to allow for topics to be approached in different perspectives and allowing students to understand the relevance for the topics within specific programming functions. We used paired programing to allow students discuss code and support each other.</p> <p>The programming project is an assessed piece of work which combines a variety of skills from across the topic base and therefore supplements the work that students do. We ensure that practical programming topics visited during the year are used to define and demonstrate their understanding within the project.</p>	<p>Completing the majority of topics within year 10 ensures that we can alter the ways in which the students recap on those subject in year 11. We begin by ensuring that all topics are complete from the OCR specification and check on understanding from different topics throughout year 10.</p> <p>Although topic knowledge is essential, lessons during this early part of the term also introduce exam and revision technique to ensure that students can articulate their understanding into written questions that provide the maximum number of marks.</p> <p>We re-visit all topics in a similar sequence to Year 10; only taking some topics out of the sequence if they are more pertinent to those areas covered in the mock exams. Larger group tasks and longer projects that might take multiple lessons to complete and encapsulate multiple topics, ensure a deeper understanding and allow students to build a broader skill set.</p> <p>We continue programming skills but will a focus on the higher cognitive skills needed to decompose a variety of different problem. This ensures that they are capable of effectively achieving the higher marks that these questions demand within the exam.</p>	<p>Within year 11, we have developed a series of lessons where students work in group to achieve specific tasks over multiple lessons. For example, they will work as a team as in their own software company. This begins with students reflecting on the legislative, environment and cultural issues that companies have to consider when basing their work. They go on to develop code and work as a group assigning roles and allocating tasks to achieve the best result for their team. We utilise a variety of software development processes that would typically be taught in KS5.</p>	
How does the KS4 Curriculum build on previous learning at KS3?	<p>We continue to develop the programming skills that the students learnt within KS3. The programming fundamentals that were taught in KS3 form the basis of their understanding of how to code in KS4, although we concentrate solely on the Python programming language. Elements of the KS3 curriculum that touch on the ways in which computers are used in real life, such as how colours are represented or how data is stored, are now developed further to meet the requirements of what they need to understand for each topic in KS4.</p> <p>Programming projects now follow specific stages that ensure the student develops their code in a consistent, considered and structured approach, much like the stages done within real software projects.</p>				