

## Subject overview: KS4 Computer Science

### Subject Rationale (Intent) linked to [whole school curriculum mission](#)

In brief ( no more than four sentences)

Computer Science will develop students' intellectual curiosity on the use of computing and technology within the world we live in. Students will have a robust understanding of the role of computing in our lives and will analyse situations through complex problem solving. Students will develop transferable skills that they can apply in the wider curriculum, future education or employment.

Additional details

As a faculty we aim for students to develop a keen interest in the field of computer science. Pupils are taught the principles of information and computation, how digital systems work and how to put this knowledge to use through programming. We aim to allow students to apply their understanding of computing to real world applications. Students develop the ability to think creatively, innovatively, analytically, logically and critically to understand the impacts of digital technology to both individuals and to the wider society.

Within Key Stage 4, two routes within business are offered: OCR GCSE Computer Science and Pearson BTEC Tech Award in Creative Media (Yr 11 only)

YEAR 10

TERM	Topic sequence (What are you teaching?)	Topic sequence rationale (Why are you teaching this? How does it link to prior learning? Any notable links to <a href="#">St Edmund's curriculum mission</a> )	Main method of assessment?
Term 1:1	<p><b><u>Unit 1 (Systems Architecture, memory and storage)</u></b></p> <ul style="list-style-type: none"> <li>&gt; Architecture of the CPU</li> <li>&gt; CPU Performance</li> <li>&gt; Memory</li> <li>&gt; Secondary Storage</li> </ul>	<p>We start the GCSE in year 10 looking at how the Computers work. This gives students a foundation for understanding how a computer system works.</p> <p>This topic develops pupils' declarative knowledge about how the CPU works. How to improve the performance of the CPU. Then it moves onto looking at what is memory and then the last topic looks at other secondary storage devices that are used in computer systems.</p>	Written assessment based on Exam Paper questions.
Term 1:2	<p><b><u>Unit 2 (Data Representation)</u></b></p> <ul style="list-style-type: none"> <li>&gt; Unit of data, storage and binary numbers</li> <li>&gt; Binary Arithmetic and Hexadecimal</li> <li>&gt; Character Representation</li> <li>&gt; Image Representation</li> <li>&gt; Sound Representation</li> <li>&gt; Compression</li> </ul>	<p>We then move onto unit 2. In this unit we look at how data is processed by the computer system. Everything is broken down in Binary/machine code.</p> <p>This topic develops pupils' declarative knowledge about how the computer system processes different types of data. First we look at units of data. From this we look at the different number conversions. The next part of this topic is to look at text, images and sound data. Pupils investigate how the computer system reads this data. The final topic of this unit is compression. Pupils consider lossy and lossless compression. They will look at the advantages/disadvantages and they will explain how this technology works.</p>	Written assessment based on Exam Paper questions.
Term 2:1	<p><b><u>Unit 3 (Computer Networks, connections and protocols)</u></b></p> <ul style="list-style-type: none"> <li>&gt; The Internet and Wide area networks</li> <li>&gt; Local Area Networks</li> <li>&gt; Wireless Networking</li> <li>&gt; Client Server and Peer to Peer Networks</li> </ul>	<p>We then move onto unit 3. In this unit we look at different computer networks, connection methods and protocols.</p> <p>This topic develops pupils' declarative knowledge about the formation of computer networks. First we look at the two different types of networks LANs and WANs. We consider the hardware, connection</p>	Written assessment based on Exam Paper questions.

	<ul style="list-style-type: none"> <li>&gt; Standards, protocols and layers</li> </ul>	<p>methods and the advantages and disadvantages of these networks. As part of this subtopic students will also look at full and partial mesh networks. Then we move onto Wireless networks, In this pupils will examine wireless connections methods and the ways to keep the data secure (Encryption methods). Then pupils will look at different client server and peer to peer networks. Students will look at different ways both of these networks can work in real life situations. The final topic of this unit looks at the standards, protocols and layers of networks. This looks at how data moves around a network.</p>	
Term 2:2	<p><b><u>Unit 4 (Network security and systems software)</u></b></p> <ul style="list-style-type: none"> <li>&gt; Network threats</li> <li>&gt; Identifying and preventing vulnerabilities</li> <li>&gt; Operating systems</li> <li>&gt; Utility Software</li> </ul>	<p>We then move onto unit 4. In this unit we look at the security of computer networks and the different types of systems software.</p> <p>This topic develops pupils' declarative knowledge about how we can keep networks secure, how operating systems work and then different types of systems software. First we look at different types of network threats. In this pupils will understand different forms of attack and threats to a network. Pupils will look at real life case studies and assess the impact these attacks have on computer networks and organisations. Then pupils will look at different ways to identify and prevent these attacks. This includes firewalls, passwords, penetration testing, anti-malware and other methods. The second half of this unit look-at at the purpose and different functions of the operating system. The final part of this unit looks at the different types of systems software and the impact this software has on the functioning computer network/computers.</p>	Written assessment based on Exam Paper questions.
Term 3:1	<p><b><u>Unit 5 (Ethical, legal, cultural and environmental impacts of digital technology)</u></b></p> <ul style="list-style-type: none"> <li>&gt; Computer systems in the modern world</li> <li>&gt; Ethical, cultural and environmental issues</li> <li>&gt; Legislation and privacy</li> </ul>	<p>We then move onto unit 5. In this unit we look at computers in the modern world, the ethical, cultural and environmental issues surrounding digital devices and the legislation and privacy issues around computer systems.</p> <p>This topic develops pupils' declarative knowledge about how computer technology impacts everything we do in society . The first part of this unit looks at computer systems in different sectors. Pupils will look at how the computers impact the running of different</p>	Written assessment based on Exam Paper questions.

		<p>organisations. The next part of this unit looks at the ethical, cultural and environmental issues surrounding computer systems. Pupils will look at real life examples of computer systems and look at how these issues affect the computer systems. The final part of this unit looks at the legislation and privacy issues surrounding computer systems. This looks at how data is protected (Data protection Act). Then it looks at the Computer Misuse Act and the Copyright Designs and Patents Act. The next part of this unit looks at different types of software licences. Then the final part of this unit looks at the privacy issues around computer systems.</p> <p>This concludes component 1 of the computer science specification.</p>	
Term 3:2	<p><b>Unit 6 (Algorithms)</b></p> <ul style="list-style-type: none"> <li>&gt; Computational thinking</li> <li>&gt; Searching algorithms</li> <li>&gt; Sorting Algorithms</li> <li>&gt; Developing algorithms using flowcharts</li> <li>&gt; Developing algorithms using pseudocode</li> </ul>	<p>This is part of the second component of computer science. In this component pupils will apply knowledge and understanding gained so far in year 10. They develop skills and understanding in computational thinking: algorithms, programming techniques, producing robust programs, computational logic and translators.</p> <p>We then move onto Unit 6. In this unit pupils will use different computational thinking methods, then they will look at how computers search and sort data. The final part of this unit looks at how to write programs using pseudocode and flowcharts.</p> <p>This topic develops pupils' declarative knowledge about different computational thinking methods, these include abstraction, decomposition, algorithmic thinking and structure diagrams. In this pupils will learn how to design algorithms for a number of situations. Then pupils will learn how computers search for data. In this they will look at linear and binary methods. Students will need to describe the methods and apply methods using different data sets. The next part of this unit looks at how computers sort data. Pupils will learn 3 different methods, these are, bubble sort, insertion sort and merge sort. In this students will need to describe the methods of sorting and apply sorts using a range of data sets. The next part of this unit looks</p>	Written assessment based on Exam Paper questions.

		at writing algorithms using flowchart symbols. Pupils will need to construct flow charts for a number of situations using a range of constructs (sequence, selection and iteration). The final part of this unit looks at writing algorithms using pseudocode. In this pupils will learn how to write algorithms using sequence, selection and iteration programming constructs.	
--	--	--	--

YEAR 11			
TERM	Topic sequence (What are you teaching?)	Topic sequence rationale (Why are you teaching this? How does it link to prior learning? Any notable links to <a href="#">St Edmund's curriculum mission</a> )	Main method of assessment?
Term 1:1	<b><u>Unit 7 (Programming) PART 1</u></b> > Programming Fundamentals > Sequence and selection programming > Iteration	<p>We then move onto Unit 7. In this unit pupils will learn how to program using python. They start looking at the basics and then they move onto programming using the different constructs (Sequence, selection and iteration).</p> <p>This topic develops pupils' declarative knowledge about different programming methods. The first part looks at programming fundamentals. For example, how to declare variables, constants, input and output statements, doing mathematical calculations, casting and string manipulation using python programming. The next part of the unit looks at the programming constructs sequence and selection. In this pupils will construct a range of python programs and they will learn how to debug programs. The next part of the unit looks at the programming construct iteration. In this pupils will look at the different types of iteration, FOR and While loops in python and the DO UNTIL Loop in OCR reference language. Pupils will learn how to write a range of programs using these skills.</p>	Written assessment based on Exam Paper questions.
Term 1:2	<b><u>Unit 7 (Programming) PART 2</u></b> > Arrays > Procedures and functions	We then move onto the second part of programming. The next part is to learn how to use 1D and 2D arrays. Then they will learn how to write a range of procedures and functions. The final part of this unit	Written assessment based on Exam Paper questions.

	<p>&gt; Records and Files</p>	<p>looks at records and files.</p> <p>This topic develops pupils' declarative knowledge about different programming methods. The next part of this unit looks at arrays. In this pupils will learn how to use 1D and 2D arrays in their programs. Pupils will also learn how to manipulate arrays. This includes adding data, editing data and removing data to arrays. The next part of this unit looks at how to write procedures and functions. In this pupils will learn how to describe the difference between them and they will learn how to create them in python and OCR reference language. The final part of this unit looks at records and files. In this pupils will learn how to create programs that use text files and CSV files. In this they will learn how to open, edit and delete data saved in a file. Then they will look at SQL databases. In this they will learn how to write an SQL query for the database.</p>	
Term 2:1	<p><b><u>Unit 8 (Logic and Languages)</u></b></p> <ul style="list-style-type: none"> <li>&gt; Logic diagrams and truth tables</li> <li>&gt; Defensive Design</li> <li>&gt; Errors and testing</li> <li>&gt; Translators and facilities of languages</li> <li>&gt; The Integrated Development Environment (IDE)</li> </ul>	<p>The final unit in the course is unit 8. In this pupils will learn about logic and languages. In this pupils will learn how to create logic diagrams and complete truth tables to show the range of possible outputs. Then they will learn about a range of defensive design practices in creating programs. The next part of the unit looks at different types of errors and different types of tests to test computer programs. The next part of the unit looks at translators and high and low level programming methods. The final part of this unit looks at the Integrated Development Environment (IDE).</p> <p>This topic develops pupils' declarative knowledge about logic and languages. The first part of this unit looks at logic diagrams and truth tables. In this pupils will learn how to identify and write logic circuits using AND, OR and NOT symbols. For this they will also learn how to construct truth tables showing the range of possible outputs. They will also learn how to write boolean expressions for these logic diagrams. The next part of this unit looks at defensive design methods. In this pupils will learn authentication routines, validation methods such as range, type length presence and format checks.</p>	Written assessment based on Exam Paper questions.

		<p>Pupils will also learn how to write pseudocode for these validation methods. Another defensive design is the maintainability of programs. The next part of this unit looks at different types of syntax errors. These include Syntax and Logic errors. Pupils will need to be able to define examples of these errors and they will need to be able to spot these errors in computer programs. Then pupils will learn how to create test plans for their programs. In this they will learn the different types of tests. These include iterative and final/terminal testing. Then they also need to use a range of test data using suitable ranges of data. These include normal data, boundary data, invalid data and erroneous data. Then students will learn how to create trace tables to test the logic of programs. They will do this for a range of computer programs. The next part of this unit looks at translators and facilities of languages. In this they will look at the different types of programming languages (high and low level). Then they will look at compilers and interpreters. The last part of this unit looks at the Integrated Development Environment, in which pupils will learn how to identify the features/purpose of the environment when creating computer programs.</p>	
Term 2:2	<p><b><u>Component 1 (Exam Paper revision)</u></b></p> <ul style="list-style-type: none"> <li>&gt; Unit 1 (Computer Systems)</li> <li>&gt; Unit 2 (Data Representation)</li> <li>&gt; Unit 3 (Computer networks, connections and protocols)</li> <li>&gt; Unit 4 (Network security and systems software)</li> <li>&gt; Unit 5 (Ethical, legal cultural and environmental impacts of digital technology)</li> </ul>	<p>In this term pupils will recap the content covered in year 10. This will include a range of exam paper questions, revision tasks and metacognition recall activities.</p>	<p>Written assessment based on Exam Paper questions.</p>
Term 3:1	<p><b><u>Component 2 (Exam Paper revision)</u></b></p> <ul style="list-style-type: none"> <li>&gt; Unit 6 (Algorithms)</li> <li>&gt; Unit 7 (Programming)</li> <li>&gt; Unit 8 (Logic and Languages)</li> </ul>	<p>In this term pupils will recap the content covered in year 11. This will include a range of exam paper questions, revision tasks and metacognition recall activities.</p>	<p>Written assessment based on Exam Paper questions.</p>
Term 3:2			

**Year 11 Creative Media Production**

<p><b>Term 1:1</b></p>	<p><b>PSA Component Two</b> Assignment released in September containing specific scenarios for the students to explore.</p>	<p><b>PSA Component Two</b> PSA 2 Learning Aim B Preparation Lessons Interactive production processes and practices Learners need to first gain disciplinary knowledge of the skills available when creating and editing images Learners will participate in workshops and classes to develop media planning and pre-production skills and techniques</p> <p>Audio/moving image post-production processes and practices:</p> <p>Publishing post-production processes and practices:</p> <p>Interactive post-production processes and practices:</p> <p>Learners will apply substantive knowledge to evaluating their own working practises</p>	<p><b>PSA Component Two workshops</b></p>
<p><b>Term 1:2</b></p>	<p><b>PSA Component Two</b> Assignment released in September containing specific scenarios for the students to explore.</p>	<p>Students are only able to access all 60 marks within the PSA if they have developed substantive and disciplinary knowledge of all the content for. They must apply this knowledge and understanding to the PSA scenario.</p>	<p><b>PSA Component Two</b></p>
<p><b>Term 2:1</b></p>	<p><b>Component 3:</b> Understand how to develop ideas in response to a brief</p> <ul style="list-style-type: none"> <li>• A1 Responding to a brief</li> </ul>	<p>Learners are able to draw on existing substantive and disciplinary knowledge from Component One; A2 to create their own media product in response to a brief Learners are able to draw on existing substantive and</p>	<p>Knowledge tests and past paper practice assignment</p>



	<ul style="list-style-type: none"> <li>● A2 Generating ideas</li> <li>● B Develop planning materials in response to a brief</li> <li>● B1 Planning material</li> <li>● C Apply media production skills and techniques to the creation of a media product</li> </ul>	<p>disciplinary knowledge from Component Two; A1 as this has given them an understanding of the different skills required to create a product. Skills are combined to <b>plan</b> a product in response to a brief</p> <p>Learners are able to draw on existing substantive and disciplinary knowledge from Component One; B1 and B2 as this has given them an appreciation of the skills required to <b>create</b> a media product</p>	
<b>Term 2:2</b>	<ul style="list-style-type: none"> <li>● C1 Monitor and review the outcomes of the production process</li> <li>● C2 Production skills and techniques</li> <li>● C3 Combining and refining content</li> <li>● C4 Testing and exporting for distribution</li> <li>● C5 Technical records</li> </ul>	<p>Learners are able to draw on existing substantive and disciplinary knowledge from Component One; B1 and B2 as this has given them an appreciation of the skills required to <b>review</b> a media product</p> <p>This links to, and consolidates, substantive and disciplinary knowledge and understanding from Component 2 on the skills required in media.</p>	Knowledge tests and past paper practice assignment
<b>Term 3:1</b>	<b>Component 3: External examination</b>		<b>External examination</b>
<b>Term 3:2</b>			