

Fairfield High School Curriculum Overview – KS4 - Years 10 & 11



Subject	Computer Science	Why do we study these units at KS4?
Lessons per fortnight	6	Students who opted to continue their studies in computing start their GCSE work in Year 10. The GCSE Computer Science syllabus is designed by the AQA examining board and is studied over Years 10 & 11 with two exam papers sat in the summer exam season of Year 11. This course teaches computational thinking and real-world programming. The course provides a challenging specification for students of all ability levels. A range of programming languages are taught but the main language used is Python with pseudocode used in exams.
Setting	Option Subject - Mixed ability teaching	

Students are encouraged to be Responsible Global Citizens through numerous links to the sustainable development goals embedded within the KS4 programme of study.

We ensure all students experience high challenge by differentiating lessons so that ideas can be extended by all students even those making greater than expected progress.

Literacy work includes the introduction of a wide range of computing vocabulary.

Innovation and Creativity opportunities are included in lessons and via workshops delivered by local universities and employers.

Employability opportunities and skills are highlighted in lessons throughout the course and supplemented with workshops and trips.

Year	Unit title	Knowledge and Understanding/content	Skills	Assessment
10	1 – Fundamentals of Algorithms	<p>Representing algorithms</p> <ol style="list-style-type: none"> 1. Algorithm Flowcharts 2. What is meant by an algorithm? 3. Taxi Flowchart 4. Introduction of pseudocode 5. Pseudocode loops 6. Array Algorithms 7. Display board algorithm 8. Pseudocode Exam questions 9. Trace Tables 10. Pseudocode 11. Pseudocode Homework assessment <p>Linear and binary searches</p> <ol style="list-style-type: none"> 12. How do binary searches work? <p>Sorting Algorithms</p> <ol style="list-style-type: none"> 13. How to sort algorithms? 14. Search algorithms 15. Merge & Sorting algorithms 	<ul style="list-style-type: none"> • Safe use of computer systems. • The languages of programming - pseudocode. • The literacy of computing 	<p>Evaluation, self-assessment & peer feedback</p> <p>Pseudocode Homework</p> <p>End of unit test</p>
10	2 Programming	<p>Types of data</p> <ol style="list-style-type: none"> 1. Data types <p>Programming concepts & subroutines</p> <ol style="list-style-type: none"> 2. Programming concepts 3. Validating data with Python 4. Introduction to functions 5. Develop a subroutine called prefix 6. Programme annotation 7. Programming assessment <p>Arithmetic operators</p> <ol style="list-style-type: none"> 8. Arithmetic operations <p>Relational operators</p> <ol style="list-style-type: none"> 9. Relational or comparison operations 	<ul style="list-style-type: none"> • GCSE programming language - Python 	<p>Evaluation, self-assessment & peer feedback</p> <p>Programming languages homework</p>

		<p>Boolean operations 10. Boolean operations</p> <p>Data structures 11. Structuring data & Lists</p> <p>Input-Output & file handling 12. File handling</p> <p>String handling 13. String handling</p> <p>Random number generation 14. Random number generation</p> <p>Robust and secure programming</p>		<p>Programming assessment</p>
10	<p>3 Fundamentals of Data Representation</p>	<p>1. Storage units & binary 2. Introduction to binary & denary data 3. Converting between binary & denary number bases</p> <p>4. Binary arithmetic & hexadecimal 5. Introduction to Hex numbers 6. Converting between number bases 7. Number base conversions 8. Binary arithmetic 9. Binary shifts</p> <p>10. Character encoding 11. ASCII and Unicode</p> <p>12. Images 13. Representing images 14. Image & character representation</p> <p>15. Sound 16. Representing sound 17. Sound data compression</p> <p>18. Data compression 19. Data compression</p>	<ul style="list-style-type: none"> GCSE programming language - Python 	<p>Evaluation, self-assessment & peer feedback</p> <p>End of unit test</p>
10	<p>4 Computer Systems</p>	<p>Boolean logic 1. Binary Logic 2. Logic gates</p>	<p>16. GCSE programming language - Python</p>	<p>Evaluation, self-assessment & peer feedback</p>

		<ul style="list-style-type: none"> 3. Boolean logic 1 4. Boolean logic 2 <p>Application & system software</p> <ul style="list-style-type: none"> 5. Computer systems 6. Software <p>Systems architecture</p> <ul style="list-style-type: none"> 7. Von Neumann architecture CPU 8. How does a CPU actually work? 9. The central processing unit <p>The central processing unit</p> <ul style="list-style-type: none"> 10. Role & components of a CPU 11. Computer parts 12. Exam question assessment <p>Memory</p> <ul style="list-style-type: none"> 13. Volatile & permanent memory 14. Types of memory <p>Secondary storage</p> <ul style="list-style-type: none"> 15. How do flash memory and hard-drives work? 		Exam question assessment
11	5 Computer Networks	<p>Wired & wireless networks</p> <ul style="list-style-type: none"> 1. Networks <p>Network topologies and transmission</p> <ul style="list-style-type: none"> 2. Network overview 3. The internet and hardware 4. Topologies 5. IP addresses, MAC addressing, packets & protocols <p>Network security</p> <ul style="list-style-type: none"> 6. Security of networks <p>Protocols and layers</p> <ul style="list-style-type: none"> 7. Internet protocols 	8. GCSE programming language - Python	Evaluation, self-assessment & peer feedback
11	6 Fundamentals of Cyber Security	<p>Cyber security threats</p> <ul style="list-style-type: none"> 1. What are the Cyber security threats? 2. Preventing cyber warfare 3. What is penetration testing? 	10. GCSE programming language - Python	Evaluation, self-assessment & peer feedback

		<p>Social engineering</p> <p>4. What is social engineering?</p> <p>5. How do we protect against blagging, phishing, pharming & shouldering?</p> <p>6. Malicious code</p> <p>7. What is malware?</p> <p>8. Protecting against computer viruses, trojan, spyware & adware</p> <p>Detect and prevent cyber security threats</p> <p>9. What security measures are there to increase cyber security?</p>		<p>Exam question assessment</p> <p>End of unit test</p>
11	7 Ethical, Legal & Environmental impacts of technology	<p>Ethical considerations of technology</p> <ul style="list-style-type: none"> • Ethical issues with technology • Driverless cars • Data breaches • Disinformation & fake news <p>Digital technology in society</p> <ul style="list-style-type: none"> • Environmental impacts of technology • Computers in the modern world <p>Legislation & privacy</p> <ul style="list-style-type: none"> • Privacy concerns with technology • Spying • Should there be an 'internet bill of rights'? • How easy is it to get hacked? 	<ul style="list-style-type: none"> • GCSE programming language - Python 	<p>Evaluation, self-assessment & peer feedback</p> <p>End of unit test</p>
11	8 The Programming Project	<p>Pseudocode</p> <ul style="list-style-type: none"> • A guide to programming in pseudocode • Naming files <p>Research task</p> <ul style="list-style-type: none"> • Analysis • Design • Testing • Component three write-up 	<ul style="list-style-type: none"> • GCSE programming language - Python 	<p>Evaluation, self-assessment & peer feedback</p> <p>Exam question assessment</p> <p>End of unit test</p>

<p><u>Text book:</u></p> <p>GCSE Computer Science book</p>	<p><u>GCSE Computer Science:</u></p> <p>AQA GCSE Computer Science: https://www.pgonline.co.uk/resources/computer-science/gcse-aqa/gcse-aqa-computer-science-8525/</p>	<p><u>Computer Science specification - 8525</u></p> <ul style="list-style-type: none"> • It is not the expectation that parents buy student books, but you may find it helpful if you are required to study at home for an extended period.
<p><u>Revision resources:</u></p> <p>Revision guide</p> <p>Revision workbook</p>	<p><u>GCSE Computer Science:</u></p> <p>Revision guide: https://www.cgpbooks.co.uk/secondary-books/gcse/computer-science/coar42-new-gcse-computer-science-aqa-revision-gu</p> <p>Workbook: https://www.cgpbooks.co.uk/secondary-books/gcse/computer-science/coaq42-new-gcse-computer-science-aqa-exam-practi</p>	<ul style="list-style-type: none"> • KS4 revision resources are recommended to aid revision as pupils prepare for their GCSE exams in May/June of yr11.