Year 12 Curriculum Overview

Rationale: The Year 12 curriculum is designed to encourage learners to be inspired, motivated and challenged by following a broad, coherent, practical, satisfying and worthwhile course of study. It will provide insight into, and experience of how computer science works, stimulating students' curiosity and encouraging them to engage with computer science in their everyday lives and to make informed choices about further study or career choices.

Term/Length of Time	Outline	Assessment/Teacher Feedback Opportunities	Homework and Literacy resources
Autumn 1	**The Characteristics of Contemporary Processors, Input, Output and Storage Devices** Students will be required to understand the different components of a computer and their uses - The structure and function of the processor (ALU, Control Unit, Registers, PC, ACC, MAR, MDR, CIR, Buses) and how this relates to assembly language programs. The F-D-Execute Cycle (including its effects on registers). The factors affecting the performance of the CPU. The use of pipelining in a processor to improve efficiency. The Von Neumann, Harvard and contemporary processor architectures. The differences between and uses of CISC and RISC processors. GPUs and their uses. Multicore and Parallel systems. How different input,	Sample examination questions at the end of each sub-topic completed as part of classwork. Formal end of topic assessments that include a mixture of open and closed questions with an additional focus on keywords/literacy. Completion of a set of Cornell Notes on the theory topics covered. A selection of written questions completed in class to assess understanding of programming A selection of programming challenges completed in class to assess understanding of programming techniques.	**Minimum homework expectation - to be set on G4S** Completion of six 30-minute revision/recall activities using an online platform called 'Smart Revise' that is bespoke for OCR A Level Computer Science. An additional 3 hours using the Computer Science Text Book: Read Sections 1, 2 and 10. Complete the exercises on pages 6, 9, 15, 19, 24, 28, 34, 38, 43, 50, 264, 267, 271, 276, 281 and 286 **Optional homework tasks and Literacy resources** Creation of revision resource (e.g. mind map) to be submitted alongside compulsory activity Watch an episode of BBC Click on the BBC iPlayer Additional Reading for Budding Computer Scientists: Choose a book from this recommended reading list Complete some 'Quiz, Terms and Advance' questions using your Smart Revise platform login Access the Physics and Maths Tutor Computer Science revision section and complete revision tasks/activities on the topics covered plus

	output and storage devices can be applied to the solution of different problems. The uses of magnetic, flash and optical storage devices. RAM and ROM. Virtual storage. **Software** Students will be required to understand the types of software and the different methodologies used to develop software - The need for, function and purpose of operating systems. Memory Management. Interrupt Service Routines. Scheduling. Distributed, embedded, multi-tasking, multi-user and Real Time operating systems. BIOS. Device drivers. Virtual machines. The nature of applications. Utilities. Open source vs closed source software. Translators, Interpreters, compilers and assemblers. Stages of compilation. Linkers, loaders and use of libraries. **Elements of Computational Thinking** Students will be required to understand what is meant by computational thinking including		access the past papers section and complete additional exam questions on topics covered (**pages are sometimes slow to load … be patient!**) Access W3Schools and learn a new Python programming technique

	thinking abstractly, thinking ahead, thinking procedurally, thinking logically, thinking concurrently		
Autumn 2	**Software Development** Students will be required to understand the waterfall lifecycle, agile methodologies, extreme programming, the spiral model and rapid application development including the relative merits and drawbacks of different methodologies and when they might be used. Students will also be expected to understand and use assembly language (including following and writing simple programs with the Little Man Computer instruction set). **Exchanging Data** Students will be required to understand how data is exchanged between different systems by learning about compression, encryption and hashing techniques, and databases (flat file and relational).	Sample examination questions at the end of each sub-topic completed as part of classwork. Formal end of topic assessments that include a mixture of open and closed questions with an additional focus on keywords/literacy. Completion of a set of Cornell Notes on the theory topics covered. A selection of written questions completed in class to assess understanding of programming A selection of programming challenges completed in class to assess understanding of programming techniques.	**Minimum homework expectation - to be set on G4S** Completion of six 30-minute revision/recall activities using an online platform called 'Smart Revise' that is bespoke for OCR A Level Computer Science. An additional 3 hours using the Computer Science Text Book: Read Sections 3 (Chapter 11), 4 (Chapters 15-17 and 20) and 11 (Chapters 53-55). Complete the exercises on pages 56, 81, 86, 87, 93, 94, 109, 293, 298 and 302 **Optional homework tasks and Literacy resources** Creation of revision resource (e.g. mind map) to be submitted alongside compulsory activity Watch an episode of BBC Click on the BBC iPlayer Additional Reading for Budding Computer Scientists: Choose a book from this recommended reading list Complete some 'Quiz, Terms and Advance' questions using your Smart Revise platform login Access the Physics and Maths Tutor Computer Science revision section and complete revision tasks/activities on the topics covered plus access the past papers section and complete additional exam questions on topics covered (**pages are sometimes slow to load … be patient!**)

	Recap on Programming Techniques Students will review, recap, develop and embed prior programming knowledge focussing on sequence, selection and iteration.		Access W3Schools and learn a new Python programming technique
Spring 1	**Exchanging Data** Students will be required to understand the use of SQL when querying databases (theory and practical using Python). Students will also gain a detailed understanding of networks including the importance of protocols and standards, the TCP/IP Stack, DNS, Protocol layering, LANs, WANs, Packet and circuit switching, Network security and threats, use of firewalls, proxies and encryption, Network hardware, Client-server and peer to peer. **Revision** There will be an opportunity for students to revisit, embed and recap learning so far in order to successfully access the mock examination	Sample examination questions at the end of each sub-topic completed as part of classwork. Formal end of topic assessments that include a mixture of open and closed questions with an additional focus on keywords/literacy. Completion of a set of Cornell Notes on the theory topics covered. A selection of written questions completed in class to assess understanding of programming A selection of programming challenges completed in class to assess understanding of programming techniques. Mock examination.	**Minimum homework expectation - to be set on G4S** Completion of six 30-minute revision/recall activities using an online platform called 'Smart Revise' that is bespoke for OCR A Level Computer Science. An additional 3 hours using the Computer Science Text Book: Read Sections 4 (Chapters 18-19) and 5 (Chapters 21-23). Complete the exercises on pages 100, 105, 118, 125 and 129 **Optional homework tasks and Literacy resources** Creation of revision resource (e.g. mind map) to be submitted alongside compulsory activity Watch an episode of BBC Click on the BBC iPlayer Additional Reading for Budding Computer Scientists: Choose a book from this recommended reading list Complete some 'Quiz, Terms and Advance' questions using your Smart Revise platform login Access the Physics and Maths Tutor Computer Science revision section and complete revision tasks/activities on the topics covered plus access the past papers section and complete additional exam

	Recap on Programming Techniques Students will review, recap, develop and embed prior programming knowledge focussing on string manipulation and file handling.		questions on topics covered (**pages are sometimes slow to load … be patient!**) Access W3Schools and learn a new Python programming technique
Spring 2	**Exchanging Data** Students will be required to understand the different web technologies required when exchanging data including HTML, CSS and JavaScript (both theoretical and practical exercises on HTML, CSS and JavaScript). How search engine indexing and Page Rank algorithms work. The difference between server and client side processing. **Recap on Programming Techniques** Students will review, recap, develop and embed prior programming knowledge focussing on arrays and procedures.	Sample examination questions at the end of each sub-topic completed as part of classwork. Formal end of topic assessments that include a mixture of open and closed questions with an additional focus on keywords/literacy. Completion of a set of Cornell Notes on the theory topics covered. A selection of written questions completed in class to assess understanding of programming A selection of programming challenges completed in class to assess understanding of programming techniques.	**Minimum homework expectation - to be set on G4S** Completion of six 30-minute revision/recall activities using an online platform called 'Smart Revise' that is bespoke for OCR A Level Computer Science. An additional 3 hours using the Computer Science Text Book: Read Sections 5 (Chapters 24-27) and 5 (Chapters 21-23). Complete the exercises on pages 135, 141, 146 and 153 **Optional homework tasks and Literacy resources** Creation of revision resource (e.g. mind map) to be submitted alongside compulsory activity Watch an episode of BBC Click on the BBC iPlayer Additional Reading for Budding Computer Scientists: Choose a book from this recommended reading list Complete some 'Quiz, Terms and Advance' questions using your Smart Revise platform login Access the Physics and Maths Tutor Computer Science revision section and complete revision tasks/activities on the topics covered plus access the past papers section and complete additional exam

			questions on topics covered (**pages are sometimes slow to load … be patient!**)
			Access W3Schools and learn a new Python programming technique
Summer 1	**Data Types and Data Structures** Students will be required to understand how data is represented and stored within different structures including common algorithms associated with these structures. This would include a detailed knowledge of data types including primitive data types, integers, real/floating point, characters, string and Boolean. How to represent positive integers in binary. The use of sign and magnitude and two's complement to represent negative numbers in binary. How to add and subtract binary integers. The representation of positive integers in hexadecimal. How to convert positive integers between binary hexadecimal and denary. The normalisation of floating point numbers in binary. Floating point arithmetic, positive and negative numbers, addition and subtraction. An understanding of Bitwise manipulation and masks. How	Sample examination questions at the end of each sub-topic completed as part of classwork. Formal end of topic assessments that include a mixture of open and closed questions with an additional focus on keywords/literacy. Completion of a set of Cornell Notes on the theory topics covered. A selection of written questions completed in class to assess understanding of programming A selection of programming challenges completed in class to assess understanding of programming techniques.	**Minimum homework expectation - to be set on G4S** Completion of six 30-minute revision/recall activities using an online platform called 'Smart Revise' that is bespoke for OCR A Level Computer Science. An additional 3 hours using the Computer Science Text Book: Read Section 6 (Chapters 28- 32) and 7 (Chapters 33-39). Complete the exercises on pages 158, 161, 166, 173, 177, 183, 189, 199, 203, 208, 213 and 221 **Optional homework tasks and Literacy resources** Creation of revision resource (e.g. mind map) to be submitted alongside compulsory activity Watch an episode of BBC Click on the BBC iPlayer Additional Reading for Budding Computer Scientists: Choose a book from this recommended reading list Complete some 'Quiz, Terms and Advance' questions using your Smart Revise platform login Access the Physics and Maths Tutor Computer Science revision section and complete revision tasks/activities on the topics covered plus access the past papers section and complete additional exam questions on topics covered (**pages are sometimes slow to load … be patient!**) Access W3Schools and learn a new Python programming technique

	character sets are used to represent text. This is followed by common data structures including arrays, records, lists, tuples. How structures are used to store data as a linked-list, graph (directed and undirected), stack, queue, tree, binary search tree and hash table. There is also the requirement to know how to create, traverse, add data to and remove data from the data structures mentioned. **Recap on Programming Techniques** Students will review, recap, develop and embed prior programming knowledge focussing on functions, parameter passing, recursion and Object Orientated Programming (OOP).		
Summer 2	**Data Types and Data Structures** Students will be required to understand how to define problems using Boolean logic, Manipulate Boolean expressions, including the use of Karnaugh	Sample examination questions at the end of each sub-topic completed as part of classwork. Formal end of topic assessments that include a mixture of open and closed	**Minimum homework expectation - to be set on G4S** Completion of six 30-minute revision/recall activities using an online platform called 'Smart Revise' that is bespoke for OCR A Level Computer Science. An additional 3 hours using the Computer Science Text Book: Read Section 8 (Chapters 40- 43) and 11 (Chapters 56, 58).

maps to simplify Boolean expressions, Use rules to derive or simplify statements in Boolean algebra, Using logic gate diagrams and truth tables, Identify and apply the logic associated with D type flip flops, half and full adders.

Revision
There will be an opportunity for students to revisit, embed and recap learning so far in order to successfully access the mock examination

Project
Students will begin to formulate a synopsis for their independent programming project and start to develop and write up their project brief. | questions with an additional focus on keywords/literacy. Completion of a set of Cornell Notes on the theory topics covered. A selection of written questions completed in class to assess understanding of programming A selection of programming challenges completed in class to assess understanding of programming techniques. Mock examination. | Complete the exercises on pages 227, 232, 237, 241, 310-312 and 325-326

Optional homework tasks and Literacy resources
Creation of revision resource (e.g. mind map) to be submitted alongside compulsory activity

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Additional Reading for Budding Computer Scientists: Choose a book from this recommended reading list

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