



Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Theory topics	<p>Introduction to the course.</p> <p>SLR1 Structure and function of the processor.</p> <p>SLR2 Types of processor</p>	<p>SLR3 Input, output and storage.</p> <p>SLR13 data types</p> <p>SLR15 Boolean algebra</p> <p>SLR3 System software</p>	<p>SLR16 Computer related legislation</p> <p>SLR5 Application generation.</p> <p>SLR6 Software development</p> <p>SLR18 Thinking abstractly.</p> <p>SLR10 Databases</p>	<p>SLR11 Networks</p> <p>SLR12 Web technologies</p> <p>SLR17 Ethical, moral and cultural issues.</p> <p>SLR14 Data Structures</p>	<p>SLR19 Thinking ahead</p> <p>SLR20 Thinking procedurally</p> <p>SLR21 Thinking logically</p> <p>SLR25 Algorithms</p>	<p>Exploring the NEA</p>
Programming	<p>Dedicated programming lessons are done throughout year 12. These are a mix of programming tasks on repl.it, object orientated lessons on Python IDLE, SQL and Defold game tutorials.</p>					
Content	<p>In these units we will explore the different types of processor and their uses.</p> <p>We will look at the Fetch-Decode-Execute cycle in depth and how it uses the different registers.</p> <p>We will then move onto CISC and RISC processors. Before analysing the speed of processing on multicore and parallel systems.</p>	<p>How different input, output and storage devices are more appropriate to solve a variety of problems.</p> <p>The use of magnetic, flash and optical storage.</p> <p>RAM, ROM and virtual storage.</p> <p>Primitive data types, integer, real, float, character, string and Booleans.</p> <p>How to represent positive binary number. Use of sign, magnitude and twos complement to handle negative binary numbers.</p> <p>Addition and subtraction in binary.</p> <p>Using hexadecimal and storing character sets.</p> <p>Using Boolean expressions including using Karnaugh maps to simplify them.</p>	<p>The Data Protection Act.</p> <p>The Copyright Design and Patents Act.</p> <p>The regulation of Investigatory Powers Act.</p> <p>The Computer Misuse Act.</p> <p>The nature of applications. Open sources vs Closed source.</p> <p>Different program life cycles including waterfall, agile, extreme, spiral and rapid growth. The related positives and drawbacks of each.</p> <p>Different types of testing.</p> <p>The need and nature of abstraction.</p> <p>Relational databases, flat file, keys, entity-relationship model and normalisation.</p>	<p>Characteristics of networks. Protocols and standards.</p> <p>The TCP/IP stack, DNS, layering, packet switching and circuit switching.</p> <p>Client server and Peer to Peer.</p> <p>HTML, CSS and JavaScript.</p> <p>Lossy and lossless compression.</p> <p>Ethical, moral and cultural issues will include censorship and the internet, monitoring behaviour, analysing personal information and privacy and offensive communications amongst many more outlined in the syllabus.</p> <p>The properties of stacks and queues.</p>	<p>Identify inputs and outputs for a given situation.</p> <p>Determine the preconditions for devising a solution.</p> <p>The need for reusable programming components.</p> <p>Determine the order of steps needed to solve a problem.</p> <p>Identify where decisions have been made and logical conditions that have been used.</p> <p>How the above effects the flow of a program.</p> <p>Bubble sort, insertion sort, binary search and linear search. These will need to be understood from a theoretical perspective and how they are achieved in code.</p>	<p>Students will be given the opportunity to explore previous projects and their write ups. We will look at the documentation involved and develop some computer games.</p>
Rationale/ Linking	<p>These are good starting units for a refresher for post GCSE students and students new to Computer Science.</p>	<p>These data types are necessary to understand when programming. The binary in turn lends itself to character sets and logical expressions.</p>	<p>Students will have to work within the law throughout the course so it is imperative that they understand it well. Students will need to use program life cycles in their upcoming project so with this knowledge can make informed choices.</p>	<p>This builds upon previous legal work.</p> <p>The stacks and queues have been used previously when discussing processors so this unit adds the depth needed for Alevel.</p> <p>Networking builds from GCSE adding in the switching for Alevel.</p>	<p>This builds on from programming techniques learnt. Now they are in a position to begin to code them to potentially use in their projects.</p>	<p>This important work needs to take place in order for students to make good decisions about their project and understand the full requirements for their ideas.</p>
Assessment	<p>End of unit assessments are done throughout the course.</p> <p>Data capture are using exam builder for past exam questions.</p>			Learning Resources	<p>Repl.it</p> <p>Defold</p> <p>Hodder education course books</p> <p>w3schools</p>	



Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	Project definition SLR1, 2, 3, 5, and 6 recaps. SLR7 types of programming languages. SLR9 Compression, encryption and hashing SLR10	SLR11, 12, 13 and 14. Recap plus expand to full A level coverage.	SLR15, 16, 17, 18, 19, 20, 21 and 23 recap plus expand to full A level coverage. Plus SLR 22 Thinking concurrently.	SLR24 Computational methods.	SLR26 Algorithms. Revision lessons will start in this part of the course with exam technique focus.	Both exams take place in the first half of June.
Project lessons	NEA project lessons will take place throughout year 13. These will build upon learning in year 12 about system development life cycles, data types, data structures and algorithms. In addition there will be a significant programming element that will bring together programming learning to showcase their skills in solving their chosen problem.					
Content	Revisit the programming projects to make a final choice. Outline project initial ideas and the correct documentation. Reviewing learning and adding in the full learning for A level with: Pipelining GPUs Stages of compilation Linkers and loaders Use of libraries. Assembly language The use of addressing memory. Review object orientated methods. Compression, encryption, hashing, normalisation and SQL.	Revisiting last years learning and adding in: Network hardware Network security, threats and firewalls. Search engine indexing. PageRank algorithm Server side and client side processing. Floating point arithmetic, addition and subtraction. Bitwise manipulation. How to create, traverse, add data to and remove data from data structures including stack, queue, trees and hash tables.	Use of rules to simplify statements. Logic associated with D type flip flops, half and full adders. The nature benefits and drawbacks of caching. Determine the parts of a problem that can be solved at the same time. Outline trade offs for concurrent processing.	Features that make a problem solvable using computational methods. Problem recognition and decomposition. Use of divide and conquer. Using abstraction. This knowledge will need applying to backtracking, data mining, heuristics, data modelling, pipelining and visualisation. Standard algorithms to be expanded to include Dijkstra's shortest path and A* algorithms.	Determining the efficiency of different algorithms, Big O notation. Comparison of the complexity of algorithms. Algorithms for data structures.	
Rationale/ Linking	Each of these units is building from year 1 knowledge and expanding explicitly in the units shown above.	Each of these units is building from year 1 knowledge and expanding explicitly in the units shown above.	Each of these units is building from year 1 knowledge and expanding explicitly in the units shown above.	This is a natural next step from the computational thinking methods outlined in year 1.	This is one of the most difficult units left until last so that a thorough and expansive knowledge of programming can be applied to each. At this point students will have completed their NEA so can fully focus on these algorithms.	
Assessment	End of unit assessments are done throughout the course. Partial and full exam papers will be used throughout year 12 so students can get a real feeling for what to expect from the papers.			Learning Resources	Repl.it Defold Hodder education course books C&D essential algorithms book.	