

Autumn 1																										
	Year 10 CS	Year 11 CS																								
<b>Unit</b>	Components of a computer system	Issues																								
<b>Objectives</b>	<p>The purpose of the CPU  The fetch-execute cycle  Common CPU components and their function  ALU (Arithmetic Logic Unit)  CU (Control Unit)  Cache  Registers  Von Neumann architecture  MAR (Memory Address Register)  MDR (Memory Data Register)  Program Counter Accumulator  How common characteristics of CPU's affect their performance:</p> <ul style="list-style-type: none"> <li>• Clock speed</li> <li>• Cache size</li> <li>• Number of cores</li> </ul>	<p>Impacts of digital technology on wider society including:</p> <ul style="list-style-type: none"> <li>• Ethical issues</li> <li>• Legal issues</li> <li>• Cultural issues</li> <li>• Environmental issues</li> <li>• Privacy issues</li> </ul> <p>Legislation relevant to Computer science  The data protection act 2018  Computer misuse act 1990  Copyright designs and patents act 1988  Software licences (i.e. open source and proprietary)</p>																								
<b>NC links</b>	A5, A6, A8, B1	A8, A9, B1																								
<b>Key Words</b>	<b>Tier 2 identify, describe, explain, analyse</b>  Computer system, hardware, software, peripheral, input/output, CPU, processor, cache, clock speed, fetch-execute cycle	<b>Tier 2 analyse, evaluate, compare, discuss,</b>  Ethical, legal, cultural, environmental, privacy, prohibits, licence, off the shelf																								
<b>Homework</b>	English – report writing, bullet points, Maths – conversion, numbers	Identifying ethical, moral & cultural issues, exploring laws and regulations and assessing impact on society & business.																								
<b>Career link (Unifrog)</b>	Computer games developer, computer programmer, forensic computer analyst, software developer, network engineer, IT systems architect, CNC machinist	Private investigator, Head of IT, web developer, e-learning developer																								
<b>Employability skills (Highlight applicable)</b>	<table border="0"> <tr><td>Aiming high</td><td>Literacy</td></tr> <tr><td>Creativity</td><td>Numeracy</td></tr> <tr><td>Leadership</td><td>Independence</td></tr> <tr><td>Listening</td><td>Communication</td></tr> <tr><td>Presenting</td><td>Teamwork</td></tr> <tr><td>Problem solving</td><td>Staying positive</td></tr> </table>	Aiming high	Literacy	Creativity	Numeracy	Leadership	Independence	Listening	Communication	Presenting	Teamwork	Problem solving	Staying positive	<table border="0"> <tr><td>Aiming high</td><td>Literacy</td></tr> <tr><td>Creativity</td><td>Numeracy</td></tr> <tr><td>Leadership</td><td>Independence</td></tr> <tr><td>Listening</td><td>Communication</td></tr> <tr><td>Presenting</td><td>Teamwork</td></tr> <tr><td>Problem solving</td><td>Staying positive</td></tr> </table>	Aiming high	Literacy	Creativity	Numeracy	Leadership	Independence	Listening	Communication	Presenting	Teamwork	Problem solving	Staying positive
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<b>Common misconceptions</b>	Students may have forgotten some of the roles of the different components within a computer system.	Student become mixed up with ethical, cultural and legal issues and relate these to religious beliefs.																								
<b>Assessment</b>	Word – students will create small written report that identifies all the content that they have covered to date. Key words will be displayed as prompter. Marks will be awarded for valid references to accurate information.	Exam questions focused on ethical issues. Extended questions will be focused on in preparation for forthcoming mocks & exam series.																								
Autumn 2																										
<b>Unit</b>	Components of a computer system	Algorithms																								
<b>Objectives</b>	<p>The purpose and characteristics of embedded systems  Examples of embedded systems  The needs for primary storage  The difference between RAM and ROM  The purpose of ROM in a computer system  The purpose of RAM in a computer system  Virtual memory</p>	<p>Principles of computational thinking  Abstraction  Decomposition  Algorithmic thinking  Identify the inputs, processes, and outputs for a problem  Structure diagrams  Create, interpret, correct, complete, and refine algorithms using:  Pseudocode  Flowcharts  Reference language/high-level programming language  Identify common errors  Trace tables</p>																								
<b>NC links</b>	A5, A6, A8, B1	A1, A2, A3, A4, A6																								
<b>Key Words</b>	<b>Tier 2 identify, describe, explain, analyse</b>  RAM, ROM, bootstrap loader, volatile, non – volatile, memory, secondary memory, virtual memory, magnetic, optical, solid state	<b>Tier 2 analyse, evaluate, compare, discuss,</b>  Input, output, variable, array, integer, data, greater than, less than, equals to, IF statements, strings quotation marks, indent, nested, loops statements																								
<b>Homework</b>	Combination of homework activities that focus directly on the gaps in students learning. Recap and consolidate learning from lessons.	Directed learning challenges focusing on coding challenges booklet.																								
<b>Career link (Unifrog)</b>	Computer games developer, computer programmer, forensic computer analyst, software developer, network engineer, IT systems architect, CNC machinist	Photonics engineers, quantitative analyst, software developer, app designer																								
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<b>Common misconceptions</b>	Students may have forgotten some of the roles of the different components within a computer system.	Students may have previous misconceptions that have been built into their learning from previous years. Ensuring that all students stick to set
<b>Assessment</b>	Students will create a key facts sheet that will identify all the different types of storage. This will be a large project that will then be used as a display within the classroom. All concept will need covering within working document.	Challenge booklet to students. Given set programming challenges on weekly basis. Mock series will also be completed for both Unit 1 & 2.
<b>Spring 1</b>		
<b>Unit</b>	<b>Components of a computer system</b>	<b>Algorithms</b>
<b>Objectives</b>	<p>The need for secondary storage</p> <p>Common types of storage</p> <ul style="list-style-type: none"> <li>Optical</li> <li>Magnetic</li> <li>Solid state</li> </ul> <p>Suitable storage devices and storage media of a given application</p> <p>The advantages/disadvantages of different storage devices and storage media relating to these characteristics:</p> <ul style="list-style-type: none"> <li>Capacity</li> <li>Speed</li> <li>Portability</li> <li>Durability</li> <li>Reliability</li> <li>Cost</li> </ul> <p>The units of data storage</p> <ul style="list-style-type: none"> <li>Bit</li> <li>Nibble (4 bits)</li> <li>Byte (8 bits)</li> <li>Kilobyte (1000 bytes or 1 KB)</li> <li>Megabyte 1000 KB)</li> <li>Gigabyte (1000 MB)</li> <li>Terabyte (1000 GB)</li> <li>Petabyte (1000 TB)</li> </ul> <p>How data needs to be converted into a binary format to be processed by a computer</p> <p>Data capacity and calculation of data capacity requirements</p> <p>How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa</p> <p>How to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur</p> <p>How to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa</p> <p>How to convert binary integers to their hexadecimal equivalents and vice versa</p> <p>Binary shifts</p>	<p>Standards searching algorithms</p> <ul style="list-style-type: none"> <li>Binary search</li> <li>Linear search</li> <li>Standard sorting algorithms</li> <li>Bubble sort</li> <li>Merge sort</li> <li>Insertion sort</li> </ul> <p>The use of variables, constants, operators, inputs, outputs and assignments</p> <p>The use of three basic programming constructs used to control the flow of a program</p> <ul style="list-style-type: none"> <li>Sequence</li> <li>Selection</li> <li>Iteration (Count – and condition-controlled loops)</li> </ul> <p>The common arithmetic operators</p> <p>The common Boolean operators AND, OR and NOT</p> <p>To use of data types:</p> <ul style="list-style-type: none"> <li>Integer</li> <li>Real</li> <li>Boolean</li> <li>Character and string</li> <li>Casting</li> <li>The use of basic string manipulation the use of basic file handling operations</li> <li>Open</li> <li>Read</li> <li>Write</li> <li>Close</li> </ul> <p>The use of records to store data</p> <p>The use of SQL to search for data</p> <p>The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional arrays (2D)</p> <p>How to use sub programs (functions and procedures) to produce structured code</p> <p>Random number generation</p>
<b>NC links</b>	A5, A6, A8, B1	A1, A2, A3, A4, A6
<b>Key Words</b>	<b>Tier 2 identify, describe, explain, analyse</b> Binary, decimal, hexadecimal, shift, array, overflow, megabyte, gigabyte, terabyte, petabyte, durability, portability, capacity, reliability	<b>Tier 2 analyse, evaluate, compare, discuss,</b> Input, output, variable, array, integer, data, greater than, less than, equals to, IF statements, strings quotation marks, indent, nested, loops statements, Boolean, AND, OR, NOT, SQL injection, search, storing, functions, procedures
<b>Homework</b>	Conversion tasks focused between: binary, decimal and hexadecimal. Looking at converting each.	Directed learning challenges focusing on coding challenges booklet.
<b>Career link (Unifrog)</b>	Computer games developer, computer programmer, forensic computer analyst, software developer, network engineer, IT systems architect, CNC machinist	Photonics engineer, quantitative analyst, software developer, app designer, programmer
<b>Employability skills (Highlight applicable)</b>	<p>Aiming high      Literacy</p> <p>Creativity        Numeracy</p> <p>Leadership        Independence</p> <p>Listening          Communication</p> <p>Presenting        Teamwork</p> <p>Problem solving   Staying positive</p>	<p>Aiming high      Literacy</p> <p>Creativity        Numeracy</p> <p>Leadership        Independence</p> <p>Listening          Communication</p> <p>Presenting        Teamwork</p> <p>Problem solving   Staying positive</p>
<b>Common misconceptions</b>	Students become mixed up with the different sizes of TB, MB, GB, PB	Students may have previous misconceptions that have been built into their learning from previous years. Ensuring that all students stick to set
<b>Assessment</b>	Multiple conversion questions between different data types. Exam questions taken from OCR exam builder.	Challenge booklet to students. Given set programming challenges on weekly basis. Mock series will also be completed for both Unit 1 & 2.
<b>Spring 2</b>		
<b>Unit</b>	<b>Data representation</b>	<b>Design, testing and IDEs</b>
<b>Objectives</b>	<p>The use of binary codes to represent characters</p> <p>The term 'character set '</p> <p>The relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g. ASCII and Unicode</p> <p>How an image is represented as a series of pixels, represented in binary</p> <p>Metadata</p> <p>The effects of colour depth and resolution on:</p> <ul style="list-style-type: none"> <li>The quality of the image</li> <li>The size of the image file</li> </ul>	<p>Defensive design considerations:</p> <ul style="list-style-type: none"> <li>Anticipating misuse</li> <li>Authentication</li> <li>Input validation</li> <li>Maintainability</li> <li>Use of sub programs</li> <li>Naming conventions</li> <li>Indentation</li> <li>Commenting</li> </ul>

	<p>How sound can be sampled and stored in digital form</p> <p>The effect of sample rate, duration and bit depth on:</p> <ul style="list-style-type: none"> <li>• The playback quality</li> <li>• The size of the sound file</li> <li>• The need for compression</li> <li>• Types of compression</li> <li>• Lossy</li> <li>• Lossless</li> </ul> <p>Common prevention methods:</p> <ul style="list-style-type: none"> <li>• Penetration testing</li> <li>• Anti-malware software</li> <li>• Firewalls</li> <li>• User access levels</li> <li>• Passwords</li> <li>• Encryption</li> <li>• Physical security</li> </ul>	
<b>NC links</b>	A5, A6, A8, B1	A1, A2, A3, A4, A6, B2
<b>Key Words</b>	<b>Tier 2 identify, describe, explain, analyse</b>	<b>Tier 2 analyse, evaluate, compare, discuss,</b>
	Units, binary, denary, hexadecimal, overflow, bitmap, vector, pixel, resolution, metadata, analogue, digital	Input, output, variable, array, integer, data, greater than, less than, equals to, IF statements, strings quotation marks, indent, nested, loops statements, Boolean, AND, OR, NOT, SQL injection, search, storing, functions, procedures, sub programs, testing, IDE, errors
<b>Homework</b>	Multiple everlearner tasks and OCR exam builder questions built around topic.	Programming challenges booklet from OCR. Exam question taken from OCR exam builder to develop understanding.
<b>Career link (Unifrog)</b>	Data entry clerk, data analyst, clinical data manager, database administrator, quantitative analyst	Photonics engineer, quantitative analyst, software developer, app designer, programmer
<b>Employability skills</b>	Aiming high      Literacy Creativity      Numeracy Leadership      Independence	Aiming high      Literacy Creativity      Numeracy Leadership      Independence
<b>(Highlight applicable)</b>	Listening      Communication Presenting      Teamwork Problem solving      Staying positive	Listening      Communication Presenting      Teamwork Problem solving      Staying positive
<b>Common misconceptions</b>	Students get mixed up between lossy/lossless	Students struggle with some programming and being abke to complete independently.
<b>Assessment</b>	Exam questions taken from OCR exam builder.	Challenge booklet to students. Given set programming challenges on weekly basis. Mock series will also be completed for both Unit 1 & 2. OCR exam builder questions.
<b>Summer 1</b>		
<b>Unit</b>	Components of a computer systems	Design, testing and IDEs
<b>Objectives</b>	<p>The purpose and functionality of operating systems:</p> <p>User interfaces</p> <p>Memory management and multitasking</p> <p>Peripheral management and drivers</p> <p>User management</p> <p>File management</p> <p>The purpose and functionality of utility software</p> <p>Utility system software</p> <p>Encryption software</p> <p>Defragmentation</p> <p>Data compression</p> <p>Types of network:</p> <ul style="list-style-type: none"> <li>• LAN (Local area network)</li> <li>• WAN (Wide area network)</li> </ul> <p>Factors that affect the performance of networks</p> <p>The different roles of computers in a client-server and peer-to-peer network</p> <p>The hardware needed to connect standalone computers into a local area network:</p> <ul style="list-style-type: none"> <li>• Wireless access point</li> <li>• Routers</li> <li>• Switches</li> <li>• NIC (Network interface card)</li> <li>• Transmission media</li> </ul> <p>The internet as a worldwide collection of computer networks:</p> <ul style="list-style-type: none"> <li>• DNS 9Domain name server)</li> <li>• Hosting</li> <li>• The cloud</li> <li>• Web servers and clients</li> <li>• Star and mesh network topologies</li> </ul>	<p>The purpose of testing</p> <p>Types of testing:</p> <ul style="list-style-type: none"> <li>• Iterative</li> <li>• Final/terminal</li> <li>• Identify syntax and logic errors</li> <li>• Selecting and using suitable test data:</li> <li>• Normal</li> <li>• Boundary</li> <li>• Invalid/Erroneous</li> <li>• Refining algorithms</li> <li>• Simple logic diagrams using the operators AND, OR and NOT</li> <li>• Truth tables</li> <li>• Combining Boolean operators using AND, OR and NOT</li> </ul> <p>Applying logical operators in truth tables to solve problems</p>
<b>NC links</b>	A5, A6, A8, B1	A1, A2, A3, A4, A6, B2

<b>Key Words</b>	<b>Tier 2 identify, describe, explain, analyse</b> Software, system software, OS, utility software, defragmentation, network, topology, cloud, DNS	<b>Tier 2 analyse, evaluate, compare, discuss,</b> Input, output, variable, array, integer, data, greater than, less than, equals to, IF statements, strings quotation marks, indent, nested, loops statements, Boolean, AND, OR, NOT, SQL injection, search, storing, functions, procedures, sub programs, testing, IDE, errors
<b>Homework</b>	The everlearner tasks – set online All focused towards current topic – watch video, make notes, question paper	Programming challenges booklet from OCR. Exam question taken from OCR exam builder to develop understanding.
<b>Career link (Unifrog)</b>	Computer games developer, network engineer, electricity distribution worker, IT systems architect, IT project manager, Head of IT	Photonics engineer, quantitative analyst, software developer, app designer, programmer
<b>Employability skills</b> <b>(Highlight applicable)</b>	Aiming high      Literacy Creativity        Numeracy Leadership        Independence Listening         Communication Presenting        Teamwork Problem solving   Staying positive	Aiming high      Literacy Creativity        Numeracy Leadership        Independence Listening         Communication Presenting        Teamwork Problem solving   Staying positive
<b>Common misconceptions</b>	Students are unfamiliar with concept and technical vocabulary gaps in learning from others units covered to date.	Students struggle with some programming and being abke to complete independently.
<b>Assessment</b>	Exam questions taken from OCR exam builder.	Challenge booklet to students. Given set programming challenges on weekly basis. Mock series will also be completed for both Unit 1 & 2. OCR exam builder questions.

### Summer 2

<b>Unit</b>	<b>Networks</b>	<b>Design, testing and IDEs</b>
<b>Objectives</b>	<p>Modes of connection:</p> <ul style="list-style-type: none"> <li>• Wired</li> <li>• Ethernet</li> <li>• Wireless</li> <li>• Wi-Fi</li> <li>• Bluetooth</li> </ul> <p>Encryption IP addressing and MAC addressing Standards Common protocol including:</p> <ul style="list-style-type: none"> <li>• TCP/IP</li> <li>• HTTP</li> <li>• HTTPS</li> <li>• FTP</li> <li>• POP</li> <li>• IMAP</li> <li>• SMTP</li> </ul> <p>The concept of layers Forms of attacks:</p> <ul style="list-style-type: none"> <li>• Malware</li> <li>• Social engineering e.g. phishing, people as the 'weak point'</li> <li>• Brute force attacks</li> <li>• Denial of service attacks</li> <li>• Data interception and theft</li> </ul> <p>The concept of SQLinjection Common prevention methods:</p> <ul style="list-style-type: none"> <li>• Penetration testing</li> <li>• Anti-malware software</li> <li>• Firewalls</li> <li>• User access levels</li> <li>• Passwords</li> <li>• Encryption</li> <li>• Physical security</li> </ul>	<p>Characteristics and purpose of different levels of programming language:</p> <ul style="list-style-type: none"> <li>• High-level languages</li> <li>• Low-level languages</li> <li>• The purpose of translators</li> <li>• The characteristics of a compiler and an interpreter</li> </ul> <p>Common tools and facilities available in an Integrated Development Environment (IDE):</p> <ul style="list-style-type: none"> <li>• Editors</li> <li>• Error diagnostics</li> <li>• Run-time environment</li> <li>• Translators</li> </ul>
<b>NC links</b>	A1, A2, A4, A5	A1, A2, A3, A4, A6
<b>Key Words</b>	<b>Tier 2 identify, describe, explain, analyse</b> Network, topology, hardware, encryption, brute force attack, penetration testing, layers, Bluetooth	<b>Tier 2 analyse, evaluate, compare, discuss,</b> ASCII, translator, compiler, interpreter, integrated development environment, GUI, debugging, breakpoints
<b>Homework</b>	The everlearner tasks – set online All focused towards current topic – watch video, make notes, question paper	Programming challenges booklet from OCR. Exam question taken from OCR exam builder to develop understanding.
<b>Career link (Unifrog)</b>	Computer games developer, network engineer, electricity distribution worker, IT systems architect, IT project manager, Head of IT	Photonics engineer, quantitative analyst, software developer, app designer, programmer
<b>Employability skills</b> <b>(Highlight applicable)</b>	Aiming high      Literacy Creativity        Numeracy Leadership        Independence Listening         Communication Presenting        Teamwork Problem solving   Staying positive	Aiming high      Literacy Creativity        Numeracy Leadership        Independence Listening         Communication Presenting        Teamwork Problem solving   Staying positive

<b>Common misconceptions</b>	Students may be unfamiliar with the different network topologies covered from previous years.	Students struggle with some programming and being able to complete independently.
<b>Assessment</b>	Exam questions taken from OCR exam builder.	OCR exam builder questions. Past exam papers