

## Computer Science Curriculum Overview Year 9

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Winter Tracking</b>		<b>Spring Tracking</b>		<b>Summer Tracking</b>	
<b>ASSESSMENTS</b>					
Algorithms assessment		Programming assessment	Security assessment	Systems software assessment	
2.1 Algorithms	2.2 Programming fundamentals	2.2 Additional programming techniques	1.4 Network security	1.5 Systems software 2.4 Boolean logic	2.5 Programming languages and IDEs 2.2 Programming Project
<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Principles of computational thinking</li> <li>Structure diagrams</li> <li>Pseudocode</li> <li>Flowcharts</li> <li>Reference language</li> <li>Trace tables</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Variables, constants, operators, inputs, outputs and assignments</li> <li>The use of the three basic programming constructs: sequence, selection and iteration</li> <li>Common arithmetic operators</li> <li>Common Boolean operators</li> <li>Data types</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Basic string manipulation</li> <li>Basic file handling operations</li> <li>Use of records to store data</li> <li>Use of SQL to search data</li> <li>Use of arrays</li> <li>Use of sub programs</li> <li>Random number generation</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Threats to computer systems and networks e.g. attacks in the form of malware, social engineering, brute-force, DoS, data interception and theft, SQL injection</li> <li>Identifying and preventing vulnerabilities e.g. by utilising penetration testing, anti-malware software, firewalls, user access levels, passwords, encryption, physical security</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>The purpose and functionality of operating systems</li> <li>The purpose and functionality of utility software</li> <li>Boolean logic</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>The characteristics and purpose of different levels of programming language</li> <li>The purpose of translators</li> <li>The characteristics of a compiler and an interpreter</li> <li>Common IDE tools</li> </ul>
<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Use principles of computational thinking to define and refine problems</li> <li>Identify inputs, processes and outputs for a problem</li> <li>Create, interpret, correct, complete, and refine algorithms</li> <li>Produce diagrams to show the structure of a problem and how subsections are interlinked</li> <li>Identify syntax and logic errors and suggest fixes</li> <li>Create and use trace tables to follow an algorithm</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Abstraction</li> <li>Decomposition</li> <li>Algorithmic thinking</li> <li>Pseudocode</li> <li>Flowchart</li> </ul>	<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Practical use of the techniques and data types in a high-level language (Python) within the classroom</li> <li>Ability to choose suitable data types for data in a given scenario</li> <li>Apply variable casting where appropriate</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Sequence</li> <li>Selection</li> <li>Iteration</li> <li>Variable</li> <li>Integer</li> <li>Real</li> <li>Float</li> <li>Boolean</li> <li>Character</li> <li>String</li> <li>Casting</li> </ul>	<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Practical use of the additional programming techniques in a high-level language (Python) within the classroom</li> <li>Ability to manipulate strings</li> <li>The use of functions and procedures</li> <li>Apply knowledge of the scope of variables within a program</li> <li>Confident use of key SQL commands: SELECT, FROM, WHERE</li> <li>Be able to create and use random numbers in a program</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Manipulation</li> <li>Records</li> <li>Arrays</li> <li>Functions</li> <li>Procedures</li> <li>Local</li> <li>Global</li> <li>Constant</li> </ul>	<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Able to describe the threats posed to computer devices or systems including the purpose of an attack and how it is used</li> <li>For a given scenario suggest methods to limit threats and/or minimise vulnerabilities and demonstrate and understanding of how chosen method(s) work</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Malware</li> <li>Phishing</li> <li>Interception</li> <li>Penetration</li> <li>Firewall</li> <li>Vulnerability</li> <li>Social engineering</li> <li>Brute-force</li> <li>Encryption</li> </ul>	<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Be able to explain functions of an operating system including memory and peripheral management, user management, file management and the user interface</li> <li>Explain the need for utility software and how it performs housekeeping tasks</li> <li>Recognise logic gate symbols and their associated truth tables. Create, complete or edit logic diagrams and truth tables containing multiple gates in a given scenario</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Interface</li> <li>Multitasking</li> <li>Peripheral</li> <li>Utility</li> <li>Encryption</li> <li>Defragmentation</li> <li>Compression</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Explain the difference between high and low level programming languages</li> <li>Explain the need for translators</li> <li>Explain the differences, benefits and drawbacks of using a compiler or an interpreter</li> <li>Practical experience of the suite of tools provided by an IDE</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Translator</li> <li>Compiler</li> <li>Interpreter</li> <li>Integrated Development Environment</li> </ul>

## Computer Science Curriculum Overview Year 10

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Winter Tracking		Spring Tracking		Summer Tracking	
ASSESSMENTS					
Algorithms and architecture assessment		Ethics and memory assessment		End of year assessment	
2.1 Algorithms	1.1 Systems architecture	1.6 Ethical, legal, cultural and environmental impacts	1.2 Memory and storage	2.3 Producing robust programs 2.2 Programming Project	Exam preparation
<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Standard searching algorithms: Binary search, Linear search</li> <li>Standard sorting algorithms: Bubble sort, Insertion sort, Merge sort</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>The purpose of the CPU</li> <li>Common CPU components and their function</li> <li>Von Neumann architecture</li> <li>CPU performance characteristics</li> <li>Embedded systems</li> <li>Primary and secondary storage</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Impacts of digital technology on wider society</li> <li>Legislation relevant to Computer Science (Data Protection Act, Computer Misuse Act, Copyright Designs and Patents Act, open source and proprietary software licences)</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Units of data storage</li> <li>Denary, binary and hexadecimal number systems and conversions between them</li> <li>Arithmetic operations on binary numbers</li> <li>Character representation</li> <li>Image representation</li> <li>Sound representation</li> <li>Compression</li> </ul>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Defensive design considerations</li> <li>Input validation</li> <li>Maintainability</li> <li>The purpose and types of testing</li> <li>Logic and syntax errors</li> <li>Selecting and using suitable test data</li> </ul> <p>For 2.2 see 'Autumn 2' and 'Spring 1' of Year 9</p>	<p><b>Year 9 topic review:</b></p> <ul style="list-style-type: none"> <li>1.4 Network security</li> <li>1.5 Systems software</li> <li>2.1 Algorithms</li> <li>2.4 Boolean logic</li> </ul> <p>End of year 10 assessment includes all material from years 9 &amp; 10.</p>
<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Demonstrate an understanding of the main steps of each algorithm</li> <li>Apply any pre-requisites of an algorithm</li> <li>Apply the algorithm to a data set</li> <li>Identify an algorithm if given the code or pseudocode for it</li> <li>Fix errors (or add missing steps) to a given search or sort algorithm</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Binary</li> <li>Linear</li> <li>Insertion</li> <li>Merge</li> <li>Bubble</li> </ul>	<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Demonstrate an understanding of the fetch-execute cycle</li> <li>Understand the purpose and roles of common CPU components including registers</li> <li>Identify the effect of clock speed, cache and cores on system performance</li> <li>Explain examples and characteristics of embedded systems</li> <li>Explain the need for both primary and secondary storage</li> <li>Describe how RAM, ROM and virtual memory operate</li> <li>For a given scenario, be able to select an appropriate storage device</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Processor</li> <li>Cache</li> <li>Register</li> <li>Core</li> <li>Embedded</li> <li>Primary</li> <li>Secondary</li> <li>Durability</li> <li>Reliability</li> </ul>	<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Ability to discuss the impact of technology based around the issues listed</li> <li>Describe the purpose of each piece of legislation and the actions that it allows or prohibits</li> <li>Be able recommend a type of software licence for a given scenario including benefits and drawbacks</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Ethical</li> <li>Legal</li> <li>Cultural</li> <li>Environmental</li> <li>Privacy</li> <li>Licence</li> </ul>	<p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>Explain why data must be stored in a binary format</li> <li>Convert between different units of data storage</li> <li>Calculate file sizes for sound, image and text files</li> <li>Explain how characters, images and sounds are represented in binary</li> <li>Describe (and use in calculations) the parameters that determine the quality of images and sound</li> <li>Explain the need for, and effect of different types of compression algorithm</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Binary</li> <li>Denary</li> <li>Hexadecimal</li> <li>Shift</li> <li>Character</li> <li>Sample rate</li> <li>Duration</li> <li>Bit depth</li> <li>Colour depth</li> <li>Pixel</li> <li>Resolution</li> <li>Metadata</li> <li>Compression</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Explain the need for defensive design and demonstrate an understanding of it in this half term's programming project and associated report</li> <li>Create and execute an appropriate test plan during the course of software development</li> <li>For 2.2 see 'Autumn 2' and 'Spring 1' of Year 9</li> </ul> <p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>Misuse</li> <li>Authentication</li> <li>Validation</li> <li>Maintainability</li> <li>Indentation</li> <li>Commenting</li> <li>Iterative</li> <li>Boundary</li> <li>Refine</li> </ul> <p>For 2.2 see 'Autumn 2' and 'Spring 1' of Year 9</p>	

## Computer Science Curriculum Overview Year 11

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Winter Tracking		Spring Tracking		Summer Tracking	
ASSESSMENTS					
Year 11 mock exams				GCSE exams	
1.3 Computer networks, connections and protocols	Mock Exam preparation and review	Full paper assessment (1 & 2)	Full paper assessment (1 & 2)	Exam preparation	
<b>Knowledge:</b> <ul style="list-style-type: none"> <li>Types of computer network</li> <li>Factors that affect network performance</li> <li>Roles of computers in a client-server and peer-to-peer network</li> <li>LAN hardware</li> <li>The Internet</li> <li>Network topologies</li> </ul>		<b>Topic review:</b> <ul style="list-style-type: none"> <li>1.1 Systems architecture</li> <li>1.2 Memory and storage</li> <li>1.3 Computer networks</li> <li>1.4 Network security</li> <li>1.5 Systems software</li> <li>1.6 Ethics, legal, cultural, environmental impacts</li> <li>2.1 Algorithms</li> <li>2.2 Programming fundamentals</li> <li>2.3 Producing robust programs</li> <li>2.4 Boolean logic</li> <li>2.5 Programming languages and IDEs</li> </ul> <p>*running order will be determined following mock exam review</p>	<b>Topic review:</b> <ul style="list-style-type: none"> <li>1.1 Systems architecture</li> <li>1.2 Memory and storage</li> <li>1.3 Computer networks</li> <li>1.4 Network security</li> <li>1.5 Systems software</li> <li>1.6 Ethics, legal, cultural, environmental impacts</li> <li>2.1 Algorithms</li> <li>2.2 Programming fundamentals</li> <li>2.3 Producing robust programs</li> <li>2.4 Boolean logic</li> <li>2.5 Programming languages and IDEs</li> </ul> <p>*running order will be determined following Spring 1 assessment review</p>	(Exams start during week 5)	
<b>Skills:</b> <ul style="list-style-type: none"> <li>Describe the characteristics of LANs and WANs</li> <li>Explain factors that affect network performance</li> <li>Demonstrate knowledge of how each piece of LAN hardware operates</li> <li>Explain the concept of the Internet including the role of DNS</li> <li>Explain advantages and disadvantages of the Cloud</li> <li>Apply understanding of networks to a given scenario</li> <li>Explain the pros and cons of Star and Mesh topologies</li> </ul> <b>Keywords</b> <ul style="list-style-type: none"> <li>Network</li> <li>Client-server</li> <li>Peer-to-peer</li> <li>Performance</li> <li>Bandwidth</li> <li>Cloud</li> <li>Server</li> <li>Topology</li> </ul>					