

## KS4 Curriculum Plan Computer Science KS4

Year 10		
<b>Autumn Term</b>	<b>Topic (Terms 1 &amp; 2 – Computer Systems)</b> <ul style="list-style-type: none"> <li>• <b>Systems Architecture</b></li> <li>• <b>Memory</b></li> <li>• <b>Storage</b></li> <li>• <b>Wired and Wireless Networks</b></li> </ul>	<b>Brief description</b> Students will look into: <ul style="list-style-type: none"> <li>• The Von Neumann architecture of computers</li> <li>• Memory address registers</li> <li>• Memory data registers</li> <li>• Program calculators and the role of accumulators</li> <li>• The purpose of embedded systems</li> <li>• ROM and RAM memory</li> <li>• Virtual memory</li> <li>• Storage mediums, looking into purpose and place related to capacity, speed, portability, durability and reliability. Magnetic, Optical and Solid State</li> <li>• Difference between LAN and WAN networks</li> <li>• Factors that affect network performance</li> <li>• Hardware to connect LANS – wireless access points, routers/switches, network interface controllers, transmission media</li> <li>• The internet as a collection of networks – The difference between the internet and the World Wide Web, DNS, Hosting and the role of the Cloud. Virtual networks.</li> </ul>
<b>Spring Term</b>	<b>Topic</b> <ul style="list-style-type: none"> <li>• <b>Network topologies, protocols and layers</b></li> <li>• <b>System Security</b></li> <li>• <b>System Software</b></li> <li>• <b>Ethical, legal, cultural and environmental concerns in Computing</b></li> </ul>	<b>Brief description</b> <ul style="list-style-type: none"> <li>• Star, mesh, line and ring networks, appropriateness to scenario</li> <li>• Wifi – frequency, channels and encryption</li> <li>• Ethernets</li> <li>• TCP/IP (transmission control protocol/ internet protocol)</li> <li>• HTTP (Hyper text transfer protocol)</li> <li>• HTTPS (same – secure)</li> <li>• FTP (File transfer protocol)</li> <li>• POP (Post office protocol)</li> <li>• IMAP (Internet Message Access protocol)</li> <li>• SMTP (simple mail. Transfer protocol)</li> <li>• Concepts of layers and packet switching</li> <li>• Forms of attack and threats (Malware, Phishing)</li> <li>• People as ‘weak point’ (social engineering), Brute force attacks, Denial of service attacks, Data interception and theft</li> <li>• Concept of SQL injection, Poor network policy, Identifying and preventing vulnerabilities, Penetration testing</li> <li>• Network forensics, Network policies, Anti-malware software, Firewalls, User access levels, Passwords, Encryption</li> <li>• Operating systems and their role in computer management</li> <li>• System software – utility programs, library programs and translators</li> <li>• Application software – off the shelf, custom written, proprietary and open source</li> <li>• Computer reliability, use in real world systems, failure (percentage failure, mean time between failure, disaster recovery and hardware redundancy)</li> <li>• Computing and LEDC’s, locality and computers, accessibility</li> </ul>

		<ul style="list-style-type: none"> <li>• Data protection act, health and safety at work, copyright, designs and patents, computer misuse act</li> <li>• The carbon footprint, environmental positive and negative effects, working from home, computing efficiency.</li> </ul>
<b>Summer Term</b>	<b>Topic</b> (Terms 3 – Computational Thinking, algorithms and programming) <ul style="list-style-type: none"> <li>• <b>Algorithms</b></li> <li>• <b>Programming techniques</b></li> <li>• <b>Producing robust programs</b></li> <li>• <b>Computational logic</b></li> <li>• <b>Translators and facilities of languages</b></li> <li>• <b>Data representation</b></li> </ul>	<b>Brief description</b> (Programming will mainly be taught through learning high level programming language Python) <ul style="list-style-type: none"> <li>• Using arithmetic operators in Python (addition, subtraction, multiplication, division, modulus, exponent)</li> <li>• Using the print command to output to the interpreter</li> <li>• Declaring, re-declaring and using variables efficiently</li> <li>• Datatypes and the importance of converting for use in functions</li> <li>• Strings, indexing and using loops through strings</li> <li>• Functions and passing variables through them</li> <li>• Efficient use of program functions</li> <li>• Taking input from the user (and importance of considering integer from input)</li> <li>• Using if, then, else statements</li> <li>• For loops and their uses</li> <li>• While loops and their uses</li> <li>• Creating and using lists, concatenating lists</li> <li>• List functions – inserting, sorting, counting, extending, popping, removing, revering, indexing, length function, using max and min</li> <li>• Using text files, writing to, reading and printing from, appending existing and using file paths as variables for efficiency</li> <li>• Using databases and SQL in efficient coding – SELECT, WHERE, UPDATE, DELETE AND INSERT.</li> </ul>
<b>Year II</b>		
<b>Autumn Term</b>	<b>Topic</b> (Term 4 – 5 <sup>1/2</sup> – Programming project) <ul style="list-style-type: none"> <li>• <b>Programming techniques</b></li> <li>• <b>Analysis</b></li> <li>• <b>Design</b></li> </ul>	<b>Brief description</b> Techniques used in the development of programming knowledge will be used here in a controlled assessment task – students will develop custom program solutions to the problem presented and will follow the system lifecycle model of development to present their work.
<b>Spring Term</b>	<b>Topic</b> <ul style="list-style-type: none"> <li>• <b>Development</b></li> <li>• <b>Testing</b></li> <li>• <b>Evaluation and Conclusions</b></li> <li>• <b>Opportunities for extended programming learning related to curriculum topics</b></li> </ul>	<b>Brief description</b> Techniques used in the development of programming knowledge will be used here in a controlled assessment task – students will develop custom program solutions to the problem presented and will follow the system lifecycle model of development to present their work.
<b>Summer Term</b>	<b>Topic</b> <ul style="list-style-type: none"> <li>• <b>Revision of theory topics and working through past exam papers in preparation for the two written exams</b></li> </ul>	<b>Brief description</b> Past papers will be worked through in using a range of techniques, including walking-talking mock exams, peer assessment and improvement and teacher marked assessments in preparation for the final exams.