



## Curriculum Map

Subject: **Computer Science GCSE and BTEC Level 3 Extended Certificate in Computing.**

	<b>AP1</b>	<b>AP2</b>	<b>AP3</b>
<b>Year 9</b>	<p>Introduction to the course</p> <p>2.1.1 Algorithms and pseudocode</p> <p>2.2.8 Introduction to text based programming using Small Basic which includes the following topics:</p> <p>The use of variables, constants, inputs, outputs and assignments</p> <p>The use of the three basic programming constructs used to control the flow of a program: sequence, selection, iteration (count and condition-controlled loops)</p> <p>The use of basic string manipulation</p> <p>2.2.8/ 2.2.11 Introduction of using text-based programming language Python which includes the following topics:</p> <p>The use of variables, constants, inputs, outputs and assignments</p>	<p>2.2.8/ 2.2.11 Introduction of using text-based programming language Python which includes the following topics:</p> <p>The use of basic file handling operations: Open, read, write, close</p> <p>The use of records to store data</p> <p>The use of arrays when solving problems, including both one- and two-dimensional arrays</p> <p>How to use sub programs (functions and procedures) to produce structured code</p> <p>The use of data types: Integer, real, Boolean, character and string, casting</p> <p>The common arithmetic operators</p> <p>The common Boolean operators</p>	<p>Problem solving – using algorithms, flowcharts and Python to solve individual programming problems independently.</p> <p>2.3 Producing robust programs: Defensive design considerations. Maintainability, the purpose of testing. How to identify syntax and logical errors. Selecting and using suitable test data.</p> <p>2.4 Computational logic: Applying computing related mathematics</p> <p>2.5 Translators and facilities of languages</p>



# Holmer Green Senior School

Work Hard, Be Kind

	<p>The use of the three basic programming constructs used to control the flow of a program: sequence, selection, iteration (count and condition-controlled loops) The use of basic string manipulation</p>		
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<p><b>Year 10</b></p>	<p>2.2.8/ 2.2.11 Recap of using text-based programming language Python in preparation for the coursework element.</p> <p>2.6 Data representation including:</p> <ul style="list-style-type: none"> <li>• Data</li> <li>• Numbers</li> <li>• Characters</li> <li>• Character sets</li> <li>• Images</li> <li>• Sound</li> <li>• Compression</li> </ul> <p>Completion of the programming project (20 hours) set by the examining board.</p> <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Design</li> <li>• Development</li> </ul>	<p>Completion of the programming project (20 hours) set by the examining board.</p> <ul style="list-style-type: none"> <li>• Development</li> <li>• Testing</li> <li>• Evaluation</li> <li>• Conclusion</li> </ul> <p>2.4 Computation logic:</p> <ul style="list-style-type: none"> <li>• Logic diagrams</li> <li>• Truth tables</li> <li>• Combining Boolean operators using AND, OR and NOT to two levels</li> <li>• Applying logical operators in appropriate truth tables to solve problems</li> </ul>	<p>1.1 Systems Architecture:</p> <ul style="list-style-type: none"> <li>• CPU</li> <li>• Embedded Systems</li> </ul> <p>1.2 Memory</p> <ul style="list-style-type: none"> <li>• RAM</li> <li>• ROM</li> </ul> <p>1.3 Storage</p> <ul style="list-style-type: none"> <li>• Virtual Memory</li> <li>• Flash memory</li> <li>• The need for secondary storage</li> <li>• Common types of storage</li> <li>• Suitability of storage devices and media</li> </ul>
<p><b>Year 11</b></p>	<p>1.4 Networks:</p> <ul style="list-style-type: none"> <li>• Wired and Wireless</li> <li>• LAN</li> <li>• WAN</li> <li>• Factors that affect</li> <li>• Client server</li> <li>• Peer-to-Peer</li> </ul> <p>1.4 Network Hardware:</p> <ul style="list-style-type: none"> <li>• Wireless Access Points</li> <li>• Routers/Switches</li> <li>• NIC</li> <li>• Transmission media</li> <li>• Internet</li> </ul>	<p>1.6 System Security:</p> <ul style="list-style-type: none"> <li>• Forms of attack</li> <li>• Threats posed to networks</li> <li>• Identifying and preventing vulnerabilities</li> </ul> <p>1.7 Systems software:</p> <ul style="list-style-type: none"> <li>• Operating systems</li> <li>• Utility system software</li> </ul> <p>1.8 Ethical, legal, cultural and environmental concerns:</p> <ul style="list-style-type: none"> <li>• Legislation</li> </ul>	<p>Revision of all topics</p>



	<ul style="list-style-type: none"> <li>• DNS</li> <li>• Hosting</li> <li>• The cloud</li> <li>• Virtual networks</li> </ul> <p>Network Topologies, protocols and layers:</p> <ul style="list-style-type: none"> <li>• Star and Mesh network topologies</li> <li>• Wifi</li> <li>• Ethernet</li> <li>• IP addressing</li> <li>• MAC addressing</li> <li>• Protocols</li> <li>• Concepts of layers</li> <li>• Packet Switching</li> </ul>	<ul style="list-style-type: none"> <li>• How to investigate and discuss computer science technologies while considering the concerns</li> <li>• How key stakeholders are affected by technologies</li> <li>• Environmental impact</li> <li>• Cultural implication</li> <li>• Open source v Proprietary</li> </ul> <p>Revision of all topics covered</p>	
<b>BTEC L3 Extended Certificate in Computing</b>			
<p><b>Year 12</b></p>	<p><b>Unit 1: Principles of Computer science</b></p> <p>Computational thinking: Application of the thinking skills involved in analysing problems and process, to identify solution that can be developed into computer programs.</p> <ul style="list-style-type: none"> <li>• Decomposition</li> <li>• Pattern recognition</li> <li>• Pattern generalisation and abstraction</li> <li>• Algorithm design</li> <li>• Producing and applying Pseudocode</li> <li>• Creating Flowcharts</li> </ul>	<p><b>Unit 1: Principles of Computer Science</b></p> <p>Types of programming and mark-up languages: Investigating the features, applications, impact and implications of using different programming paradigms to develop code to solve problems.</p> <ul style="list-style-type: none"> <li>• Procedural programming</li> <li>• Object-orientated programming</li> <li>• Event driven programming</li> <li>• Coding for the web</li> <li>• The issues and implications of translating code between programming languages</li> </ul> <p><b>Unit 2: Fundamentals of Computer systems</b></p>	<p><b>Unit 2: Fundamentals of Computer systems</b></p> <p>Data processing:</p> <ul style="list-style-type: none"> <li>• The use, features and implications of computer systems for data processing</li> <li>• The role of hardware in collecting data</li> <li>• The role of software in collecting data</li> <li>• Data processing functions</li> <li>• The impact on individuals and organisations of using and storing data across multiple computer systems</li> <li>• Back up and data recover procedures</li> </ul> <p>Computer architecture – the implications of different models and the impact of the relationship between their component parts:</p>



<p>Using Python programming language to develop programming paradigms:</p> <ul style="list-style-type: none"> <li>• Handling data within a program using data-handling techniques and structures</li> <li>• Selecting, applying and interpreting general mathematical expressions within computing structures to process data</li> <li>• Selecting and using built-in functions to perform specific tasks to process data</li> <li>• Using and interpreting validation techniques to analyse and improve the accuracy and validity of data</li> <li>• Applying programming control structures to analyse and improve the effectiveness of code</li> <li>• Using data structures within a computer program to store and process data</li> <li>• Using bubble, quick and insertion sorts</li> <li>• Using serial/linear search and binary search</li> <li>• Using count occurrences and input validation</li> <li>• Using stacks and queues to implement sorting and searching (LIFO and FIFO)</li> </ul>	<p>Hardware and software: The concepts and implications of the use of, and relationships between, hardware and software that form computer systems.</p> <p>Computer hardware in a computer system:</p> <ul style="list-style-type: none"> <li>• Types of computer systems</li> <li>• The purpose, features and uses of internal components used in the types of computer systems</li> <li>• Factors affecting the choice, use and performance of internal components</li> <li>• The hardware used in computer systems</li> <li>• How the features of hardware can affect their performance and the performance of a computer system</li> <li>• Factors that affect the choice of hardware</li> <li>• Data storage and recovery systems</li> </ul> <p>Computer software in a computer system:</p> <ul style="list-style-type: none"> <li>• Types of operating system</li> <li>• The role of the kernel in controlling and managing system components and tasks</li> <li>• The role of the operating system in managing networking and security</li> <li>• Factors affecting the choice and use of user interfaces</li> <li>• Factors affecting the choice of operating system</li> <li>• Factors affecting the use and performance of an operating system</li> <li>• Utility software</li> <li>• Application software</li> </ul>	<ul style="list-style-type: none"> <li>• Approaches to computer architecture</li> <li>• Feature and characteristics of stored program model, cluster computing and uniform memory access and non-uniform memory access</li> <li>• Use and application of emulation</li> <li>• Factor affecting the choice of different architecture models</li> <li>• The impact of using different architecture models</li> <li>• The concepts of microarchitecture</li> <li>• Registers and register handling</li> <li>• Types of registers</li> <li>• The role of interrupts in a computer system</li> </ul> <p>How data is represented by computer systems, the characteristics, concepts and implications of computer data representation methods:</p> <ul style="list-style-type: none"> <li>• Number systems</li> <li>• Text representation</li> <li>• Image representation</li> </ul> <p>How data is organised on computer systems:</p> <ul style="list-style-type: none"> <li>• Data structures</li> <li>• Indices and matrices</li> </ul> <p>How data is transmitted by computer systems:</p> <ul style="list-style-type: none"> <li>• Types of communication channel</li> <li>• Methods of connecting devices and transmitting data across and between computer systems</li> <li>• The selection of connection methods to fulfil specified tasks and functions</li> <li>• Asynchronous and synchronous data transmission</li> </ul>
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<b>Year 13</b>	<p><b>Unit 7: IT Systems security and encryption</b></p> <p>Coursework unit where students will study IT system security threats and the methods used to protect against them. Students then undertake activities to construct their own network and protect the IT systems from security threats, including data encryption.</p> <p>Understand current IT security threat types (which are continually evolving):</p> <ul style="list-style-type: none"> <li>• Internal threats</li> <li>• External threats</li> <li>• Physical threats</li> <li>• Social engineering and software-driven threats</li> <li>• Passive threats</li> <li>• Active threats</li> <li>• Cloud computing security risks</li> </ul>	<p><b>Unit 7: IT Systems security and encryption</b></p> <p>Implement strategies to protect an IT system from security threats:</p> <ul style="list-style-type: none"> <li>• Group policies</li> <li>• Anti-malware protection</li> <li>• Firewall configuration</li> <li>• Wireless security</li> <li>• Access control</li> <li>• Testing and reviewing protection applied to an IT system</li> <li>• Skills, knowledge and behaviours</li> </ul> <p>Students are then provided with the required amount of time to complete their coursework report and perform the tasks to protect an IT system to meet set requirements.</p> <p><b>Unit 14: Computer games development</b></p> <p>Investigate technologies used in computer gaming:</p>	<p><b>Unit 14: Computer games development</b></p> <p>Design a computer game to meet client requirements: Investigating computer games design processes and techniques</p> <ul style="list-style-type: none"> <li>• Mathematical techniques and processes</li> <li>• Graphic processing and editing techniques</li> <li>• Platform and delivery</li> <li>• Visual styles</li> <li>• Assets</li> <li>• Game play features</li> </ul> <p>Creating design documentation including:</p> <ul style="list-style-type: none"> <li>• Requirements of the brief, including audience, purpose and client requirements</li> <li>• Legal and ethical consideration</li> <li>• Game design</li> <li>• Choice of programming language</li> <li>• Intended platform/media for delivery</li> <li>• Timeline</li> <li>• Production schedule</li> <li>• Hardware, software and other resources required</li> </ul>



<ul style="list-style-type: none"> <li>Principles of confidentiality, integrity and availability of information</li> <li>Unauthorised access or modification of information</li> <li>Principle of minimal access to information or lowest required access permission to be able to maximise protection</li> <li>Deliberate or accidental loss of information</li> <li>The need to protect intellectual property from theft or malicious damage</li> <li>Legal requirements</li> <li>Impact of a serious security breach</li> </ul> <p>Investigate cryptographic techniques and processes used to protect data:</p> <ul style="list-style-type: none"> <li>Cryptographic principles</li> <li>Cryptographic methods</li> <li>Applications of cryptography</li> </ul> <p>Examine the techniques used to protect an IT system from security threats:</p> <ul style="list-style-type: none"> <li>Physical security</li> <li>Policies and procedures</li> <li>Software-based protection</li> </ul>	<ul style="list-style-type: none"> <li>Social trends in computer gaming</li> <li>Technologies used in computer gaming</li> <li>Benefits and limitations of different platform options for the development of computer games</li> <li>Hardware options and their effect on the development of computer games</li> <li>Software options and their effect on the development of computer games</li> <li>Uses of game engines, their capabilities and how they aid computer game developers</li> </ul> <p>Students are provided with time and guidance to use new software called GoDot prior to starting their coursework.</p>	<ul style="list-style-type: none"> <li>Test plans to check playability, performance and other quality characteristics</li> <li>Constraints</li> </ul> <p>Reviewing and refining designs:</p> <ul style="list-style-type: none"> <li>Working with others to improve quality, effectiveness and appropriateness of designs</li> <li>Updating design schematic documentation based on review and feedback</li> </ul> <p>Develop a computer game to meet client requirements:</p> <ul style="list-style-type: none"> <li>Principles of computer games development</li> <li>Developing computer games</li> <li>Testing computer games</li> <li>Reviewing computer games</li> <li>Quality characteristics</li> <li>Skills, knowledge and behaviours</li> </ul> <p>Students are then provided with the required amount of time to complete their coursework report and perform the tasks to protect an IT system to meet set requirements.</p>
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