

## Shoreham Academy ICT and Computing Department: 7 year curriculum map

Note: The structure of KS3/4/5 curriculum is designed to meet the practical knowledge/skills/content missed during the pandemic, therefore similar topics may be covered across year groups, with curriculum being reviewed, updated for 2022/23.

	Autumn		Spring		Summer	
<p><b>Year 7</b></p> <p>ICT and Computing</p>	<p><b>Topic:</b> E-Literacy and E-safety</p> <p><b>Knowledge/skills taught:</b> How to use the school network. Electronic file and folder management. Searching the web using Boolean Operators. Cyberbullying - inappropriate content, contact and conduct.</p> <p><b>Has links to:</b> Using the school network safely and respectfully. Online relationships covered in year 8 and 9. Databases in year 9. Boolean Algebra KS4/KS5 Computer Science.</p>	<p><b>Topic:</b> Computing theory</p> <p><b>Knowledge/skills taught:</b> Identifying/describing the functions of computer hardware components, storage devices, input, and output devices. Binary Conversion.</p> <p><b>Has links to:</b> Computing theory studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Data Manipulation and Processing - Spreadsheets</p> <p><b>Knowledge/skills taught</b> Create, edit, and process data using appropriate software tools and techniques – Data entry/formatting, formulae, functions, Charts/Graphs, Modelling.</p> <p><b>Has links to:</b> Spreadsheets studied in year 9 and KS4/KS5 IT.</p>	<p><b>Topic:</b> Computer Crime and Legislation</p> <p><b>Knowledge/skills taught</b> Identify and explain legislation relating to securing and protecting personal data – GDPR. Crimes linked to data theft - explain the need for data protection.</p> <p><b>Has links to:</b> Legislation/Data studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Designing algorithms using Flowcharts</p> <p><b>Knowledge/skills taught:</b> Create flowcharts to solve and model of real-world problems. Use flowcharts symbols to construct flowcharts and show the step-by-step solution to the problem.</p> <p><b>Has links to:</b> Algorithms studied in year 7/8/9 programming Topic and KS4/KS5 Computer Science.</p>	<p><b>Topic:</b> Programming (Scratch)</p> <p><b>Knowledge/skills taught:</b> Programming using block based visual programming. Use programming techniques – sequence, selection, and iteration. Plan and develop a digital game – based on client requirement.</p> <p><b>Has links to:</b> Programming studied in year 8 (Small Basic), 9 (Python) and KS4/5 Programming - Computer Science.</p>
<p><b>Year 8</b></p> <p>ICT and Computing</p>	<p><b>Topic:</b> Data Manipulation and Processing - Spreadsheets</p> <p><b>Knowledge/skills taught</b> Create, edit, and process data using appropriate software tools and techniques – Data entry/formatting, formulae, functions, Charts/Graphs, Modelling.</p> <p><b>Has links to:</b> Spreadsheets/Data Manipulation studied in year 9 and KS4/KS5 IT.</p>	<p><b>Topic:</b> Computer Crime and Legislation</p> <p><b>Knowledge/skills taught -</b> legislation relating to intellectual property - Copyright, Designs and Patents Act. Legislation relating to Computer Crimes – Hacking and Malware – Computer Misuse Act.</p> <p><b>Has links to:</b> Legislation - studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Designing algorithms using Flowcharts</p> <p><b>Knowledge/skills taught:</b> Create flowcharts to solve and model of real-world problems. Use flowcharts symbols to construct flowcharts and show the step-by-step solution to the problem.</p> <p><b>Has links to:</b> Algorithms studied in year 7/8/9 programming Topic and KS4/KS5 Computer Science.</p>	<p><b>Topic:</b> Programming Techniques (Small Basic)</p> <p><b>Knowledge/skills taught:</b> Code instructions to a graphics and text window. Understand and use programming constructs - sequence, selection, and iteration.</p> <p><b>Has links to:</b> Programming studied in 9 (Python) and KS4/5 Computer Science.</p>	<p><b>Topic:</b> Networks and topologies</p> <p><b>Knowledge/skills taught.</b> Types of networks (LAN/WAN), network hardware, factors affecting network performance. Network topologies -Star, Ring, Bus and Mesh.</p> <p><b>Has links to:</b> Networks and topologies studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> E-safety and Cyber Security</p> <p><b>Knowledge/skills taught:</b> Understand online risks and how to stay safe. Understand cyber-crime threats -social engineering and malware. Methods used to prevent cyber-attacks.</p> <p><b>Has links to:</b> Cybercrime and Threats studied in KS4/KS5 Computer Science and IT.</p>
<p><b>Year 9</b></p> <p>ICT and Computing</p>	<p><b>Topic:</b> Data Management</p> <p><b>Knowledge/skills taught:</b> Database management – database design, entry, data types, creating queries and reports.</p> <p><b>Has links to:</b> Database Management studied in KS4 IT and KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Programming (Python)</p> <p><b>Knowledge/skills taught:</b> Write and run programs using Sequence (Input and output), Selection (Making decisions), Iteration (Repeating instructions). Write pseudocode algorithms for a given problem.</p> <p><b>Has links to:</b> Programming studied in 9 (Python) and KS4/5 Computer Science.</p>	<p><b>Topic:</b> Web design and development</p> <p><b>Knowledge/skills taught:</b> Analysing and assessing websites, creating a website prototype to meet customer criteria. Use HTML to structure static web pages. Modify HTML tags using inline styling to improve the appearance of web pages.</p> <p><b>Has links to:</b> KS4/5 IT coursework units.</p>	<p><b>Topic:</b> App Development</p> <p><b>Knowledge/skills taught:</b> Implement and customise GUI elements to meet the needs of the user. Use user input in an event-driven programming environment. Develop an app prototype to include some functionality. Act on user feedback and evaluate the solution.</p> <p><b>Has links to:</b> KS4/5 IT coursework units. Programming Concepts studied in KS4/5 Computer Science.</p>	<p><b>Topic:</b> Data Manipulation and Processing - Spreadsheets</p> <p><b>Knowledge/skills taught:</b> Using techniques to create, edit and process data. Using formulae, conditional formatting, What If Scenarios (goal seek), advanced functions and cell referencing.</p> <p><b>Has links to:</b> Spreadsheets/Data Manipulation studied in KS4/KS5 IT.</p>	<p><b>Topic:</b> Project Management</p> <p><b>Knowledge/skills taught:</b> Understanding project life cycle, using planning tools and software to plan a project and the meet requirements of client, presenting information using tools and techniques. Evaluating projects.</p> <p><b>Has links to:</b> KS4/5 IT units – Project Lifecycle, app design and game design.</p>

<p><b>Year 10</b> IT</p>	<p><b>Topic:</b> L01 and L02 Project Lifecycle</p> <p><b>Key Knowledge/skills taught:</b> Understand the tools and techniques that can be used to initiate and plan solutions. To be able to initiate and plan a solution to meet an identified need:</p> <ul style="list-style-type: none"> <li>• Phases of the Project Lifecycle, inputs and outputs, advantages of using the PLC</li> <li>• Planning tools: PERT charts, GANTT charts, Flowcharts, Task lists, Mind maps</li> <li>• Project Management software</li> </ul>	<p><b>Topic:</b> L03 Data Collection and Storage methods / L04 Cyber Security</p> <p><b>Key Knowledge/skills taught:</b> Understand how data and information can be collected, stored, and used.</p> <ul style="list-style-type: none"> <li>• Data and Information / Data types</li> <li>• Data collection methods</li> <li>• Technologies used to support data collection</li> <li>• Storage methods</li> <li>• Uses of data within a context</li> </ul> <p>Understand the factors to be considered when collecting and processing data and storing data/information:</p> <ul style="list-style-type: none"> <li>• Threats: Malware, social engineering, hacking, DDos, Pharming</li> <li>• Vulnerabilities: environmental, physical, system</li> <li>• Impacts/consequences of cyber security attacks</li> <li>• Prevention measures: physical, logical, safe destruction of data</li> <li>• IT Legislation</li> </ul>	<p><b>Topic:</b> L05 Data Manipulation</p> <p><b>Key knowledge/skills taught:</b> To be able to import and manipulate data to develop a solution to meet an identified need using Spreadsheets and Databases</p> <ul style="list-style-type: none"> <li>• Spreadsheets: Functions, absolute cell referencing, linking worksheets, what if analysis, macros, importing data, presenting data using charts and graphs, applying security measures, exporting data.</li> <li>• Database software: Relational databases, importing data, data validation, input forms/switchboards/navigations, queries, reports, applying security measures, exporting data.</li> </ul>
<p><b>Year 10</b> Computer Science</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>1. Boolean logic</li> <li>2. Memory and storage</li> <li>3. Systems architecture</li> <li>4. Computer networks, connections, and protocols</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Boolean logic:</b> Simple logic diagrams using the operators AND, OR and NOT, Truth tables, combining Boolean operators using AND, OR and NOT, applying logical operators in truth tables to solve problems.</p> <p><b>Memory and storage: Primary storage (RAM/ROM/VIRTUAL memory) Secondary storage.</b> The units of data storage: How data needs to be converted into a binary format to be processed by a computer. Data capacity and calculation of data capacity requirements (Numbers, Characters, Images, Sound) Compression)</p> <p><b>Systems architecture:</b> Architecture of a CPU, CPU Performance, Embedded systems.</p> <p><b>Networks and topologies:</b> Types of networks, wired and wireless networks, protocols and layers.</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>1. Systems software</li> <li>2. Algorithms</li> <li>3. Programming fundamentals</li> <li>4. Producing robust programs</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Systems software: Operating systems, Utility software</b></p> <p><b>Algorithms:</b> Computational thinking, designing, creating, and refining algorithms, searching, and sorting algorithms.</p> <p><b>Programming fundamentals:</b> The use of variables, constants, operators, inputs, outputs, and assignments, use programming constructs used to control the flow of a program, arithmetic operators, Boolean operators AND, OR and NOT. <b>Data types:</b> The use of data types.</p> <p><b>Additional programming techniques:</b> basic string manipulation, file handling operations, SQL to search for data, arrays (or equivalent) when solving problem. Sub programs (functions and procedures) to produce structured code. Random number generation.</p> <p><b>Producing robust programs:</b> Defensive design, testing, Refining algorithms.</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>1. Practical Programming knowledge/skills</li> <li>2. Practical programming Task</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Practical Programming knowledge/skills:</b> Learn Programming fundamentals and techniques with Python.</p> <p><b>Practical programming Task:</b> All students are given the opportunity to undertake programming tasks to allow students to develop knowledge/skills within the following areas when programming:</p> <ul style="list-style-type: none"> <li>• Design</li> <li>• Write</li> <li>• Test</li> <li>• Refine</li> </ul> <p>Python as a programming language, will be used to solve a problem (or problems).</p>

<p><b>Year 11</b></p> <p>IT</p>	<p><b>Topic:</b> L06 and L07 Processing and presenting data / Revision for external exam (Unit R012) during week 1 of Spring term.</p> <p><b>Key knowledge/skills taught:</b> Understand the different methods of processing data and presenting information.</p> <ul style="list-style-type: none"> <li>Using spreadsheets and databases to process information</li> <li>Software tools used to present information in each context, presentation methods.</li> <li>Consideration when presenting information: Target audience, content limitation, distribution channels, presentation methods.</li> </ul> <p>To be able to select and present information in the development of the solution to meet an identified need.</p> <ul style="list-style-type: none"> <li>Word Processing tools and techniques: text/tables, referencing tools, table of contents/indexes, mail merge, linking and embedding data, document reviewing, saving, and exporting into formats</li> <li>Presentation techniques: text and objects, slideshows, speaker notes, sound/video, master pages, integrating applications, security measures, saving/exporting</li> <li>Web/mobile technologies: HTML, CSS, web design.</li> </ul>	<p><b>Topic:</b> L08 Evaluating a solution / Controlled Assessment Mock</p> <p><b>Key knowledge/skills taught:</b> To be able to iteratively review and evaluate the development of the solution.</p> <ul style="list-style-type: none"> <li>How to carry out and document an iterative review: phase reviews – reviewing each phase, identifying issues, using questionnaires/surveys to gather feedback, resolving issues, making adaptations to original plan.</li> <li>How to carry out and document an iterative review: final evaluation – measure success against criteria, review deviations to plans, effect of processes on delivering solution, maintainability – further development of the system.</li> </ul> <p>Students will complete a programming project assignment to recap on knowledge/skills, review learning, fill learning gaps and prepare students for the programming task NEA.</p>	<p><b>Topic:</b> Controlled Assessment (Unit R013)</p> <p><b>Key knowledge/skills taught:</b> Students will initiate, plan, execute and evaluate a solution to a problem based on Controlled Assessment Scenario provided by the exam board. Students demonstrate and utilise all knowledge/skills learned throughout year 10 and 11 to successfully complete the assignment.</p> <p>Past assignment examples - Students have been asked to use the Project Lifecycle to create integrated IT systems for the following businesses:</p> <ul style="list-style-type: none"> <li>Car manufacturer</li> <li>Hotels</li> <li>Bakery</li> <li>Beauty Salon</li> <li>Electricity Company</li> </ul>
<p><b>Year 11</b></p> <p>Computer Science</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>Boolean logic</li> <li>Memory and storage</li> <li>Systems architecture</li> <li>Computer networks, connections, and protocols</li> </ol> <p><b>Knowledge / Knowledge/skills:</b> <b>Boolean logic:</b> Simple logic diagrams using the operators AND, OR and NOT, Truth tables, Combining Boolean operators using AND, OR and NOT, applying logical operators in truth tables to solve problems.</p> <p><b>Memory and storage: Primary storage (RAM/ROM/VIRTUAL memory) Secondary storage.</b> The units of data storage: How data needs to be converted into a binary format to be processed by a computer Data capacity and calculation of data capacity requirements (<b>Numbers, Characters, Images, Sound) Compression).</b></p> <p><b>Systems architecture:</b> Architecture of a CPU, CPU Performance, Embedded systems.</p> <p><b>Networks and topologies:</b> Types of networks, Wired and wireless networks, protocols and layers.</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>Systems software</li> <li>Algorithms</li> <li>Programming fundamentals</li> <li>Producing robust programs</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Systems software:</b> Operating systems, Utility software.</p> <p><b>Algorithms:</b> Computational thinking, Designing, creating, and refining algorithms, Searching, and sorting algorithms.</p> <p><b>Programming fundamentals:</b> The use of variables, constants, operators, inputs, outputs, and assignments, use programming constructs used to control the flow of a program, arithmetic operators, Boolean operators AND, OR and NOT. <b>Data types:</b> The use of data types.</p> <p><b>Additional programming techniques:</b> basic string manipulation. file handling operations. SQL to search for data. Arrays (or equivalent) when solving problem. Sub programs (functions and procedures) to produce structured code. Random number generation.</p> <p><b>Producing robust programs:</b> Defensive design, testing, refining algorithms.</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>Ethical, legal, cultural, and environmental impacts of digital technology</li> <li>Programming languages and Integrated Development Environments</li> <li>Network security</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Network security</b> Threats to computer systems and networks. Identifying and preventing vulnerabilities</p> <p><b>Ethical, legal, cultural, and environmental impacts of digital technology:</b> Impacts of digital technology on wider society including legislation relevant to Computer Science.</p> <p><b>Programming languages and Integrated Development Environments</b> <b>Languages:</b> Characteristics and purpose of different levels of programming language <b>The Integrated Development Environment (IDE):</b> Common tools and facilities available in an Integrated Development Environment (IDE).</p>
<p><b>Year 12</b></p> <p>IT</p>	<p><b>Topic:</b> Fundamentals of IT (Unit 1)</p> <p><b>Key knowledge/skills taught:</b> Computer hardware and software, business IT systems, employability and communication knowledge/skills, ethical and operational issues.</p>	<p><b>Topic:</b> Application Design (Unit 6)</p> <p><b>Key knowledge/skills taught:</b> Coursework based unit. Understand how applications are designed, be able to investigate potential solutions, be able to generate and prototype a solution to meet client and user requirements, presenting them to a client.</p>	<p><b>Topic:</b> Internet of Everything (Unit 17)</p> <p><b>Key knowledge/skills taught:</b> Coursework based unit. Understand what is meant by Internet of Everything (IoE), be able to repurpose technologies to extend scope of IoE, present concept of ideas for repurposed developments.</p>

<p><b>Year 12</b></p> <p>Computer Science</p>	<p><b>Topic: <u>Fundamental of programming</u></b>  <b>Key Knowledge/skills taught:</b> Programming concepts, Programming paradigms.</p> <p><b>Topic: <u>Fundamentals of data representation</u></b>  <b>Key knowledge/skills taught:</b> Number systems, Number bases, Units of information, Binary number system, Information coding systems, Representing images, sound, and other data.</p> <p><b>Topic: <u>Fundamentals of data structures</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Data structures and abstract data types</li> <li>• Queues</li> <li>• Stacks</li> <li>• Graphs</li> <li>• Trees</li> <li>• Hash tables</li> <li>• Dictionaries</li> <li>• Vectors</li> </ul>	<p><b>Topic: <u>Fundamentals of algorithms</u></b>  <b>Key knowledge/skills taught:</b> Graph-traversal, Tree-traversal, Reverse Polish, searching algorithms, Sorting algorithms, Optimisation algorithms.</p> <p><b>Topic: <u>Theory of computation</u></b>  <b>Key knowledge/skills taught:</b> Abstraction and automation, Regular languages, Context-free languages, Classification of algorithms, A model of computation.</p> <p><b>Topic: <u>Fundamentals of computer systems</u></b>  <b>Key knowledge/skills taught:</b> Hardware and software, Classification of programming languages, Types of program translator, Logic gates, Boolean algebra.</p>	<p><b>Topic: <u>Fundamentals of computer organisation and architecture</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Internal hardware components of a computer</li> <li>• The stored program concept</li> <li>• Structure and role of the processor and its components</li> <li>• External hardware devices</li> </ul> <p><b>Topic: <u>Consequences of uses of computing</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Individual (moral), social (ethical), legal and cultural issues and opportunities</li> </ul> <p><b>Topic <u>Fundamentals of communication and networking</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Communication</li> <li>• Networking</li> <li>• The Internet</li> <li>• The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol</li> </ul>
<p><b>Year 13</b></p> <p>IT</p>	<p><b>Topic:</b> Global Information (Unit 2)</p> <p><b>Key knowledge/skills/knowledge taught:</b>  Understand where/how information is held globally, its uses by individuals and organisations. Understand legal framework governing storage, the process flow of information and principles of information security – for all types and classification of information.</p>		<p><b>Topic: <u>Game design (Unit 15)</u></b></p> <p><b>Key knowledge/skills/knowledge taught:</b>  Coursework based unit. Understand how games are designed, be able to investigate potential solutions, be able to generate and prototype a solution to meet client and user requirements, presenting them to a client. Blender to be used.</p>
<p><b>Year 13</b></p> <p>Computer Science</p>	<p><b>Topic: <u>Fundamentals of data representation</u></b>  <b>Key knowledge/skills taught:</b> Number systems, Number bases, Units of information, Binary number system, Information coding systems, Representing images, sound, and other data.</p> <p><b>Topic: <u>Fundamentals of computer systems</u></b>  <b>Key knowledge/skills taught:</b> Hardware and software, Classification of programming languages, Types of program translator, Logic gates, Boolean algebra.</p> <p><b>Topic: <u>Fundamentals of communication and networking</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Communication</li> <li>• Networking</li> <li>• The Internet</li> <li>• The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol</li> </ul>	<p><b>Topic: <u>Consequences of uses of computing</u></b>  <b>Key knowledge/skills taught:</b> Individual (moral), social (ethical), legal and cultural issues and opportunities.</p> <p><b>Topic: <u>Fundamentals of databases</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Conceptual data models and entity relationship modelling</li> <li>• Relational databases</li> <li>• Database design and normalisation techniques</li> <li>• Structured Query Language (SQL)</li> <li>• Client server databases</li> </ul> <p><b>Topic: <u>Fundamentals of computer organisation and architecture</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Functional programming paradigm</li> <li>• Writing functional programs</li> <li>• Lists in functional programming</li> </ul> <p><b>Topic: <u>Big Data</u></b></p>	<p><b>Topic: <u>Fundamentals of functional programming</u></b>  <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Functional programming paradigm</li> <li>• Writing functional programs</li> <li>• Lists in functional programming</li> </ul> <p><b>Topic: <u>Systematic approach to problem solving</u></b>  <b>Key knowledge/skills taught:</b> Aspects of software development.</p> <p><b>Non-exam assessment - Computing practical project</b></p>