

## Computer Science Curriculum Map 2024/25

Our specialisms: Fundamentals of components of a computer, networking & the internet, programming and Different way computers represent data.

In KS3 Computer Science at Salvatorian, students cover topics and skills over three years, gaining a solid foundation in computer science, e-safety, computer components, malware, laws, logic gates, and network topologies. They also learn about legal and ethical considerations, including intellectual property, data protection, and online privacy. In Year 9, they delve into programming concepts, algorithms, pseudocode, computer hardware, software, digital systems, and programming languages like Python.

In KS4 GCSE, students gain a comprehensive understanding of computer science, covering programming, algorithms, data representation, computer systems, databases, cybersecurity, and artificial intelligence. Year 10 focuses on core topics and introduces advanced ones like computer systems and databases. Year 11 includes practical activities, programming projects, and assessments. The program concludes with a formal written examination, providing a strong foundation in computer science for further study or careers in the field.

Term	Autumn 1		Autumn 2		Spring 1	Spring 2		Summer 1	Summer 2
<b>Year 7</b>	<b>Computer Fundamentals</b>  This topic teaches students how to use a computer, including logging in, opening applications like Word, accessing email and OneDrive, and saving files.  <b>Learning to Use Microsoft Word</b>  This topic introduces students to Microsoft Word, focusing on basic features such as creating, editing, and formatting documents.  <b>Colour Hat Hackers</b>  This topic explores the different types of hackers, categorized by "hat" colours: white hat (ethical hackers), black hat (illegal hackers), and grey hat (hackers who may act ethically or unethically).	<b>Test</b>	<b>Passwords</b> This topic covers the importance of strong, secure passwords in protecting personal and online information <b>E-safety</b> <ul style="list-style-type: none"> <li>Understanding how to stay safe online and outing the dangers that excise online.</li> </ul> <b>Phishing</b> <ul style="list-style-type: none"> <li>Students will look at how this attack works, looking at real life examples and ways we can identify and avoid the attack.</li> </ul>	<b>Test</b>	<b>Practical assessment</b> <ul style="list-style-type: none"> <li>This topic introduces students to Scratch, a visual programming language.</li> </ul>	<b>Practical assessment</b> <ul style="list-style-type: none"> <li>This topic introduces students to Scratch, a visual programming language.</li> </ul>	<b>Practical</b>	<b>Malware</b> <ul style="list-style-type: none"> <li>Identifying the different types of malwares and understanding how each one damages a computer is a different way.</li> </ul> <b>Computers</b> <ul style="list-style-type: none"> <li>Students learn that computers are not just what they use to play games on but actually many things they use in their daily life is also a type of computer.</li> </ul>	<b>Practical assessment</b> <ul style="list-style-type: none"> <li>Putting together everything the students have learnt this year, students will be tasked with creating an outline plan for an app that students can use to help with their studies at home.</li> </ul>

<p><b>Year 8</b></p>	<p><b>E-safety</b></p> <ul style="list-style-type: none"> <li>Understanding how to stay safe online and outing the dangers that excise online.</li> </ul> <p><b>Embedded systems</b></p> <ul style="list-style-type: none"> <li>Students will dive deeper into what a computer is by looking at the different types that excised, such as embedded systems are and what they are used for.</li> </ul> <p><b>Public network</b></p> <ul style="list-style-type: none"> <li>Public network attacks involve various threats like man-in-the-middle, packet sniffing, and rogue hotspots, targeting vulnerable, unsecured networks to steal data or hijack sessions, which can be mitigated through encryption, VPNs, and secure practices.</li> </ul>	<p><b>Test</b></p>	<p><b>Computer Components - software</b></p> <ul style="list-style-type: none"> <li>Software refers to the programs and operating systems that run on a computer, enabling it to perform tasks and manage hardware resources, including system software (e.g., operating systems) and application software (e.g., word processors, browsers).</li> </ul> <p><b>Binary</b></p> <ul style="list-style-type: none"> <li>Students will learn the fundamentals of the binary number system, understand how binary digits (0 and 1) represent data in computers, and practice converting binary numbers to decimal by applying positional value and powers of 2.</li> </ul>	<p><b>Test</b></p>	<p><b>Learning the Basics of HTML and Projects</b></p> <p>This topic teaches students the fundamentals of HTML (Hypertext Markup Language) for creating web pages. Students will learn about basic HTML tags, structure, and elements like headings, paragraphs, links, and images. They will apply this knowledge to create their own simple web projects.</p>	<p><b>Learning the Basics of HTML and Projects</b></p> <p>This topic teaches students the fundamentals of HTML (Hypertext Markup Language) for creating web pages. Students will learn about basic HTML tags, structure, and elements like headings, paragraphs, links, and images. They will apply this knowledge to create their own simple web projects.</p>	<p><b>Practical</b></p>	<p><b>Hexadecimal</b></p> <p>Students will learn how to convert binary numbers to hexadecimal by grouping the binary digits into sets of four (starting from the right), and then converting each group into its equivalent hexadecimal value (0-9, A-F).</p> <p><b>Networking</b></p> <ul style="list-style-type: none"> <li>students will learn about the technology that enables computers and other devices to communicate with each other over a network.</li> </ul>	<p><b>Ethical, cultural, environmental issues with AI</b></p> <p>Students will explore the ethical, cultural, and environmental issues surrounding AI, including concerns about bias, privacy, job displacement, cultural impacts, and the environmental effects of AI's energy consumption and resource use.</p> <p><b>Revision for EOY</b></p>
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<p><b>Year 9</b></p>	<p><b>Embedded systems</b></p> <ul style="list-style-type: none"> <li>Students will dive deeper into what a computer is by looking at the different types that exist, such as embedded systems are and what they are used for.</li> </ul> <p><b>Secondary Storage</b></p> <ul style="list-style-type: none"> <li>students will learn about the different types of storage devices, their advantages and disadvantages, and how data is stored and retrieved from them. They will also learn about file systems, storage capacity, and data management techniques.</li> </ul>		<p><b>Logic gates</b></p> <ul style="list-style-type: none"> <li>When learning about logic gates, students will learn about the basic building blocks of digital circuits and computer systems. Logic gates are the fundamental elements of digital circuits, used to process and transmit binary signals.</li> </ul> <p><b>Binary and hexadecimal</b></p> <ul style="list-style-type: none"> <li>Students will learn how to convert decimal numbers (base 10) to binary (base 2) and hexadecimal (base 16) representations. They will learn the concepts and algorithms used to perform these conversions, as well as the advantages and disadvantages of different number systems.</li> </ul> <p><b>Networking</b></p> <ul style="list-style-type: none"> <li>students will learn about the technology that enables computers and other devices to communicate with each other over a network.</li> </ul>		<p><b>Python</b></p> <p>This topic introduces students to Python, a beginner-friendly programming language. Students will learn basic concepts such as variables, data types, loops, and conditionals, and how to write simple programmes.</p>	<p><b>Python</b></p> <p>This topic introduces students to Python, a beginner-friendly programming language. Students will learn basic concepts such as variables, data types, loops, and conditionals, and how to write simple programmes.</p>		<p><b>Network topologies &amp; threats</b></p> <ul style="list-style-type: none"> <li>Students will learn about different networking topologies, such as star, bus, ring, and mesh, and how they determine the layout and communication flow in a network, as well as the potential security threats each topology faces, including data interception, denial of service, and unauthorised access.</li> </ul>	<p><b>Ethical, cultural, environmental issues</b></p> <ul style="list-style-type: none"> <li>They will learn about the ethical and moral considerations surrounding the use of technology, such as privacy, security, and intellectual property rights.</li> </ul> <p><b>Revision for EOY</b></p>
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<p><b>Year 10</b></p>	<p>Students will gain a fundamental understanding of digital logic and computer systems. They will learn about the basic building blocks of digital logic, such as AND, OR, and NOT gates, and how they are used to perform logical operations.</p> <p>Students will also learn about decimal to binary and hexadecimal conversions, which are important for understanding how computers store and process data.</p> <p>Additionally, students will learn about computational thinking, which involves breaking down complex problems into smaller, more manageable steps and using algorithms and logic to find solutions.</p>	<p><b>Assessment 1</b></p>	<p>When learning about data representation with images and sound, and compression, students will learn about the different methods and technologies used to store, process, and transmit multimedia data such as images, audio, and video.</p> <p>They will learn about different image and audio file formats, such as JPEG, PNG, and MP3, and how they are used to represent images and sound in a digital format.</p>	<p><b>Assessment 2</b></p>	<p>Python programming and ethical, legal, cultural, and environmental impacts, students will gain a foundation in programming concepts and practices. They will learn how to write code in Python, a widely used programming language, and understand the basic syntax and structure of a program. They will also learn about variables, data types, control structures, functions, and more.</p>	<p>Defensive design and the architecture of the CPU, students will gain a deeper understanding of computer systems and how they are designed to operate securely. They will learn about defensive design techniques and strategies, including input validation, error handling, and security testing, to create software that is resilient against security threats.</p>	<p><b>Assessment 3</b></p>	<p>When learning about secondary storage and utility software, students will gain an understanding of the different types of storage used in computing systems. They will learn about secondary storage devices, including hard disk drives, solid-state drives, and cloud storage, and how they are used to store and retrieve data.</p> <p>Additionally, students will learn about utility software, including tools and applications used to manage, maintain, and optimize computer systems. This includes understanding the different types of utility software, such as disk defragmenters, backup software, and anti-virus software, and how they can be used to increase efficiency, ensure data security, and improve overall system performance. By the end of the unit, students will have a solid understanding of secondary storage and utility software, and how they are used to manage and maintain computer systems.</p>
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<p><b>Year 11</b></p>	<p>Students will gain an in-depth understanding of the central processing unit (CPU) and how it functions within a computer system. They will learn about the different components of the CPU, including the control unit, arithmetic logic unit, and cache, and how they work together to execute instructions and perform tasks.</p> <p>Additionally, students will learn about CPU performance and how it can be measured and optimized. This includes understanding the different factors that influence CPU performance, such as clock speed, number of cores, and memory, and how they can be used to improve the overall performance of a computer system. By the end of the unit, students will have a solid understanding of the architecture of the CPU and CPU performance, and how they impact the performance and efficiency of a computer system.</p>	<p><b>Mock Exam 2</b></p>	<p>Students will understand of the different types of network configurations and how they are used to connect devices. They will learn about different network topologies, including bus, star, and mesh networks, and the advantages and disadvantages of each.</p> <p>Additionally, students will learn about the various security threats that can impact computer systems, including viruses, malware, and hacking, and how to protect against these threats. This includes understanding the different types of security measures, such as firewalls, antivirus software, and encryption, and how they can be used to secure computer systems and networks. By the end of the unit, students will have a solid understanding of networking topology and the various security threats to computer systems, and how to protect against them.</p>	<p><b>Mock Exam 3</b></p>	<p>When learning about different searching and sorting algorithms, students will gain an understanding of various methods used to search and sort data. They will learn about different types of searching algorithms, such as linear search, binary search, and hash table, and how they can be used to find specific data within a large dataset.</p> <p>Additionally, students will learn about different sorting algorithms, including bubble sort, insertion sort, and quick sort, and how they can be used to efficiently sort data. This includes understanding the different trade-offs, such as time and space complexity, of each algorithm and when to use each one based on the specific requirements of a given problem.</p>	<p><b><i>Revision in preparation for end of year exams.</i></b></p>
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<p><b>Year 12</b></p>	<p><b>Unit 1 - Operating Systems, Processors, and Storage</b></p> <p>Covers key concepts in operating systems, processors, and storage, including the purpose and types of operating systems (distributed, embedded, multi-user, etc.), memory management techniques (paging, segmentation, virtual memory), and scheduling algorithms. It also explores CPU interrupts, BIOS, device drivers, virtual machines, processor types (CISC vs. RISC), GPU uses, multicore systems, and different types of input, output, and storage devices (magnetic, flash, optical, RAM, ROM).</p> <p><b>Unit 11 – Python Programming</b></p> <p>Programming fundamentals cover key concepts such as programming constructs (sequence, iteration, branching), recursion versus iterative approaches, and the use of global and local variables. It also includes understanding modularity, functions, procedures, parameter passing (by value and by reference), using an IDE for development and debugging, and applying object-oriented programming techniques.</p>	<p><b>Mock Exam 2</b></p>	<p><b>Unit 2 - Memory Management</b></p> <p>This unit explores the role of operating systems, including their need, functions, and purposes, as well as memory management, interrupts, and scheduling techniques. It covers BIOS, device drivers, virtual machines, and the difference between open source and closed source software. Additionally, students will learn about translators (interpreters, compilers, assemblers), the stages of compilation, linkers, loaders, and libraries. The unit also introduces data compression (lossy vs. lossless, RLE), encryption methods (symmetric and asymmetric), and hashing techniques.</p> <p><b>Unit 5 – Web technologies</b></p> <p>This unit covers key concepts in web development and networking, including HTML for structuring web pages, JavaScript for interactive functionality, and various networking topologies (such as star, bus, and mesh). It also explores hardware components, including processors, memory, storage devices, and the role of networking in communication. Students will learn how these technologies work together to create efficient, functional systems and websites.</p>	<p><b>Mock Exam 3</b></p>	<p>This unit covers data compression techniques (lossy vs. lossless, Run Length Encoding, encryption methods, and hashing), along with database concepts like relational databases, keys, normalization, SQL, referential integrity, and transaction processing. It also explores networking, including protocols, the TCP/IP stack, DNS, LANs, WANs, packet/circuit switching, network security, and the difference between client-server and peer-to-peer architectures.</p> <p>This unit covers the analysis and design of algorithms, focusing on their suitability for different tasks and data sets based on execution time and space. Students will learn to assess algorithm efficiency using Big O notation, compare algorithm complexities, and understand key algorithms for data structures (stacks, queues, trees, linked lists) and standard algorithms (bubble sort, insertion sort, merge sort, quick sort, Dijkstra's shortest path, A*, binary search, and linear search).</p>
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