# St Mary's CE High School Curriculum Map 2023-24
## Computer Science Year 10

| | Autumn 1a | Autumn 1b | Spring 2a | Spring 2b | Summer 3a | Summer 3b |
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| **CONTENT**<br><br>*Declarative / core / powerful Knowledge – 'Know What'* | Memory and Storage:<br>- Primary storage<br>  ○ The need for primary storage<br>  ○ The difference between RAM & ROM<br>  ○ The purpose of ROM & RAM in a computer system<br>  ○ Virtual memory<br>- Secondary storage<br>  ○ The need for secondary storage<br>  ○ Common types of storage<br>  ○ Suitable types of storage devices & storage media for given applications<br>  ○ The advantages & disadvantages of different storage devices (Capacity, Speed, Portability, Durability, Reliability & Cost)<br>- Units | Computer Networks, Connections and Protocols:<br>- Networks and topologies<br>- Types of Networks: LAN & WAN<br>- Factors that affect the performance of networks<br>- The different roles of computers in a client-server and peer-to-peer network<br>- The hardware needed to connect stand-alone computers into a LAN<br>- Internet as a worldwide collection of computer networks<br>- Star and mesh topologies<br>- Wired and wireless networks, protocols & layers<br>- Moods of wired and wireless connections<br>- Encryption | Network Security:<br>- Threats to computer systems and networks<br>- Forms of Attack:<br>  ○ Malware<br>  ○ Social engineering e.g. phishing, people as the 'weak point'<br>  ○ Brute-force attacks<br>  ○ Denial of service attacks<br>  ○ Data interception and theft<br>  ○ The concept of SQL injection<br>- Identifying & preventing vulnerabilities<br>- Common prevention methods:<br>  ○ Penetration testing<br>  ○ Anti-malware software<br>  ○ Firewalls<br>  ○ User access levels<br>  ○ Passwords<br>  ○ Encryption<br>  ○ Physical security | Systems Software:<br>-Operating systems<br>- The purpose & functionality of operating systems:<br>  ○ User interface<br>  ○ Memory management & multitasking<br>  ○ Peripheral management & drivers<br>  ○ User management<br>  ○ File management<br>- Utility software:<br>- The purpose & functionality of utility software<br>- Utility system software:<br>  ○ Encryption software<br>  ○ Defragmentation<br>Data compression | Ethical, Legal, Cultural and Environmental impacts of digital technology:<br>- Impacts of digital technology on wider society including:<br>  ○ Ethical issues<br>  ○ Legal issues<br>  ○ Cultural issues<br>  ○ Environmental issues<br>  ○ Privacy issues<br>- Legislation relevant to Computer Science:<br>  ○ The Data Protection Act 2018<br>  ○ Computer Misuse Act 1990<br>  ○ Copyright Designs and Patents Act 1988<br>  ○ Software Licences (open source/proprietary) | Practical Programming – within this term students will learn how to use the Exam reference language needed for their component 2 exam.<br><br>Students will be given a series of Python programming tasks that will allow them to:<br>- Design<br>- Write<br>- Test<br>- Refine<br><br>Practical programming will include how to write the following in terms of programming:<br>- Pseudocode<br>- Flowcharts<br>- OCR Exam Reference Language<br>- Natural English |

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| | ○ The units of data storage<br>○ How data needs to be converted into binary format<br>○ Data capacity and calculation of data capacity requirements<br>- Data storage (refer to SOW for further breakdown)<br>○ Numbers<br>○ Characters<br>○ Images<br>○ Sound<br>- Compression<br>○ Types of compression (Lossy & Lossless) | - IP & MAC addressing<br>- Standards<br>- Common protocols including:<br>○ TCP/IP<br>○ HTTP<br>○ HTTPS<br>○ FTP<br>○ POP<br>○ IMAP<br>○ SMTP<br>- The concept of layers | | | | |
| **Skills**<br><br>*Procedural Knowledge – 'Know How'* | - Why computers have primary storage (how this consists of RAM & ROM)<br>- Key characteristics of RAM & ROM<br>- Why virtual memory may be needed & how it works<br>- Why computers have secondary storage | - The characteristics of LANs & WANs<br>- Understanding of different factors that can affect the performance of a network<br>- The tasks performed by each piece of hardware<br>- The concept of the Internet as a network of computer networks | - Threats posed to devices/systems<br>- Knowledge/principles of each form of attack including:<br>○ How the attack is used<br>○ The purpose of the attack<br>- Understanding of how to limit the threats posed | - What each function of an operating system does<br>- Features of a user interface<br>- Memory management, e.g. the transfer of data between memory, and how this allows for multitasking. | - Technology introduces ethical, legal, cultural, environmental and privacy issues<br>- Knowledge of a variety of examples of digital technology and how it impacts on society<br>- An ability to discuss the impact of technology based around the issues listed | - Design programs<br>- Write programs<br>- Test programs<br>- Refine programs<br>- Pseudocode<br>- Flowcharts |

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| | - Recognise a range of secondary storage devices & the differences between them<br>- Advantages & disadvantages of different storage devices<br>- Why data must be stored in binary format<br>- Familiarity with data units and moving between them<br>- Data storage devices have different fixed capacities<br>- Calculate required storage capacity for a given size<br>- Calculate files sizes of sound, images and text files<br>- Denary number range 0-255, Hexadecimal range 00-FF & Binary range 00000000 - 11111111<br>- Understand the terms most significant bit and least significant bit | - A Domain Name Service (DNS) is made up of multiple Domain Name Servers<br>- A DNS's role in the conversion of a URL to and IP address<br>- Concept of servers providing services<br>- Concept of clients requesting/using services from a server<br>- The Cloud: remote service provision<br>- Advantages & disadvantages of the cloud<br>- Advantages & disadvantages of Star & Mesh topologies<br>- Compare benefits & drawbacks of wired versus wireless connections<br>- The principle of encryption to secure data across network connections<br>- IP addressing and the format of an IP address (IPv4 & 6) | - Understanding of methods to remove vulnerabilities<br>- Knowledge/principles of each prevention method:<br>  ○ What each prevention method may limit/prevent<br>- How it limits the attack | - Understand that: data is transferred between devices & the processor and that this process needs to be managed<br>- User management functions e.g.<br>  ○ Allocation of an account<br>  ○ Access rights<br>  ○ Security etc.<br>- File management & the key features, e.g.:<br>  ○ Naming<br>  ○ Allocating folders<br>  ○ Moving files<br>  ○ Saving etc.<br>  ○ | - The purpose of each piece of legislation & the specific actions it allows or prohibits<br>- The need to license software and the purpose of a software licence<br>- Features of open source<br>- Features of proprietary | |

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| | - Conversion of any number of in these ranges to another number base<br>- Ability to deal with binary numbers containing between 1 and 8 bits<br>- Understand the effect of a binary shift (left and right) and carry this out | - A MAC address is assigned to devices & its use within a network<br>- The principle of a protocol as a set of rules<br>- The different types of each protocol<br>- The basic principles of each protocol<br>- How layers are used in protocols, and the benefits of using layers | | | | |
| **Key Questions** | What is the key difference between primary & secondary storage?<br>What is the difference from RAM & ROM?<br>What does volatile and non-volatile mean?<br>What is secondary storage?<br>What are the advantages and disadvantages of the common secondary storage medias?<br>Why do computers use binary? | What is the difference between LAN & WAN?<br>What are some of the different factors that can affect the performance of a network?<br>What hardware can be used to connect computers to a LAN?<br>What is the structure of a Star topology?<br>What is the structure of a Mesh topology?<br>What are the different modes of wired and wireless connections?<br>What is the difference between IP & MAC addressing? | What are the different forms of attack that can happen to a system/network?<br>How is a man in the middle attack done?<br>How can we prevent the most common forms of attack? | What is the purpose of an operating system?<br>How does the operating system manage memory and multitasking?<br>How does the operating system manage peripheral devices?<br>What is utility software?<br>List the different types of utility software and what they do. | What are the different impacts of digital technology?<br>What is the difference between open source and proprietary software?<br>What are the different legislations that are relevant to computer science?<br>What are the main points of the computer misuse act? | How do we use the exam reference language to answer exam questions?<br>What is the difference between pseudocode and flowcharts?<br>How do we design a program?<br>How do we write a program?<br>How do we test a program?<br>How do we refine a program? |

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| | | List the common protocols and what they do<br>What do the different layers do? | | | | |
| **Assessment** | End of Memory and storage assessment (will also include prior modules) | End of Computer Networks, connections and protocols assessment (will also include prior modules) | End of Network Security assessment (will also include prior modules) | End of Systems software assessment (will also include prior modules) | End of Ethical, legal, cultural and environmental impacts of digital technology assessment (will also include prior modules) | End of Component 1 – Computer Systems assessment<br>Practical programming assessment |