Curriculum Map: Year 10 Computer Science

Topic	Key Knowledge *What will all students KNOW by the end of the topic?*	Key Skills *What key skills will be learnt/developed by the end of the topic? What will all students be able to DO by the end of the topic?*	Assessment Opportunities *What are the key pieces of assessment? How will students be assessed?*
Systems architecture and Storage	**Students will be able to:** Understand what the CPU of a computer does. Know what major components of the CPU are. Know the stages of the fetch, execute cycle. Understand the need for secondary storage. Know the common types of storage. Know the characteristics of storage devices. Understand the suitability of storage devices for given applications. Understand the advantages and disadvantages of devices based on their characteristics Know what is meant by the term "embedded system." Know several examples of embedded systems. Know what a microcontroller is	**Students will:** Begin to program in Python following the Try, Investigate, Make and Evaluate challenges and Defold 2D games tutorials.	**Students will be assessed by:** SLR 1 Student workbook SLR 1 End of topic test
Systems Software	**Students will be able to:** Understand the need for operating systems. Understand the functions of operating systems. Understand how the operating system handles the management of the processor(s). Understand how the operating system handles. the management of the memory. Understand how scheduling works.	**Students will:** Continue programming in Python following the Try, Investigate, Make and Evaluate challenges and Defold 2D games tutorials.	**Students will be assessed by:** SLR 2 Student workbook SLR 2 End-of-topic test SLR 3 Student workbook – part 1 SLR 3 End-of-topic test – part 1

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	Understand what a device driver is. Understand the need for virtual memory. Understand how the operating system handles file management. Understand how the operating system handles user permissions. Understand how the operating system handles user management. Understand anti-malware utilities. Understand defragmentation utilities. Understand data compression utilities. Understand backup utilities.		
Data Representation	**Students will be able to:** Understand why computers systems use binary to store data. Understand that computers use binary to represent many different types of data and instructions. Understand number bases: Denary (base 10), Binary (base 2), Hexadecimal (base 16) Explain why hexadecimal is often used in computer science. Understand how binary can be used to represent whole numbers. Under how hexadecimal can be used to represent whole numbers. Understand how Two's complement can be used to represent both positive and negative integers in binary. Understand what binary shift achieves and their limitations.	**Students will:** Continue programming in Python following the Try, Investigate, Make and Evaluate challenges and Defold 2D games tutorials. Know how to convert denary whole numbers (0 to 255 and -128 to +127) into 8-bit binary numbers and vice versa. Know how to convert binary whole numbers (0 to 255 and -128 to +127) into hexadecimal. Know how to convert denary whole numbers (0 to 255 and -128 to +127) into hexadecimal. Know how to add together up to two 8-bit binary numbers. Know how to perform a left and right logical binary shift and how to perform a left and right arithmetic binary shift.	**Students will be assessed by:** SLR 3 Student workbook – part 2 SLR 3 End-of-topic test – part 2

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	Understand what is meant by the terms bit, nibble, byte, kibibyte, mebibyte, gibibyte and tebibyte.	Know how to represent the capacity of data storage using these units and be able to convert between them.	
Computer Networks, protocols and layers	**Students will be able to:** Know what is meant by a 'computer network'. Know the different types of networks: LAN and WAN. Understand the advantages / disadvantages of networking. Understand what the internet is. Understand what IP address is. Understand what routers are and why they are important. Understand what packets are and what sort of information packet headers contain. Understand that Ethernet is a wired method of connection. Understand that Wi-Fi, Bluetooth, RFID/NFC and ZigBee are wireless methods of connection. Understand the benefits and drawbacks of wired versus wireless connections. Know what factors affect the performance of networks. Understand the importance of 9 common protocols and what they are used for. Know why protocols are layered. Understand the four layers that make up the TCP/IP protocol model. Know what star, bus, mesh networks are.	**Students will:** Continue programming in Python following the Try, Investigate, Make and Evaluate challenges and Defold 2D games tutorials. Be able to recommend a connection type for a given scenario. Understand how to construct expressions involving file size, transmission speed and time.	**Students will be assessed by:** SLR 4 Student workbook SLR 4 End-of-topic test

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Network and cybersecurity	**Students will be able to:** Describe the main purpose of network security. Explain what penetration testing is and what it is used for. Explain the difference between black-box and white-box penetration testing. Understand what an “ethical hacker” is. Define the term malware and describe what malware is and how it can be protected against. Describe the following form of malware: Virus, Worms, Trojans, Ransomware, Keylogger. Describe what social engineering is and how it can be protected against. Explain the following form of social engineering: Pretexting, Phishing. Describe what social engineering is and how it can be protected against. Explain the following form of social engineering: Baiting, Quid pro quo Understand and be able to explain a range of security measures, including Anti-malware, Encryption, Acceptable use policies, Backup and recovery procedures	**Students will:** Continue programming in Python following the Try, Investigate, Make and Evaluate challenges and Defold 2D games tutorials.	**Students will be assessed by:** SLR 5 Student workbook SLR 5 End-of-topic test

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Ethical, legal and environmental issues	**Students will be able to:** Understand the environmental impact of computers in terms of: Manufacturing, Use, Disposal, Recycling Know a range of things to consider beyond development when implementing new computer systems. Understand at least one ethical issue of digital technology. Know the principles of the Acts of Parliament: Data Protection Act 2018, Computer Misuse Act 1990 Privacy and Electronics Communication Regulation 2003 Understand some of the legal impacts of computer science and its related technologies. Understand the difference between: Artificial intelligence, Machine learning, Robotics Understand the concepts of Accountability, Safety, Algorithmic bias and Legal liability in relation to the above topics. Understand the term intellectual property. Understand the following methods of protecting intellectual property: Copyright, Patents, Licensing Trademarks Understand the difference between open source and proprietary software	**Students will:** Continue programming in Python following the Try, Investigate, Make and Evaluate challenges and Defold 2D games tutorials.	**Students will be assessed by:** LR 6 Student workbook SLR 6 End-of-topic test
Text adventure game	Dedicated lessons for students to attempt an extended text-based space adventure game called Telium to consolidate coding completed so far.		
Programming skills	**Programming tasks include the creation and use of:** Functions, Parameters, Variables, Constants, Concatenation, selection (If, Else, Switch), number data types inc., Integers & decimals, Casting, Random, string manipulation, iteration such as For, Foreach in, Step, While, input, Sanitisation & validation, arrays & lists, use of serial files, try, catch, strip etc.		