COMPUTER SCIENCE

YEAR 10

AUTUMN 1

1.1 Systems Architecture
By the end of this topic you will have studied: the purpose of the CPU, the fetch-execute cycle, common CPU components and their function, ALU, CU, Cache, Registers, Von Neumann architecture and MAR, MDR, Program Counter, and Accumulator. You will also have studied: how common characteristics affect their performance: Clock speed, cache size, number of cores as well as the purpose, characteristics and examples of embedded systems.

Prior Learning
Students will have been introduced to the basics of how computer work and how things are saved as part of computer and binary topics.

AUTUMN 2

1.2 Memory and storage
By the end of this topics you will have studied: the need for primary and secondary 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 and how to convert positive denary whole numbers to binary (up to and including 8 bits) and vice versa. You will explore how to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur; how to convert denary whole numbers into 2-digit hexadecimal numbers and vice versa and how to convert binary integers to their hexadecimal equivalents and vice versa. The relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g.: ASCII, Unicode

Prior Learning
Students will have been introduced at KS3 to what storage is and how memory works this will be a more advanced understanding.

SPRING 1

1.3 Computer networks, connections and Protocols
By the end of this topic you will have studied: types of network, LAN, WAN and factors that affect the performance of networks. The different roles of computers in a client-server and peer-to-peer network; the hardware needed to connect stand-alone computers to a LAN; wireless access points, routers, switches, NIC, transmission media. The Internet as a worldwide collection of computer networks: DNS, Hosting, The Cloud, Web servers and clients. Star and Mesh network topologies. Modes of connection: Wired (Ethernet), Wireless (Wi-Fi, Bluetooth). Encryption. IP addressing and MAC addressing. Standards. Common protocols including: TCP/IP, HTTP, HTTPS, FTP, POP, IMAP, SMTP and the concept of layers.

Prior Learning
Students will have been introduced at KS3 the basics of computer networking, LAN/WAN and different network topologies.

SPRING 2

1.4 Network security Forms of attack
By the end of this topics you will have studied: malware, social engineering (e.g. phishing, people as the 'weak point'), brute-force attacks, and denial of service attacks, data interception and theft, and the concept of SQL injection. You will explore common prevention methods: penetration testing, anti-malware software, firewalls, user access levels, passwords, encryption, physical security.

Prior Learning
Students will been introduced to cyber security in Y9 and will already have a good understanding of different malware and measure to protect a computer system.

SUMMER 1

1.5 Systems software
By the end of this topics you will have studied: the purpose and functionality of operating systems, user interface, memory management and multitasking, peripheral management and drivers, user management, file management. You will also explore the purpose and functionality of utility software, utility system software, encryption software, defragmentation, data compression.

Prior Learning
Students will had a basic introduction at KS3 at systems software and the role an operating system has on a computer.

SUMMER 2

1.6 Ethical, legal, cultural and environmental
By the end of this topic you will have studied the impacts of digital technology, Impacts of digital technology on wider society including: ethical issues, legal issues, cultural issues, environmental issues, privacy issues. You will explore the legislation relevant to Computer Science: the Data Protection Act 2018, Computer Misuse Act 1990, Copyright Designs and Patents Act 1998 Software licences (i.e. open source and proprietary).

Programming skills building – project

Prior Learning
Students will have looked at the ethical and environmental issues surrounding computing at KS3. For the last term students will be undertaking a text based game programming project to build programming skills ready for paper 2 in Y11.

CAREERS LINKS

Systems architect
IT technician.
Network administrator.
Network Manager.
ICT teacher.
Programmer.

CHARACTER LINKS

Performance virtues of determination, motivation and perseverance are fostered through trial and error activities when accessing new information and skill.
Critical thinking and judgement traits (intellectual virtues) are cultivated in all units of work.

KEY ASSESSMENT DATES

Students complete an end of unit test for each unit studied, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6. The department also set separate mock assessments in accordance with the school assessment calendar.