All Saints' Academy Computer Science Department KS4 Curriculum Overview - September 2023_4

Aims and Learning Outcomes

OCR's GCSE (9–1) in Computer Science will encourage students to:

- Understand and apply the fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation
- Analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs
- Think creatively, innovatively, analytically, logically and critically
- Understand the components that make up digital systems, and how they communicate with one another and with other systems
- Understand the impacts of digital technology to the individual and to wider society
- Apply mathematical skills relevant to Computer Science.

Assessment Overview	
Written paper: 1 hour and 30 minutes **50%** of total GCSE 80 marks This is a non-calculator paper.	**Written paper: 1 hour and 30 minutes** **50%** of total GCSE 80 marks This is a non-calculator paper. This paper has two sections: Section A and Section B. Students must answer both sections

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Cycle	Year 10	Enrichment
Careers	Software Developer/Engineer, Data Scientist, Cybersecurity Analyst, Web Developer	
1	**Systems Architecture** • The purpose of the CPU: The fetch-execute cycle • Common CPU components and their function: ALU (Arithmetic Logic Unit) CU (Control Unit) Cache, Registers • Von Neumann architecture: MAR (Memory Address Register), MDR (Memory Data Register), Program Counter, Accumulator, Clock speed, Cache size, Number of cores • The purpose and characteristics of embedded systems **Memory and Storage** • The need for primary storage: RAM & ROM • The need for secondary storage: Optical, Magnetic, Solid state • Suitable storage devices and storage media for a given application • 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 • Data Storage, including Characters, Images, Sound • Compression Types – Lossy and Lossless	Open Source – Raspberry pi configuration
Careers	Systems Analyst, Network Administrator, Artificial Intelligence (AI) Engineer, UX/UI Designer, IT Project Manager, Database Administrator, Computer Programmer, IT Consultant & Game Developer	
2	**Network and Topologies** • Types of networks:: LAN (Local Area Network), WAN (Wide Area Network) • Factors that affect the performance of networks • The different roles of computers in a client-server and a peer-to-peer network • Hardware in Networking: Wireless access points, Routers o Switches, NIC (Network Interface Controller/Card), Transmission media • Connecting Networks: DNS (Domain Name Server), 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: TCP/IP (Transmission Control Protocol/Internet Protocol), HTTP (Hyper Text Transfer Protocol) ,. , HTTPS (Hyper Text Transfer Protocol Secure), FTP (File Transfer Protocol), POP (Post Office Protocol), IMAP (Internet Message Access Protocol), SMTP (Simple Mail Transfer Protocol) **Network Security** • Threats posed to devices/systems, Knowledge/principles of each form of attack including How the attack is used & The purpose of the attack • Common prevention methods: Penetration testing, Anti-malware software, Firewalls, User access levels, Passwords, Encryption, Physical security	AI projects SQL Injection Testing Mobile Game Development

Careers	Digital Marketing Specialist, Cloud Architect, Mobile App Developer, Computer Systems Analyst, Information Security Analyst, IT Support Specialist & Technology Teacher/Instructor	
3	**System Software** The purpose and functionality of operating systems: • User interface o Memory management and multitasking • Peripheral management and drivers • User management o File management What each function of an operating system does Features of a user interface Memory management • e.g., the transfer of data between memory, and how this allows for multitasking ü Understand that: Data is transferred between devices and the processor • This process needs to be managed ü User management functions • Allocation of an account • Access rights • Security, etc. File management, and the key features, e.g. Naming, Allocating to folders, Moving files, Saving, etc. The purpose and functionality of utility software ¨ Utility system software: o Encryption software o Defragmentation o Data compression **Ethical, legal, cultural and environmental impact** Impacts of digital technology on wider society including Ethical issues, Legal issues, Cultural issues, Environmental issues, Privacy issues Legislation relevant to Computer Science: The Data Protection Act 2018, Computer Misuse Act 1990, Copyright Designs and Patents Act 1988, Software licences (i.e. open source and proprietary)	Grows event – SGS and Glocs Col