

Curriculum Narrative



Subject: Computer Science	Year: KS4 (OCR J277)	Author: N. Ogu
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Key Knowledge <i>Students will know</i>	Key Skills <i>Students will be able to</i>
<u>Key Threshold Concepts:</u> GCSE Computer Science deepens students' understanding of how digital systems work and how computational methods solve problems. Students will know: - How computer systems are designed and operated, including CPU architecture, registers, FDE cycle and performance factors. - How memory and storage technologies work, including RAM, ROM, virtual memory and secondary storage. - How networks operate, including LAN/WAN structure, topologies, hardware, protocols and network security methods. - How computers represent data using binary, hexadecimal, characters, images, sound and compression techniques. - How cybersecurity threats arise and how systems and users can be protected. - How algorithms solve problems using abstraction, decomposition, flowcharts, pseudocode and formal reasoning. - How Python programs are structured using sequence, selection, iteration, subroutines, lists, string handling and file handling. - How SQL is used to store, retrieve and filter data. - How technology impacts society, law, privacy, culture and the environment.	<u>Subject Skills:</u> By the end of KS4, students should be able to: - Write structured Python programs using GCSE-level constructs, including arrays, subprograms, records and file handling. - Trace, debug and evaluate algorithms using dry runs, flowcharts and pseudocode. - Use records to store data and write basic SQL to search for data. - Explain and compare network models, cybersecurity measures and system performance factors. - Analyse data-representation problems and perform conversions accurately. - Evaluate the ethical, legal, cultural and environmental impacts of technology. - Respond confidently to exam-style questions across both papers.

<u>Subject Specific Knowledge and Sequencing:</u>	<u>Prerequisites and Spiral Teaching:</u>
2 lessons each week (Theory + Programming) Year 10 - Core knowledge and programming foundations Python fundamentals: sequence, variables, input/output, data types and casting.	- KS4 builds directly on KS3 knowledge of binary, flowcharts, algorithms, Python basics, networks and problem-solving. - Retrieval practice (including SmartRevise) embeds core knowledge at the start of every lesson.

• Selection, iteration, string handling and subprograms. • Lists (arrays) and basic data structures. • 1.1 Systems architecture (CPU, FDE cycle, performance); 1.2 memory and storage. • 1.2 Data representation (binary, hex, characters, images, sound, compression). • 2.1 Algorithms (searching and sorting); 2.3 robust and defensive design; 2.4 Boolean logic; 2.5 languages and IDEs. • Regular topic tests and mid-year assessments (Paper 1 and Paper 2). Year 11 — Systems, networks, advanced programming and exam preparation • 1.3 Networks, connections and protocols; 1.4 network security. • 1.5 Systems software (operating systems and utility software); 1.6 ethical, legal, cultural and environmental impacts. • 2.2 Advanced programming: arrays, subprograms, records and file handling. • Records to store data and SQL (SELECT, FROM, WHERE) to search data. • Consolidation of the full algorithms unit and extended, GCSE-style coding challenges. • Structured revision (Paper 1, then Paper 2, then mixed papers), mocks and pre-exam intervention.	• Concepts spiral across the two years (e.g., selection to defensive design; binary to data representation; networks to security). • Programming and theory are taught in parallel to maintain fluency and reduce cognitive load. • Misconceptions are addressed early through low-stakes quizzes, modelling and spaced practice. <u>Cross-Curricular Knowledge Links</u> • Maths: logic, arithmetic, sequences, functions, data, algorithms • English: structured writing, clarity, justification, argumentation • DT: systems thinking, design cycles, inputs/outputs • PSHE: digital citizenship, online behaviour, data protection • Business: data modelling, computational workflows
Reading Lists / Sources / Reading around the subject recommendations: • OCR J277 specification and ExamBuilder. • NCCE GCSE Computer Science resources. • Craig'n'Dave videos and SmartRevise. • BBC Bitesize GCSE Computer Science; • W3Schools (GCSE-friendly Python and SQL). • NCSC CyberFirst; Hello World magazine (Raspberry Pi Foundation).	

