



Subject: Computer Science	Year: KS4	Author: N. Ogu
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Key Knowledge Students will know	Key Skills Students will be able to
<p style="text-align: center;"><u>Key Threshold Concepts:</u></p> <p>GCSE Computer Science deepens students' understanding of how digital systems work and how computational methods solve problems.</p> <p>Students will know:</p> <ul style="list-style-type: none"> • 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. 	<p style="text-align: center;"><u>Subject Skills:</u></p> <p>By the end of KS4, students should be able to:</p> <ul style="list-style-type: none"> • Write structured Python programs using GCSE-level constructs. • Trace, debug and evaluate algorithms using dry runs, flowcharts and pseudocode. • Apply SQL queries to retrieve, filter and sort data. • Explain and compare network models, cybersecurity measures and system performance factors. • Analyse data representation problems and perform conversions accurately. • Evaluate the ethical, legal, environmental and societal impacts of technology. • Respond confidently to exam-style questions across both papers.

<p style="text-align: center;"><u>Subject Specific Knowledge and Sequencing:</u></p> <p>2 lessons each week cycle</p> <p>Year 10 – Core Knowledge & Programming Foundations</p> <ul style="list-style-type: none"> • Python fundamentals: sequence, variables, input/output • Selection & iteration • String handling 	<p style="text-align: center;"><u>Prerequisites and Spiral Teaching:</u></p> <ul style="list-style-type: none"> • KS4 builds directly on KS3 knowledge of binary, flowcharts, algorithms, Python basics, networks and problem-solving. • Retrieval practice embeds core knowledge at the start of every lesson. • Concepts spiral across the two years (e.g., selection to defensive design; binary to data representation; networks to security).
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- Subroutines
 - Sorting algorithms
 - Lists and data structures
 - File handling
 - CPU, memory, storage
 - Networks & topologies
 - Defensive design & testing
 - Operating systems & utility software
 - Regular topic tests and mid-year assessments (Paper 1 & Paper 2)
- Year 11 – Advanced Programming, Data, and Exam Preparation**
- SQL (SELECT, WHERE, ORDER BY)
 - Data representation (binary, hex, images, sound, compression)
 - Network security, protocols & the TCP/IP model
 - Threats, vulnerabilities, encryption and countermeasures
 - Ethical, legal, cultural and environmental impacts
 - Full algorithm unit consolidation
 - Extended programming tasks & GCSE-style coding challenges
 - Structured revision: Paper 1 to Paper 2 then Mixed papers
 - Final mock and pre-exam intervention

- 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.

- Cross-Curricular Knowledge Links**
- **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:

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| <ul style="list-style-type: none"> • OCR J277 Specification & ExamBuilder • NCCE GCSE Computer Science Resources • Craig'n'Dave Videos & Smart Revise • Python Tutor (visual code tracing) | <ul style="list-style-type: none"> • W3Schools Python (GCSE-friendly sections) • BBC Bitesize GCSE Computer Science • NCSC CyberFirst • Hello World Magazine (Raspberry Pi Foundation) |
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