St Cuthbert Mayne School Curriculum Map 2023-2024

Year 10

Department: COMPUTING

Key Stage 4 Curriculum Summary
Exam Board: OCR
Course title: J277 Computer Science

This GCSE consists of two papers, one focusing on computer systems and one with a focus on programming, computational thinking, and algorithms. Both papers have identical weighting and mark allocations. 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. They will analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs.

Autumn Term

Topic/Unit	Data Storage	Binary and Data Representation	Programming Fundamentals	Python Programming - The Basics
Knowledge (Content covered)	This unit teaches students about the different types of storage computers use. Primary storage ● RAM ● ROM Secondary storage ● Magnetic Drives ● Solid State Drives ● Optical Drives	This unit teaches students how binary is used to represent data. Introduction to the Binary Number System & Binary Units Hexadecimal Representing Images in a Computer System Representing Characters in a Computer System Representing Sound in Computer Systems Compression- lossy and lossless	This unit teaches students the essential programming skills needed for GCSE Computer Science. ● Data types ● Casting to change a variable type ● constants and variables ● Input, output and assignment statements ● Common arithmetic operators ● String manipulation ● programming constructs - sequence, selection and iteration ● Boolean operators ● one and two dimensional arrays ● SQL to search for data ● Sub-programs ● file-handling operations.	This unit works alongside the Programming Fundamentals unit as the practical element. ● Outputs, Inputs and Variables ● Selection (IF-ELSE) ● WHILE Loops ● 1D Lists ● Data Types and Maths ● FOR Loops ● Validation and Error Handling ● 2D Lists
Skills	Computer Science Problem solving			Programing Skills
Assessment	Lesson Review Quizzes (AfL) and Final Topic Assessment (Summative)			
Gatsby 4 (Linking curriculum learning to careers)	Data scientist. Software tester. Web developer. Systems analyst. Business analyst. Product manager. Network architect. Software engineer. Teacher			

Spring Term

Topic/Unit	System Architecture	Boolean Logic	Algorithms	Python Programming
Knowledge (Content covered)	**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	● Simple logic diagrams using the operations AND, OR and NOT ● Truth tables ● Combining Boolean operators using AND, OR and NOT ● Applying logical operators in truth tables to solve problems	**Principles of computational thinking** ● Abstraction ● Decomposition ● Algorithmic Thinking. **Identify the inputs, processes, and outputs for a problem** **Structure diagrams** **Create, interpret, correct, complete, and refine algorithms using:** ● Pseudocode ● Flowcharts ● Reference language/high-level programming language **Identify common errors** **Trace tables** **Standard searching algorithms:** ● Binary search ● Linear search **Standard sorting algorithms:** ● Bubble sort ● Merge sort ● Insertion sort	This unit works alongside the Programming Fundamentals unit as the practical element. ● Outputs, Inputs and Variables ● Selection (IF-ELSE) ● WHILE Loops ● 1D Lists ● Data Types and Maths ● FOR Loops ● Validation and Error Handling ● 2D Lists
Skills	Computer Science Problem solving			Programing Skills
Assessment	Lesson Review Quizzes (AfL) and Final Topic Assessment (Summative)			
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Summer Term

Topic/Unit	Network Security	Systems Software	Computer Networks, connections and protocols	Ethical, Legal, Cultural and Environmental issues
Knowledge (Content covered)	**Forms of attack** ● Malware ● Social engineering, e.g. phishing, people as the 'weak point' ● Brute-force attacks ● Denial of service attacks ● Data interception and theft ● The concept of SQL injection **Common prevention methods:** ● Penetration Testing ● Anti-malware software ● Firewalls ● User access levels ● Passwords ● Encryption ● Physical Security	**The purpose and functionality of operating systems:** ● User interface ● Memory management and ● multitasking ● Peripheral management and ● drivers ● User management ● File management **The purpose and functionality of utility software** ● Encryption software ● Defragmentation ● Data Compression	**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 **The hardware needed to connect stand-alone computers into a Local Area Network:** ● Wireless access points ● Routers ● Switches ● NIC (Network Interface Controller/Card ● Transmission media The Internet as a worldwide collection of computer networks: ● DNS (Domain Name Server) ● Hosting ● The Cloud ● Webservers and Clients **Star and Mesh network topologies**	**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)
Skills	Computer Science Problem solving			
Assessment	Lesson Review Quizzes (AfL) and Final Topic Assessment (Summative)			
Gatsby 4 (Linking curriculum learning to careers)	Data scientist. Software tester. Web developer. Systems analyst. Business analyst. Product manager. Network architect. Software engineer. Teacher			