

Curriculum Intent 2023/24

Subject: Computer Science

	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
HT1 6wk	1. Getting started (6) Knowledge -Know the processes for logging into the school's network -Know the processes for sending and receiving emails -Understand how to save, rename and organise files -Understand how to access files stored in the cloud -Understand key principles of Internet safety -Understand the qualities of vector and bitmap graphics Application -Log into the school's network proficiently -Send and receive emails successfully, using appropriate language and content -Organise files and folders to facilitate ease of access and use -Demonstrate safe practices when using the Internet	Theory: E Safety (1) Knowledge Understand the dangers that are online and how to avoid them. Application Outline the dangers online and how to avoid them. Computing Components (2) Knowledge Understand the functions of a range of input and output devices. Understand the different types of memory and storage and their use. Application Identify the correct input and output devices to us in a range of different situations. Programming: Python Sequence (3) Knowledge Understand a range of basic programming constructs in Python. Know how to print to the screen, perform calculations, take inputs and store them in suitably named variables.	L1. Careers in CS L2. Part 1 CS theory L3. Part 1CS coding. L4. Part 2 CS theory L5. Part2 CS coding L6. Intro to BTEC IT L7. Jobs market CS	Section 1: System Architecture (6) Section 7: programming – sequence & selection (6) Section 1. Knowledge Ram, Rom, CPU Registers, CPU performance, storage mediums, embedded systems. Application Be able to state the differences between RAM and ROM Choose suitable storage devices and storage media for a given application. Describe the characteristics of CPUs that affect their performance. Understand the purpose and characteristics of embedded systems. Section 7. Knowledge Data types, constants & variables, Random numbers, Boolean, constructs sequence & selection. Application Understand and use data types. Declare and use constants and variables. Use input, output and assignment statements. Use random number generation. Write algorithms in pseudocode involving sequences.	Section 4: Security & System software (6) Section 6: Algorithms 6.4-6.6(4) Section 7: programming- Iteration & Arrays (2) Section 4. Knowledge Data threats, anti-malware software, passwords, physical security, prevention of vulnerabilities functions User interface. Application: Understand forms of attack and threats. Identify and understand the prevention of vulnerabilities. Explain the functions of User interface Section 6: Knowledge Write algorithms in pseudocode, algorithm purpose & errors, trace tables, algorithm output. Application. Write algorithms in pseudocode involving sequence, selection and iteration Understand the purpose of a given algorithm and how an algorithm works Understand how to identify and correct errors in algorithms Create and use of trace tables to follow an algorithm	Section 11(ASA): Programming techniques(2x6=12)(Project preparation for proficiency in programming) Section 3(KGR): Software development(6) (Done to prepare for project)(not to be done in this term) technologies(6) (Done to prepare for project) Section 11(ASA): Knowledge IDE to develop/debug a program, and the fundamentals of programming. Application: Use an IDE to develop and debug a program. Understand iteration, random number generation, subroutines, arrays, recursion. Define the OOP terms class, object, method, attribute, inheritance, encapsulation and polymorphism. Section 3(KGR): Knowledge systems analysis methods, algorithm design, programming paradigms, assembly language object-oriented programming. Application. Understand systems development models. Name and describe different types of testing. Write pseudocode algorithms. use a trace table to trace through an algorithm. Define the terms object, class, method, attribute, inheritance. Understand the LMC instruction set.	Section 5(KGR): Network and web technologies(Chp 24-27)(4) Section 7(ASA): Data structures(9) Project(KGR): Analysis & Design (8) Project(AVU):Development(12) Knowledge Students should learn how to distinguish key parts of a project so they can break it into smaller computational problems. Next, they will learn how to create a plan to explain how the smaller problems could be solved using algorithms. Students should understand how to do testing for verification and validation. Application Students should implement what they have learned in a real problem. They will start by decomposition, explain key variables in their algorithm that they will suggest as solution and explain how they plan to do testing. Section 5(KGR): Knowledge Learn about LANs , packet switching, network threats, HTML and CSS, web forms and JavaScript & search engines. Application. State the importance of protocols and standards.

	-Be able to create and manipulate images	Application Develop working programs in Python to solve specific problems.			Understand how to determine the correct output of an algorithm for a given set of data Section 7: Knowledge. Iteration & one- and two-dimensional arrays Application. Write algorithms in pseudocode involving iteration Use one- and two-dimensional arrays in the design of solutions to simple problems		Explain the protocols used within the TCP/IP stack. Explain packet switching. Explain the function of a firewall. Create a basic webpage using HTML and some CSS. Use JavaScript to make web form elements interactive and add validation. Describe the PageRank algorithm and factors that influence page ranking Section 7: Knowledge Learn abstract data structures - ilinked lists, graphs, stacks, queues, trees, binary search trees and hash tables. Application. Describe the concept and uses of a queue, stack, graph, tree, binary search tree and hash table. traverse a binary tree. Create a binary search tree. Apply a simple hashing algorithm. Describe and explain how collisions may be handled Project: Knowledge Learn to Analyse & design a computer system. Application. Describe and justify the features that make the problem solvable. Specify and justify the solution requirements Identify and justify measurable success criteria
HT2 6wk	2. Introducing spreadsheets (6) Knowledge -Understand how to write basic formulae in a spreadsheet -Understand the concept of replication and the uses of relative and absolute cell referencing -Understand how to name cells and	Theory: Computing Components (3) Knowledge Understand the functions of a range of input and output devices. Understand the different types of memory and storage and their use. Application	L1. Careers in CS L2. Part 1 CS theory L3. Part 1CS coding. L4. Part 2 CS theory L5. Part2 CS coding L6. Intro to BTEC IT L7. Jobs market CS	Section 2: Data representation (6) Section 6: programming- Iteration (6) Revision(2) Section 2: Knowledge bit, byte, kilobyte, megabyte, gigabyte, converting data, add binary digits, ASCII, Unicode, Sample rate, Bit depth. Application. Define the terms bit, byte, kilobyte, megabyte, gigabyte.	Revision & Exams PPE (6) Section 5: Ethical, Cultural(3) Section 6: programming- Arrays (3) Section 5: Knowledge impacts of digital technology, impact of e-waste, legislation, open source and proprietary software. Application. Discuss the impacts of digital technology on the wider society.	Section 10(ASA): Computational Thinking(6) Section 12(ASA): Algorithms (6) Section 5(KGR): Network and web(6) Section 6(KGR): Data types (6) Project(KGR): Proposal(3) Section 10(ASA): Knowledge abstraction and reality, inputs and outputs. reusable program components, caching, Divide and Conquer algorithm, backtracking, data mining, heuristics, performance modelling, pipelining and visualisation. Application.	Exams (2 weeks) Project(AVU): Analysis & Design (Review) + Development Knowledge Knowledge Areas for improvement after feedback given. Students should understand how to give evidence of their solution when using a programming language. Application

	ranges within a spreadsheet -Understand how to write a range of basic functions including SUM, AVERAGE, MAX, MIN, COUNT and IF -Understand how to use conditional formatting -Understand how to use data in a spreadsheet to create graphs and charts Application -Use a range of basic formulae to manipulate data -Use conditional formatting -Create graphs and charts to represent different types of information	Identify the correct input and output devices to us in a range of different situations. Programming: Python Sequence (3) Knowledge Understand a range of basic programming constructs in Python. Know how to print to the screen, perform calculations, take inputs and store them in suitably named variables. Application Develop working programs in Python to solve specific problems.		Understand that data needs to be converted into a binary format . Add two 8-bit binary integers. Understand the term 'character set'. Understand how a bitmap graphic is made up of individual pixels. Explain how each pixel is represented in binary. Section 6: Knowledge Iteration, FOR and WHILE loops Application: Understand and use iteration in an algorithm. Write algorithms in pseudocode involving sequence, selection and iteration.	Discuss the impact of e-waste. Discuss the impact of digital technology regarding legal issues and privacy issues. Describe legislation relevant to Computer Science. Describe the features of open source and proprietary software licences. Section 6: Knowledge Arrays (lists in Python) Application: Use one- and two-dimensional arrays in the design of solutions to simple problems.	Determine the preconditions for devising a solution to a problem. Describe the nature, benefits and drawbacks of caching. Identify the components of a problem and its solution. Determine the order of steps needed to solve a problem. Determine the logical conditions that affect the outcome of a decision. Determine how decisions affect flow through a program. Identify sub-procedures needed to solve a problem. Explain how a Divide and Conquer algorithm works. Explain what is meant by backtracking, data mining, heuristics, performance modelling, pipelining and visualisation. Section 12(ASA): Knowledge bubble sort, insertion sort, merge sort, quick sort, Big-O notation, depth-first and breadth-first graph traversals, Dijkstra's shortest path algorithm and the A* algorithm. Application: Write recursive algorithm to solve a problem. Show the changing contents of a call stack as a recursive routine is executed. Derive the time complexity of an algorithm. Write an algorithm for a binary search. Write an algorithm to merge two lists. Trace through sorting algorithms. Trace depth-first and breadth-first graph traversal algorithms. Section 5(KGR): Knowledge Learn about LANs , packet switching, network threats, HTML and CSS, web forms and JavaScript & search engines. Application: State the importance of protocols and standards. Explain the protocols used within the TCP/IP stack. Explain packet switching. Explain the function of a firewall. Create a basic webpage using HTML and some CSS. Use JavaScript to make web form elements interactive and add validation. Describe the PageRank algorithm and factors that influence page ranking	Acting on feedback and improvements made to project. In some cases, development started. Students will try to implement their plan using a programming language. Section 9(KGR): Legal, moral, ethical and cultural issues(4) Revision(ASA): Section 11 Section 9(KGR): Knowledge Legislation, effect of digital technologies on society, effect of AI Application: Discuss the challenges facing legislators in the digital age. Discuss how developments in computer science and the digital technologies have dramatically altered the shape of communications and information flows in societies. Discuss how ethical frameworks can provide answers to challenges such as those presented by programming autonomous machines. Describe examples of different cultural responses to design issues such as layout and colour, and explain the need for a range of character sets and how these can be encoded. Revision(ASA): Section 11 Topics of concern to be revised. Revision tests to be given to students.
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HT3 6wk	3. Computing: past, present and future Knowledge -Know about important figures in the development of computing -Understand Moore's Law and how computer technology has developed and changed over time -Know how to format documents -Understand the importance of aesthetics when presenting information and have an awareness of factors that can inhibit this. Application -Present knowledge about computing using word processing and presentation software -Use formatting appropriately -Ensure that work has been proofread and that spelling and grammar has been checked	Theory: Computing Components (1) Knowledge Understand the functions of a range of input and output devices. Understand the different types of memory and storage and their use. Application Identify the correct input and output devices to us in a range of different situations. Algorithms (2) Knowledge Understand the concepts of abstraction, decomposition, pattern recognition and algorithms. Know how to read and develop flow diagrams. Application Use the principles of abstraction and decomposition to produce algorithms to solve a range of problems. Write flow diagrams to sequence the steps		Exams MYE(2 weeks) Section 3: Wired & wireless networks (4) Section 6: Algorithms (4)	Section 6: programming – procedures & functions(6) Programming: Logic & languages(6)	Section 12(ASA): Algorithms (8) Section 8(KGR): Boolean Algebra(4) Project(KGR): Analysis(4) Revision for MYE Exam MYE(2 weeks)	Revision-ASA, KGR Project(AVU): Development Knowledge: Students will have to understand how to do testing in an iterative development process. Application Later they need to test it during coding and when all smaller pieces of their solution is connected as a whole project.

		involved in completing a task. <u>Programming: Python</u> <u>Selection (3)</u> <u>Knowledge:</u> Understand how to use selection in Python. Understand how to program condition-controlled loops in Python. <u>Application</u> Develop working programs in Python to solve a range of problems.					
HT4 6wk	4. Programming in Scratch (6) <u>Knowledge</u> Understand the concepts of sequencing, selection and iteration <u>Application</u> Develop working programs in Scratch	<u>Theory: Algorithms (3)</u> <u>Knowledge</u> Understand the concepts of abstraction, decomposition, pattern recognition and algorithms. Know how to read and develop flow diagrams. <u>Application</u> Use the principles of abstraction and decomposition to produce algorithms to solve a range of problems. Write flow diagrams to sequence the steps involved in completing a task. <u>Programming: Python</u> <u>Selection (3)</u> <u>Knowledge:</u> Understand how to use selection in Python. Understand how to program condition-controlled loops in Python. <u>Application</u> Develop working programs in Python		<u>Section 3:</u> Wired & wireless networks (3) <u>Section 4:</u> System software and security (3) <u>Section 6:</u> Algorithms (2) <u>Section 7:</u> programming-Iteration & Arrays (4)	<u>Programming:</u> Records & files.(4) <u>Revision:</u> exam papers <u>Programming:</u> practice writing of programmes	<u>Section 1(ASA):</u> Computer Components (8) <u>Section 2(ASA):</u> Software systems(2) <u>Section 8(KGR):</u> Boolean Algebra(4) <u>Project(KGR):</u> Analysis(2) <u>Project(KGR):</u> Design(4) Exam Review	Revision-ASA, KGR <u>Project(AVU):</u> Evaluation

		to solve a range of problems.					
HT5 6wk	5. Computing components (6) Knowledge -Know about and understand the function of a range of input and output devices -Know about and understand different types of memory and storage and their use	Theory: Internet safety, cyber security and encryption (3) Knowledge: Understand a range of malware and the effects they have. Know what precautions to take to maintain safety online. Understand the role of encryption in maintaining safety online. Know about a range of ciphers. Application: Demonstrate safe practices when using the internet. Use a range of ciphers to encrypt and decrypt text. Programming: Binary and computer logic (3) Knowledge: Understand binary and why it is used in computing. Know how to convert between denary and binary. Understand how binary is used to encode text and images. Understand the concept of AND, OR and NOT gates and their use in computer programs. Application: Carry out binary/denary conversions. Encode and decode text and images in binary.		Exams EoY(2 weeks) Section 4: System software and security (1) Section 5: Ethical, legal, environmental (2) Section 7: programming- Iteration & Arrays (4)	Revision: exam papers- Targeted questions	Section 2(ASA): Software systems(4) Section 4(ASA): Exchanging Data(6) Section 8(KGR): Boolean Algebra(2) Project(KGR): Analysis(2) Project(KGR): Design(6) Revision	Revision-ASA, KGR, AVU

HT6 6wk	Theory: Cybersecurity (3)	Theory: Internet safety, cyber security and encryption (3) Knowledge: Understand a range of malware and the effects they have. Know what precautions to take to maintain safety online. Understand the role of encryption in maintaining safety online. Know about a range of ciphers. Application: Demonstrate safe practices when using the internet. Use a range of ciphers to encrypt and decrypt text. Programming: Binary and computer logic (3) Knowledge: Understand binary and why it is used in computing. Know how to convert between denary and binary. Understand how binary is used to encode text and images. Understand the concept of AND, OR and NOT gates and their use in computer programs. Application: Carry out binary/denary conversions. Encode and decode text and images in binary.		Section 5: Ethical, legal, environmental (5) Section 7: programming – procedures & functions(6)		Exams EoY (2 weeks) Section 4(ASA): Exchanging Data(10) Project(KGR): Development(10)	
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