

Component 1		
Approximate teaching time	Topic	Sub topic
5	1.1.1 Architecture of the CPU	<ul style="list-style-type: none"> <input type="checkbox"/> the purpose of the CPU <ul style="list-style-type: none"> o the fetch-execute cycle <input type="checkbox"/> common CPU components and their function: <ul style="list-style-type: none"> o ALU (Arithmetic Logic Unit) o CU (Control Unit) o Cache o Registers <input type="checkbox"/> Von Neumann architecture: <ul style="list-style-type: none"> o MAR (Memory Address Register) o MDR (Memory Data Register) o Program Counter o Accumulator
2	1.1.2 CPU Performance	<ul style="list-style-type: none"> <input type="checkbox"/> how common characteristics of CPUs affect their performance: <ul style="list-style-type: none"> o Clock speed o Cache size o Number of Cores
2	1.1.3 Embedded systems	<ul style="list-style-type: none"> <input type="checkbox"/> The purpose and characteristics of embedded systems <input type="checkbox"/> Examples of embedded systems
2	1.2.1 Primary storage (Memory)	<ul style="list-style-type: none"> <input type="checkbox"/> The need for primary storage <input type="checkbox"/> The difference between RAM and ROM <input type="checkbox"/> The purpose of ROM in a computer system <input type="checkbox"/> The purpose of RAM in a computer system <input type="checkbox"/> Virtual memory
5	1.2.2 Secondary storage	<ul style="list-style-type: none"> <input type="checkbox"/> The need for secondary storage <input type="checkbox"/> Common types of storage: <ul style="list-style-type: none"> o Optical o Magnetic o Solid state <input type="checkbox"/> Suitable storage devices and storage media for a given application <input type="checkbox"/> The advantages and disadvantages of different storage devices and storage media relating to these characteristics: <ul style="list-style-type: none"> o Capacity o Speed o Portability o Durability o Reliability o Cost
1	1.2.3 Units	<ul style="list-style-type: none"> <input type="checkbox"/> The units of data storage: <ul style="list-style-type: none"> o Bit o Nibble (4 bits) o Byte (8 bits) o Kilobyte (1000 bytes or 1 KB) o Megabyte (1,000 KB) o Gigabyte (1,000 MB) o Terabyte (1,000 GB) o Petabyte (1,000 TB) <input type="checkbox"/> How data needs to be converted into a binary format to be processed by a computer. <input type="checkbox"/> Data capacity and calculation of data capacity requirements
11	1.2.4 Data storage	<ul style="list-style-type: none"> Numbers <input type="checkbox"/> How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa <input type="checkbox"/> How to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur <input type="checkbox"/> How to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa <input type="checkbox"/> How to convert from binary to hexadecimal equivalents and vice versa <input type="checkbox"/> Binary shifts Characters <input type="checkbox"/> The use of binary codes to represent characters <input type="checkbox"/> The term 'character-set' <input type="checkbox"/> The relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g.: <ul style="list-style-type: none"> o ASCII o Unicode Images <input type="checkbox"/> How an image is represented as a series of pixels, represented in binary <input type="checkbox"/> Metadata <input type="checkbox"/> The effect of colour depth and resolution on: <ul style="list-style-type: none"> o The quality of the image o The size of an image file Sound <input type="checkbox"/> How sound can be sampled and stored in digital form <input type="checkbox"/> The effect of sample rate, duration and bit depth on: <ul style="list-style-type: none"> o The playback quality o The size of a sound file
2	1.2.5 Compression	<ul style="list-style-type: none"> <input type="checkbox"/> The need for compression <input type="checkbox"/> Types of compression: <ul style="list-style-type: none"> o Lossy o Lossless
8	1.3.1 Networks and topologies	<ul style="list-style-type: none"> <input type="checkbox"/> Types of networks: <ul style="list-style-type: none"> o LAN (Local Area Network) o WAN (Wide Area Network) <input type="checkbox"/> Factors that affect the performance of networks <input type="checkbox"/> The different roles of computers in a client-server and a peer-to-peer network <input type="checkbox"/> The hardware needed to connect stand-alone computers into a Local Area Network: <ul style="list-style-type: none"> o Wireless access points o Routers o Switches o NIC (Network Interface Controller/Card) o Transmission media <input type="checkbox"/> The Internet as a worldwide collection of computer networks: <ul style="list-style-type: none"> o DNS (Domain Name Server) o Hosting o The Cloud o Webservers and Clients <input type="checkbox"/> Star and Mesh network topologies
		<ul style="list-style-type: none"> <input type="checkbox"/> Modes of connection: <ul style="list-style-type: none"> o Wired <ul style="list-style-type: none"> • Ethernet

8	1.3.2 Wired and wireless networks, protocols and layers	<ul style="list-style-type: none"> o Wireless <ul style="list-style-type: none"> • Wi-Fi • Bluetooth <input type="checkbox"/> Encryption <input type="checkbox"/> IP addressing and MAC addressing <input type="checkbox"/> Standards <input type="checkbox"/> Common protocols including: <ul style="list-style-type: none"> o TCP/IP (Transmission Control Protocol/Internet Protocol) o HTTP (Hyper Text Transfer Protocol) o HTTPS (Hyper Text Transfer Protocol Secure) o FTP (File Transfer Protocol) o POP (Post Office Protocol) o IMAP (Internet Message Access Protocol) o SMTP (Simple Mail Transfer Protocol) <input type="checkbox"/> The concept of layers
3	1.4.1 Threats to computer systems and networks	<ul style="list-style-type: none"> <input type="checkbox"/> Forms of attack <ul style="list-style-type: none"> o Malware o Social engineering, e.g. phishing, people as the 'weak point' o Brute-force attacks o Denial of service attacks o Data interception and theft o The concept of SQL injection
2	1.4.2 Identifying and preventing vulnerabilities	<ul style="list-style-type: none"> <input type="checkbox"/> Common prevention methods: <ul style="list-style-type: none"> o Penetration Testing o Anti-malware software o Firewalls o User access levels o Passwords o Encryption o Physical Security
3	1.5.1 Operating systems	<ul style="list-style-type: none"> <input type="checkbox"/> The purpose and functionality of operating systems: <ul style="list-style-type: none"> o User interface o Memory management and multitasking o Peripheral management and drivers o User management o File management
3	1.5.2 Utility software	<ul style="list-style-type: none"> <input type="checkbox"/> The purpose and functionality of utility software <input type="checkbox"/> Utility system software: <ul style="list-style-type: none"> o Encryption software o Defragmentation o Data Compression
6	1.6.1 Ethical, legal, cultural and environmental impact	<ul style="list-style-type: none"> <input type="checkbox"/> Impacts of digital technology on wider society including: <ul style="list-style-type: none"> o Ethical issues o Legal issues o Cultural issues o Environmental issues o Privacy issues <input type="checkbox"/> Legislation relevant to Computer Science: <ul style="list-style-type: none"> o The Data Protection Act 2018 o Computer Misuse Act 1990 o Copyright Designs and Patents Act 1988 o Software Licences (i.e. open source and proprietary)

Component 2

Approximate teaching time	Topic	Sub Topic
2	2.1.1 Computational thinking	<input type="checkbox"/> Principles of computational thinking <ul style="list-style-type: none"> ○ Abstraction ○ Decomposition ○ Algorithmic Thinking.
8	2.1.2 Designing, creating and refining algorithms	<input type="checkbox"/> Identify the inputs, processes, and outputs for a problem <input type="checkbox"/> Structure diagrams <input type="checkbox"/> Create, interpret, correct, complete, and refine algorithms using: <ul style="list-style-type: none"> ○ Pseudocode ○ Flowcharts ○ Reference language/high-level programming language <input type="checkbox"/> Identify common errors <input type="checkbox"/> Trace tables
4	2.1.3 Searching and sorting algorithms	<input type="checkbox"/> Standard searching algorithms: <ul style="list-style-type: none"> ○ Binary search ○ Linear search <input type="checkbox"/> Standard sorting algorithms: <ul style="list-style-type: none"> ○ Bubble sort ○ Merge sort ○ Insertion sort
7	2.2.1 Programming fundamentals	<input type="checkbox"/> The use of variables, constants, operators, inputs, outputs and assignments <input type="checkbox"/> The use of the three basic programming constructs used to control the flow of a program: <ul style="list-style-type: none"> ○ Sequence ○ Selection ○ Iteration (count- and condition- controlled loops) <input type="checkbox"/> The common arithmetic operators <input type="checkbox"/> The common Boolean operators AND, OR, NOT
4	2.2.2 Data types	<input type="checkbox"/> The use of data types: <ul style="list-style-type: none"> ○ Integer ○ Real ○ Boolean ○ Character and string ○ Casting
8	2.2.3 Additional programming techniques	<input type="checkbox"/> The use of basic string manipulation <input type="checkbox"/> The use of basic file handling operations: <ul style="list-style-type: none"> ○ Open ○ Read ○ Write ○ Close <input type="checkbox"/> The use of records to store data <input type="checkbox"/> The use of SQL to search for data <input type="checkbox"/> The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional (2D) arrays <input type="checkbox"/> How to use sub programs (functions and procedures) to produce structured code <input type="checkbox"/> Random number generation
5	2.3.1 Defensive design	<input type="checkbox"/> Defensive design considerations: <ul style="list-style-type: none"> ○ Anticipating misuse ○ Authentication <input type="checkbox"/> Input validation <input type="checkbox"/> Maintainability: <ul style="list-style-type: none"> ○ Use of sub programs ○ Naming conventions ○ Indentation ○ Commenting
4	2.3.2 Testing	<input type="checkbox"/> The purpose of testing <input type="checkbox"/> Types of testing: <ul style="list-style-type: none"> ○ Iterative ○ Final/terminal <input type="checkbox"/> Identify syntax and logic errors <input type="checkbox"/> Selecting and using suitable test data: <ul style="list-style-type: none"> ○ Normal ○ Boundary ○ Invalid ○ Erroneous

		<input type="checkbox"/> Refining algorithms
4	2.4.1 Boolean logic	<input type="checkbox"/> Simple logic diagrams using the operations AND, OR and NOT <input type="checkbox"/> Truth tables <input type="checkbox"/> Combining Boolean operators using AND, OR and NOT <input type="checkbox"/> Applying logical operators in truth tables to solve problems
2	2.5.1 Languages	<input type="checkbox"/> Characteristics and purpose of different levels of programming language: <ul style="list-style-type: none"> o High-level languages o Low-level languages <input type="checkbox"/> The purpose of translators <input type="checkbox"/> The characteristics of a compiler and an interpreter
2	2.5.2 The Integrated Development Environment (IDE)	<input type="checkbox"/> Common tools and facilities available in an integrated development environment (IDE): <ul style="list-style-type: none"> o Editors o Error diagnostics o Run-time environment o Translators