

COMPUTING CURRICULUM MAP

Intent: The Computing department at UTC Heathrow aims to equip students to participate in a rapidly changing world through challenging and engaging topics. Students will develop an understanding and application in the fundamental principles of computer science, Information Technologies (IT), and Cybersecurity by having the opportunity to write programs design webpages, apply technical skills gained in cybersecurity and produce professional digital products. Some of the critical skills include project management, systems analysis, design, and cybersecurity.

Computing and IT skills are a significant factor in enabling children to be confident, creative and independent learners, and we intend that students have every opportunity available to allow them to achieve this.

The national curriculum for Computing aims to ensure that all pupils:

- can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms, and data representation
- can analyse problems in computational terms, and have repeated the practical experience of writing computer programs to solve such problems
- can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- are responsible, competent, confident, and creative information and communication technology, users.

In Computer Science, we are dedicated to ensuring our students leave with the skills to embrace a future of rapidly advancing computer technology fully. Apart from the academic curriculum, students will gain key industry skills through

We intend to develop key skills in IT and cybersecurity, which include:

- IT management for business
- Digital technology solutions
- Computer networks and security
- Business computing and entrepreneurship

Year 10 Computer Science (J277) curriculum map

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
<p>1.1 Systems Architecture How a computer processes data in the form of Von Neumann Architecture? Common CPU components, their functions, and characteristics. CPU performance and embedded systems</p> <p>1.2 Memory and storage The different types of memory (RAM, ROM, Virtual Memory & Flash) The typical storage devices used by computers – optical, Magnetic and Solid State and their characteristics. Units of data storage</p> <p>Translators and facilities of languages Students will be able to identify and understand the difference between Low and High Level Programming.</p> <p>Programming techniques Understand the three main programming concepts – Iteration, Selection and Sequence, use data types. Use of variables, constants, operators, inputs and outputs Basic string manipulation, use of arrays when solving problems (one and two dimensional)</p> <p>2.1 Algorithms 2.1.1 Computational Thinking and Algorithms Principles of Computational thinking</p> <p>2.1.2 Designing, creating and refining algorithms</p> <p>2.2.1 Programming fundamentals</p>	<p>1.2.3 Systems software The purpose and functionality of systems software namely Operating systems and Utility system software</p> <p>1.2.3 Units of data storage Students get familiar with data units and move between each.</p> <p>1.2.4 Data storage (numbers) Students learn how to convert positive denary whole numbers to binary and hexadecimal and vice versa. Perform binary shifts and addition</p> <p>Characters The use of binary codes to represent characters The relationship between the number of bits per character in a character set and the number of characters that can be represented (ASCII and Unicode).</p> <p>1.2.4 Data Representation Images How an image is represented as a series of pixels represented in binary</p> <p>Sound How sound can be sampled and stored in digital form.</p> <p>1.2.5 Compression Students learn the need for compression and types of compression</p> <p>2.1 Algorithms 2.1.3 Searching and sorting algorithms To be able to write and recognise both searching (Linear and Binary) algorithms To be able to write and recognise sorting algorithms including Bubble Sort, Merge Sort, Insertion Sort Interpret, correct, and complete algorithms</p> <p>2.2.1 Programming fundamentals 2.2.2 Data types</p>	<p>1.3.1 Computer networks, connections, and protocols Networks and topologies How data is transferred across networks and the components of networks. Types of networks LAN and WAN and factors that affect the performance of networks. The different roles of computers in a client-server and a peer-to-peer network.</p> <p>1.3.2 Wired and wireless networks, protocols and layers The Internet as a worldwide collection of computer networks. Wired and wireless modes of connection. The use of Encryption, IP and MAC addressing, standards and common protocols. The concept of protocol layers.</p> <p>2.2.1 Programming Development</p> <p>2.2.3 Additional programming techniques The use of basic string manipulation. The use of basic file handling operations (open, read, write, close). The use of records to store data. The use of SQL to search for data.</p> <p>Year 10 Mock exams and revision</p> <p>Cisco Networking Academy courses, Gmetrix Microsoft office courses</p>	<p>1.4 Network security 1.4.1 Threats to computer systems and networks Forms of attack and threats posed to the computer system and networks. 1.4.2 Identifying and preventing vulnerabilities Understanding of how to limit the threats Understanding of methods to remove vulnerabilities. Knowledge/principles of each prevention method.</p> <p>1.5 Systems software revision The purpose and functionality of systems software namely Operating systems and Utility system software.</p> <p>2.2.3 Additional programming techniques – interleaving The use of basic string manipulation. The use of basic file handling operations (open, read, write, close). The use of records to store data. The use of SQL to search for data.</p> <p>Programming Development</p> <p>Cisco Networking Academy courses, Gmetrix Microsoft office courses</p>	<p>1.6 – Ethical, legal, cultural and environmental impacts of digital technology Ethical, legal, cultural, and environmental impact of digital technology on wider society. Legislation relevant to Computer Science</p> <p>2.3.1 – Producing robust programs Producing robust programs Defensive design considerations, input validation, maintainability.</p> <p>2.3.2 Testing Understand the purpose and types of testing. Identify syntax and logic errors, Selecting and using suitable test data and Refining algorithms</p> <p>2.5 – Programming languages and Integrated Development Environments Characteristics and purpose of different levels of programming language The purpose of translators The characteristics of a compiler and an interpreter Common tools and facilities available in an Integrated Development Environment (IDE)</p> <p>Programming Development</p> <p>Cisco Networking Academy courses, Gmetrix Microsoft office courses</p>	<p>2.4 Boolean Logic why data is represented in computer systems in binary form Simple logic diagrams using the operations AND, OR and NOT" Computational Logic • combining Boolean Operators using AND, OR and NOT to two levels" Applying logical operators in truth tables to solve problems • truth tables</p> <p>Programming Development</p> <p>Cisco Networking Academy courses, Gmetrix Microsoft office courses</p>

Year 11 Computer Science curriculum map (J277)					
Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
1.5 Systems software revision The purpose and functionality of systems software namely Operating systems and Utility system software 2.1 – Algorithms and Computational methods and programming revision Revision for mock exams	1.4 Threats to Computer systems and networks Forms of attack and threats posed to the computer systems and networks. Identifying and preventing vulnerabilities 2.2 Algorithms revision Programming Development Revision for mock exams Mock theory exams	1.6 Ethical, legal, cultural and environmental impacts of digital technology revision 2.1 – 2.3 programming Revision 2.4 Boolean logic revision	Mock exam revision (J277/01-02) Programming development (2.5) March Mock exams	Revision for Summer final examination Final examinations	Final examinations

Impact: To ensure that all students make significant progress, through continual formative and summative assessments. The assessments will feed into the tracker and teaching and interventions will be affected accordingly to enhance knowledge and understanding. Progress is tracked through central records and classroom teachers will adapt their teaching accordingly.

Pupil engagement in homework, end of topic tests and intervention is also closely monitored with parents/guardians kept up to date through regular contact. Through the curriculum, we aim to develop in our students' an appreciation of computing, IT and cybersecurity and a sense of enjoyment and curiosity for the subject. The success of this will be monitored at the end of Year 11, Year 13 with the external exams and internal assessments in IT. On successful completion of these studies at KS5, hope to have developed confident students who will be able to partake relevant apprenticeships or university.