Curriculum Mapping: Computer Science   Year 10 - 11

Year	Autumn 1.1	Autumn 1.2	Autumn 1.3	Autumn 1.4	Spring 1.1	Spring 1.2	Summer 1	Summer 2
	Control systems with flowol	*Introduction to python*	*Fundamentals of algorithms*	*Fundamentals of data representation 1*	*Python next steps*	*Computer systems part 1*	*Relational databases and SQL*	*AQA Coding projects*
Year 10	**Concepts/Tier 3 vocabulary** Algorithm, flowchart, flowchart symbol, start, stop, output, input, process, delay, arrow, control system, infinite loop, sensors, light dependent resistor (LDR), light sensor, push button, temperature sensor, passive infra-red detector (PIR), smart home, subroutine, actuator, variable.	**Concepts/Tier 3 vocabulary** *Sequence, interactive mode, script mode, input, print, variables, error messages, variable names, comments, type conversion, data types, assignment, round function, calculations, order of precedence, BIDMAS, IF, ELIF, ELSE, IF, comparison operators, code indentation, pseudocode, syntax errors, run-time errors, logic errors, WHILE loop, random number function, linear search, binary search, algorithm efficiency,*	**Concepts/Tier 3 vocabulary** *Algorithm, decomposition, sub-problems, abstraction, pseudo-code, program code, flowchart, inputs, processing, outputs, trace tables, algorithm efficiency, linear search, binary search, merge sort, bubble sort.*	**Concepts/Tier 3 vocabulary** *Decimal, binary, hexadecimal, binary, data, instructions, bit, byte, kilo, mega, giga, tera, binary shift, 7-bit ASCII, Unicode, character code, pixel, image size, colour depth, bitmap, analogue, sampling rate, sample resolution, hertz.*	**Concepts/Tier 3 vocabulary** *Data types, integer, float/floating point number, string, IF-ELIF-ELSE, WHILE, FOR, iteration, list, append, element, item, procedures, parameters, functions, return value, call function, call procedure.*	**Concepts Tier 3 vocabulary** *Hardware, software, Boolean logic, truth tables, NOT, AND, OR, XOR, system software, application software, operating system,, processor, memory, input/output assembler, Von Neumann architecture, central processing unit (CPU), Von Neumann architecture, arithmetic logic unit (ALU), control unit, clock, register, bus, clock speed, processor cores, cache, fetch-execute cycle, fetch, decode, execute, random access memory (RAM), read only memory (ROM)*	**Concepts Tier 3 vocabulary** Database, flat-file database, CSV, relational database, table, record, field, primary key, foreign key, inconsistency, redundancy, SQL, SELECT, FROM, WHERE, ORDER BY, ASC, DESC, INSERT INTO, VALUES, UPDATE SET, DELETE FROM, data type, text, varchar, char, integer, real, float, decimal, time, date, datetime.	

Justification:	Justification:	Justification:	Justification:	Justification:	Justification	Justification	Justification
This is a practical unit covering the principles of producing control and monitoring solutions using a flowchart-based interface. Pupils will start by producing systems that use simple loops and basic outputs, and then move on to look at systems that have multiple inputs, outputs and decisions. Towards the end of the unit, pupils will make use of more complex flowcharts that incorporate variables and actuators. Subroutines will be used to help develop modular programs.	This unit is an introduction to Python. The focus is on getting pupils to understand the process of developing programs, the importance of writing correct syntax, being able to formulate algorithms for simple programs and debugging their programs. The pupils' final programs are put into a learning portfolio with evidence of correct running, for assessment purposes.	The unit begins by covering decomposition and abstraction. Further lessons in the unit cover algorithms, flowcharts and pseudo-code, before looking at specific algorithms for sorting and searching, including the bubble and merge sorts. A final lesson covers the efficiency of algorithms, comparing the processing time and results of different algorithms on the same data sets..	*The conversion of integers from decimal to binary is covered in the first lesson, together with the binary addition of up to three numbers and binary shifts. In subsequent lessons, the use of hexadecimal numbers and character encoding is described. Representation of images and sound are covered in two separate lessons*	*This unit builds on introduction to Python and the first lesson has a series of tasks designed to revisit the basic skills already covered. Pupils then use FOR loops and compare their use with WHILE loops, before moving on to Python lists, which are introduced as a new data structure and are used in conjunction with FOR loops. Functions with and without parameters are covered to help pupils understand the concept and benefits of modular programming.*	*Students begin by looking at Boolean logic, moving on to software classification including the function of the Operating System. Lessons continue to cover systems architecture and factors affecting performance. The many forms of memory available in modern computers including RAM, ROM and cache are also covered along with secondary storage devices and their uses*	*The unit begins by covering the concept of a database before extending this into relational databases and associated terminology. Inconsistency and redundancy are covered before looking at Structure Query Language (SQL). SQL is used to write and interpret simple queries and to insert, update or delete data from a database table. Activities to develop and consolidate understanding of each concept are provided.*	*Programming is a fundamental skill required for success in GCSE Computer Science. These programming challenges are designed to develop students' programming skills.*

Assessment:

All units have an end-of-unit test, which draws together skills and knowledge from the previous lessons

Wider reading/Cultural capital

Throughout KS4 there are opportunities for students to access varied curriculum that is ambitious and goes beyond the specification. From the onset we focus on ensuring that our students are aware of the ethical, legal, environmental, and cultural issues related to computer science. Students are regularly reminded how to be respectful digital citizens. A solid understanding of how technology works from the inside out and how it affects the real world is vital for students to be able to succeed. Students in year 10 attend lectures at TNMOC and the centre of computing history.

Be the best you can be

	Autumn 1.1	Autumn 1.2	Autumn 1.3	Spring 1	Spring 2	Summer 1.1	Summer 1.1	
Year 11	*Practical programming skills in python*	*Fundamentals of data representation 2*	*Computer systems part 2*	*Fundamentals of computer networks*	*Cyber security*	*Impacts of digital technology*	*Revision*	
	Concepts/Tier 3 vocabulary *Variable, string, syntax, assignment statement, data type, integer, float, round, BIDMAS, selection, iteration, regular expression, list, two-dimensional list, text file, syntax error, logic error, debug, procedure, function, call, argument, parameter.*	**Concepts/Tier 3 vocabulary** *Decimal, binary, hexadecimal, binary, data, instructions, bit, byte, kilo, mega, giga, tera, binary shift, 7-bit ASCII, Unicode, character code, pixel, image size, colour depth, bitmap, analogue, sampling rate, sample resolution, hertz, data compression, decompress, Huffman coding, Huffman tree, run length encoding (RLE), frequency/data pairs.*	**Concepts/Tier 3 vocabulary** *Students recap looking at Boolean logic, moving on to software classification including the function of the Operating System in further detail. Lessons continue to cover systems architecture and factors affecting performance. The many forms of memory available in modern computers including RAM, ROM and cache are also covered along with secondary storage devices and their uses.*	**Concepts/Tier 3 vocabulary** *Network, personal area network, PAN, local area network, , Internet topology, protocol, Ethernet, Wi-Fi, TCP, UDP, User Datagram Protocol, IP, Protocol, HTTP, Hypertext Transfer Protocol, HTTPS, Hypertext Transfer Protocol Secure, FTP, File Transfer Protocol, SMTP, Simple Mail Transfer Protocol, IMAP, Protocol, Wi-Fi, authentication, encryption, firewall, MAC address filtering, MAC address.*	**Concepts/Tier 3 vocabulary** *Cyber security, social engineering, , malware, pharming, default password, misconfigured access rights, removable media, unpatched software, outdated software, cyber attack, fake website, white-box penetration test, black-box penetration test, social engineering, blagging, pretexting, phishing, shouldering, virus, trojan, spyware.*	**Concepts/Tier 3 vocabulary** *Ethical, cultural, environmental, legislation, manufacture, disposal, upgrade, replace, e-waste, privacy, legal, data protection, computer misuse, copyright, copyright designs and patents act, wireless networking, wearable technologies, cloud technologies, computer-based implants, cochlear implants, autonomous vehicles.*	**Concepts/Tier 3 vocabulary**	
	Justification: Students to have recap on, all the previous areas covered in year 10. Programming	**Justification:** The conversion of integers from decimal to binary is covered in the first lesson,	**Justification:** Students recap by looking at Boolean logic, moving on to software	**Justification:** . The lessons begin by comparing wired and wireless networks,	**Justification:** This unit begins by examining the threats to, and vulnerabilities	**Justification:** Different computer technologies and applications and the ethical, environmental and	**Justification:**	

techniques are taught such as validating data entry, creating a menu system with separate functions and 2-dimensionl lists.	together with the binary addition of up to three numbers and binary shifts. In subsequent lessons, the use of hexadecimal numbers and character encoding is described. Representation of images and sound are covered in two separate lessons with a final lesson covering lossy compression techniques used for images, sound and video, and lossless techniques such as RLE and Huffman encoding.	classification including the function of the Operating System. Lessons continue to cover systems architecture and factors affecting performance. The many forms of memory available in modern computers including RAM, ROM and cache are also covered along with secondary storage devices and their uses.	including PANs, LANs, WANs and network topologies. Subsequent lessons cover a wide range of common networking and Internet protocols with reference to the TCP/IP protocol stack and the concept of layers. One topic also looks at network security including encryption and MAC address filtering.	of networks, computers and programs including the concept of social engineering. Various forms of malicious code and their effects are covered. The unit concludes with a lesson on the detection and prevention of cyber security threats.	legal considerations surrounding them are described.

Assessment:

All units have an end-of-unit test, which draws together skills and knowledge from the previous lessons

Wider reading/Cultural capital

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