

Computing Trust Curriculum Overview 2022-23

Intent

Summary of curriculum intent

In computing, the intent of the curriculum is to ensure all students are equipped with knowledge and skills which allow them to be confident in their use of technology, but also to develop their ability to solve problems and computational thinking through learning to code. The curriculum offer is designed to ensure that practical ICT skills which can be applied in a wide range of contexts are taught early to ensure that students can apply these skills to their other subjects. This is accompanied by programming and computing theory to ensure that students are well prepared to study a range of ICT/Computer Science courses, and Online Safety to support students to make informed and sensible decisions about their use of technology.

Broadly the curriculum can be divided into three areas; Computer Science, ICT and Digital Literacy.

Subject content

Computer Science	Information Technology	Digital Literacy
Algorithms	Use of Office applications	Typing
Programming	Designing web pages	Use of email
Number Systems	Image editing	Use websites
Binary Logic	Animation	Advantages & disadvantages of using technology
Hardware and software	Presenting Data	
Databases	Databases	
Web technologies	Spreadsheets	
Data representation	Design cycle	
Computer Networks	Legal, ethical and moral considerations	
Legal, ethical and moral considerations		

Computational Thinking Skills

In the Trust, all subjects develop students' ability to apply the following computational thinking skills:

- Decomposition
- Abstraction
- Pattern recognition
- Algorithms

These skills are applied to topics across Computing curriculum; not exclusively in the Computer Science stream.

Implementation

Content and skills in computing is built with the fundamentals of both IT and computer science curriculum learnt first. Concepts are then revisited and built on with greater detail, and increasing complexity as the year progresses. At KS3, the units are varied between Computer Science units and IT units so that students are exposed to both before they decide whether to take it as an option subject in year 9. Lessons work progressively through objectives multiple checkpoints for teachers and students to reflect on their knowledge and skills gained and allowing teachers to adapt as necessary. The curriculum is carefully planned out to ensure that the units covered are relevant to the KS4 and KS5 curriculum and that they are built on from the previous year to consolidate learning.

Literacy is developed through explicitly teaching of keywords, keyword glossaries at the back of KS3 workbooks and KS4 exercise books as well as exam command word and toolkit cards for extended writing (particularly at KS4).

In order to ensure that students of different abilities are able to access the curriculum, a distinction in options are made in year 9 where a select set of students (LAP's) are taught a more IT focussed curriculum to prepare them for the WJEC IT qualification at KS4, whilst the HAP's continue to build on the computational thinking and computer science stream. At KS4, we provide the two main routes; GCSE Computer Science and the WJEC IT (Level 1/Level 2) qualification.

Impact

Students are regularly assessed through assessed homework for each unit, as well as mini-starter quizzes at the start of KS4 lessons which are based on any topic covered so far and not necessarily the topic we are currently on – interleaving, in order to build confidence in applying skills in unfamiliar contexts and ensure students are continuously recalling information from previous units. Additionally, students undertake formal exams twice per year – at our quarter 2 and quarter 4 reporting points in December and July. In addition, low stakes assessments are conducted at quarter 1 and quarter 3 reporting points to gauge progress and inform planning/teaching.

The assessments are carefully planned to ensure both content and skills based questions are tested (AO1, AO2 and AO3 skills) which help to ensure that students are not only able to demonstrate their understanding but also able to apply key concepts to a range of contexts.

The information collected from the quarterly assessments are used to create question level analysis documents whereby the topics students more struggled with are easily identifiable and it can be used to adapt revision and re-teach concepts where required. The question level analysis also enables the teacher to provide the student with a tailored list of topics they found challenging and direct them to resources that would help to improve their understanding.

KS3 Computing & KS4 Computer Science Curriculum Intent

Course overview	Year 7	Year 8	Year 9 Computer Science	Year 10 Computer Science	Year 11 Computer Science	Year 12 Computer Science	Year 13 Computer Science
Autumn 1	Unit 1: Digital Literacy Knowledge: Understanding how to use basic office packages & key functions of a computer Skills: Using emailing appropriately, formulas and functions in spreadsheets, formatting word documents	Unit 1: Web technologies Skills: Using HTML and CSS code to build skills on different components of creating a website – resulting in the students creating their own Adalove lace website	Unit 1: Data Representation Knowledge: Understanding how computers use binary to communicate and how logic gates are used. Understanding of the ways to compress data as well as how images, sound and text can be represented using binary. Skills: Ability to calculate binary/decimal and demonstrate 3 level binary addition as well as mathematical calculations of how image and sound file sizes are calculated. The ability to formulate truth tables based on logic gates. Be able to use Huffman coding to calculate compression	Unit 1: Networks & Python programming Knowledge: Understanding how computers are connected in a network and how they communicate across the network through the TCP/IP protocol model Skills: Using text based programming to build basic python skills such as variables, iteration, selection, lists and functions through small and larger programming problems to solve. Builds upon the basic programming learnt in year 9	Unit 1: Databases Knowledge: Understanding of what a database is and basic concepts such as a table, record, field and primary key Skills: Use SQL to insert and retrieve data from a database	4.6 Fundamentals of computer systems Knowledge: Understand the main elements of relationship between hardware and software that make up a computer system and how programming languages are classified. Skills: Apply Boolean algebra and logic gates. 4.1.1 Programming Knowledge: Understand the syntax of the Java programming language, and, if continuing from GCSE, builds on knowledge of programming in Python (or other language studied). Skills: Apply core Java programming skills to solve basic problems.	4.12 Fundamentals of functional programming Knowledge: Understand the main features of the functional programming paradigm. Skills: Be able to write programs using a functional language. NEA Skills: Independently develop practical skills in the context of solving a realistic problem or carrying out an investigation. Knowledge: Deepen understanding of Computer Science through practical experience. Big Data NEA (see below) Pre-release material
	Unit 2: Online Safety Knowledge: Understanding how to be safe online and the consequences of not doing so. Being able to identify what "fake news" is online	Unit 2: Computing theory 2 Knowledge: Understanding the different components of a computer and how they help to function a computer Skills: Ability to calculate binary/decimal and demonstrate 2 level binary addition as well as mathematical calculations of how image and sound file sizes are calculated		Unit 2: Ethical, legal and environmental issues Knowledge: Understanding the current ethical, legal and environmental impacts and risks of digital technology on society Skills: Applying the knowledge of these ethical, legal and environmental issues to a 10-12 mark essay question on any given topic	Revision	4.8 Consequences of uses of computing Knowledge: Understanding the ethical, cultural, legal and environmental issues surrounding the development of digital technology. Skills: Applying the knowledge of these ethical, cultural, legal and environmental issues to a 9-12 mark essay question. 4.1.2 Programming Paradigms Knowledge: Understand the principles and advantages of procedural- and object-oriented programming paradigms Skills: Able to apply the structured approach to creating programs. Able to write object-oriented programs. Able to draw and interpret class diagrams.	4.9 Fundamentals of communication and networking Knowledge: Understand how computers communicate with peripheral devices and with other computers. Understand the infrastructure of networks and the internet. Understand security threats online. Skills: Demonstrate and apply your knowledge of communication and networking. NEA (see below) Pre-release material
Spring 1	Unit 3: Computing theory 1 Knowledge: Understanding how computers communicate including the hardware and software of a computer Skills: Ability to calculate binary to decimal and demonstrate how protocols are used to communicate across a network	Unit 3: Digital images Skills: Ability to manipulate images using software to enhance or refine an image for a particular need.	Unit 2: Basic python programming Skills: Using text based programming to build basic python skills such as variables, iteration, selection, lists and functions. Builds upon the python Micro:bit unit in year 8	Unit 3: Data Representation & Intermediate python programming Knowledge: Understanding how computers use binary to communicate and understanding how data can be compressed through RLE and Huffman coding Skills: Ability to calculate binary/decimal/hexadecimal and demonstrate 3 level binary addition as well as mathematical calculations of how image and sound file sizes are calculated. The ability to demonstrate how files can be compressed through RLE or Huffman coding	Revision	4.4 Theory of Computation Knowledge: Understand techniques to support problem solving and model solutions. Understand how to classify algorithms by their complexity. Skills: Apply problem solving and modelling techniques. Apply regular and context-free languages. Apply maths for regular expressions. Analyse the complexity of algorithms. 4.10 Fundamentals of Databases Knowledge: Understanding how persistent data is structured, stored and retrieved in relational databases. Skills: Able to design relational databases using ER diagrams and normalisation techniques. Able to use Data Definition Languages and Structured Query Languages.	Revision NEA (see above) Pre-release material
	Unit 4: Programming with the Micro:bit (Block programming) Skills: Using variables, iteration and selection with block programming to program the Micro:bit to complete a specific task	Unit 4: Data Handling Skills: Building on digital literacy skills in year 7 so that students are competently able to use the functions in a spreadsheet and database to handle data	Unit 3: Intermediate python programming Skills: Using text based programming to build on the basic python skills from term 1 and using more intermediate skills such as file handling and functions when programming.	Unit 4: Fundamentals of algorithms & Advanced programming Skills: Applying different data search methods and data sorting methods to find specific data as well as being able to applying abstraction and decomposition to complete trace tables based on unknown pseudocode Understanding the various classification of programming languages Skills: Using text based programming to apply advanced programming skills to a problem, including robust and secure programming techniques, and structured approaches to programming	Revision	4.5 Data Representation Knowledge: Understanding how computers use binary to store and communicate different types of information. Skills: Application of number system conversions and mathematical operations. Calculating storage sizes of image and sound files. Calculating precision and accuracy of data stored. 4.2 Fundamentals of Data Structures Knowledge: Understand how to store large volumes of data in formats that make it easy for programs and users to access. Skills: Able to implement data structures in Java.	Revision

Summer term	Unit 5: Python turtle programming Skills: Build on the skills from spring 2 to text based programming – using similar skills as learnt in previous unit.	Unit 5: Programming with the Micro:bit (text based) Skills: Building on skills from year 7 – now using text based programming to use variables, iteration and selection with block programming to program the Micro:bit to complete a specific task	Unit 5: Networks & Cyber Security Knowledge: Understanding how computers are connected in a network and how they communicate across the network. Understanding the cyber security threats online and precautions that can be taken to prevent these threats	Unit 5: Cyber Security Knowledge: Understanding the cyber security threats online and precautions that can be taken to prevent these threats Unit 6: Hardware and Software Knowledge: Understanding the functions of an operating system and be able to explain the Von Neumann architecture to demonstrate how the fetch decode execute cycle work to get data from the main memory	Revision	4.7 Fundamentals of computer organisation and architecture Knowledge: Understand the role of internal and external hardware components and the operation of the processor. Skills: Able to read and write simple assembly language code. 4.3 Fundamentals of Algorithms Knowledge: Understand how to traverse data structures introduced in 4.2 and the complexities of each algorithm. Understand Reverse Polish Notation. Skills: Be able to trace and analyse the complexities of given algorithms and evaluate RPN expressions. NEA (see next column)	Revision

KS4 IT Curriculum Intent

Course overview	Year 9 IT	Year 10 WJEC IT	Year 11 IT OCR
Autumn 1	Unit 1: Spreadsheet skills Knowledge: Be able to plan and design a spreadsheet as well as creating and formatting a spreadsheet. During this unit, students will use appropriate data formatting and add suitable validation rules as well as formulae and functions to meet set outcomes as a basic level in preparation for the coursework in year 10 Skills: Be able to use formula with single operator, simple functions (SUM, AVERAGE, MAX, MIN, RAND, COUNTIF. Students will also be able to use more complex functions such as IF, SUMIF, AVERAGEIF, VLOOKUP and pivot tables	Unit 1: Spreadsheet Coursework unit Knowledge: Understand how to plan and design a spreadsheet as well as creating and formatting a spreadsheet. During this unit, students will use appropriate data formatting and add suitable validation rules as well as formulae and functions to meet set outcomes. Skills: Students will apply a range of spreadsheet skills to the coursework task such as using formula with single operator, simple functions (SUM, AVERAGE, MAX, MIN, RAND, COUNTIF. Students will also be able to use more complex functions such as IF, SUMIF, AVERAGEIF, VLOOKUP and pivot tables and apply these skills to the coursework scenario.	Unit LO3 Knowledge: Understand how data and information can be collected, stored and used Skills: In this theory unit in preparation for the external exam, students will learn a range of data types and be able to apply the most appropriate data type as well as having a good understanding of data and information. Additionally students will understand ways to collect data and information and how IT can be used to support these activities. Unit LO6 Knowledge: Understand the different methods of processing data and presenting information Skills: Students will be able to identify the most appropriate software tools and techniques to present information and process information and apply these to different contexts. They will be able to understand that different methods have advantages and disadvantages and be able to use these to select methods justifying their choice for different contexts.
Autumn 2	Unit 2: Image editing skills Knowledge: Be able to plan and design an image and then use the design to create and modify the image using appropriate tools and techniques. Additionally, students will gain the knowledge on how to store the image appropriately and outputting the final image in a format that is fit for purpose. Skills: Be able to use a range of standard and advanced image editing skills. Standard skills include select marquee, lasso, distort images, magic wand, and bring to front/send to back, brushes/pencil and creating shapes and curves. Some advanced skills will also be touched upon such as include blurring, blending, smudge, sharpen, colour mode, brightness, masking/mask layer, cloning, background eraser, airbrush and gradient in preparation for the coursework in year 10.	Unit 2: Images Coursework unit Knowledge: Understand how to plan and design an image and then use the design to create and modify the image using appropriate tools and techniques. Additionally, students will gain the knowledge on how to store the image appropriately and outputting the final image in a format that is fit for purpose. Skills: Students will apply a range of image editing skills to the coursework scenario. These include standard skills such as select marquee, lasso, distort images, magic wand, and bring to front/send to back, brushes/pencil and creating shapes and curves. Some advanced skills include blurring, blending, smudge, sharpen, colour mode, brightness, masking/mask layer, cloning, background eraser, airbrush and gradient. These skills will then be used and applied to the coursework scenario.	Revision
Spring 1	Unit 3: Database skills Knowledge: Be able to plan and design a database as well as creating and modifying a database, interrogating a database, creating user interfaces and testing and evaluating a database at a basic level in preparation for the coursework in year 10. Skills: Be able to create and add tables and create a primary key. Students should also be able to create select queries with single and multiple criteria, use wildcards and queries to perform calculations. Students will also be able to produce reports from queries with customisation	Unit 3: Database coursework unit Knowledge: Understand how to plan and design a database as well as creating and modifying a database, interrogating a database, creating user interfaces and testing and evaluating a database Skills: Students will apply a range of database skills to the coursework scenario such as being able to create and add tables and create a primary key. Students should also be able to create select queries with single and multiple criteria, use wildcards and queries to perform calculations. Students will also be able to produce reports from queries with customisation and apply this to the coursework scenario	Students to take the early entry exam in January

<p style="text-align: center;">Spring 2</p>	<p>Unit 4: Automated document skills Knowledge: Be able to plan and design an automated document by creating an effectively structured data source and link this to a standard document. Students will be able to appropriately structure the content of the standard document and inserting fields as required and merging and outputting final documents at a basic level in preparation for the coursework in year 10.</p> <p>Skills: Be able to creating a standard document, a source document, appropriately divided fields, data within the fields and create a link between the data source and standard document. Additionally. Students will be learn how to insert appropriate fields, check accuracy and add appropriate formatting features on the document</p>	<p>Unit 4: Automated document coursework unit Knowledge: Understand how to plan and design an automated document by creating an effectively structured data source and link this to a standard document. Students will be able to appropriately structure the content of the standard document and inserting fields as required and merging and outputting final documents</p> <p>Skills: Students will apply a range of skills such as creating a standard document, a source document, appropriately divided fields, data within the fields and create a link between the data source and standard document. Additionally. Students will be learn how to insert appropriate fields, check accuracy and add appropriate formatting features on the document and apply this to the coursework scenario.</p>	
<p style="text-align: center;">Summer term</p>	<p>Unit 5: Theory Knowledge: xx</p> <p>Skills: xx</p>	<p>Unit 5: Theory - How IT can be used to fulfil the needs of organisations and individuals Knowledge: In this theory unit of the course, students will be able to understand the functionality of different hardware devices, different software's and services provided by IT. This unit is in preparation for the Unit 1 ICT in Society unit which will compose part of the final online theory exam in year 11.</p> <p>Skills: Students will learn about a range of computing devices, input/output/storage devices, basic internal components and ports. They will also learn about a range of software such as system, application and utility software and specialist software. Students will explore how each IT service improves efficiency and productivity for business and individual users.</p>	

Curriculum Impact

	Q1	Q2	Q3	Q4
Year 7		Digital Literacy Online Safety	Digital Literacy Online Safety Computing theory Programming with micro:bits	Digital Literacy Online Safety Computing theory Programming with micro:bits Python turtle
Assessed homework	Digital literacy	Online Safety	Computing theory 1 Programming with microbits	Python turtle
Year 8		Web technologies Computing theory 2	Web technologies Computing theory 2 Graphics Data handling	Web technologies Computing theory 2 Graphics Data handling Python programming with micro:bit
Assessed homework	Web technologies	Computing theory 2	Graphics Data Handling	Python programming with micro:bits
Year 9 CS		Data Representation	Data Representation Basic Programming Intermediate programming Networks	Basic programming Intermediate programming Mathematics for computing Networks Cyber Security
Assessed homework	Web technologies	Computing theory 2	Graphics Data Handling	Python programming with micro:bits
Year 10 CS	<ul style="list-style-type: none"> • Networks • Basic programming 	Paper 1: Programming Paper 2: Networks Ethical, legal and environmental	<ul style="list-style-type: none"> • Algorithms • Programming • Data Representation • Cyber security • Ethical, legal and environmental • Networks 	Paper 1: Programming Algorithms Paper 2: Networks Ethical, legal and environmental Data Representation Cyber security Hardware and software
Assessed homework	Networks	Ethical, legal and environmental	Data Rep Algorithms Cyber security	Hardware and software
Year 10 WJEC	Milestone marker – coursework review grade	Milestone marker – coursework review grade	Milestone marker – coursework review grade	First unit
Assessed homework	LO1	LO1	N/A	LO4
Year 11 CS	All content – 1 paper	All content – 2 papers	All content – 1 paper	N/A
Year 11 IT	LO1, LO3, LO4	All content	N/A	N/A
Year 12	<ul style="list-style-type: none"> • Programming • Fundamentals of computer systems 	Paper 1: Fundamentals of Programming Programming Paradigms Paper 2: Fundamentals of computer systems Consequences of uses of computers	Paper 1: Fundamentals of Programming Programming Paradigms Theory of computation Data Structures Paper 2: Fundamentals of computer systems Consequences of uses of computers Fundamentals of databases Data Representation	Paper 1 Fundamentals of Programming Programming Paradigms Theory of computation Data Structures Fundamentals of algorithms Paper 2 Fundamentals of computer systems Consequences of uses of computers Fundamentals of databases Data Representation Computer organisation

Assessed homework	Fundamentals of computer systems Fundamentals of programming	Theory of computation Programming paradigms	Data Representation Consequences of computing Fundamentals of computing	Fundamentals of algorithms Computer systems Data structures
Year 13	Paper 1 All content Paper 2 All content	Paper 1 All content – including prelim material Paper 2 All content	Paper 1 All content – including prelim material Paper 2 All content	N/A