

Introduction

At Dixons Fazakerley Academy, we aim to communicate with clarity and transparency. This document, therefore, aims to offer an overview of all aspects of the Computing curriculum so that staff feel confident and comfortable with the sequencing of our curriculum. This will, ultimately, support students to make exceptional progress throughout the course of their studies.

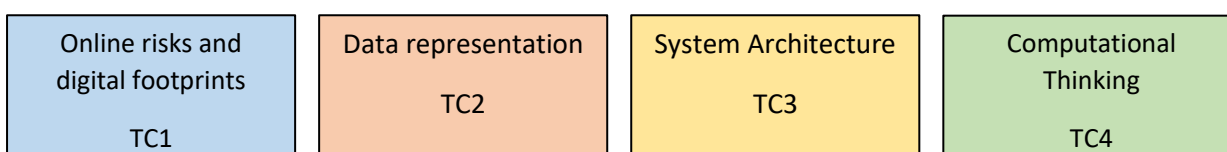
Overview of the curriculum

The table below shows the order of topics that are taught in Years 7 to 11. We recognise the importance of intelligently sequencing knowledge to develop secure schema and in Computing, topics have been meticulously planned and ordered to ensure that students are always building on and deepening their previous learning.

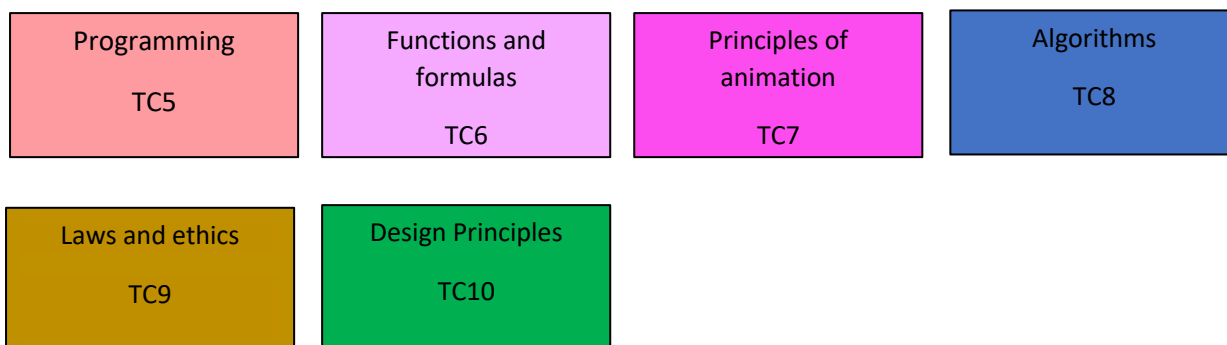
	Cycle 1	Cycle 2	Cycle 3
Year 7	Introduction to CS E-Safety	Computer Systems Computational thinking - Algorithms	Programming object based Kodu
Year 8	Networks Cyber Security	Spreadsheet Modelling	Programming text based Python
Year 9	Data representation (Binary)	User interface project	Animation
Year 10	BTEC Digital Information Technology Component 1: Exploring User Interface Design Principles and Project Planning Techniques	BTEC Digital Information Technology Component 2: Collecting, Presenting and Interpreting Data	BTEC Digital Information Technology Component 3: Effective Digital Working Practices A- Modern technologies
Year 11	BTEC Digital Information Technology Component 2: Collecting, Presenting and Interpreting Data Component 3: Effective Digital Working Practices B- Cyber Security	Component 3: Effective Digital Working Practices C- The wider implications of digital systems D - Planning and communication in digital systems	Component 3: Effective Digital Working Practices Exam revision

Threshold concepts

Within our curriculum design, we have carefully considered how to sequence and interleave the threshold concepts within our subjects so that students are able to build and develop secure schema over time. The table below shows how we have mapped our threshold concepts throughout our English curriculum.



Curriculum Overview: Computing



Mapping powerful knowledge in Computing

All children are entitled to a curriculum and to the powerful knowledge which will open doors and maximise their life chances. Below is a high-level overview of the powerful knowledge children will learn in this particular subject, from Year 7 through to Year 11. The curriculum is planned vertically and horizontally giving thought to the optimum sequence for building secure schema.

	YEAR 7 Knowledge to be gained at each stage*		
	Cycle 1 TC1,TC9	Cycle 2 TC2, TC3, TC4, TC8, TC9	Cycle 3 TC4, TC5, TC8, TC10
Substantive knowledge introduced	Introduction and E-Safety How to use PowerPoint, word, searching the web and email What is personal information Laws Data protection/Computer Misuse Cyberbullying- gender- stereotypes Digital footprint Spam and Phishing Malware- threats to a network location aware applications would involve Understanding the different types of location technologies available Understanding of the ethical, legal and societal implications of location tracking and privacy concerns.	Computer Systems What is a computer system? What are the different types and how they have evolved over time. Hardware Storage- memory (RAM/Rom) Units of data Input/output devices CPU - fetch execute cycle Software- operating system Logic - logic gates- circuits – truth tables Artificial Intelligence Computational Thinking Algorithms Decomposition Pattern recognition? Abstraction? What is an algorithm? What is a flowchart? What are the common flowchart symbols? Programming constructs, sequence, selection iteration.	Programming (Object – based Kodu) What is a program and understand a program needs precise instructions to operate correctly What is coding Manual and automatic methods of movement in Kodu What are clones and creatables Programming constructs, sequence, selection iteration. Use advanced programming/gaming techniques (scoring, levels)
Substantive knowledge revisited & embedded	- Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. (KS2) - Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content. (KS2)	Ethics Y7 C1 -use sequence, selection, and repetition in programs; work with variables and various forms of input and output (KS2) -use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs (KS2)	Algorithms Y7 C2 -design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts (KS2) -use sequence, selection, and repetition in programs; work with variables and various forms of input and output (KS2)
CEAIG	Careers spotlight: Cyber Security Specialist Careers spotlight: Digital Privacy Consultant Careers spotlight: Online Safety Coordinator	Careers spotlight: Software Developer Careers spotlight: Hardware engineer Careers spotlight: Algorithm developer	Careers spotlight: Web Developer Careers spotlight: Programmer Careers spotlight: Data Analyst
Disciplinary knowledge introduced, revisited & embedded	C1: How to create a master slide and save work correctly in folders The impacts of not adhering to laws The difference between the DPA and Computer misuse act Analyse inappropriate content and draw conclusions How to identify and protect against Spam and Phishing cyber attacks		

Analyse the characteristics of different malware and methods to prevent malware attacks

C2

- Explain how the CPU works with other hardware components to execute programs
- How do storage and main memory work together to execute a program
- Explain how the CPU works with other hardware components to execute programs
- The difference between input and output devices
- Explain Software, Application Software, Systems Software
- Define what an operating system is, and recall its role in controlling program execution
- Use logic gates to construct logic circuits, and associate these with logical operators and expressions
- What are the moral dilemmas linked to AI
- Write simple algorithms
- To identify the need for different flowchart shapes
- Evaluate an algorithm and provide feedback to improve
- Explain and review the purpose of an algorithm using key terminology
- Apply the correct sequencing to an algorithm
- Extended writing – explain the importance of sequencing

C3

- Understand the difference between clones and creatables
- Write instructions in a programming language that a computer can understand and execute.
- Understand the difference between each type of movement and program (manual movement)
- Evaluate the different tools used in Kodu (Paths, landscapes etc.)
- How do sequence and selection differ, what are the advantages of using selection in a program
- Write programs using the programming constructs

	YEAR 8 Knowledge to be gained at each stage*		
	Cycle 1 TC1, TC3,TC9	Cycle 2 TC3, TC6, TC10	Cycle 3 TC2, TC4, TC5, TC8
Substantive knowledge introduced	Cyber Security What is a network LAN/WAN Network topologies What is data The data protection act/Computer Misuse act Types of social engineering (Phishing, Pharming etc.) Hacking, ethical and unethical What is hacktivism/ Dos and DDOS Types of malware Network policies Back up policies	Spreadsheet Modelling What is a spreadsheet? How is data organised in a spreadsheet? Spreadsheet layout, cells, references, rows and columns Formatting tools What are the built in formulas (auto sum)? What are the built in functions (range, average, min and max)? Types of cell reference Graphs and charts Analyse graphs Create a report	Python Programming What is a program and understand a program needs precise instructions to operate correctly What is coding Variables and data types Casting Bugs and errors (Syntax/logic) Debugging BIDMAS and logical operators IF/ELIF statements Sequence, selection and iteration Indentation Algorithms and Pseudocode
Substantive knowledge revisited & embedded	Spam-Phishing Y7 C1 Malware Y7 C1 DPA act Y7 C1 Ethics Y7 C1 Y7 C2 -understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration (KS2)	Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information. (KS2)	Algorithms Y7 C2 Programming Y7 C3 -design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts (KS2) -use sequence, selection, and repetition in programs; work with variables and various forms of input and output (KS2)
CEAIG	Careers spotlight: Cybersecurity analyst Careers spotlight: Info security manager Careers spotlight: Cryptographer	Careers spotlight: Financial analyst Careers spotlight: Marketing analyst Careers spotlight: Operations manager	Careers spotlight: Data Scientist Careers spotlight: Python Developer Careers spotlight: Software Engineer
Disciplinary knowledge introduced, revisited & embedded	C1 <ul style="list-style-type: none"> What are the consequences of breaking the data protection act/Computer Misuse act Advantages and disadvantages of networks Analyse the characteristics of different types of social engineering What is the difference between a Dos and a DDos attack? Impacts of viruses on a computer system Analyse the characteristics of different malware Methods to prevent malware attacks and network disaster recovery plans C2 <ul style="list-style-type: none"> Interpret a client brief to create a spreadsheet model Apply effective formatting techniques to a spreadsheet model Apply functions/formulas to your spreadsheet model. Analyse new data and apply the correct techniques e.g. decimal, data type. Analyse the data in your spreadsheet model and apply the correct range, min, max and average. Discuss the difference between cell references. Analyse graphs, charts, outgoings and finance. Draw conclusions from your data. Analyse spreadsheet model, provides recommendations and draws conclusions. C3 <ul style="list-style-type: none"> Analyse code in python, this will increase in complexity throughout the unit Explain the rules for naming variables and data types Sequence, selection and iteration identify where these have been used in various programs Write a program, this will increase in complexity throughout the unit Explain IF/ELIF statements Writing in pseudocode Apply PRIMM to programs (Predict, run, investigate, modify and make) Explain the difference between Float and Integer data types How to fix errors (debug) 		

	YEAR 9 Knowledge to be gained at each stage*		
	Cycle 1 TC2,TC3	Cycle 3 TC3, TC10	Cycle 2 TC3, TC7, TC10
Substantive knowledge introduced	Data Representation (Binary) What is binary/denary Number systems Binary/denary conversion Adding binary Overflow errors Hexadecimal Hexadecimal conversion denary/binary Quantities/units of data Binary in digital images and image quality Binary is sound (analogue and digital) Compression (Lossy and Lossless) Binary as characters ASCII	User Interface Design Types of user Interface What hardware and software is needed to build a user interface Audience needs – Accessibility, skill level and demographic What are the key design principles – House style, colour, font, layout, language and amount of information. Project planning techniques, Moodboard, Storyboard Project proposal – Target audience, constraints, requirements and timescales	Animation What is animation What is stop motion? 2D/3D animation Bitmaps and vectors What is a key frame, frame rate and layers Tweening, classic and shape Pixels Text manipulation Storyboards Scene creation Animation tools
Substantive knowledge revisited & embedded	Units of data Y7 C2	How to use software Y7 C1, Y8 C2, Y9 C2 Storyboards Y9 C2 Hardware/software Y7 C2 -Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information. (KS2)	Spreadsheets (introduction to software) Y8 C2 Digital Images Y9 C1 Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information. (KS2)
CEAIG	Careers spotlight: Data Analyst Careers spotlight: Computing Teacher Careers spotlight: Technology Trainer	Careers spotlight: UX Designer Careers spotlight: UI Designer Careers spotlight: Interaction Designer	Careers spotlight: Animator Careers spotlight: Visual effects artist Careers spotlight: Storyboard artist
Disciplinary knowledge introduced, revisited & embedded	<p>C1</p> <ul style="list-style-type: none"> How does binary represent data and text Use binary to explain how sound, image and text are stored with computer systems Convert from denary into binary and binary into denary Explain why the computer uses the binary numbering system Understand what Hexadecimal is and why it's used To be able to convert Binary and Denary to a 2 digit Hex Number Understand how binary works in digital images Provide examples of the different ways that binary digits are physically represented in digital devices, Convert between different units and multiples of representation size What is the difference between lossy and lossless compression <p>C2</p> <ul style="list-style-type: none"> What are the factors that impact the choice of user interface Understand the varying needs of the audience and how they affect both the type and the design of the interface. How design principles provide both appropriate and effective user interaction with hardware devices. How to design an effective user interface Use project planning techniques to plan, design and develop a user interface Create a project proposal Review a user interface, consider the strengths and weaknesses <p>C3</p> <ul style="list-style-type: none"> Explain how animation has changed of time comparing 2D/3D and the different types of animation. Explain how stop motion animation works Create an animation using a range of techniques. Create a frame by frame animation using bitmaps Create an animation using a classic tween with an explanation of the tweening process. Create an animation using a shape tween with an explanation of the tweening process. Analyse the success you had with each animation techniques. Create a storyboard combining a number of elements e.g. scene, colour, skills used etc. Apply a number of animation skills to your storyboard Explain, using advantages and your own experiences, the importance of layers Create and test your animation 		

GCSE Disciplinary knowledge YEAR 10 and 11

Students will learn to:

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This knowledge will be introduced, revisited and embedded throughout Years 10 and 11. Topic overviews highlight where this knowledge is taught and in what context.

	YEAR 10 Knowledge to be gained at each stage*		
	Cycle 1 TC1, TC3, TC9, TC10	Cycle 2 TC1, TC3, TC9	Cycle 3 TC1, TC9
Substantive knowledge introduced	<p>Component 1: Exploring User Interface Design Principles and Project Planning Techniques (Controlled Assessment).</p> <p>Types of interface and features What hardware and software is needed for an interface Who is your client? What is a project proposal brief Understand interface design for individuals and organisations. Purpose and audience of the project What are project requirements User accessibility requirements? Project constraints? What are timescales (including tasks and sub-tasks)? What key milestones What are task dependencies Understand interface design for individuals and organisations What are design principles Accessibility features Understand interface design for individuals and organisations.</p>	<p>Component 3: Effective Digital Working Practices (External Assessment)</p> <p>Topic A – Modern Technologies</p> <p>What are the communication technologies What are Ad Hoc networks- (Open Wi-Fi, Ad Hoc network, personal area network) Security Issues with networks Types of internet infrastructure Cloud technologies (Cloud storage and cloud computing) Features of cloud and traditional systems –(Device synchronisation, online/offline working, notifications) Implications of using cloud technologies e.g Maintenance, disaster recovery etc. Types of modern teams (World, multicultural and inclusivity) Collaboration and communication tools How modern technologies aid inclusivity and accessibility Types of accessibility (colours used, layout design etc.) E-commerce, mobile commerce Distributed and dispersed data How teams collaborate</p>	<p>Component 3: Effective Digital Working Practices (External Assessment)</p> <p>Topic B – Cyber Security</p> <p>Threats to data and why systems are attacked e.g. Data theft, financial gain etc. External Threats to a network, hacking, malware etc. Internal threats to a network e.g. internet downloads, data leaks etc. User access restrictions e.g. two factor authentication, biometrics etc. Ethical hacking and penetration testing System protection e.g firewalls, anti-virus software etc. Security parameters e.g. Password policy, acceptable use policy Disaster recovery policy Backups</p>
Substantive knowledge revisited & embedded	How to use software Y7 C1, Y8 C2, Y9 C2 Storyboards Y9 C2 Hardware/software Y7 C2 User interface design Y9 C3	Hardware Y7 C1 Networks, policies and backups Y8 C1 Accessibility Y9 C3	E-safety, malware etc. Y7 C1 Cyber Security, networks Y8 C1
CEAIG	Careers spotlight: User Researcher Careers spotlight: UI Designer Careers spotlight: Information Architect	Careers spotlight: Cloud Solution Architect Careers spotlight: Cloud Infrastructure Engineer Careers spotlight: Cloud Operations Manager	Careers spotlight: Cybersecurity analyst Careers spotlight: Information security manager Careers spotlight: Cryptographer
Disciplinary knowledge introduced, revisited & embedded	<p>C1</p> <ul style="list-style-type: none"> Factors that impact the choice of interface Select the relevant information from the brief that will be used for the controlled task. Apply purpose, audience, accessibility needs and requirements to your project proposal report. Be able to use project planning techniques to plan, design and develop a user interface. Apply your planning techniques to a Gantt chart. Produce designs for four screens of the user interface. Be able to use project planning techniques to plan, design and develop a user interface. Create a report explaining the strengths and weaknesses of your user interface. Create a report explaining how the interface meets audience needs <p>C2</p> <ul style="list-style-type: none"> What are the advantages and disadvantages of ad hoc networks Apply your network knowledge to range of scenarios e.g. Advise a local business etc Describe how the selection of platforms and services impacts on the use of cloud technologies. What are the associated advantages and disadvantages of cloud technologies. Describe how cloud and traditional systems are used together Describe how cloud and traditional systems are used together Consider the implications for organisations when choosing cloud technologies: Explain the benefits and drawbacks of working modern teams. How can modern technologies manage modern teams <p>C3</p> <ul style="list-style-type: none"> Understand the reasons why systems are attacked What are the impacts to an organisation of a security breach Understand measures used to protect digital systems and reduce the impact of threats Understand how weaknesses are found and system security is improved Understand measures that can be implemented to protect and manage digital systems and data Understand the requirements of a disaster recovery policy including backup and recovery Understand the actions to take after an attack 		

	YEAR 11 Knowledge to be gained at each stage*		
	Cycle 1 TC2, TC6, TC10	Cycle 2 TC1, TC4, TC8, TC9	Cycle 3
Substantive knowledge introduced	Component 2: Collecting, Presenting and Interpreting Data (Internal assessments) Understand how data is collected What are the characteristics of data What are the characteristics of information Understand the different ways of representing information e.g tables, graphs etc Validation methods and validation checks What are the different data collection methods e.g. Primary/secondary What are the features of data collection Factors of quality that impact information What sectors use data modelling What are the data processing methods e.g data manipulation, advanced manipulation and other methods What is a data dashboard and what are the appropriate presentation features	Component 3: Effective Digital Working Practices (External Assessment) C The wider implications of digital systems How is data shared e.g. location based, cookies etc. Environmental impact of digital systems e.g. energy, waste etc. What are the legal, ethical and privacy issues when using digital systems What is equal access to services What is net neutrality The legal requirements and professional guidelines regarding equal access What are acceptable use policies What are the social and business boundaries Data protection principles Use of the internet Intellectual property The criminal use of a computer system e.g. hacking, malware D Planning and communication in digital systems What are the different forms of notation e.g. flowcharts, data flow diagrams system diagrams, written information and tables	GCSE Revision and Exams
Substantive knowledge revisited & embedded	Spreadsheet Modelling Y8 C2 Controlled assessment skills e.g. task list, deadlines, presenting findings and reviewing Y10 C1	E-safety e.g. Malware Y7 C1 DPA act Y7 C1 Ethics Y7 C1 Y7 C2 Cyber security Y8 C1 Algorithms use of flowcharts Y7 C2	
CEAIG	Careers spotlight: Financial analyst Careers spotlight: Marketing analyst Careers spotlight: Operations manager	Careers spotlight: Cybersecurity Analyst Careers spotlight: IT Asset Manager Careers spotlight: Network Security Engineer	Careers spotlight: Careers spotlight: Careers spotlight:
Disciplinary knowledge introduced, revisited & embedded	C1 <ul style="list-style-type: none"> Understand how data is collected by organisations and its impact on individuals Explain situations where information would be represented Ensure data is suitable for processing The strengths and weaknesses of each data collection method How data collection features affect its reliability and how the collection of data could be improved Understand how different types of data are used by organisations for data modelling. Explore how to accurately apply data processing methods to aid decision making Create a data dashboard Draw conclusions based on the findings in your data e.g. trends, patterns and errors C2 <ul style="list-style-type: none"> Explain the benefits and drawbacks of using shared data Understand the impact of manufacture, use and disposal of IT systems on the environment Evaluate the environmental considerations when upgrading or replacing computers Explain the energy saving settings and policies available for digital devices Identify the benefits to organisations, individuals and society of equal access To understand the purpose and use of acceptable use policies To be aware of the blurring of social and business boundaries To understand the implications of criminal use of a computer Understand how organisations use systems diagrams Be able to interpret a systems diagram in a range of contexts Draw a diagram to represent how a systems will work 		

*A powerful, knowledge-rich curriculum teaches both substantive knowledge (the academic content for a particular subject) and disciplinary knowledge (application of knowledge required for each academic domain).
Please refer to the DAT Curriculum Principles, published on our website, for further information about how we have designed our all-through curriculum.