Curriculum Coverage in the Department of Computing

	Year 7	Year 8	Year 9	Year 10 Digital Information Technology	Year 10 GCSE Computer Science	Year 11 Digital Information Technology	Year 11 GCSE Computer Science
Autumn Term 1	**Topic:** Passport to Computing **Overview** Gaining a passport to the Computing Curriculum at HLC is vitally important not just for IT lessons but cross curricular as it shows students are prepared and skilled when using the computers. They will look at the rules of a computing room and how to successfully log on and off the computers. We will understand how to productively use the school network and all the drives available to you including saving, opening and crating documents. The final part of this unit will show you how to communicate via email and use Microsoft 365 effectively. **Assessment:** Passport to computing test in week 4	**Topic:** Passport to Computing Update **Overview** Maintaining a passport to the Computing Curriculum at HLC is vitally important not just for IT lessons but cross curricular as it shows students are prepared and skilled when using the computers. Building upon the Passport to computing in Year 7, students will look at changes and updates that have been made to the network, software and technology itself. **Assessment:** Passport to computing test in week 4	**Topic:** BTEC – User Interfaces **Overview** Students will select and investigate a user interface. They will assess how: • effectively the user interface meets the audience's requirements, including their accessibility needs, skills level and demographics • effectively different design principles have been used to allow both appropriate and effective user interactions with hardware devices • techniques have been used to allow users to efficiently interact with the interface Students will investigate different project planning techniques. Teachers will provide students with a brief for the design requirements of a user interface. • select appropriate project planning tools and methodologies to create a project plan, **i**ncluding outlining the timescales, possible	**Topic:** Exploring User Interface Design Principles and Project Planning Techniques - Develop and review a user interface **Overview** Students will produce a written document, report or presentation demonstrating how user interfaces meet different user needs and design principles. They will be able to say how two different types of interface meet a range of specific user needs and design principles. They will explore the relationship between design principles and how they can be used to meet user needs. Students will carefully consider how effectively two different types of user interface meet a wide range of user interface design principles. They will be critical	**Topic & Overview**: "Define key computational thinking terms such as ""decomposition"" and ""abstraction.""" Explore problem-solving through real-world examples, including the Towers of Hanoi game. **Overview:** Understand the importance of breaking down complex problems into smaller steps. Learn how to load and debug Python programs. Practice using arithmetic operators and writing clean, maintainable code in Python. Identify and correct errors in simple Python programs." "Define the term “algorithm” and its significance in programming. Understand how to decompose a problem and structure it as a sequence of logical steps. Use algorithms to create basic Python programs in an IDE. Identify and fix errors in algorithm ordering and Python syntax. Apply the concept of “sequence” in algorithm and program design.	**Topic:** Collecting, Presenting and Interpreting Data - Investigate the role and impact of using data on individuals and organisations **Overview** Students will provide a written document showing an understanding of how two different sectors use data to make decisions. This will include how the data collection methods and its features affect the quality of information. They will be able to provide relevant examples in the context of each sector. They will be able to make a link between the data collection methods used and how these can affect the data. Students will be able to make a direct link between the collection methods/features and how they affect the quality of data. weaknesses of both their project plan and their user interface. The user interface should focus purely on the overall look and feel, and the user navigation methods. In Maths, Statistics and sampling allows students to look at real life data and how to collect, analyse and eliminate bias.	**Topic & Overview**: "Decompose a problem Use turtle graphics to draw lines" "Use Cartesian coordinates Incorporate selection, repetition, and iteration into turtle graphics Use subprograms" "Use turtle pens of different colours Use turtle pens of different sizes Use turtle fill in closed shapes" Combine subprograms to produce a turtle graphics image "Decompose a problem into smaller parts Combine subprograms to create a solution" Use the turtle module, programming constructs, and subprograms to create images "Give reasons why computers are connected on a network Differentiate between a LAN and a WAN Categorise tasks according to the type of network used to carry them out Explain the benefits to organisations of a WAN Explain why protocols are needed on a network Describe the purpose of an IP address"

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			constraints and risks in their project • produce an initial design for a user interface that meets user, input, output and accessibility needs. Their initial design should show the designs for at least four different screens in their user interface. Students are not allowed to use the dashboard they created in Component 2 as evidence of creating a user interface. They are required to design, create and refine a different user interface for a different set of user requirements. **Assessment:** Weekly online assessment Final Artifact assessment	in their assessment of each user interface and will assess the positive and negative effects that each design principle has on the user and their ability to positively interact with the device using detailed relevant examples **Assessment:** In class assessments each lesson End of unit hand in for NEA.	Use Python to display outputs and process user inputs. Interpret and debug error messages effectively." "Understand the structure and objectives of the course, including the topics covered and how they relate to real-world applications. Learn the assessment format, including the number of exam papers and their weightage (50% each). Write their names, class, and subject on their new books or folders to stay organized. Familiarize themselves with the course specification and resources, including the course website and syllabus details. Explore examples of real-world applications of computer science to inspire interest and relevance. Understand classroom rules, expectations, and how to ask for help effectively. Understand the importance of organization, maintaining a folder or digital record for all their coursework. Explore the benefits of computer science skills in future careers and industries."	**Assessment:** In class assessments each lesson End of unit hand in for NEA.	"Define the meanings of the terms 'bandwidth' and 'latency' Explain how bandwidth and latency affect the performance of a network Use bits per second (bps) to describe network speed Construct expressions involving file size, transmission rate and time" "Differentiate between wired and wireless connectivity Explain how data are transmitted along copper and fibre-optic cables Compare the performance of copper and fibre-optic cables and give examples of their use Describe how high-speed broadband is delivered " "Describe how devices are connected on a wireless network Compare the performance of wired and wireless LANs and give examples of situations where one is preferable to the other Summarise the characteristic of Wi-Fi, Bluetooth, RFiD, Zigbee and NFC and give examples of their use" "Define the term 'topology' Describes the characteristics of bus, star

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					"Understand what a computer is and its key components. Explore the Von Neumann architecture, including the function of the Control Unit (CU), Arithmetic Logic Unit (ALU), and Memory Unit. Learn about computer memory: RAM, ROM, and cache. Understand the fetch-decode-execute cycle and its role in processing instructions. Gain familiarity with binary and how computers store and process data." "Recognize examples of embedded systems in real-world devices (e.g., washing machines, cars). Understand the differences between embedded systems and general-purpose computers. Explore how embedded systems are designed for specific tasks and are optimized for performance and efficiency. Learn about the hardware and software components of embedded systems. Understand the role of sensors, actuators, and control systems in **embedded devices."**		and mesh network topologies Draw and label a diagram of each topology Match descriptions to network topologies Match descriptions of what they do to internet components (backbone, POP, NAP, router)" "Give three reasons for connecting devices in a network Explain how a LAN differs from a WAN Define the term 'internet backbone' Describe the function of a router Explain how data are transmitted on a fibre-optic cable State two advantages and two disadvantages of using wireless to connect devices on a LAN rather than cable Construct an expression to calculate the time needed to transmit a file over a network Explain why protocols are needed on a network "

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Autumn Term 2	**Topic:** Online Safety Intermediate **Overview** The overall aim is that students become responsible and resilient users of technology, able to make confident and safe use of the web and of other internet-based services, and able to detect and deal with issues when they arise. People are living more of their lives online and students will be made aware of the dangers that exist on the internet from their own personal conduct, contact with other people, and from their access to different types of content. They will become aware of their legal and ethical their computers and online data from threats. They will understand the importance of keeping their computers and software up to date, and of using tools such as virus scanners. Students will understand what constitutes safe practice when accessing websites and opening email attachments. They	**Topic:** Online Safety Advanced **Overview** Using the Think U Know resources from the National Crime Agency and Child Exploitation and Online Protection provision, online safety is delivered as an engaging learning resource for Students. Supporting Students to explore the information, advice and guidance at Thinkuknow.co.uk will enable them: • develop confident, healthy approaches to relationships and the internet • identify any negative behaviour they encounter, and respond with resilience • know where they can access advice and guidance on these issues, in their own time • know where to go for help if they ever feel anxious or threatened online. All lessons ensure Students feel safe to engage by establishing a nurturing environment of self-discovery and mutual respect where Students feel comfortable using words related to sensitive topics,	**Topic:** Programming Edu Blocks **Overview** Comparing Scratch & Python Understand basic coding concepts Learn about Algorithms/Sequencing Introduction to EduBlocks Learn about Turtle Draw shapes in Turtle Draw a pattern in Turtle Understand how iteration works Learn about User Input in Python Understand errors in Python Learn about basic data types Use logic in Python Learn what variables are Use variables in a Python program Learn how variables work Learn how to use variables with Turtle Learn about Functions and Subroutines Learn how to use arguments with functions Understand how functions make code shorter	**Topic:** Exploring User Interface Design Principles and Project Planning Techniques - Use project planning techniques to plan and design a user interface **Overview** Students will select and use a variety of project planning tools to plan out the different parts of their project. They will then put together a design specification that shows an initial design of a user interface that meets both user requirements and design principles. Their initial design should show the designs for at least four different screens in their user inter**face. Students are not allowed to use the dashboard they created in component two as evidence of**	**Topic & Overview:** "Define the term 'program' Identify types of programs used every day Identify Python as a programming language Access an integrated development environment Load and run a Python program Change a Python program Save a Python program Use arithmetic operators and BIDMAS Layout code to be readable and maintainable Correct errors in programs Use variables in algorithms and programs" "Define the term 'decomposition' Define the term 'algorithm' Decompose a problem Order the pieces of an algorithm (unplugged) Order the pieces of an algorithm (IDE) Define the term 'sequence' and use sequence in algorithms and program code Interpret error messages Correct errors in ordering" "Recognise primitive data types (int, real, char, string) Define the term 'variable' Create variables of all types Create meaningful identifier names	**Topic:** Collecting, Presenting and Interpreting Data - Create a dashboard using data manipulation tools and draw conclusions and review data presentation methods. **Overview** Students will assess in comprehensive detail how data is used across two different sectors in order to make decisions. They will be able to select and use different data manipulation tools to manipulate the data in a large data set and produce data summaries. They will then show their data summaries on a dashboard. Students will be able to use their dashboard to make conclusions and recommendations. They will show understanding of how the presentation features affected the conclusions and recommendations made. They will be able to use their dashboard effectively to make relevant and specific conclusions. We link with the Geography, Maths and Science departments throughout this module to look at the various graphs they use to display their data	**Topic & Overview:** "Use: – sequence in programs – if, elif, else in programs – repetition (while) in programs – iteration (one-dimensional) in programs" "Define the terms: – 'procedure' – 'function' – 'parameter' – 'return value' Create: – procedures – functions Use: – 'separation of concerns'" "Define the terms: – 'local variable' – 'global variable' justify using either or both" "Be able to: – use math library methods – round real numbers to given decimal places" "Write programs that take input and give output Use arithmetic operators Use maths library methods Use time library methods Format numeric output using round()" "Be able to:

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	will become familiar with secure websites that use https; including basic cryptography such as the Caesar cipher. Students will become aware of their online identity and take steps to protect it. They will understand what strong passwords are and how they are used to protect A digital footprint is the data that is stored about a person's online activities. It can include information that people have willingly uploaded or that others have recorded about them without their knowledge. All this data may be available to people, such as future employers, and students should consider taking steps to limit access to their personal data, because of this student will be aware that the internet is not an anonymous space; their activities can be tracked through their IP address and browser cookies. **Assessment:** Weekly online assessment Final artifact assessment	and where all questions and comments are considered worthy of consideration. **Assessment:** Weekly online assessment Final artifact assessment	Use functions with Turtle Build a project in Turtle Apply knowledge learned in previous lessons Examples and ideas of what project to build Recap everything learned in the past six lessons Top of Form Bottom of Form **Assessment:** Weekly online assessment Final artifact assessment	**creating a user interface.** **We have great links with the Art and Design Graphics department who we work alongside when developing graphics and professional user interfaces as they have some similar objectives such as designing graphics for a shop or vinyl sleeve covers.** **Assessment:** In class assessments each lesson End of unit hand in for NEA.	Assign values to variables, with the correct data types View contents of memory (variable) in IDE" "Take input and create output Define the term 'runtime error' Find and fix runtime errors Use primitive data types (integer, real, char, string)" "Translate code into flowchart symbols Represent an algorithm in a flowchart Translate a flowchart into code" "Represent algorithms in flowcharts Create code from algorithms represented in flowcharts" "Define the term 'program' Identify types of programs used every day Identify Python as a programming language Access an integrated development environment Load and run a Python program Change a Python program Save a Python program Use arithmetic operators and BIDMAS Layout code to be readable and maintainable Correct errors in programs Use variables in algorithms and programs"	**Assessment:** In class assessments each lesson End of unit hand in for NEA.	Use one-dimensional data structure Round real numbers Use mathematical methods Write subprograms using parameters Use string.format to create output" "Define what is meant by the term 'embedded system' Explain how an embedded system differs from a general-purpose computer Identify hardware and software components of embedded systems Describe applications of embedded systems" "Define what is meant by the term 'Internet of Things' (IoT) Explain the role of embedded systems in the IoT Outline security and privacy issues associated with the IoT Explain why power is an important consideration for many IoT devices" "Describe how packet switching is used to transmit data between devices on the internet Explain the purpose of an IP address.

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					"Define the term 'decomposition' Define the term 'algorithm' Decompose a problem Order the pieces of an algorithm (unplugged) Order the pieces of an algorithm (IDE) Define the term 'sequence' and use sequence in algorithms and program code Interpret error messages Correct errors in ordering" "Recognise primitive data types (int, real, char, string) Define the term 'variable' Create variables of all types Create meaningful identifier names Assign values to variables, with the correct data types View contents of memory (variable) in IDE" "Take input and create output Define the term 'runtime error' Find and fix runtime errors Use primitive data types (integer, real, char, string)" "Translate code into flowchart symbols Represent an algorithm in a flowchart Translate a flowchart into code" "Represent algorithms in flowcharts		Describe the role of routers" "Explain how the TCP/IP stack enables different types of devices attached to different networks to communicate with each other across the internet Put the layers of the stack in the correct order" "Describe what each layer of the stack does List the protocols that operate in each layer Describe what each protocol does" "Identify the hardware components of an embedded systems Describe a task that could be performed by an embedded system State the purpose of a protocol List three pieces of information stored in a packet header Put the layers of the TCP/IP model in the correct order Describe two tasks performed by the transport layer Give two protocols used in the link layer "

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					Create code from algorithms represented in flowcharts"		

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Spring Term 1	**Topic:** Programming **Overview** The aim of this unit is to build Students' confidence and knowledge of the key programming constructs. Importantly, this unit does not assume any previous programming experience, but it does offer Students the opportunity to expand on their knowledge throughout the unit. The main programming concepts covered in this unit are sequencing, variables, selection, and count-controlled iteration. Students will build on their understanding of the control structures' sequence, selection, and iteration (the big three), and develop their problem-solving skills. Students will learn how to create their own subroutines, develop their understanding of decomposition, and learn how to create and use lists, and build upon their problem-solving skills by working through	**Topic:** Programming **Overview** Kodu Game Lab is a 3D game development environment that is designed to teach kids basic programming principles. Kodu allows creators to build the world's terrain, populate it with characters and props, and then program their behaviours and games rules in a bespoke visual programming language. Game Design Course is a self-learning, self-paced "Game Design" course, designed to run through five weeks. Learn about Game Making with Kodu Game Lab and the informal process of game design. Learn about rapid prototyping by brainstorming, identifying risks, design patterns, and Kodu Game Lab Recipes. Learn about Game Mechanics - designing challenge and engagement. Learn to develop a Game Experience: Theme and Story. Learn about Pushing the Boundaries - Game of skill and chance using puzzles and probability.	**Topic:** Issues and Impact **Overview** Awareness of emerging trends in computing technologies, and the impact of computing on individuals, society and the environment, including ethical, legal and ownership issues. Environmental: understand environmental issues associated with the use of digital devices (energy consumption, manufacture, replacement cycle, disposal, Ethical and legal understand ethical and legal issues associated with the collection and use of personal data (privacy, ownership, consent, misuse, data protection) , understand ethical and legal issues associated with the use of artificial intelligence, machine learning and robotics (accountability, safety, algorithmic bias, legal liability) ,understand methods of intellectual property protection for computer systems and software (copyright,	**Topic:** Exploring User Interface Design Principles and Project Planning Techniques - Develop and review a user interface **Overview** Students are required to design, create and refine a different user interface to meet a different set of user requirements. They will be able to select appropriate project planning tools and be able to comment as to why they are suitable. They will include all major parts of their project plan, including timescales, constraints and contingencies. Students will put together a comprehensive design specification. Their designs will be effective and cover the vast majority of elements. Students will use different	**Topic & Overview: U**se string manipulation functions (index, left, right, upper, lower, isalpha, …, etc.) "Use relational operators in flowchart and code Use 'if' and 'if else' in code Use flowchart decision symbol" "Use relational operators in flowchart and code Use 'if' and 'if else' in code Use 'if elif else' in code Use flowchart decision symbol Use comments, white space, meaningful identifiers, and indentation in code Identify parts of code (variables, constants, selection, repetition)" "Define 'AND', 'NOT' and 'OR' Construct truth tables for Boolean operators and combinations Use relational operators in flowchart and code" "Use repetition (condition-controlled loops) in algorithms Use repetition (condition-controlled loops) in code Use repetition (condition-controlled loops) in flowcharts" "Use flowcharts to represent selection and repetition Identify parts of a program	**Topic:** Collecting, Presenting and Interpreting Data - Draw conclusions and review data presentation methods. **Overview** Students will be able to use their dashboard effectively to make relevant and specific conclusions. They will then be able to use their conclusions to make appropriate recommendations. They will show full awareness of how the presentation methods used lead to data not being biased, misunderstood or being used to make inaccurate decisions. They will then be able to use their conclusions to make appropriate recommendations. They will show full awareness of how the presentation methods used lead to data not being biased, misunderstood or being used to make inaccurate decisions. Interpreting and displaying data is cross-curricular subjects through analysing experimental results in Science to display rainfall data in Geography. **Assessment:** In class assessments each lesson End of unit hand in for NEA.	**Topic & Overview:** "Determine the value of variables using trace tables" "Predict output, give input Identify errors (runtime, syntax, logical) Fix errors (syntax, runtime, logical)" "Describe the characteristics of a bubble sort Apply a bubble sort algorithm to a list of items (numbers and strings) Recognise, amend, and trace the code for a bubble sort" "Describe the characteristics of a binary search Apply a binary search algorithm to a list of items (numbers and strings) Recognise, amend, and trace the code for a binary search" "Decompose a problem Read and write text files Use subprograms that take parameters and return results Write code in a high-level programming language" "Compare algorithm efficiency (number of passes, number of compares) Apply a bubble sort to a list

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	a larger project at the end of the unit. **Assessment:** Weekly online assessment Final artifact assessment	**Assessment:** Weekly online assessment Final artifact assessment	patents, trademarks, licencing), Cybersecurity: understand the threat to digital systems posed by malware (viruses, worms, Trojans, ransomware, key loggers) and how hackers exploit technical vulnerabilities (unpatched software, out-of-date anti-malware) and use social engineering to carry out cyberattacks, understand methods of protecting digital systems and data (anti-malware, encryption, acceptable use policies, backup and recovery procedures) **Assessment:** Weekly online assessment Final artifact assessment	design principles effectively to design an effective and efficient solution. They will use their plan to create a user interface and assess the strengths and weaknesses of their project plan. **Assessment:** In class assessments each lesson End of unit hand in for NEA.	Solve problems using code Use repetition in code Use selection in code" "Convert between signed denary numbers and two's complement binary numbers Determine the range of values that can be represented in two's complement by a binary number of a given length " "Apply logical left and right shifts to binary integers Use logical binary shifts to multiply and divide unsigned binary integers by powers of 2 Explain why a number may be less precise after a binary shift right has been applied" "Apply arithmetic left and right shifts to signed binary numbers Describe how an arithmetic right shift differs from a logical right shift" "Define what is meant by the term 'hexadecimal' Explain why hexadecimal notation is used Convert between hexadecimal and binary " "Define what is meant by the term 'character set' Describe how characters are represented in 7-bit ASCII Given the ASCII code for one character derive the code for another		Apply a binary search to a sorted list Trace an algorithm to determine state of variables Locate and fix logic errors in algorithm (paper)" "Describe the environmental impact of the manufacture of digital technology Describe ways in which the environmental impact can be reduced Describe how the energy consumed by digital devices harms the environment Describe how energy consumption can be reduced" "Define what is meant by the term 'e-waste' Describe environmental issues associated with the disposal of digital technology Explain how responsible recycling can reduce the environmental impact of digital technology Explain how the short replacement cycle of mobile phones and other digital devices impacts on the environment" "Define what is meant by the terms 'low-level language' and 'high-level language'

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					Outline the shortcomings of ASCII and how encoding systems that use more bits overcome them" "Apply a logical binary shift left to a positive 8-bit binary number Apply a logical shift right to a positive 8-bit binary number Explain why a binary number may become less accurate after a binary shift right Apply an arithmetic binary shift right to a two's complement number Give the hexadecimal equivalent of an 8-bit binary number Give the binary equivalent of a hexadecimal number Explain why hexadecimal is used Describe how characters are encoded in ASCII Derive the code for an ASCII character from that of another Describe the limitations of ASCII "		Explain why each processor has its own unique instruction set Describe how writing a program in a low-level language differs from writing one in a high-level language Compare features of low-level and high-level languages and identify tasks for which each is best suited" "Explain the need for program translators Define what is meant by the terms 'compiler' and 'interpreter' Compare the way in which interpreters and compilers translate high-level code into machine code Describe the advantages/disadvantages of each approach Select and justify which method of translation to use for a given purpose" "Define what is meant by the term 'intellectual property' Describe possible consequences of IP theft Explain how copyright, patents and trademarks help to protect IP Compare features of open source and proprietary software"

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							"List two ways in which the manufacture of digital technology damages the environment Describe one way of reducing the amount of e-waste that is generated List two ways in which a high-level language differs from a low-level language Identify a task for which a low-level language would be used and one for which a high-level language would be more suitable State the purpose of a language translator Describe how an interpreter differs from a compiler Explain how a copyright differs from a patent Explain why a software developer may prefer to use open source software rather than proprietary software "

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		Topic: E Waste – a Video Project **Overview** Every year millions of electrical and electronic devices are discarded as products break or become obsolete and are thrown away. These discarded devices are considered e-waste and can become a threat to health and the environment if they are not disposed of and recycled appropriately. This unit looks not only at the growing issues of E-waste but also builds skills and knowledge in creating video content for a good cause. Learners will look at the sustainability issue of e-waste and the impacts this has on the world and then produce a news article in the form of a video to record their findings. They will collect and film the footage, edit, add and edit audio, match and move footage and create a professional video. **Assessment:** Weekly online assessment Final artifact assessment	**Topic:** Advanced Programming **Overview** This unit introduces learners to how data can be represented and processed in sequences, such as lists and strings. The lessons cover a spectrum of operations on sequences of data, that range from accessing an individual element to manipulating the entire sequence. Great care has been taken so that the selection of problems used in the programming tasks are realistic and engaging: learners will process solar system planets, book texts, capital cities, leaked passwords, word dictionaries, ECG data, and more. A range of pedagogical tools are employed throughout the unit, with the most prominent being pair programming, live coding, and worked examples. The Year 7 and 8 scratch and python programming units are prerequisites for this	**Topic:** Modern technologies **Overview** explore how organisations use digital systems, and the wider implications associated with their use. Learners should learn about how current and modern technologies are used by and have an impact on organisations and their stakeholders. Learners need to know the ways in which organisations and associated individuals use modern technologies to exchange information, communicate, and complete work-related tasks. Learners must be able to apply their knowledge to a range of vocational contexts. **Assessment**: In class assessment**s** each lesson End of unit exam	**Topic & Overview:** "Define the terms ‘array’ and ‘list’ Access each item in a list using indexing Create, append, delete items from a list" "Explain that the range() function generates a sequence of numbers Use iteration ‘for’ to process every item in a one-dimensional data structure" "Define the term ‘procedure’ Define the term ‘parameter’ Create procedures" "Define the term ‘function’ Define the term ‘return value’ Create functions" "Create functions Create procedures Use ‘separation of concerns’" "Use ‘lists’ Use ‘range()’ Use ‘for’ Create procedures Create functions" "Define what is meant by the ‘stored program concept’ Describe the hardware components used in the von Neumann architecture and explain their role in the fetch-decode-execute cycle" "Draw and label a diagram of the inside of a computer; label each hardware	**Topic:** Planning and communication in digital systems **Overview** explore how organisations use digital systems, and the wider implications associated with their use. Learners should be able to interpret and use standard conventions to combine diagrammatical and written information to express an understanding of concepts. Assessment: In class assessments each lesson End of unit exam Final summer exam and mocks.	**Topic & Overview:** "Use primitive data types Define the terms valid, erroneous, boundary (extreme) data Design data to test all three conditions Test code using test data" "Understand the characteristics of one-dimensional data structures Choose appropriate use of one-dimensional data structures Reverse traverse a one-dimensional data structure Discuss efficiency considerations for one-dimensional structures" Determine the value of variables using trace tables "Predict output, give input Locate errors (runtime, syntax, logical) Fix errors (syntax, runtime, logical)" "Decompose problems Design subprogram interfaces Read and write files Use string manipulation methods Use one-dimensional data structures" "Design test data to meet requirements Justify the use of data structure

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			unit. It is assumed that learners are already able to write Python programs that display messages, receive keyboard input, use simple arithmetic expressions, and control the flow of program execution through selection and iteration structures. **Assessment:** Weekly online assessment Final artifact assessment	Final summer exam and mocks**.**	component and briefly describe its role Explain how the speed of the clock impacts on performance Explain how pipelining improves the performance of the CPU" "Explain the relationship between the width of the address bus and the number of memory locations that can be addressed Calculate the number of addressable memory locations provided by an address bus of a specified width" "Explain why secondary storage is needed Describe how data are stored on magnetic, optical and solid-state media" "Compare the capacity, speed and portability of magnetic, optical and solid-state storage devices Select an appropriate type of storage for a particular purpose Construct an expression to calculate data storage requirements " "Define what is meant by the term 'stored program concept' Describe what is stored in main memory when a program is running		Use trace tables with nested constructs Use a reverse linear search on a sorted list efficiently Use a forward linear search on an unsorted list" "Describe how bitmap images are represented in binary Define what is meant by the terms 'bitmap', 'pixel', 'resolution' and 'colour depth' Construct an expression to calculate the size of an image in pixels Differentiate between image size and image resolution Convert binary data into bitmap images and generate the binary data for bitmap images" "Construct an expression to calculate the file size of an image (width x height x colour depth) and – given the file size and the values of any two of the variables – to calculate the value of the remaining one Explain how the number of available bits impacts on the accuracy of the representation and why there is always a trade-off between resolution and storage space/bandwidth." "Differentiate between analogue and digital data

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					Explain what happens during the fetch-decode-execute cycle and the role of specified components Label and complete a diagram of the inside of a computer Explain the need for secondary storage Describe how data are stored on a solid-state drive "		Define what is meant by the terms ‘amplitude’, ‘sample rate’, ‘bit depth’ and ‘sample interval’ Describe the process of converting analogue sound into binary data. Identify factors that affect the accuracy of the digital representation." "Draw and label a diagram illustrating ADC Explain why an analogue sound is never fully reproducible in binary Explain factors that affect the fidelity of the digital representation Construct an expression to calculate the file size of a sound (sample rate x bit depth x time)" "Give reasons for wanting to reduce file sizes (storage, streaming) Describe how compression affects file sizes Identify potential drawback of compressing files Explain the difference between lossless and lossy compression Describe the advantages/disadvantages of each" "Describe how bitmap images are represented in binary

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							Explain the difference between image size and image resolution Explain the limitations of binary representation of data (bitmaps) Construct an expression to calculate the file size of an image in kibibytes Describe how analogue sound is represented in binary Construct an. expression to calculate file sizes of sounds Explain the limitations of binary representation of data (sound) Explain the need for data compression Select the appropriate type of compression for a specified purpose "

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Summer Term 1	**Topic:** Heros **Overview** In this unit, students will look at Data and Information and how using structure and context is vitally important. The topic used is the Heroes of computing, looking at many famous women and men who have been inspirational in this field. Students will research appropriately using the internet which they will create a questionnaire from to gather data and import into spreadsheet software. • select and apply the data manipulation methods to manipulate data in order to provide appropriate summaries of the data. They will then use the most popular Hero to create a magazine cover for using a graphics package and including the data and information that they have gathered and manipulated. **Assessment:**	**Topic:** Cyber Security **Overview** This unit takes the students on an eye-opening journey of discovery about techniques used by cybercriminals to steal data, disrupt systems, and infiltrate networks. The students will start by considering the value of their data to organisations and what they might use it for. They will then look at social engineering techniques used by cybercriminals to try to trick users into giving away their personal data. The unit will look at the more common cybercrimes such as hacking, DDoS attacks, and malware, as well as looking at methods to protect ourselves and our networks against these attacks. **Assessment:** Weekly online assessment Final artifact assessment	**Topic:** Computer Science **Overview** This unit looks at the impact of technology on individuals, organisations, and the planet. Through a range of real-world examples, they will learn how to identify the specific type of impact, ie legal, cultural, privacy, environmental, and ethical. They will then progress to identifying stakeholders who are impacted by technology, and learn how these impacts are experienced, negated, or adapted to. Throughout the unit, learners will be encouraged to discuss their views and make use of sample long-form answers as either close or comprehension exercises, to further develop their rhetorical skills. Lastly, they will complete an assessment and identify which of the technologies that they have studied they believe to have had the most negative or	**Topic:** Cyber security **Overview** Learners must understand how the increased reliance of organisations on digital systems to hold data and perform vital functions presents a range of challenges and dangers. They should understand the nature of threats to digital systems and ways that they can be mitigated through organisation policy, procedures and the actions of individuals. They should be able to apply knowledge of cyber security to a range of vocational contexts **Assessment:** In class assessments each lesson End of unit exam Final summer exam and mocks.	**Topic & Overview**: "Format output to meet requirements Format output suitable for the end user" "Define the term 'array' Define the term 'list' Give characteristics of one-dimensional and two-dimensional data structures Use indexing to access any item in a two-dimensional structure Use 'for' to iterate over every item in a two-dimensional structure Use 'while' to find a row in a two-dimensional structure" Validate input using presence check, length check, range check, pattern check "Apply a linear search to a one-dimensional list (paper) Complete a linear search algorithm in a flowchart Write a linear search for a single item in a one-dimensional list (code)" "Apply a linear search to a two-dimensional list (paper) Complete a linear search algorithm in a flowchart Write a linear search for a single record in a two-dimensional list (code)" "Use one-dimensional and two-dimensional lists	**Topic & Overview:** Review of digital working practices, exam practice and revision of topics. **Assessment:** In class assessments each lesson End of unit exam Final summer exam and mocks.	**Topic & Overview:** "Recall the characteristics of two-dimensional structures (record/entity/row, column/field, mixed types) Use indexing to locate records and fields in two-dimensional structure Traverse a two-dimensional structure Display a record/entity/row in columnar format" "Define the terms local and global in terms of variables Define the terms function, procedure, parameters, return value Decompose problems Write functions and procedures with/without parameters" "Decompose a problem Read a text file Build a two-dimensional data structure Search a two-dimensional data structure Use string.format() to make output fit for purpose" "Create a flowchart given working code Use trace tables to determine state of variables Recognise the code for a bubble sort" "Decompose a problem

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	Weekly online assessment Final artifact assessment		positive effect on our society as a whole. **Assessment:** Weekly online assessment Final Video artifact assessment		Find a single item in a one-dimensional list Find a single record and file in a two-dimensional list" "Describe the role of the operating system in a computer system Identify tasks carried out by an OS" "Describe how the OS organises files and allocates space on a hard drive Construct an expression to calculate the number of blocks of space on a hard drive needed to store a file of a given size Describe how file permissions are used to control access to files Select an appropriate level of file access (read, write, delete, none) for a user" "Describe how an OS uses scheduling to give each active process a share of CPU time Describe the features of the round-robin scheduling algorithm Describe how the OS uses a paging algorithm to swap programs in and out of main memory." "Define what is meant by the term 'peripheral' Describe how the OS uses drivers to communicate with and manage peripherals		Create subprograms (procedures, functions) using parameters and return values Design and use test data (valid, erroneous, boundary) Use a linear search" "Use a trace table to find and fix errors Create code for a bubble sort Linear search two-dimensional structure Design and create test data Translate a flowchart to code" "Define the meaning of the terms 'AI', 'machine learning' and 'robotics' Describe applications of these technologies Describe ethical issues associated with the use of these technologies Describe safety and accountability issues associated with the use of these technologies" "Define the meaning of the term 'algorithmic bias Give examples of algorithmic bias Weigh-up the benefits and drawbacks of these technologies and recommend how they should be regulated" "Define what is meant by the term 'digital footprint'

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					Explain the purpose of a user interface and describe features of a user interface Define what is meant by the term 'access control' Describe commonly used methods of authentication Select suitable access right for specified individuals" "Define what is meant by the term 'utility software' Identify different types of utility software Describe the purpose of: – file repair/recovery software – backup/recovery software – file compression software – disk defragmentation software Select which utility software tool to use for a particular task" "Define what is meant by the term 'operating system' Describe how files are organised Select appropriate permissions for specified users Define what is meant by the term 'process' Describe how an OS allocates each active process a share of CPU time Explain the role of a device driver		and give examples of activities in which digital footprints (active or passive) are generated Explain how and why organisations collect personal data Describe benefits and drawbacks of sharing personal data with other people and organisations." "Describe privacy concerns associated with the collection and use of personal data Explain why it is difficult to attribute ownership of personal data to a specific individual Define the meaning of the terms 'identity theft' and 'data misuse'" "Explain the rights of data subjects and the obligations of organisations laid down in the UK Data Protection Act Outline how the Computer Misuse Act deters criminals from stealing personal data Give examples of misuse of personal data " "Explain one ethical concern associated with the use of social media Describe how legislation helps to protect personal data from misuse Explain what is meant by the 'right to be forgotten'

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					Describe features of a GUI user interface Select a utility tool for a specified job "		can help to protect the privacy of an individual Explain how algorithmic bias can discriminate against some individuals Describe two ways in which the use of AI and machine learning impacts on employment Describe one potential societal benefit of the use of AI and machine learning "

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Summer Term 2	**Topic:** Artificial Intelligence L1 **Overview** Students will explore the importance of artificial intelligence (AI) and machine learning within society; they will explore how to create intelligent programs using block-based programming, whilst training a machine in different contexts, using different types of data. **Assessment:** Weekly online assessment Final artifact assessment	**Topic:** Artificial Intelligence L2 **Overview** Students will explore the importance of artificial intelligence and machine learning within society, they will explore how to create intelligent programs using block-based programming, whilst training a machine in different contexts, using different types of data. Students will explore how artificial intelligence is being used in medicine and the ethical arguments around adopting AI within this area. **Assessment:** Weekly online assessment Final artifact assessment	**Topic:** Artificial Intelligence L3 **Overview** Students will explore the importance of artificial intelligence and machine learning within society; they will explore how to create intelligent programs using text-based programming (Python), whilst training a machine in different contexts, using different types of data. Students will explore how application programming interfaces (APIs) are being used within industry to use data from large companies and incorporated within artificial intelligence and machine learning. **Assessment:** Weekly online assessment Final artifact assessment	**Topic:** The wider implications of digital systems **Overview** Learners should understand the wider implications of digital systems and their use. Learners should understand how legislation covering data protection, computer crimes and intellectual property has an impact on the way that organisations and individuals use digital systems and data. Learners should understand the procedures that organisations must follow in order to conform to legal requirements and professional guidelines. **Assessment:** In class assessments each lesson End of unit exam Final summer exam and mocks.	**Topic & Overview** "Describe the merge sort algorithm Merge two sorted lists (paper, code)" "Open files for reading Read lines from text files Close a file" "Split lines on commas Store items in lines as records in two-dimensional structure" "Open files for writing Construct comma-separated value line from record in two-dimensional structure Write comma separated text (records) to a file Close a file" "Define the term 'authentication' Create a flowchart for algorithm Implement authentication using a two-dimensional structure with at least two columns" "Validate input Read and write files Iterate over all records in a two-dimensional structure" "Define what is meant by the term 'cyberattack' Describe the financial, reputational and legal damage that a cyberattack can cause Describe the characteristics of and threat posed by different types of malware		

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					Describe how anti-malware works Explain why it is important to keep anti-malware up-to-date" "Define what is meant by the term 'hacker' Explain why unpatched software is a target for hackers Explain the function of a firewall Explain how ethical hacking and penetration testing help identify vulnerabilities" "Define what is meant by the term 'social engineering' Describe commonly used social engineering tactics (phishing, pretexting, baiting, quid pro quo) used by hackers Explain the purpose of an acceptable use policy and what it typically includes" "Explain how data are protected by encryption Describe how backup and recovery procedures protect against data loss Explain how access control helps to protect systems and data" "Define what is meant by the term 'robust software' Explain how a hacker can exploit a code vulnerability Describe examples of bad coding practices and secure coding practices		

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					Explain how code reviews and audit trails help to identify vulnerabilities" "Identify a type of malware Describe how anti-malware protects digital systems and data Explain how backup and recovery procedures would help an organisation withstand a ransomware attack Explain the security threat posed by unpatched software Describe the purpose of an acceptable use policy Describe two bad programming practices that could make software vulnerable to attack "		