Curriculum Area:	Computer Science

Intent

Curriculum Statement:

The Computer Science curriculum at Corby Business Academy is designed to inspire a passion for learning in all students. It will ensure that they obtain an understanding of how computers work, how to design programs for the future and how to creatively solve problems. We will equip all students with the digital literacy skills that are essential for the continuous advancements in technology.

The curriculum will focus on data representation, algorithms and programming, development, hardware and software, data and ethical and legal issues. Depth of understanding in these areas will progress each academic year, with a commitment to students obtaining sustainable knowledge that is useable throughout their lives.

There will be a commitment to inspire students to want to follow the subject at both GCSE and A Level; we also embed a curriculum that stimulates students to studying computer science beyond the Academy and achieve career pathways that are both aspirational and fulfilling.

Implementation

Year 7 - Content		Assessments		CEIAG	Personal Development	Literacy and numeracy
		Topics	Assessment type			
Term 1	• Data representation - Binary and character sets	• Binary to denary and denary to binary conversion • Binary addition • Character sets	• On screen summative assessment • Extended writing task	• Software engineer • Computer hardware engineer • Computer science teacher / lecturer • Cybersecurity expert • Data scientist • Electronics engineer • Software architect • Software engineer • Systems analyst	• Numeracy skills • Digital literacy • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy. • Numeracy – students will have an opportunity to work on basic addition and subtraction when working with binary
Term 2	• Algorithms and programming – programming with scratch	• Introduction to programming • Use of variables • sequence • Selection	• Onscreen summative assessment • Practical assessment – creating a program	• Software engineer • Computer science teacher / lecturer • Game artist • Game designer	• Digital literacy • Numeracy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will

	- Operators - Iteration - Problem solving		- Game developer - Game tester - Special effects creator - Mobile application developer - Multimedia artist - Software developer - User interface designer		need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations.
Term 3	Development – physical computing	- Using a BBC microbit - Working with inputs - Data conditions and selection - Using variables - Energy data - Night safety	- On screen assessment - Practical task	- Designer - Cybersecurity expert - eCommerce consultant - Illustrator - Information technology consultant - Web designer - Mobile application developer - Multimedia artist - New media specialist - Search engine optimization specialist	- Design skills - Numeracy skills - Environmental awareness - Road safety awareness	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Numeracy – students will work with numbers when creating their programs
Term 4	Hardware and software – Networks	- Computer networks and protocols - Networking hardware - Wired and wireless networks - The Internet - Internet services - The World Wide Web	On screen summative assessment	- Software engineer - Computer forensics investigator - Computer hardware engineer - Computer science teacher / lecturer - Computer support specialist - Electronics engineer - Network technician - Mobile application developer - Telecommunications engineer	- Digital literacy - Numeracy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy.
Term 5	Data – spreadsheet modelling	- Getting to know a spreadsheet - Creating formulas - Collecting data - Creating a spreadsheet model	- On screen summative assessment - Practical spreadsheet task	- Business intelligence analyst - Data architect - Data scientist - Database analyst - Statistical programmer	- Financial awareness - Numeracy skills - Digital literacy - Employability skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these

						• keywords and talk about what they mean. • Numeracy – students will work with numbers as when creating formulas. They will make graphs and look at values such as mean and range.
Term 6	• Ethical and legal issues – Impact of technology – collaborating online respectfully and promoting a cause	• Respectful online communication • Features of a word processor • Image licensing • Credibility of sources • Creating a blog	• Practical task – writing a blog	• New media specialist • Computer science teacher / lecturer • Cybersecurity expert • eCommerce consultant • Information technology consultant • Online media buyer	• Social awareness • Literacy skills • Digital literacy • Presentation skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – the final assessment will be a written task that will be marked for literacy

Year 8 - Content		Assessments		CEIAG	Personal Development	Literacy and numeracy
		Topics	Assessment type			
Term 1	• Data representation – hexadecimal and images	• Hexadecimal to denary conversion • Denary to hexadecimal conversion • How hexadecimal is used to display colours • How bitmap images work	• On screen summative assessment • Extended writing task	• Software engineer • Computer hardware engineer • Computer science teacher / lecturer • Cybersecurity expert • Data scientist • Electronics engineer • Software architect • Software engineer • Systems analyst	• Numeracy skills • Digital literacy • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy. • Numeracy – students will have an opportunity to work on basic addition and subtraction when working with binary and hexadecimal
Term 2	• Algorithms and programming – Introduction to python programming	• First steps • Working with numbers • Selection • Iteration • Counting loops	• On screen summative assessment • Practical programming challenge	• Software engineer • Computer forensics investigator • Computer hardware engineer • Computer science teacher / lecturer • Computer support specialist • Electronics engineer • Network technician • Mobile application developer • Telecommunications engineer	• Digital literacy • Literacy skills • Numeracy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy– writing code involves attention to detail and spelling is vitally important especially when working with variables. This will be continually emphasised to students. • Numeracy – students will have to calculate the size of images when adding the code to their webpages
Term 3	• Development – developing for the web	• Website building blocks • Adding images • Using cascading style sheets • Searching the web • Advanced web search techniques • Navigating the web	• On screen summative assessment • Practical programming challenge	• Web developer • Web designer • Software engineer • Computer science teacher / lecturer • Game artist • Game designer • Game developer	• Digital literacy • Numeracy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these

				• Special effects creator • Mobile application developer • Multimedia artist • Software developer • User interface designer		• keywords and talk about what they mean. • Literacy– writing code involves attention to detail and spelling is vitally important especially when working with variables. This will be continually emphasised to students.
Term 4	• Hardware and software – Computer systems	• What is a computer system? • Under the hood • The processor • Logic gates • Thinking machines • Sharing	• On screen summative assessment • Extended piece of writing	• Electronics engineer • Software engineer • Computer forensics investigator • Computer hardware engineer • Computer science teacher / lecturer • Computer support specialist • Network technician • Mobile application developer • Telecommunications engineer	• Digital literacy • Numeracy skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy. • Numeracy – students will work with numbers when calculating the clock speeds of multicore processors
Term 5	• Data – programming with data	• How to use python with lists • Adding, moving and modifying items • Iteration • For loops • Mini programming project	• On screen summative assessment • Practical task	• Business intelligence analyst • Data architect • Data scientist • Database analyst • Statistical programmer	• Data awareness • Numeracy skills • Digital literacy • Employability skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy. • Numeracy – students will work with numbers as when creating formulas. They will make graphs and look at values such as mean and range.

| Term 6 | • Ethical and legal issues – online safety | • The digital divide
• Artificial Intelligence
• Privacy
• E-waste
• Presenting a balanced view | • On screen summative assessment
• Extended piece of writing | • Ethical hacker
• Computer forensics investigator
• Computer science teacher / lecturer
• Cybersecurity expert
• eCommerce consultant
• Information technology consultant
• New media specialist
• Online media buyer | • Social awareness
• Literacy skills
• Digital literacy | • Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean.
• Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy.
• Numeracy – students will work with statistics when discussing ethical issues . |

Year 9 - Content		Assessments		CEIAG	Personal Development	Literacy and numeracy
		Topics	Assessment type			
Term 1	• Data representation – going audio visual	• How images are represented with binary • How colours are represented in binary • How to manipulate digital images • How sound is represented in binary • How to manipulate digital sound	• Online summative assessment	• Software engineer • Computer science teacher / lecturer • Game artist • Game designer • Game developer • Game tester • Special effects creator • Mobile application developer • Multimedia artist • Software developer • User interface designer	• Digital literacy • Numeracy skills • Computational thinking • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy. • Numeracy – students will need to use numeracy skills to see how file sizes are calculated
Term 2	• Algorithms and programming – drawing with python	• Introduction to drawing with code • Using the python turtle • Experimenting with code • Creating with code	• Online summative assessment • Practical task	• Software engineer • Computer science teacher / lecturer • Game artist • Game designer • Game developer • Game tester • Special effects creator • Mobile application developer • Multimedia artist • Software developer • User interface designer	• Numeracy skills • Digital literacy • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Numeracy – students will work with numbers when programming and will have to calculate angles, distances and co-ordinates.
Term 3	• Development – mobile app development	• Introduction to creating an app • Creating an app using app lab • Identify and fix common errors • Working with user inputs	• On screen summative assessment • Practical task	• Software engineer • Computer science teacher / lecturer • Game artist • Game designer • Game developer • Game tester • Special effects creator • Mobile application developer • Multimedia artist • Software developer • User interface designer	• Digital literacy • Design skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. • Literacy assessment – part of end of topic assessment will include a literacy task that

						- will involve a piece of extended writing that will be marked for literacy. - Numeracy – students will work with numbers when discussing bandwidth and latency
Term 4	Hardware and software – using software to complete everyday tasks	- Using email effectively - Using a word processor - Using spreadsheet software - An introduction to mail merge - Making effective presentations	Group assignment	Any career	- Digital literacy - Numeracy skills - Literacy skills - Employability skills	- Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. - Numeracy – students will work with numbers as when creating formulas in the spreadsheet lesson
Term 5	Data – data science	- Delving into data science - Global data - Statistical state of mind - Data for action - Clean it up - Make a change	- Online multiple choice - Literacy assessment	- Business intelligence analyst - Data architect - Data scientist - Database analyst - Statistical programmer	- Legislative awareness of issues relating to computing - Awareness of computing's impact on privacy - Literacy skills - Digital literacy	- Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean. - Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy. - Numeracy – students will work with statistics when discussing ethical issues

| Term 6 | • Ethical and legal issues - cybersecurity | • You and your data
• Social engineering
• Script kiddies
• Rise of the bots
• Malware
• Under attack | • Online summative assessment
• Literacy assessment | • Ethical hacker
• Computer forensics investigator
• Computer science teacher / lecturer
• Cybersecurity expert
• eCommerce consultant
• Information technology consultant
• New media specialist
• Online media buyer | • Social awareness
• Literacy skills
• Digital literacy
• | • Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. There will be an opportunity in lessons to discuss these keywords and talk about what they mean.
• Literacy assessment – part of end of topic assessment will include a literacy task that will involve a piece of extended writing that will be marked for literacy.
• Numeracy – students will work with statistics when discussing ethical issues . |

Year 10 - Content		Assessments		CEIAG	Personal Development	Literacy and numeracy
		Topics	Assessment type			
Term 1	• Computer systems – system architecture	• Defining what is a computer system • Common CPU components and their function • Von Neumann architecture • The fetch-decode-execute cycle • CPU performance • Embedded systems	• Past paper exam questions	• Software engineer • IT consultant • Computer science teacher / lecturer • Game artist • Game designer • Game developer • Game tester • Special effects creator • Mobile application developer • Multimedia artist • Software developer • User interface designer	• Digital literacy • Numeracy skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
	• Programming fundamentals - sequence	• Translators • Sequence • Variables Inputs • Flowcharts	• Practical programming assignment			
Term 2	• Computer systems – memory and storage	• Primary storage • Secondary storage • Units of data storage • Binary numbers • Hexadecimal numbers • Characters • Images • Sound • Compression	• Past paper exam questions	• Software engineer • Computer forensics investigator • Computer hardware engineer • Computer science teacher / lecturer • Computer support specialist • Electronics engineer • Network technician • Mobile application developer • Telecommunications engineer	• Digital literacy • Numeracy skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers when discussing memory units and clock speeds
	• Programming fundamentals - selection	• Randomisation • Arithmetic expressions • Selection • Logical expressions • Nested selection	• Practical programming assignment			
Term 3	• Computer systems – Computer networks, connections and protocols	• Types of network • Performance factors • Roles of computers • Hardware needed • Internet technology • Network topology • Modes of connection • Encryption • IP and MAC addressing • Common protocols	• Past paper exam questions	• Software engineer • Computer forensics investigator • Computer hardware engineer • Computer support specialist • Cybersecurity expert • Electronics engineer • Information technology consultant • Systems analyst	• Digital literacy • Numeracy skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords.

	Topic	Content	Assessment	Careers	Skills	Literacy/Numeracy
	• Programming fundamentals – iteration	• While loops • Trace tables • For loops • Data validation • Pseudocode	• Practical programming assignment			• Numeracy – students will work with numbers when discussing memory units
Term 4	• Computer systems – network security	• Malware • Social engineering • Brute force attacks • Denial of service attacks • Data interception • SQL injection • Prevention methods	• Past paper exam questions	• Software engineer • Computer science teacher / lecturer • Game artist • Game designer • Game developer • Game tester • Special effects creator • Mobile application developer • Multimedia artist • Software developer • User interface designer	• Digital literacy • Numeracy skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
	• Programming fundamentals – subroutines	• Subroutines • Functions • Scope • XOR • Structured programming • Programming challenge	• Practical programming assignment			
Term 5	• Computer systems – system software	• Purpose and use of operating systems • Purpose and use of utility software	• Past paper exam questions	• Software engineer • Computer hardware engineer • Computer science teacher / lecturer • Cybersecurity expert • Data scientist • Electronics engineer • Software architect • Software engineer • Systems analyst	• Numeracy skills • Digital literacy • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
	• Programming fundamentals – strings and lists	• GUIs • String handling • Arrays and lists • List methods • Programming challenge	• Practical programming assignment			

Term 6	• Computer systems - Ethical, legal, cultural and environmental impacts	• Ethical issues • Environmental issues • Privacy issues • Cultural issues • Legislation	• Past paper exam questions	• Software engineer • Computer hardware engineer • Computer science teacher / lecturer • Cybersecurity expert • Data scientist • Electronics engineer • Software architect • Software engineer • Systems analyst	• Numeracy skills • Digital literacy • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
	• Programming fundamentals – dictionaries and data files	• Records and dictionaries • Dictionary challenge • Reading and writing to text files • Working with CSV files • Being a programmer	• Practical programming assignment			

Corby Business Academy

Quality of Education - Curriculum

Year 11 - Content	Assessments		CEIAG	Personal Development	Literacy and numeracy
	Topics	Assessment type			
Term 1 • Algorithms	• Computational thinking • Representing algorithms • Tracing algorithms • Linear search • Binary search • Comparing searching algorithms • Bubble sort • Insertion sort • Coding sorting algorithms • Merge sort • Algorithms review	• Past paper exam questions • Practical programming assignment	• Software engineer • Computer forensics investigator • Computer hardware engineer • Computer science teacher / lecturer • Computer support specialist • Cybersecurity expert • Electronics engineer • Information technology consultant • Network manager • Network technician • Network analyst • Network architect	• Digital literacy • Design skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
Term 2 • Computer systems – networks revisited • Computational thinking, algorithms and programming – producing robust programs	• What are networks? • Basic networks • Real world networks • Networks and servers • Internet and WWW • Network protocols • The IP suite and packet switching • Network speed and performance • Logic errors • Syntax errors • Arithmetic order • Debugging tools • Runtime errors • Authentication • Test plans • Test data • Black box strategy • White box strategy • Iterative testing • Final testing	• Past paper exam questions • Past paper exam questions	• Cybersecurity expert • Ethical hacker • Software engineer • Computer forensics investigator • Computer hardware engineer • Computer science teacher / lecturer • Computer support specialist • Electronics engineer • Information technology consultant • Network manager • Network technician • Network analyst • Network architect	• Digital literacy • Numeracy skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
Term 3 • Computer systems revisited	• Computer systems and system software • The CPU • The FDE cycle • Main memory • Secondary storage • Optical and magnetic storage • Selecting a storage device • Computer specifications	• PPE	• Software engineer • Computer forensics investigator • Computer science teacher / lecturer • Computer support specialist • Information technology consultant • Software architect • Software developer • Software engineer • Systems analyst	• Digital literacy • Numeracy skills • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords.

		• Logic gates • Logic problems • Assembly language				• Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
	• Computational thinking, algorithms and programming – Boolean logic • Computational thinking, algorithms and programming – databases and SQL	• Logic gates • Logic problems • Database essentials • SQL searches • Insert, update, delete • Database challenge	• Practical assignment			
Term 4	• Computer systems – data representation	• What is representation? • Number bases • Binary maths • Hexadecimal • Number base conversions • Text representation • Bitmap images • Vector images • Representation of sound	• PPE	• Computer forensics investigator • Computer science teacher / lecturer • Cybersecurity expert • eCommerce consultant • Information technology consultant • New media specialist • Online media buyer	• Environmental awareness • Legislative awareness • Digital literacy • Literacy skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will have weekly vocabulary tests that will focus on spelling and the meaning of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations
	• Computational thinking, algorithms and programming – programming languages and IDEs	• Machine code • Assembly language • High level language • Translators • Compilers • IDE features	• Past paper exam questions			
Term 5	• Revision and exam practice	• All topics • Exam techniques	• PPE	• Software engineer • Computer forensics investigator • Computer science teacher / lecturer • Computer support specialist • Information technology consultant • Software architect • Software developer • Software engineer • Systems analyst	• Digital literacy • Numeracy skills • Literacy skills	

Year 12 - Content		Assessments		CEIAG	Personal Development	Literacy and numeracy
		Topics	Assessment type			
Term 1	• Component 1 - Structure and Function of Processor • Component 2 - Thinking Abstractly • Component 1 - Types of Processor • Component 2 - Thinking Ahead	• The Arithmetic and Logic Unit; ALU, Control Unit and Registers (Program Counter; PC, Accumulator; ACC, Memory Address Register; MAR, Memory Data Register; MDR, Current Instruction Register; CIR). Buses: data, address and control • The Fetch-Decode-Execute Cycle; including its effects on registers. • The factors affecting the performance of the CPU: clock speed, number of cores, cache. • The use of pipelining in a processor to improve efficiency • "Von Neumann, Harvard and contemporary • processor architecture. • The nature of abstraction. • The need for abstraction. • The differences between an abstraction and reality. • Devise an abstract model for a variety of situations. • The differences between and uses of CISC and RISC processors. • GPUs and their uses (including those not related to graphics). • Multicore and Parallel systems. • Identify the inputs and outputs for a given situation.	• Past paper exam questions • Practical programming assignments	• Artificial intelligence specialist • Software engineer • Computer forensics investigator • Computer hardware engineer • Computer science teacher / lecturer • Electronics engineer • Game developer • Network technician • Software architect • Software developer • Software engineer • Systems analyst	• Numeracy • Literacy • Digital literacy • Problem solving skills • Employability skills • Independent study skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

		Determine the preconditions for devising a solution to a problem. • The nature, benefits and drawbacks of caching. • The need for reusable program components.				
Term 2	• Component 1 - Data Types • Component 2 - Thinking Procedurally	• Primitive data types, integer, real/floating point, character, string and Boolean. • Represent positive integers in binary. • Use of sign and magnitude and two's complement to represent negative numbers in binary. • Addition and subtraction of binary integers. • Represent positive integers in hexadecimal. • Convert positive integers between binary hexadecimal and denary. • Representation and normalisation of floating point numbers in binary. • Floating point arithmetic, positive and negative numbers, addition and subtraction. • Bitwise manipulation and masks: shifts, combining with AND, OR, and XOR. • Positive and negative real numbers using normalised floating point representation • How character sets (ASCII and UNICODE) are used to represent text. • Identify the components of a problem. • Identify the components of a solution to a problem.	• Past paper exam questions • Practical programming assignments	• Computer science teacher / lecturer • Cybersecurity expert • Data architect • Data scientist • Database analyst • Information technology consultant • Software engineer • Statistical programmer	• Numeracy • Literacy • Digital literacy • Problem solving skills • Employability skills • Independent study skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

		• Determine the order of the steps needed to solve a problem. • Identify sub-procedures necessary to solve a problem.				
Term 3	• Component 1 – Systems software • Component 1 – Application development • Component 3 - Analysis of the Problem	• The need for, function and purpose of operating systems. • Memory Management (paging, segmentation and virtual memory). • Interrupts, the role of interrupts and Interrupt Service Routines (ISR), role within the Fetch-Decode-Execute Cycle. • Scheduling: round robin, first come first served, multi-level feedback queues, shortest job first and shortest remaining time. • Distributed, embedded, multi-tasking, multi-user and Real Time operating systems. • BIOS. • Device drivers. • Virtual machines, any instance where software is used to take on the function of a machine, including executing intermediate code or running an operating system within another. • The nature of applications, justifying suitable applications for a specific purpose. • Utilities. • Open source vs. closed source. • Translators: Interpreters, compilers and assemblers.	• Past paper exam questions • Practical programming assignments • Programming project	• Software engineer • Designer • Game designer • Game developer • Web designer • Mobile application developer • Software architect • Software developer • Software engineer	• Numeracy • Literacy • Digital literacy • Problem solving skills • Employability skills • Independent study skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

		• Stages of compilation (lexical analysis, syntax analysis, code generation and optimisation). • Linkers and loaders and use of libraries. • Describe and justify the features that make the problem solvable by computational methods. • Explain why the problem is amenable to a computational approach. • Identify and describe those who will have an interest in the solution explaining how the solution is appropriate to their needs (this may be named individuals, groups or persona that describes the target end user). • Research the problem and solutions to similar problems to identify and justify suitable approaches to a solution. • Describe the essential features of a computational solution explaining these choices. • Explain the limitations of the proposed solution. • Identify the points in a solution where a decision has to be taken. • Determine the logical conditions that affect the outcome of a decision • Determine how decisions affect flow through a program.			
Term 4	• Component 1 - Software Development • Component 1 - Compression,	• Understand the waterfall lifecycle, agile methodologies, extreme programming, the spiral	• Past paper exam questions • Practical programming assignments • Programming project	• Software engineer • Computer forensics investigator • Computer science teacher / lecturer • Cybersecurity expert • Data architect	• Numeracy • Literacy • Digital literacy • Problem solving skills • Employability skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students

Encryption and Hashing • Component 2 - Thinking Logically	model and rapid application development. • The relative merits and drawbacks of different methodologies and when they might be used. • Writing and following algorithms. • Different test strategies, including black and white box testing and alpha and beta testing • Test programs that solve problems using suitable test data and end user feedback, justify a test strategy for a given situation. • Lossy vs. Lossless compression. • Run length encoding and dictionary coding for lossless compression. • Symmetric and asymmetric encryption. • Different uses of hashing. • Identify the points in a solution where a decision has to be taken. • Determine the logical conditions that affect the outcome of a decision. • Determine how decisions affect flow through a program.		• Game designer • Software architect • Software developer • Software engineer • User interface designer	• Independent study skills	will create a glossary of definitions of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

Term 5	• Component 1 - Types of Programming Language
	• Component 2 - Thinking Concurrently
	• Component 3 – Design of the solution
		• Need for and characteristics of a variety of programming paradigms.
		• Procedural languages:
		  − program flow
		  − variables and constants
		  − procedures and functions
		  − arithmetic, Boolean and assignment
			• Past paper exam questions
			• Practical programming assignments
			• Programming project
				• Software engineer
				• Designer
				• Computer science teacher / lecturer
				• Cybersecurity expert
				• Game designer
				• Information technology consultant
				• Network technician
				• Software architect
				• User interface designer
					• Numeracy
					• Literacy
					• Digital literacy
					• Problem solving skills
					• Employability skills
					• Independent study skills
						• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords.
						• Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

- Operators:
  - string handling
  - file handling.
- Assembly language (including following and writing simple programs with the Little Man Computer instruction set).
- Modes of addressing memory (immediate, direct, indirect and indexed).
- Object-oriented languages with an understanding of classes, objects, methods, attributes, inheritance, encapsulation and polymorphism.
- Determine the parts of a problem that can be tackled at the same time.
- Outline the benefits and trade offs that might result from concurrent processing in a particular situation.
- Break down the problem into smaller parts suitable for computational solutions justifying any decisions made.
- Explain and justify the structure of the solution
- Describe the parts of the solution using algorithms justifying how these algorithms form a complete solution to the problem.
- Describe usability features to be included in the solution.
- Identify key variables / data structures / classes justifying choices and any necessary validation.

		• Understand the waterfall lifecycle, agile methodologies, extreme programming, the spiral model and rapid application development. • The relative merits and drawbacks of different methodologies and when they might be used. • Writing and following algorithms. • Different test strategies, including black and white box testing and alpha and beta testing. • Test programs that solve problems using suitable test data and end user feedback, justify a test strategy for a given situation.				
Term 6	• Component 1 – databases • Component 2 - Programming Techniques	• Relational database, flat file, primary key, foreign key, secondary key, entity relationship modelling, normalisation and indexing. • Methods of capturing, selecting, managing and exchanging data. • Normalisation to 3NF. • SQL – Interpret and modify. • Referential integrity. • Transaction processing, ACID (Atomicity, Consistency, Isolation, Durability), record locking and redundancy. • Programming constructs: sequence, iteration, branching. • "Recursion, how it can be used and compares to an • iterative approach." • Global and local variables.	• Past paper exam questions • Practical programming assignments • Programming project	• Software engineer • Computer forensics investigator • Computer science teacher / lecturer • Cybersecurity expert • Data architect • Data scientist • Database analyst • eCommerce consultant • Information technology consultant • Software architect • Software developer • Software engineer • Statistical programmer	• Numeracy • Literacy • Digital literacy • Problem solving skills • Employability skills • Independent study skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

	• "Modularity, functions and procedures, parameter • passing by value and by reference." • Use of an IDE to develop/debug a program. • Use of object oriented techniques.	

Year 13 - Content		Assessments		CEIAG	Personal Development	Literacy and numeracy
		Topics	Assessment type			

Term 1	• Component 1 - networks
	• Component 1 – web technologies
	• Component 2 – software development
	• Component 3 – Developing the solution
		• Characteristics of networks and the importance of protocols and standards.
		• "The internet structure:
		  – The TCP/IP Stack.
		  – DNS
		  – Protocol layering.
		  – LANs and WANs.
		  – Packet and circuit switching."
		• Network security and threats, use of firewalls, proxies and encryption.
		• Network hardware.
		• Client-server and peer to peer.
		• HTML, CSS and JavaScript.
		• Search engine indexing.
		• PageRank algorithm.
		• Server and client side processing.
		• Understand the waterfall lifecycle, agile methodologies, extreme programming, the spiral model and rapid application development.
		• The relative merits and drawbacks of different methodologies and when they might be used.
			• Past paper exam questions
			• Practical programming assignments
			• Programming project
				• Cybersecurity expert
				• eCommerce consultant
				• Web designer
				• Network manager
				• Network technician
				• Network analyst
				• Network architect
				• Mobile application developer
				• Search engine optimization specialist
				• Software architect
				• Software developer
				• Software engineer
				• User interface designer
					• Numeracy
					• Literacy
					• Digital literacy
					• Problem solving skills
					• Employability skills
					• Independent study skills
						• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords.
						• Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

		• Writing and following algorithms. • Different test strategies, including black and white box testing and alpha and beta testing • Test programs that solve problems using suitable test data and end user feedback, justify a test strategy for a given situation. • Provide annotated evidence of each stage of the iterative development process justifying any decision made. • Provide annotated evidence of prototype solutions justifying any decision made. • Provide annotated evidence for testing at each stage justifying the reason for the test. • Provide annotated evidence of any remedial actions taken justifying the decision made.				
Term 2	• Component 1 - Data Types • Component 1 – Boolean algebra • Component 2 - Computational Methods	• Primitive data types, integer, real/floating point, character, string and Boolean. • Represent positive integers in binary. • Use of sign and magnitude and two's complement to represent negative numbers in binary. • Addition and subtraction of binary integers. • Represent positive integers in hexadecimal. • Convert positive integers between binary hexadecimal and denary.	• Past paper exam questions • Practical programming assignments • Programming project	• Computer science teacher / lecturer • Data architect • Data scientist • Database analyst • Statistical programmer	• Numeracy • Literacy • Digital literacy • Problem solving skills • Employability skills • Independent study skills	• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords. • Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

		- Representation and normalisation of floating point numbers in binary. - Floating point arithmetic, positive and negative numbers, addition and subtraction. - Bitwise manipulation and masks: shifts, combining with AND, OR, and XOR. - Positive and negative real numbers using normalised floating point representation - How character sets (ASCII and UNICODE) are used to represent text. - Define problems using boolean logic. - Manipulate Boolean expressions, including the use of Karnaugh maps to simplify Boolean expressions - Use the following rules to derive or simplify statements in Boolean algebra: De Morgan's Laws, distribution, association, commutation, double negation. - Using logic gate diagrams and truth tables. - The logic associated with D type flip flops, half and full adders. - Features that make a problem solvable by computational methods. - Problem recognition. - Problem decomposition. - Use of divide and conquer. - Use of abstraction. "Learners should apply their knowledge of: - backtracking - data mining				

	- heuristics - performance modelling - pipelining - visualisation to solve problems.				
Term 3	- Component 1 - Computing related legislation - Component 2 - Algorithms - Component 3 – evaluation	- The Data Protection Act 1998. - The Computer Misuse Act 1990. - The Copyright Design and Patents Act 1988. - The Regulation of Investigatory Powers Act 2000. - Analysis and design of algorithms for a given situation. - The suitability of different algorithms for a given task and data set, in terms of execution time and space. - Standard algorithms (bubble sort, insertion sort, binary search and linear search). - Standard algorithms (quick sort, Dijkstra's shortest path algorithm, A* algorithm, binary search). - Implement bubble sort, insertion sort. - Implement binary and linear search. "Representing, adding data to and removing data from queues and stacks." - Measures and methods to determine the efficiency of different algorithms, Big O notation (constant, linear, polynomial, exponential and logarithmic complexity). - Algorithms for the main data structures, (stacks, queues, trees, linked lists, depth-first (post-order)	- Past paper exam questions - Practical programming assignments - Programming project	- Business intelligence analyst - Computer forensics investigator - Computer science teacher / lecturer - Computer support specialist - Cybersecurity expert - Database analyst - eCommerce consultant - New media specialist - Online media buyer - Search engine optimization specialist	- Numeracy - Literacy - Digital literacy - Problem solving skills - Employability skills - Independent study skills	- Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords. - Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

		and breadth-first traversal of trees). • Comparison of the complexity of algorithms. • Compare the suitability of different algorithms for a given task and data set. • Provide annotated evidence of testing the solution of robustness at the end of the development process. • Provide annotated evidence of usability testing (user feedback). • Use the test evidence from the development and post development process to evaluate the solution against the success criteria from the analysis. • Provide annotated evidence of the usability features from the design, commenting on their effectiveness. • Discuss the maintainability of the solution. • Discuss potential further development of the solution.			

Term 4	• Component 1 - Moral and Ethical Issues	• The individual moral, social, ethical and cultural
		• opportunities and risks of digital technology:
		  – Computers in the workforce.
		  – Automated decision making.
		  – Artificial intelligence.
		  – Environmental effects.
		  – Censorship and the Internet.
		  – Monitor behaviour.
		  – Analyse personal information.
			• Past paper exam questions
			• Practical programming assignments
			• Programming project final submission
				• Business intelligence analyst
				• Computer forensics investigator
				• Computer science teacher / lecturer
				• Computer support specialist
				• Cybersecurity expert
				• eCommerce consultant
				• Information technology consultant
				• Network analyst
					• Numeracy
					• Literacy
					• Digital literacy
					• Problem solving skills
					• Employability skills
					• Independent study skills
						• Focus on keywords – there will be a list of keywords for the topic that all students will need to learn. Students will create a glossary of definitions of keywords.
						• Numeracy – students will work with numbers as part of their programming when changing variable values or performing calculations

		– Piracy and offensive communications. – Layout, colour paradigms and character sets.				
Term 5	• Revision and exam techniques		• Use of PPE papers to close gaps			
Term 6	• Revision and exam techniques		• Use of PPE papers to close gaps			