The Computing KS4 Curriculum at TAL

Computing Curriculum Overview

The Key Stage 4 Computing curriculum at TAL provides a robust, two-year programme that interleaves theoretical knowledge with practical programming application to strengthen long-term retention and deepen understanding. Students study both GCSE Computer Science and BTEC pathways, building on Key Stage 3 foundations in systems architecture, programming fundamentals, data representation, networks and online safety. Across Year 10 and Year 11, learners revisit key concepts such as CPU architecture, memory and storage, algorithms, data handling, and network security while progressively developing skills in Python programming, algorithmic thinking, and problem-solving. The curriculum is intentionally sequenced so that students engage in continual recall and application—balancing Paper 1 theory with Paper 2 programming practice each term—to ensure fluency in both the conceptual and technical aspects of the subject. Alongside this, ethical, legal, cultural and environmental issues surrounding technology are explored, preparing students to understand the wider impact of digital systems on society. For BTEC learners, structured components guide students through user interface design, data handling, cyber security, modern technologies, and enterprise-focused project work, culminating in controlled assessments that develop independence, digital literacy and professional readiness. This coherent and carefully staged curriculum ensures all students are equipped with the knowledge, skills and confidence needed for further study and the evolving digital world.

Phase 2 Overview – Computer Science

Year	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
10	**<u>Paper 1:</u>** **Systems Architecture –** • What is a CPU? • What are the common components of a CPU? • What is the Von Neumann System Architecture and how has it influenced ALL modern computer systems? • What are the common characteristics of a CPU? Clock speed, cache size, cores. • Embedded systems and their purpose. **<u>Paper 2:</u>** **Programming Fundamentals –** • Python programming recap. • Writing inputs and outputs. • Variables, constants, arrays, lists etc. • Mathematical operators. • Data types and how to assign and cast values. • How to generate random numbers. • Sequence, Selection and Iteration. • How to read from, and write to files from programs.	**<u>Paper 1:</u>** **Memory and storage –** • What is Primary storage? What are the different types? • What is Secondary storage? What are the common types of secondary storage? What are the advantages and disadvantages of each type of secondary storage? • What is binary and how does it link to the CPU? • How do we convert binary to and from decimal numbers? **<u>Paper 2:</u>** **Programming Fundamentals –** • Database introduction. • How to create tables and link them in a database. • How to access a database from a program. • SQL. **Algorithms –** • Reading and writing algorithms – flow diagrams, pseudocode etc.	**<u>Paper 1:</u>** **Memory and storage –** • How do we add binary numbers together? • What is a binary shift and what happens when we shift to two places left or right? • What is a hexadecimal number? • How do we convert numbers to and from decimal, binary and hexadecimal? • What is a character set and how does it link to binary? • How do computers save images? • How do computers save sounds? **<u>Paper 2:</u>** **Algorithms –** • Common sorting algorithms (bubble, merge and insertion). • Common searching algorithms (binary and linear). **Writing Robust Programs -** • Defensive designs • Input validation and sanitisation • Maintainability of our code.	**<u>Paper 1:</u>** **Memory and storage –** • What is compression? **Computer networks, connections and protocols -** • What are Local and Wide Area Networks? (LAN and WAN) • What is a STAR or MESH network topology? • What hardware do you need for a network? **<u>Paper 2:</u>** **Writing Robust Programs -** • Defensive designs • Input validation and sanitisation • Maintainability of our code. • Testing our code	**<u>Paper 1:</u>** **Computer networks, connections and protocols -** • What is the internet and how does it work? (IP and addressing) • Wired vs Wireless networks – what are the uses, benefits and drawbacks of each? How do they differ? • What are network protocols? What are the common protocols? • What is network protocol layer? How does layering work and why is it useful? **Network Security –** • What network vulnerabilities exist? **<u>Paper 2:</u>** **Programming Project –** • Evidence of analysis, planning, writing, testing and evaluation of a programming project.	**<u>Paper 1:</u>** **Network Security –** • How do we identify and prevent network vulnerabilities? **System Software –** • What are operating systems? • What are the main components of an operating system? • What is utility software? **<u>Paper 2:</u>** **Programming Practice –** • Students will spend some time finalising their project and looking back over the topics to practice skills.
11	**<u>Paper 1:</u>** **Ethical, legal, cultural and environmental impacts of digital technology –** • Ethical issues of technology in society. • Legal issues of technology in society. • Cultural issues surrounding technology. • Environmental issues surrounding the use of technology. • Privacy issues surrounding technology. **<u>Paper 2:</u>** **Programming Fundamentals –** • Recap of the various skills surrounding the programming unit. • How to decompose problems and write algorithms for specific needs	**<u>Paper 1:</u>** **Ethical, legal, cultural and environmental impacts of digital technology –** • The Data Protection Act. • Computer Misuse Act. • Copyright Designs and Patents Act. • Software licencing. **<u>Paper 2:</u>** **Programming Fundamentals –** • File management – reading and writing files. • Data types, including lists and arrays and how to use them correctly in a program.	**<u>Paper 1:</u>** **Exam Preparation and Revision** Students will spend these last two terms working on strategic topics that we have identified during the course as areas of focus. We will look at exam technique: including how to correctly answer questions and how to decode what we are being asked in the papers. **<u>Paper 2:</u>** **Exam Preparation and Revision** As well as the above, for paper 2 we will also look at how to write code in the exam. We will look at the OCR Exam Reference Language and how this is used both in questions from the exam board, but also in our own responses to questions.			

Traditionally I have delivered GCSE Computing as two discreet units: Students would start Year 10 by learning the entirety of paper 2. This meant that all of the programming knowledge and practice was constrained to their first year of study. Students who practiced these skills throughout the course did well in paper 2, however others suffered due to a lack of practice.

GCSE Computing at TAL therefore has now been designed to be taught over two years, with each term broken into a split of paper 1 and paper 2 based lessons.

This is to ensure that students constantly stress their schema and have to recall prior learning. The effect here is that key knowledge is not lost, as well as a more balanced and broad set of lessons each term for students.

Most aspects of the programming paper have been taught in some form during the course of Key Stage 3, therefore most new delivery at Key Stage 4 is a continuation of the recall process.

	• How to correct plan for, and counteract problems both in the code and with end users. • How to test our code			

Paper 1 (theory) Topics

Year 10 Computer Science								
Topic	**Enquiry Question**	**Composite**	**Components (Disciplinary Knowledge)**	**National Curriculum Link:**	**Rationale: Why this, why here, why now?**	**Breadth and Depth: Wider links to curriculum/world/cultural capital**	**Academic Vocabulary: Key Tier 3 Language**	**Academy Key Drivers: Empower, Literacy, Diversity, PD, Voice**
Systems architecture	**What is a computer?**	• To learn about the essential components of a computer.	• What is a CPU? • What are the common components of a CPU? • What is the Von Neumann System Architecture and how has it influenced ALL modern computer systems? • What are the common characteristics of a CPU? Clock speed, cache size, cores. • Embedded systems and their purpose.	**Develop their capability, creativity and knowledge in computer science, digital media and information technology**	**Before students learn anything else in the GCSE about computers and components, they have to understand how the brain of the computer works.** **This first unit in the GCSE for Computer Science is therefore the foundation for most of the learning that takes place this year.**	**Building directly on what has been taught in Key Stage 3 with regards to computer types, input, output, as well as hardware and software.**	**Hardware Software Process Instruction Fetch Decode Execute Cycle**	**Empower:** As will all topic booklets; there will be a section with links to jobs within the industry based on specific lessons. **Literacy:** As part of exam prep, students will answer extended writing questions. This will include careful dissection of command verbs and how to link arguments.
Memory and storage	**What is memory and why does a computer require it?**	• To learn about the different types of storage that a computer system uses.	• What is Primary storage? What are the different types? • What is Secondary storage? What are the common types of secondary storage? What are the advantages and disadvantages of each type of secondary storage? • What is binary and how does it link to the CPU? • How do we convert binary to and from decimal numbers? What is compression?		**As we have looked at the CPU and now understand that it processes the instructions that we will also be programming in practical lessons, it is time to think about where those instructions are stored.** **This unit allows students to learn about where the computer will save programs, before then breaking down binary into the key parts that they have already studied in KS3 lessons.**	**Building directly on what has been taught with regards to computation and hardware and software in Key Stage 3.**	**Storage Volatile Primary Secondary Capacity Reliability**	
Computer networks	**Wha is a computer network and how do they work?**	• To learn about computer networks and how they work.	• What are Local and Wide Area Networks? (LAN and WAN) • What is a STAR or MESH network topology? • What hardware do you need for a network? • What is the internet and how does it work? (IP and addressing) • Wired vs Wireless networks – what are the uses, benefits and drawbacks of each? How do they differ? • What are network protocols? What are the common protocols? What is network protocol layer? How does layering work and why is it useful?	**Understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.**	**Now that students have an understanding of how a computer works and where it saves data, it is time to think about how they share data with one another.** **Not only that, but when thinking about the ethical aspects of Computer Science later in the course, it is vital to know how the internet works.**	**Building the knowledge developed in Year 8 and 9 regarding networks and the internet, as well as the WWW.**	**Topology Connection Transfer Wireless Local Global Protocol**	
Network Security	**How can we protect a computer network?**	• To learn about ways in which we can keep a computer network secure.	• What network vulnerabilities exist? • How do we identify and prevent network vulnerabilities?		**Now that students understand what a network is, they have to start to think about the dangers of networks and connected computers.**	**Building on Key Stage 3 e-safety topics, as well as directly linking to knowledge regarding the internet from year 9.**	**Vulnerability Prevention**	

Year 11 Computer Science								
Topic	**Enquiry Question**	**Composite**	**Components (Disciplinary Knowledge)**	**National Curriculum Link:**	**Rationale: Why this, why here, why now?**	**Breadth and Depth: Wider links to curriculum/world/cultural capital**	**Academic Vocabulary: Key Tier 3 Language**	**Academy Key Drivers: Empower, Literacy, Diversity, PD, Voice**

Ethics and legal implications of computer science.	**How is technology impacting on the world?**	• To learn about the implications of rapidly expanding technological progress.	• Ethical issues of technology in society. • Legal issues of technology in society. • Cultural issues surrounding technology. • Environmental issues surrounding the use of technology. • Privacy issues surrounding technology. The Data Protection Act. • Computer Misuse Act. • Copyright Designs and Patents Act. • Software licencing.	**understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.**	**The final topic of the specification builds on the knowledge of the components of a computer, in a way that discusses how quickly technology is developing. This then feeds into the discussion of where e-waste goes, as well as how technology is impacting on workforces.**	**There is a direct link here to work that students have completed in the Build, as well as PD sessions with regards to recycling, but also in the idea of ethics and morality.**	**Licence Copyright Proprietary**	**Empower:** As will all topic booklets; there will be a section with links to jobs within the industry based on specific lessons. Personal Development: Students will have to consider ethics and morality in this topic. They will have to think about where e-waste goes, as well as automation of tasks.

Phase 2 Overview – BTEC Digital Information

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
10	Component 1 Teaching: During this first term, students will learn the fundamental knowledge that they will need in order to successfully complete their first piece of coursework. We will cover user interface design and the various factors that influence this. Students will then have the opportunity to actually develop their own user interfaces in order to develop their skills as well as their knowledge. They will also learn about project development; with a focus on the planning stages and the ways in which we prepare for a project. As part of the component, students will also learn to review existing user interfaces, so that they may be better equipped to develop their own.	Component 1 Practice Assessment: Students are given a practice component assessment. They will work through the stages of the assessment in the same way as the final task. This prepares students for the rigour of the actual coursework, but in a more comfortable environment where it is ok to ask for help when needed.	Component 1 Final Assessment: Students will now work through the Pearson Set Assignment (PSA). They have a set amount of time to complete the tasks that are required, with work completed under controlled, exam-like conditions.	Component 1 Final Assessment: Following general feedback to the entire class from key points that have been found, students will now have a second attempt to develop their PSA coursework. They are allowed to create new content, or edit their old work, but again, this is completed under strict conditions.	Component 2 Teaching: Following the completion of the first component, students will move on to the second coursework unit. We will cover the characteristics of data and how it is collected, stored and analysed. We will look at our responsibility to protect data and how to effectively ensure, as best we can, that no unauthorised users can access it.	Component 2 Teaching: Continuing from last term, we will end Year 10 by looking at data analysis in full. We will look at tools that are available to us to process data. We will look at how to produce user-friendly documents and dashboards to present this information as well once it has been processed from raw data. Finally we will learn about data analysis. We will learn how to draw conclusions from data and how to effectively report on these.

	Term 1	**Term 2**	**Term 3**	**Term 4**
11	**Component 2 Final Assessment:** **Students will now work through the Pearson Set Assignment (PSA).** **They have a set amount of time to complete the tasks that are required, with work completed under controlled, exam-like conditions.**	**Component 1 Final Assessment:** **Following general feedback to the entire class from key points that have been found, students will now have a second attempt to develop their PSA coursework.** **They are allowed to create new content, or edit their old work, but again, this is completed under strict conditions.**	**Component 3 Teaching:** **We will now prepare for the final component in these final terms. We will cover the various topics of component 3, including:** **Modern technologies and their impact on the world.** **Cyber security and both threats and preventive measures that are available. How to set policies that restrict issues from occurring**	**Component 3 Teaching:** **Continuing our development of knowledge for component 3, in this term we will look at the legal and ethical topics that surround modern technology.** **Finally we will learn about forms of notation in information technology; such as data flow, flow diagrams, system diagrams, tables and written information.**

Phase 2 Overview – BTEC Enterprise

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
10	Component 1 Teaching:	Component 1 Practice Assessment:	Component 1 Final Assessment:	Component 1 Final Assessment:	Component 2 Teaching:	Component 2 Practice Assessment:

	During this first term, students will learn the fundamental knowledge that they will need in order to successfully complete their first piece of coursework. We will cover initially what small and medium-sized enterprise actually are. This will allow students to successfully select one for their assessment. We will look at different markets and sectors that enterprise covers, as well as the common aims for enterprises. We will study the use of market research techniques, as well as how to properly conduct our own market research. We will take this further, by then looking at how our research affects our own Enterprises through the decisions that we make.	Students are given a practice component assessment. They will work through the stages of the assessment in the same way as the final task. This prepares students for the rigour of the actual coursework, but in a more comfortable environment where it is ok to ask for help when needed.	Students will now work through the Pearson Set Assignment (PSA). They have a set amount of time to complete the tasks that are required, with work completed under controlled, exam-like conditions.	Following general feedback to the entire class from key points that have been found, students will now have a second attempt to develop their PSA coursework. They are allowed to create new content, or edit their old work, but again, this is completed under strict conditions.	Following the completion of the first component, students will move on to the second coursework unit. We will start by studying the idea of what a micro-enterprise is. We will cover the way in which we can choose a micro-enterprise idea and then how to plan for it. In order to help with the development of our pitch, we will learn about how to present information properly and how to then review our own presentations.	Just like we did in term 2; students are given a practice component assessment. They will work through the stages of the assessment in the same way as the final task. This gives them the chance to see how data can be developed and how we can push forwards with a micro-enterprise before completing the actual assessment at the start of year 11.

	Term 1	Term 2	Term 3	Term 4
11	Component 2 Final Assessment: Students will now work through the Pearson Set Assignment (PSA). They have a set amount of time to complete the tasks that are required, with work completed under controlled, exam-like conditions.	Component 1 Final Assessment: Following general feedback to the entire class from key points that have been found, students will now have a second attempt to develop their PSA coursework. They are allowed to create new content, or edit their old work, but again, this is completed under strict conditions.	Component 3 Teaching: We will now prepare for the final component in these final terms. We will cover the various topics of component 3, including: Marketing activities. This includes things such as how to target a market, the 4Ps of the marketing mix, factors that influence the choice of marketing and trust. We will also start to look at financial documents and statements.	Component 3 Teaching: Continuing our development of knowledge for component 3, in this term we will look at payment methods and revenue and costs of enterprises, as well as profitability and liquidity, Finally we will look at financial planning and forecasting for enterprises. We will look at budgeting, cash flow, suggesting improvements to cash flow, as well as break-even points and break-even analysis.