Swindon Academy Computer Science & Creative iMedia Curriculum Map

Intent - Computer Science

The computer science curriculum aims to provide students with a deep understanding of all things to do with computers, from the basics such as simple logic and computer functionality through to advanced topics such as cybersecurity and networking. Through these topics and a continual and growing focus on applying their knowledge to problem solving, students will necessarily become critical thinkers. These thinkers will be able to analyse challenges in real-world scenarios and apply their understanding of computers in the modern world.

Students are initially taught the basics of algorithms and working through and solving problems step by step which leads perfectly into programming where they are able to apply and develop their problem-solving skills with real-world challenges and immediate real-time feedback. Whilst continually practicing programming, the students will go on to data representation and how computers understand and work with numbers and data such as images and sound. Then there is a focus on computer systems themselves and how they physically operate before moving onto the networking of multiple computer systems. Building on from this, the students will explore cybersecurity and the wider impact of computers in the world. The final stage of the curriculum covers databases, including the practical creation and use of which along with their applications throughout the world.

There are a wide range of extra-curricular opportunities for students to engage with, including the programming of robots and a project where the students can create and explore each other's games with one another. Students who wish to can also attend TED talks which are open to all year groups, these explore interesting topics such as Artificial Intelligence in games etc. Cross-curricular trips are planned with Business and iMedia to experience and learn about computers in real-world environments.

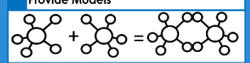
Intent - Creative iMedia

The purpose of the creative imedia curriculum is to enrich our students with a range of practical, digital creation skills, such as photo editing and website design. This is provided in a business and marketing context which demonstrates real-world connections to and practical applications for these skills. Students will become confident digital content creators who will practice with and grow increasingly capable of working on large projects, designing products to meet client requirements.

Students are initially taught the basics of project development, including how to analyse a client's requirements and meet the needs of the target audience. This goes through a range of pre-production documents which help design and plan a digital product. After learning the basics, students move on to understanding computers and how to work with them before learning how to manipulate images and photos and create their own digital graphics. Once they have created their graphics, students will then design their own websites and compose their own audio files. Each of these creative sections are assessed through projects which last for multiple weeks.

There are a wide range of extra-curricular opportunities for students to engage with, including competitions where students can create their own digital products to meet a client brief and then vote on the products they believe best. Cross-curricular trips are planned with Business and Computer Science to experience and learn about digital products in real-world environments.

Implementation – Rosenshine principles of instruction – *please write one or two sentences to describe the implementation for each of the Rosenshine principles below these must be subject specific and observable in lessons.*

Daily Review	New Material in Small Steps	Ask Questions	Provide Models	Guide Student Practice	Check Student Understanding	Obtain High Success Rate	Scaffolds for Difficult Tasks	Independent Practice	Weekly and Monthly Review
 Daily review is an important component of instruction. It helps strengthen the connections of the material learned. Automatic recall frees working memory for problem solving and creativity.	 Our working memory is small, only handling a few bits of information at once. Avoid its overload—present new material in small steps and proceed only when first steps are mastered.	 The most successful teachers spend more than half the class time lecturing, demonstrating and asking questions. Questions allow the teacher to determine how well the material is learned.	 Students need cognitive support to help them learn how to solve problems. Modelling, worked examples and teacher thinking out loud, help to clarify the specific steps involved.	 Students need additional time to rephrase, elaborate and summarise new material in order to store it in their long-term memory. More successful teachers build in more time for this.	 Less successful teachers merely ask "Are there any questions?" no questions are taken to mean no problems. False. By contrast, more successful teachers check on all students.	 A success rate of around 80% has been found to be optimal, showing students are learning and also being challenged. Better teachers taught in small steps followed by practice.	 Scaffolds are temporary supports to assist learning. They can include modelling, teacher thinking aloud, cue cards and checklists. Scaffolds are part of cognitive apprenticeship.	 Independent practice produces 'overlearning' - a necessary process for new material to be recalled automatically. This ensures no overloading of students' working memory.	 The effort involved in recalling recently –learned material embeds it in long-term memory. And the more this happens, the easier it is to connect new material to such prior knowledge.
TLAC: Do Now, Exit ticket, Quizzing. Do Now consists of four questions, all review from previous teaching. Answers are checked via cold call or whiteboards. KIP quizzes and KPI tests. Exit tickets planned.	TLAC: What to do, Name the steps, I do we do you do. Teachers will provide steps/instructions to ensure logic and understanding of students.	TLAC: No opt out, cold call, right is right, stretch it. Teachers will use the phrases and plan questions being asked. Thinking about what the outcome of the questions should be in all abilities.	TLAC: Name the steps, I do we do you do, using the visualiser, show call. Demo's will be given and clarification on steps to complete tasks. Teacher will observe and use student answers for discussion.	TLAC: Exam-Style questions after each chunk of learning in order to practice and model the correct answers.	TLAC: Circulate-check-respond, show me, tracking not watching, reject self-report. Teachers will circulate and observe students working. Whiteboards should be in use and shown to the teacher on request. Be focused on what you are looking for in your observations/give feedback to support mastering of the topic.	TLAC: I do we do you do, 100%, no opt out, SLANT, Circulate-check-respond. Teachers should observe, check and stop learning if misconceptions are identified. All should participate in checking of understanding which is construed by questioning.	TLAC: Break it down, name the steps, turn and talk, build stamina. This should be visible throughout the entire lesson. There will be elements of demo from teachers and students. There should be pair work and opportunity for discussion whilst written and computer work is being undertaken.	TLAC: Build stamina, show call, SLOP – Share lots of practice. Students will be given silent time to formulate ideas and produce work independently. The teacher will observe and share good practice when they see fit during the lesson.	TLAC: Do now, Exit ticket, Quizzing, This will be visible in the questioning and structure of do nows. Students will be recalling concepts as they progress through the syllabus therefore recalling will be visible as students will be referring to work they have previously created.

Term	1	2	3		3	4	5	6		6
Year 10	GCSE Computer Science: Unit 1 & 2: Fundamentals of algorithms & Programming. Unit 1 introduces algorithms and breaking down a problem. This includes computational thinking which benefits other subjects as it teaches how to approach problems and find solutions. Students will learn flowcharts and Pseudocode which are forms of strategy in how to break down a problem. Unit 2 is the main learning in these terms. This introduces and teaches students how to code and complete problems in a programming language (Python). Students will learn the theory behind the language and the technical programming skills of Python. They will learn how to build programs for different purposes, e.g. to complete arithmetic, file manipulation etc. At the end of the learning students will be given programming problems which accumulate the learning from these units and will be a walkthrough of what is to come next term in their actual NEA. Skills will be maintained and improved throughout the rest of the curriculum until the NEA itself is complete in Y11.			**Assessment 1 – Made paper focusing on U3/4**	**Review and reteach**	GCSE Computer Science: Unit 3 & 4: Data Representation & Computer Systems Unit 4 will be taught first. This unit focuses on how the computer is built and what components make up the computer system. Pupils will study the Von Neumann architecture and link this to how the memory is used. They will investigate how data is sent through this system and look inside the intricate workings of the CPU and other components. Students will focus on hardware and software which are essential to the computer systems functions. They will study what the role is of system software and how it works within the whole system. Unit 4 builds on unit 3 and has a focus on how data is stored and used with the computer. It starts with binary and how the computer converts decimal and hexadecimal into its own language to conserve memory. It moves forward into memory and how much you can store in each memory allocation. Binary arithmetic is covered. And finally, how images and text is stored and compressed to save memory and enable the computer to be the most efficient it can be.		GCSE Computer Science: Non-examined Assessment (NEA): Students will be prepared in terms 4/5 and taught how to program. As part of the GCSE students will need to complete an NEA which is provided by the exam board and students must have 20 hours to complete it. This consist of a programming problem which they will need to create in the time allocated. Students will receive booster sessions of knowledge to ensure they are enabled to complete the NEA.	**Assessment 2 – Past Paper 1**	**Review and reteach**
Year 10	Cambridge National in Creative iMedia: Unit R081: Pre-Production skills This unit is the basis of all other units in this qualification and teaches skills that are required in all other units. Students will learn what documents and planning requirements there are when creating iMedia. This includes the uses and purpose of mood boards, mind maps, visualisation diagrams, story boards and scripts. Students will then learn how to read and interpret client requirements for pre-production including the importance of identifying the audience needs. Students will learn how to prepare a work plan and schedule which includes health and safety considerations and legislation.	Unit R081: Pre-Production skills Students will produce all the pre-production documents for a client brief. Students will review the pre-production document and identify areas for improvement. Students will sit a mock exam paper for this unit. It is a written paper.	**Assessment 1 – Mock paper for Unit R081**		Cambridge National in Creative iMedia: Unit R082: Creating Digital Graphics This unit teaches student the basics of digital graphics editing. Students will first learn about why and how digital graphics are used. They will learn about the types of graphics and the properties of digital graphics, i.e. properties such as pixel dimension etc. Secondly students will learn how to interpret a clients' requirements for a digital graphic, produce a work plan for it and identify the assets and resources needed for it. In addition, the legislation that goes with using digital graphics will also be taught. Thirdly students will now create a digital graphic. Finally, students will review and identify improvements for the digital graphic. Students will practice the creating the documents necessary to fulfil the assignment briefs using similar scenarios. Students will then be fully prepared to complete the documents necessary for the actual assignment brief which is provided by the exam board. Students will sit the real exam for unit R081. Students will complete revision and preparation work which will enable them to sit this paper.		**Assessment 1 – Mock paper for Unit R081**	

Term	1		2		3	4		5
Year 11	GCSE Computer Science: Unit 5 Computer Networks Students will learn the different types of networks used across the globe. Students will focus then on the structures they can use in each of the networks and learn about the pros and cons of each. Students should be able to recognise which network is suited to a specific scenario. Alongside this, students will learn about the protocols of data transmission across the networks and how to keep the network safe from hackers etc.	***Mock 1***	GCSE Computer Science: Unit 6: Cyber Security Students will learn what cyber security is and its purpose. They will focus on the threats that can pose a risk to computers/networks. This includes social engineering and malicious code. Students will learn how to detect and protect their computer/data from cyber security threats, including biometrics, CAPTCHA, etc.	***Mock 2***	GCSE Computer Science: Unit 7 Ethics, Legal & Environmental impact on society & Recap of all units, & Recap previous learning. Students will investigate the impact of any ethical, legal and environmental aspects of digital technology on wider society. Students will focus this learning on the following subjects: cyber security, mobile technologies, wireless networking, cloud storage, theft of computer code, issue's around copyright of algorithms, cracking, hacking, wearable technologies and computer-based implants. Students will be expected to understand and explain the general principles. Data privacy issues should be considered in all aspects. Recap learning from all units – focus on main areas of syllabus by completing self-assessment checks and quizzing.	***Mock 3***	Revision and past paper practice to embed knowledge and apply skills
Year 11	Cambridge National in Creative iMedia: Resits for Unit R081: Pre-Production skills Students will produce all the pre-production documents for a client brief. Students will review the pre-production document and identify areas for improvement. Students will sit a mock exam paper for this unit. It is a written paper.		Cambridge National in Creative iMedia: Unit R085: Creating a multipage website. This unit builds on units R081 and R082 and learners will be able to apply skills, knowledge and understanding gained in those units. Multipage websites are the basis of internet content and are therefore used extensively in the creative digital media sector, whether for mobile phones or computers in all their forms. This unit will enable learners to understand the basics of creating multipage websites. It will enable learners to demonstrate their creativity by combining components to create a functional, intuitive and aesthetically pleasing website. It will allow them to interpret a client brief and to use planning and preparation techniques when developing a multipage website. On completion of this unit, learners will be able to explore and understand the different properties, purposes and features of multipage websites, plan and create a multipage website and review the final website against a specific brief		Cambridge National in Creative iMedia: Unit R088: Creating a digital sound sequence This unit builds on units R081 and R082 and learners will be able to apply the skills, knowledge and understanding gained in those units. Gaming technologies, mobile phones and multimedia websites all use digital sound sequences to enhance and inform their content. This unit will enable them to understand where digital sound sequences are used in the media industry such as radio, film, web applications or computer gaming. The learner will also learn how these technologies are developed to reach an identified target audience. On completion of this unit, learners will understand the purpose of digital audio products and where they are used. They will be able to plan a digital sound sequence, create and edit a digital sound sequence and review the final sound sequence against a specific brief.		

Term	1			2		2	3		3	4		4	5	6		6
Year 12	4.3 Fundamentals of algorithms • Algorithms recursive algorithms • Big-O notation • Searching and sorting • Graph traversal algorithms • Optimisation algorithms • Limits of computation 4.2 Fundamentals of data structure • Vectors • Queues • Lists • Stacks • Hash tables • Graphs • trees	Assessment 1	Review and reteach	4.4 Theory of computation • Regular languages: Mealy machines • Sets • Regular expression 4.5 Fundamentals of data representation 4.6 Fundamentals of computer systems • Hardware and software • Role of an operating system • Programming language classification • Programming language translators • Logic gates • Boolean algebra	Assessment 2	Review and reteach	4.1 Fundamentals of programming • Programming basics • Selection • Iteration • Arrays • Subroutines • Files and exception handling • Problem solving: computational thinking • Structured programming • Writing and interpreting algorithms • Testing • Abstraction and automation • Finite state machines • Binary arithmetic • Representing images • Representing sound • Data compression and encryption algorithms • OOP and functional programming • OOP design principles • Functional programming • Function application • Lists in functional programming	Assessment 3	Review and reteach	4.5 Fundamentals of data representation • Number systems • Bits, bytes and binary • Turing machines • Bachus-Naur • Reverse polish notation	Assessment 4	Review and reteach	Topics to be covered 4.7 Fundamentals of computer organisation and architecture • Internal computer architecture • The processor • The processor instruction set • Assembly language • Input-output devices • Secondary storage devices		Assessment 5	Review and reteach
	Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.			Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.			Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.			Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.			Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.			
	Students will complete weekly practical programming practice.			Students will complete weekly practical programming practice.			Students will complete weekly practical programming practice.			Students will complete weekly practical programming practice.			Students will complete weekly practical programming practice. Students will be introduced to the programming project. This is worth 20% of the overall grade.			

Term	1		2		3		4		5
Year 13	Topics to be covered: 4.10 Fundamentals of databases • Entity relationship modelling • Relational databases and normalisation • Introduction to SQL • Defining and updating tables using SQL • Systematic approach to problem solving 4.11 Big Data • Big data	*Mock 1*	Topics to be covered: 4.9 Fundamentals of communicating and networking • Communication methods • Network topology • Client-server and peer-to-peer • Wireless networking • Communication and privacy	*Mock 2*	4.9 Fundamentals of communicating and networking • The internet: structure of the internet • Packet switching and routers • Internet security • TCP/IP standard application layer protocols • IP addresses • Client-server model	*Mock 3*	4.8 Consequences of using computers • Social, legal and cultural issues	*Mock 4*	**Revision and past paper practice to embed knowledge and apply skills**
	Students will also be working on the programming project which is a requirement of the exam board and is worth 20% of the overall grade.		Students will also be working on the programming project which is a requirement of the exam board and is worth 20% of the overall grade.		Students will also be working on the programming project which is a requirement of the exam board and is worth 20% of the overall grade.		Students will also be completing their work on the programming project which is a requirement of the exam board and is worth 20% of the overall grade.		
	Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.		Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.		Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.		Students will be preparing for their exams throughout the term by learning exam techniques and practicing exam questions.		