Why is the study of Computer Science important?

Computer Science is the study of the principles and use of computers. Its study will make you question how the systems that you use in a modern day society work and encourage you to explore the concepts behind the technology you use and develop skills to become a creator of technology yourself. From Year 7 you will have the exciting opportunity to develop and consolidate basic ICT skills that will allow you to access more complex Computer Science concepts. From there you will study the four cornerstones of Computational Thinking, these are crucial as they can be applied to any computer science context and will provide firm foundations for other topics within the subject. From this, key programming constructs can be learnt, allowing you to develop programming skills in more than one environment, this will help you to understand key similarities between different programming environments and develop key skills in problem solving and debugging. These skills will be further consolidated and mastered in text based programming languages throughout your study, applying the cornerstones of Computational Thinking in a wealth of scenarios to develop your problem solving skills. Computer Science theory is also explored, looking 'under the bonnet' of the computer systems that you use on a day-to-day basis. Key systems hardware are investigated, including how networks are formed, the inherent security risks that networked devices produce and how to mitigate against these risks. Computer Security is currently one of the biggest risks to national security, is relevant, interesting, and provides you with knowledge that can help you become a responsible e-citizen. Your study of Computer Science will encourage you to think deeply and help you more effectively to become a resilient problem solver that understands the technological world in which we live – a great life skill that all universities and employers will appreciate.

Across your study you will explore fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation. You will analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs. Furthermore, the subject will teach you to think creatively, innovatively, analytically, logically and critically and understand the impacts of digital technology to the individual and to wider society. Lessons will provide a wide range of opportunities for practical application of key concepts through a chosen programming language as well as plentiful opportunities for you to investigate how computers work. In addition, there will be opportunities for extended discussion about the ethical, moral and social implications of technology in society. Computer Science offers significant challenge, this is because it is a subject that encourages technological progress and breaking new ground, but this is what makes it exciting! Can you apply the concepts, knowledge and skills you have learnt in a creative way that others haven't thought of before? Can you identify an area of computer science that provides further technological development? Seems challenging – but you are going to love it! Computer Science will expand your mind!

Big Questions will be explored such as are the developments in artificial intelligence affecting job prospects and opportunity? Is technology creating a digital divide that further disadvantages people in developing countries? Can you create a program for a specific scenario to solve a problem? What opportunities and issues does

the internet develop? All of these questions are key and can be explored by understanding key computer science concepts both through theory and practical application. I bet you can't wait to get started?

Why is the study of Creative iMedia important?

In the ever changing digital world, digital media is the method of choice for people to access information. Creative iMedia is media sector-focused, including film, television, web development, gaming and animation, and have IT at their heart. It is a fantastic hybrid of creative ICT with an underlying theme of media within it. Not only is it about creating suitable products for audience and purpose, but it requires being able to justify decisions as to the reasons for design choices and how they are a suitable medium within an industry.

Across the study of creative iMedia you will learn about essential working practices for working in the creative and digital media sector. This includes developing an understanding of the client brief, time frames, deadlines and preparing products that meet the needs of the client. As well as learning how to plan and design a product to meet the brief of a user, you will learn graphics, web design, video editing and skills to create interactive products. How we communicate and interact with technology has changed significantly in recent years. Having the skills to create graphics, edit videos and create websites is more relevant than ever, and possessing these skills demonstrate a knowledge and ability to communicate effectively in the digital world.

What skills will the study of Computer Science teach you?

You are a citizen in this world and you need to know how to solve problems using technology and the key concepts involved in the technology that we have become so dependent on. It will teach you to…

- Apply computational thinking techniques (abstraction, decomposition, pattern recognition, algorithms) in a range of scenarios to solve problems.
- Develop resilience by not being afraid of challenges when solving problems, but to break them down and keep trying.
- Be creative in a subject that may not be renowned for it – there is no limit to creativity when you create the solution.
- How to act responsibly online to ensure that you and others stay safe online.
- Identify the key programming constructs (sequence, selection, iteration) required to solve a problem.
- Apply the key programming constructs (sequence, selection, iteration) to any programming language.
- Work independently and part of a team to solve complex problems.
- Construct reasoned arguments to ethical, social and moral problems that have arisen due to technology and communicate these in an effective way.
- Identify links between different elements of computer science
- Evaluate different methods of representing data and decide on the most suitable method for presentation/storage

What will you know and understand from your study of Computer Science?

- How computers processes data, the architecture of a CPU (von Neumann) and the characteristics that affect the performance of computer systems
- Different types of computer system and how embedded systems are used in society
- Methods of storage within a computer system, including primary and secondary storage
- How to calculate storage requirements for a range of different types of file
- The suitability of different storage devices based on capacity, cost, speed, portability, durability and reliability
- Different types of networks and factors that affect the performance of networks
- Hardware required to create a network and the different responsibilities of the different type of hardware
- How the internet is used for access to the WWW and online storage
- How the TCP/IP (the rules used to send data across a network) stack works, the different protocols related to each layer and their roles
- Threats to network and system security and how to prevent/overcome these problems
- Different types of software (operating systems and utility software) and their roles within a computer system
- Ethical, cultural and environmental issues that have arisen due to technology
- Different legislation that relates to computers and technology
- Different searching and sorting algorithms and how they are used
- The key programming constructs (sequence, selection and iteration) and how these can be written in a text based programming language
- The use of file handling in a programming language
- How SQL (structured query language) can be used to query and interrogate data
- The use of data types, arithmetic, Boolean and string manipulation when creating programs
- Different defensive design considerations for creating robust programs and how to implement these in programming
- How to generate test plans for a range of different scenarios
- Applying computational logic to generate truth tables for logic circuits.
- How translators are used to deal with different types of programming language
- How data is represented in computers, including binary, hexadecimal, characters, images and sound
- How compression is used in computer systems.
- How to select and combine multiple applications to achieve challenging goals, including collecting and analysing data and meeting the needs of a given scenario

What skills with the study of Creative iMedia teach you?

The skills you will learn through Creative iMedia include:

- creating graphics through using a range of tools and techniques using specialist image editing software
- creating graphics that are of an appropriate format for a range of scenarios

- creating multi-page websites that includes a range of different media types that are suitable for audience and purpose
- creating interactive products that include graphics, sound, video, animation and navigation

What will you know and understand from your study of Creative iMedia?

- How to use mood boards, visualisation diagrams, storyboards and scripts to design a product.
- How to interpret client requirements and produce plans with timescales to meet these requirements
- The different hardware and software requirements for a range of media products
- What legislation applies to creating digital media products
- What the different formats that are used in media products are used for and when it is appropriate to use them
- How to analyse a range of media products for audience and purpose
- How media products need to be adapted to suitable for a range of different devices
- How connectivity methods affect user experience and how this needs to be factored when designing media products
- What types of user interface there are and how their design needs to consider house style, layout and accessibility

How does your study of Computer Science support your study in other subjects?

Study of any subject in our curriculum takes full advantage of links with other subject areas- we term these as interdisciplinary links and we make the most of them because we know that deep learning requires the transference of knowledge and skills from one topic of learning to another. Once you can transfer your learning across topics and subject areas then you are really mastering what you know and how to apply your understanding and skills.

Computer Science touches on so many other subjects such as mathematics as you develop skills in problems solving, including decomposition (breaking down problems), abstraction (removing unnecessary detail from a problem) and pattern recognition. All of these skills will support your teaching in Mathematics as these are very important in being able to solve mathematics problems in a range of contexts. There are also links with Science as binary logic can be applied to electrical circuits in Physics and much of the technology from Computer Science can be mapped back to core principles of Science. For example, how sensors are used to monitor motion, force and/or pressure. You will learn methods of thinking and research that are widely applicable to other subject areas helping your thinking in all subjects.

How can you deepen your understanding of Computer Science?

The Computer Science department offers lots of great opportunities for you to really engage with this fabulous subject. In Year 7 & 8 we engage with an external program called iDEA (Inspiring Digital Enterprise Award). This is an online program that students can complete in addition to their lessons to develop digital and enterprise skills. It is the digital equivalent of the Duke of Edinburgh programme. Across Years 9 to 12, we also have a group of students who compete in the international FIRST Tech challenge to build an autonomous robot.

Why not attend the enrichment for the iDEA programme to complete your bronze award, see if you can complete all the badges, develop your digital literacy and enterprise skills and compete against other students in the trust. Do you enjoy doing these? Do they provide mental stimulation and a challenge to you? If so, ask your teacher about how to get involved further.

Get involved! Become a Computer Scientist!

How does your study of Creative iMedia support your study in other subjects?

The design principles and the skills you learn in Creative iMedia are directly transferable across all subjects in the curriculum. Creative iMedia is about design concepts and applying these design concepts when creating other documents or products in other subjects still applies. The practical ICT skills that are developed throughout the course will allow you to ensure that when technology is used in other subjects for other contexts, that the end product is of high quality not just for the subject specific content but the product itself.

How can you deepen your understanding of Creative iMedia?

Creative iMedia is all around us, and taking an interest in the products that you may see on social media such as videos, graphics etc not just for their content but also the underlying design principles around them. Why is a video constructed in the way it is? Why do magazines design and layout their front cover in the way they do? These questions will further deepen your understanding within the subject. Immersing yourself in digital media will certainly help deepen your knowledge and understanding of media products.

How are you assessed in Computer Science?

Throughout the 5 or 7 years Computer Science course you are assessed using the following assessment objectives which ensure that you can cumulatively build your subject understanding in preparation for future GCSE and A Level study. There are half termly assessment points each year that we term Praising Stars©. For younger years we base our assessment on our subject mapping of the age related expectations across the curriculum, assessing students' performance at their current stage of study against expectation. At GCSE and A Level we make informed predictions informed by our holistic assessment of their progress against the key assessment objectives and their aspirational targets. These are also the basis for any appropriate support and intervention.

Key Assessment Objectives

AO1: Demonstrate knowledge and understanding of the key concepts and principles of Computer Science.

A02: Apply knowledge and understanding of key concepts and principles of Computer Science.

A03: Analyse problems in computational terms:

- to make reasoned judgements

- to design, program, evaluate and refine solutions.

How are you assessed in Creative iMedia?

Creative iMedia is assessed through a range of internal and external assessment. There are four units in total with each contributing 25% towards the overall qualification. There is a written assessment and then three internally assessed and externally moderated coursework units. The course units consist of a graphics unit, a web design unit and an interactive multimedia product unit.

How can Computer Science support your future?

Of course we offer the study of GCSE and A Level Computer Science and we encourage your continued study in this fantastic subject. Yet we know that choice and personal interest are important aspects of worthy study. Whether you have continued your study of Computer Science into GCSE or A level or not you will have gained access to this enriching subject and its study will have taught you to think differently and deeply.

Computer Science is offered at most prestigious universities either as a single honours or a joint honours subject studied alongside other disciplines e.g. Computer Systems Engineering, Computer Games Design, Computer Science & Artificial Intelligence, Mathematics & Computer Science and Computer Forensics. The very fact that you have been able to study Computer Science e.g. computational thinking will help your future application be they for colleges, universities, apprenticeships or employment.

Careers that the study of Computer Science supports include:

- Secondary School Teacher
- Database administrator
- Software Developer
- Web Application Developer
- Computer Systems Analyst
- Mobile App Developers
- Information Security Analyst
- Computer Network Architect
- Software Tester
- Network Manager

How can Creative iMedia support your future?

There are a wide range of ICT & media based courses offered post-GCSE students at colleges and sixth form providers including our own. Within Outwood we offer an ICT qualification that utilises the skills learnt in Creative iMedia and this is deliberate to ensure progression between stages of

study. Due to Creative iMedia being a wide ranging curriculum this allows for many avenues to be explored into higher and further education. There are a vast range of courses offered at university that target digital media, either through the production, design or publicising through this media.

Careers that the student of Creative iMedia supports include:

- Secondary School Teacher
- Web designer
- Graphics design
- Video production
- Social media publicist
- Media Marketing Director

	CURRICULUM PROGRESSION PATHWAY FOR COMPUTER SCIENCE AT OUTWOOD GRANGE ACADEMY				
	YEAR 7	**YEAR 8**	**YEAR 9**	**YEAR 10**	**YEAR 11**
Autumn 1	e-Safety ICT Project - Word processing, spreadsheets, presentations	e-Safety Programming in Python	Programming Concepts Algorithms Programming Techniques	Storage Wired & Wireless Networks Network Topologies, Protocols & Layers	Algorithms Programming Techniques Producing Robust Programs
Autumn 2	ICT Project - Word processing, spreadsheets, presentations Computational Thinking	Programming in Python	Programming Concepts Algorithms	Programming Concepts	Non-exam assessment completion

			Translators & Facilities of Languages Computational Logic Data Representation	Wired & Wireless Networks Network Topologies, Protocols & Layers System Security	Producing Robust Programs Translators & Facilities of Languages Computational Logic Data Representation
Spring 1	Computational Thinking History of Computing	Programming in Python Computing theory - hardware, number systems	Programming Concepts Data Representation	Programming Concepts Systems Software	Systems Architecture Memory Storage Wired & Wireless Networks Network Topologies, Protocols & Layers
Spring 2	Computing Number Systems Micro:bit - text based programming	Computing theory - binary logic, types of software, storage devices, algorithms	Programming Concepts Producing Robust Programs Algorithms	Programming Concepts Ethical, legal, cultural and environmental concerns	System Security Systems Software Ethical, legal, cultural and environmental concerns
Summer 1	Micro:bit - text based programming Small Basic - text based programming	Computing theory - networks	Programming Concepts Algorithms Programming Techniques	Programming Concepts & Challenges	Final Exam Prep

| **Summer 2** | Small Basic - text based programming | Web design - HTML/CSS | Programming Project Systems Architecture Memory Storage | Programming Project | |