



COMPUTER SCIENCE & IMEDIA

COMPUTER SCIENCE, Digital Literacy and Creative iMedia

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 challenges, 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 Digital Literacy important?

Digital literacy has become paramount in any workplace or educational setting in the world. A good understanding of how to use technology to perform common tasks is a requirement that students need to be prepared for. Students will learn how technology can be used and apply this to real-world settings, investigating modern-day problems spanning the bridge between humanities and technology. This includes investigations into recent war, political issues and hands-on life-skills to prepare students for post academy life. Digital literacy is an integral part of our computer science curriculum at KS3.

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

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 problem 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 an initiative from the Duke of York and is the digital equivalent of the Duke of Edinburgh programme.

Why not continue the iDEA programme at home 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.

Get involved! Become a Computer Scientist!

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

Digital literacy is designed to support your study of other subjects. It provides you skills in a range of areas, including analytical - giving you the ability to analyse data from any subject to form opinions. The curriculum supports your development in English, with examples such as letter writing and using technology to communicate.

How are you assessed in Computer Science?

Throughout the 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 assessment points each year that we term Praising Stars©. For KS3 these are termly and for KS4 these are every half term. 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 we make informed predictions informed by our holistic assessment of their progress against the key assessment objectives and their aspirational GCSE 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.

AO2: Apply knowledge and understanding of key concepts and principles of Computer Science.

AO3: Analyse problems in computational terms:

- to make reasoned judgements
- to design, program, evaluate and refine solutions.

How can Computer Science support your future?

Computer Science is offered at most sixth form colleges and 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 it for colleges, universities, apprenticeships or employment.

Careers that the study of Computer Science supports include:

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

KS3 COMPUTER SCIENCE PROGRESSION PATHWAY AT OUTWOOD ACADEMY REDCAR

At Outwood Academy Redcar, students are given a diverse curriculum in Computer Science which aims to provide them with a broad range of digital skills. One of the main aims of this curriculum is to allow students to experience a wide variety of practical computer-related skills to better inform their career choices and decisions related to further and higher education. Students will learn about being responsible, conscientious, safe e-citizens across all three years of KS3. They will learn to program in a multitude of languages starting with the visual-based MicroBit systems in Year 7, the intermediary text-based language Small Basic in Year 8, and two units of Python spread across Years 8 and 9. This will directly benefit students should they wish to study Computer Science at GCSE. Students will also develop their knowledge of computer systems by analysing computer hardware and researching networks, converting between Binary and Denary numbers and examining the wider role computers play in our society. Additionally, students will cultivate their digital literacy by engaging in more practical tasks such as creating spreadsheets, presentations, word documents, websites and digital images.

Term	Year 7	Year 8	Year 9
Autumn 1	E-Safety	E-Safety	E-Safety
Autumn 2	G-Suite and Office Programs	Computer systems theory	Python programming
Spring 1	Computational Thinking	Small Basic programming	Digital Graphics
Spring 2	MicroBit programming	Computing and Society	Hardware and Memory
Summer 1	Outwood Travels	Python	Networks
Summer 2	iDEA Project	iDEA Project	Events that Changed the World

GCSE COMPUTER SCIENCE PROGRESSION PATHWAY AT OUTWOOD ACADEMY REDCAR

At Outwood Academy Redcar, students in Year 10 and 11 are given the opportunity to study the OCR GCSE Computer Science qualification. The qualification builds on the knowledge, understanding and skills established through our KS3 computer science curriculum. The content has been designed not only to allow for a solid basis of understanding but to engage learners and get them thinking about real world application.

The qualification is split into two distinct areas, each worth 50% of the course and assessed with two written papers at the end of year 11.

Component 1, Computer Systems, focuses on how computers work, computer processors, storage devices and memory, computer networks, security and legislation and ethics.

Component 2, Computational thinking, algorithms and programming, allows students to develop their skills as a computer scientist. They will solve complex computation problems and develop solutions using algorithms and programming techniques.

Term	Year 10	Year 11
Autumn 1	Algorithms and problem solving	Networks
Autumn 2	Representing data in computer systems	System security
Spring 1	Programming fundamentals	Ethical, legal, cultural and environmental impacts of digital technology
Spring 2	Producing robust solutions	Knowledge retention and recall
Summer 1	Systems architecture	Knowledge retention and recall
Summer 2	Memory and Storage	Exam paper 1 and 2