



SUBJECT & QUALIFICATION: Computer Science

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 the CPU works, the inherent security risks that 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 Python, Micro:bit and Small Basic 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:

How are the developments in artificial intelligence affecting our lives? 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?

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



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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.

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 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

The key learning objectives for Computer Science are:



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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 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 for colleges, universities, apprenticeships or employment. Locally there are some amazing opportunities working within the rail industry or software development industry with Network Rail and Volker rail.

Study of Computer Science can lead to a wide range of careers:

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



Computer Science GCSE Course Overview		
Term	Year 1	Year 2
Autumn 1	Algorithms and Programming fundamentals	Computer networks, connections and protocols
Autumn 2	Producing robust programs	Network security
Spring 1	Boolean logic	Systems software
Spring 2	Programming languages and Integrated Development Environments	Ethical, legal, cultural and environmental impacts of digital technology
Summer 1	Systems architecture	Knowledge retention and recall
Summer 2	Memory and storage	Exam paper 1 and 2



Computer Science KS3 Course Overview		
Students will have 1 hour of Computer Science a week in years 7, 8 & 9.		
Year 7	Year 8	Year 9
History of computing	E-safety - What is sexting and what can you do about it? What does the law say about sexting? What is appropriate behaviour when using the internet? How do we critically consider our online friendships?	E-safety - Phishing. What is online gambling and why could it be bad? What is privacy and how bad can it get? What is the difference between a law and a code of conduct? How can you be a good citizen when using the internet?
Google login, Mail , Drive & Classroom	PRIMM Programming - Outputting Data, data types & variables, selection, turtle and loops, menus and loops, EasyGui, maze game,	Digital Forensics - The Case, location, metadata, messages, searching the computer, rewind and review.
School Production - About me, poster, tickets, animated promotion, programme, ticket revenue, what-if analysis, assessment.	Data Representation - Binary Number Systems, binary addition, hexadecimal, binary logic, sequencing instructions, images, sound.	PRIMM Python -Inputs & Outputs, variables, selection, iteration, maintainability, string manipulation & functions, arrays.
E-safety - What are the dangers to look out for on the internet? What is cyberbullying and what are the effects? What is a digital footprint and how can it affect you? Is social media good for us?	Running for PM - Research infographic, gathering information, analysing results, the budget, manifesto.	Theory - IT and the Modern World of Work, laws and ethics, inputs, outputs & processes, the CPU, storage, storage & expansion.
Computational Thinking - Abstraction, pattern recognition, decomposition, logic, algorithms, evaluating programmes, automation, searching data, sorting data, drifting in space.	HTML Web Design - site setup, images, text colour & size.	AI - What is AI? How do computers learn from data? What is bias? What careers are there in AI?
Micro:bit - Using the micro:bits, displaying data, user input, selection, iteration,	Events that have changed our time - Timeline of events, creating a website, mapping events, blog, quizzing.	How to use computers to build a brand - logos? How to use computers to build a brand? - building a brand, online adverts, celebrity endorsement. How do we launch our brand using the internet?
Small Basic - Turtle, input, output, variables, selection, tessellation.		

KS3 COMPUTER SCIENCE AND DIGITAL LITERACY PROGRESSION PATHWAY

E-Safety

School Production (Digital Literacy)



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Computational Thinking (Computer Science)
Micro:Bit (Computer Science)
Small Basic (Computer Science)
Python Programming (Computer Science)
Computing Theory (Computer Science)
Running for Prime Minister (Digital Literacy)
Events that changed the world (Digital Literacy)
HTML Web Design (Computer Science)
Digital Forensics (Computer Science)
Artificial Intelligence (Computer Science)
Sonic Pi (Computer Science)