

Computer Science - Intent

A high-quality computing education equips Students to understand and change the world through logical thinking and creativity, including by making links with mathematics, science, and design and technology. In computer science, students are taught the principles of information and computation and how digital systems work.

Our intent is to provide opportunities for students so they:

1. can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
2. can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
3. can evaluate and apply information technology, including new or unfamiliar technologies, analytically, to solve problems
4. are responsible, competent, confident and creative users of information and communication technology.

Key stage 4:

OCR Specification:

Aim of the course:

OCRs GCSE (9–1) Computer Science will encourage learners to:

- think creatively, innovatively, analytically, logically and critically
- understand the components that make up digital systems, and how they communicate with one another and with other systems
- understand the impacts of digital technology to the individual and to wider society
- apply mathematical skills relevant to Computer Science.

Course content:

(J276/01) Computer systems

- Systems architecture
- Memory
- Storage
- Wired and wireless networks
- Network topologies, protocols and layers
- System security
- System software
- Ethical, legal, cultural and environmental concerns

(J276/02) Computational thinking, algorithms and programming

- Algorithms
- Programming techniques
- Producing robust programs
- Computational logic
- Translators and facilities of languages
- Data representation

(J276/03/04) Programming project

- Programming techniques

- Analysis
- Design
- Development
- Testing, evaluation and conclusions.

Impact

Computing equips pupils to use information technology to create programs, systems and a range of media. It also ensures that students become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

Enrichment opportunities-

We run Code Club at lunch time for students that enjoy computer science and problem solving. Students are offered programming workshops in school. They also get the opportunity to visit Bletchley Park – the home of the codebreakers.

Computer Science Aim/Intent Computer Science follows the National Curriculum https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239067/SECONDARY_national_curriculum_-_Computing.pdf

A high-quality Computing education equips students to understand the world through logical thinking and creativity. In Computer Science, the students are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Building on this knowledge and understanding, students are equipped to use information technology to create programs and systems. Computing also ensures that students become digitally literate – able to use, and express themselves and develop their ideas through information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

The aims in Computer Science are that students will be taught:

- to understand and apply the fundamental principles and concepts of Computer Science, including abstraction, logic, algorithms and data representation
- to analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
- to evaluate and apply information technology analytically to solve problems
- to be responsible, competent, confident and creative users of information and communication technology.

How cultural capital is enhanced through Computer Science:

Personal Development

Careers in Computing and information on further and higher education. Practicing and discussing computational thinking with peers; that make minds receptive to new computational ideas and techniques used in the work place.

Social Development

Working in teams to solve problems based on real world scenarios for clients. Discovering ways through which improved communications have brought societies closer.

Understanding the impacts of digital technology to the individual and to wider society.

Understanding the profound effect computer technologies have on the ways in which people live, work and relate to each other.

Physical Development

Becoming aware of their online identity and taking steps to protect it. Understanding a range of ways to use technology safely, respectfully, responsibly and securely. Recognising inappropriate content, contact and conduct and know how to report concerns.

Spiritual Development

Exploring the impact of the digital divide on people who have little or limited access to computer technologies.

Cultural Development

Developing an understanding of how the use of computers is rapidly changing the world we live in. Understand how the use of mobile phones and social media have allowed people from countries with repressive governments to report on what is happening and have been a tool in bringing about revolutions.

Moral Development

Considering the positive and negative impact of computer technology on the lives of the people. Understanding the several laws that govern the use of computer systems and data, realising good practice and behaving in a morally correct way.

How students' vocabulary is developed through Computer Science:

- Students are encouraged to use key words when describing the purpose, function and characteristics of the various components in computer system.
- Students demonstrate their understanding of key terms when evaluating their programming projects.
- Students are encouraged to develop their book of glossary as they learn new topics.
- End of unit quizzes are used to embed the key terminology in their learning.

Implementation:

KS3

During Y7 and Y8, Key Stage 3 students have one lesson of Computer Science over the two-week timetable. At the end of each unit, there is a test, to assess how much progress each student has made. There is also an End-of-year test. During KS3:

- Students learn about the dangers that exist on the internet from their own personal conduct, from contact with other people and from their access to different types of content. They become aware of what constitutes safe practice when accessing websites.
- Students use Scratch (visual programming language) and Python (textual programming language) to solve a variety of computational problems.

- Students learn about the hardware and software components that make up computer systems, and how the various components communicate with one another and with other systems.
- Students undertake creative projects that involve selecting, using, and combining multiple applications, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users.

KS4

Key Stage 4 students follow the OCR GCSE specification. This specification enables students to develop valuable thinking and programming skills that are extremely attractive in the modern workplace. It also develops a deep understanding of computational thinking and how to apply it through a chosen programming language.

The scheme of work ensures that the specification is well planned in helping the students to build on their knowledge.

Students are assessed both formally and informally throughout the year. Verbal feedback and peer assessment keeps students continually improving. Formal assessments in the form of class tests, End-of-Topic tests and End-of-Year tests help students celebrate their success. It also helps the students to discover the gaps in their learning and work towards removing them.

Impact:

Computer Science equips pupils to use information technology to create programs, systems and a range of media. Understanding how computers work and being able to use them creatively gives students the power to shape the world around them. Computer Science gives students the opportunity to access technologies and ideas at sufficient depth to allow them to progress to a higher level of study or to make informed choices about their future.

We run Code Club at lunch time for students that enjoy Computer Science and problem solving. Students are offered programming workshops in school.

Curriculum Map

| AGE - STAGE | TOPICS | | | | |
|-------------|---|--|---|--|----------------------|
| Year 7 | Stay Safe Online | Scratch Programming | | Data Collection and Processing | |
| Year 8 | Python Programming | Spreadsheet Design | | Computer Hardware | |
| GCSE Y9 | Programming Fundamentals (2.2.1, 2.2.2) | System Architecture (1.1) | Memory and Storage(1.2.1, 1.2.2, 1.2.3) | Data Storage (1.2.4, 1.2.5, 2.4.1) | System Software(1.5) |
| GCSE Y10 | Networks (1.3, 1.4) | Ethical, Legal, Cultural and Environmental Impacts of Digital Technology (1.6) | Algorithms (2.1) | Additional Programing Techniques (2.2.3) | |
| GCSE Y11 | Testing (2.3) | IDE (2.5) | Revision | | Revision |