

# Key Stage Four Curriculum Overview for Computer Science

## Curriculum Intent and Rationale for Exam Boards (for examined subjects)

To be engaging and practical, encouraging creativity and problem solving. To encourage students to develop their understanding and application of the core concepts in Computer Science. To encourage students to analyse problems in computational terms and devise creative solutions by designing, writing, testing and evaluating programs.

## How does the KS4 curriculum build on that from KS3?

The KS4 curriculum develops depth and breadth upon the 5 KS3 foci of: Information and Communications Technology; Hardware and Processing; Data Representation; Algorithms and Programming. All of these elements are encompassed within the J277/01 – Computer Systems and J277/02 – Computational Thinking elements of the course along with the extended Practical Programming Project.

## What do students do with their acquired knowledge and skills?

- Understand and apply the fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation
- analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs
- 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.

## How does the KS4 curriculum align to and go beyond the National Curriculum?

Pupils have the opportunity to study computer science at sufficient depth to allow them to progress to higher levels of study or to a professional career.

All pupils are taught to:

- develop their capability, creativity and knowledge in computer science
- develop and apply their analytic, problem-solving, design, and computational thinking skills
- understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to report a range of concerns

What new knowledge are students taught?		
Term	Year 10	Year 11
Autumn	<p><b>Systems Architecture</b></p> <ul style="list-style-type: none"> <li>• Fetch, Decode and Execute</li> <li>• Architecture of the CPU</li> <li>• CPU Performance</li> <li>• Embedded Systems</li> </ul> <p><b>Primary &amp; Secondary Storage</b></p> <ul style="list-style-type: none"> <li>• RAM &amp; ROM</li> <li>• Virtual Memory</li> <li>• Secondary Storage Device</li> </ul> <p><b>Units</b></p> <ul style="list-style-type: none"> <li>• Units &amp; moving data between units</li> </ul> <p><b>Programming</b></p> <ul style="list-style-type: none"> <li>• Programming fundamentals</li> <li>• Sequence and selection</li> </ul>	<p><b>Robust Programs</b></p> <ul style="list-style-type: none"> <li>• Defensive Design</li> <li>• Input validation</li> <li>• Maintainability</li> <li>• Testing</li> <li>• SQL</li> </ul> <p><b>Boolean Logic</b></p> <ul style="list-style-type: none"> <li>• Logic Gates</li> <li>• Truth Tables</li> </ul> <p><b>Programming</b></p> <ul style="list-style-type: none"> <li>• File Handling</li> </ul>
Spring	<p><b>Data Representation</b></p> <ul style="list-style-type: none"> <li>• Binary numbers</li> <li>• Binary arithmetic</li> <li>• Hexadecimal</li> </ul>	<p><b>Languages &amp; IDE</b></p> <ul style="list-style-type: none"> <li>• High &amp; Low level Languages</li> <li>• Compiler &amp; Interpreter</li> <li>• IDE Tools &amp; Facilities</li> </ul>

	<ul style="list-style-type: none"> <li>• Characters</li> <li>• Images</li> <li>• Sound</li> <li>• Compression</li> </ul> <p><b>Networks</b></p> <ul style="list-style-type: none"> <li>• The Internet and WANs</li> <li>• LANs</li> <li>• Wireless Networking</li> <li>• Client server and P2P</li> <li>• Protocols and layers</li> </ul> <p><b>Network Security and Systems Software</b></p> <ul style="list-style-type: none"> <li>• Network threats</li> <li>• Preventing vulnerabilities</li> <li>• Operating systems</li> <li>• Utility Software</li> </ul> <p><b>Programming</b></p> <ul style="list-style-type: none"> <li>• Iteration</li> </ul>	<ul style="list-style-type: none"> <li>• Logic &amp; Syntax Errors</li> </ul> <p><b>Programming</b></p> <ul style="list-style-type: none"> <li>• Programming Challenges</li> <li>• Planning, implementation &amp; Testing</li> </ul>
<p>Summer</p>	<p><b>Digital Impacts of technology</b></p> <ul style="list-style-type: none"> <li>• Ethical and cultural issues</li> <li>• Environmental issues</li> <li>• Legislation and privacy</li> </ul> <p><b>Algorithms</b></p> <ul style="list-style-type: none"> <li>• Computational Thinking</li> <li>• Searching Algorithms</li> <li>• Sorting algorithms</li> <li>• Flowcharts</li> <li>• Pseudocode</li> </ul>	<p><b>Revision</b></p>

	<ul style="list-style-type: none"><li>• Interpreting algorithms</li></ul> <p><b>Programming</b></p> <ul style="list-style-type: none"><li>• Arrays</li></ul>	
--	--	--

### How and where do students build knowledge through KS4?

The sequence provides logical development of knowledge and skills that inform subsequent learning and practical application.

This sequence means the majority of theoretical content can be covered in Year 10 therefore allowing the main focus in year 11 to be on the programming project and revision in year 11, rather than new content