

# COMPUTING – KS3

## Overview of Year 7

In Year 7, students take on a variety of tasks that collectively cover all three strands of the Computer Science programme of study: Computer Science; Information Technology and Digital Literacy. Students will have the opportunity to:

- Investigate the major internal components that make up a computer
- Practice computational thinking to solve problems
- Design algorithms that form solutions to programs
- Write pseudo-code to show the order of instructions
- Consider what constitutes a computer system and use 3D design software to develop new devices
- Write programs to make things happen in the real world by controlling devices
- Create animations, images and websites

## Overview of Year 8

In Year 8, students continue to develop and explore within the three strands of the programme of study and have the opportunity to:

- Understand the role of operating systems
- Learn to manipulate files and folders through the command line interface
- Learn the importance of binary and perform binary addition
- Investigate instruction set design
- Learn to program using selection and Boolean logic
- Design, make and program robotic devices including the development of procedures with microbit buggies
- Learn about Internet protocols
- Research sorting algorithms and create sorting programs
- Use recursion to create self-similar patterns on-screen with efficient programs

## Overview of Year 9

In Year 9, students continue to develop and explore to greater depth within the three strands of the programme of study in preparation for GCSE and have the opportunity to:

- Learn about encryption and character sets, using programming to encrypt and decrypt data
- Record digital sound and learn how it is stored, learning the connections between bitrate, quality and filesize
- Program physical devices
- Write applications for mobile devices
- Design networks and learn the use of network protocols
- Use 3D imaging and animation
- Create electronic digital circuits to learn about logic gates and memory
- Learn about different computer architectures
- Create and use databases to solve problems

## Extra-curricular clubs

Additionally, we offer lunchtime and after-school clubs to develop exciting projects in robotics, digital imaging, animation and other aspects of ICT and programming, through the use of various physical devices including micro: bits, Lego and Arduino.

# COMPUTER SCIENCE – GCSE

## Examination Board:

OCR

The school boasts a modern suite of computers and dedicated full-time IT support. GCSE Computer Science is an optional two year course for students in Years 10 & 11. There are three components of study:

### Assessment:

**Paper 1:** Computer Systems external 1 hour 30 minute examination, 50% of total mark

This component introduces learners to the Central Processing Unit (CPU), computer memory and storage, wired and wireless networks, network topologies, system security and system software. Learners will become familiar with the impact of Computer Science in a global context through the study of the ethical, legal, cultural and environmental concerns associated with Computer Science.

**Paper 2:** Computational Thinking, Algorithms and Programming external 1 hour 30 minute examination, 50% of total mark.

This component incorporates and builds on the knowledge and understanding gained in Component 1, encouraging learners to apply this knowledge and understanding using computational thinking. Learners will be introduced to algorithms and programming, learning about programming techniques, how to produce robust programs, computational logic, translators and facilities of computing languages and data representation. Learners will become familiar with computing related mathematics.

### Additionally, learners must undertake a practical project of 20 hours.

Learners will need to create suitable algorithms which will provide a solution to the problems identified in the task. They will then code their solutions in a suitable programming language. The solutions must be tested at each stage to ensure they solve the stated problem and learners must use a suitable test plan with appropriate test data. In this component, learners must think computationally to solve a task and while doing so create a report detailing the creation of their solution, explaining what they did and why they did it.

Learners will have the opportunity to demonstrate the key elements of computational thinking, namely:

- Thinking abstractly – removing unnecessary detail
- Thinking ahead – identifying preconditions and inputs and outputs
- Thinking procedurally – identifying components of problems and solutions
- Thinking logically – predicting and analysing problems
- Thinking concurrently – spotting and using similarities.

### KS4 Core Computing

All KS4 students study a curriculum of computing that will support their digital literacy skills for use both in and out of school.