

Computer Science



Curriculum Overview Key Stage 3

We work, closely, with the NCCE (National, Centre for Computing, Education) to bring an exciting curriculum offer to our students at KS3. Schemes of work cover the national curriculum, allow for progression, and offer progressive, high quality computing education throughout the key stage.

In Year 7, students study a range of units covering the impact of technology, spreadsheets, networks, using media and programming essentials in Scratch with the aim of building on Key Stage 2 learning.

In Year 8, students learning develops further through studying computing systems, web development, Python programming, media (including vector graphics), mobile app development and data representation.

In Year 9, the scene, for GCSE, is set with students studying cyber security, data science, media animations and physical computing. Python programming knowledge and understanding are further developed working with sequences of data and presenting data in audio and visual formats.

KEY STAGE 3		
	Topic	Key Themes
YEAR 7	Impact of Technology	E Safety Respectful online communication Presenting to an audience Exploring 'Who are you talking to?'
	Modelling Data - Spreadsheets	Understanding spreadsheets Basic calculations and using autofill Collecting data Introduction to functions More complex functions and using filters
		What is a computer network? Networking hardware

	Networks from semaphores to the Internet	Wired and wireless networks The Internet Explaining the difference between the Internet, its services and the worldwide web.
	Programming essentials in Scratch - Part 1	Introduction to programming and sequencing Sequences and variables Selection Operators Count controlled Iteration Problem solving
	Programming essentials in Scratch – Part 2	Sub routines Condition controlled loops Iteration Using lists Problem solving using decomposition and abstraction.
	Using media – Gaining support for a cause.	Features of a word processor Licensing appropriate images The creditability of sources Researching and planning a blog Promoting a cause.
	Topic	Key Themes
YEAR 8	Computing Systems	Investigation - what is a computer? Introducing the hardware components. Exploring how the processor, memory and storage interact Introduction to Boolean logic. Artificial intelligence and the surrounding issues.
	Developing for the web	How web pages are constructed. Using images on web pages. Using CSS and HTML Analysing how search engines work. Using advanced search techniques. Implementing and creating web pages.
	Introduction to Python programming	Writing a simple computer program Using assignment and arithmetic expressions. Using relational operators to form logical expressions Multi branch selection Using Iteration and while loops. Combining iteration and selection to control the flow of program execution.
	Media – Vector graphics	Using software to draw geometrical shapes. Manipulating groups of objects. Converting objects to paths. Combining multiple tools to create a vector graphic design. Explaining vector graphics.
	Mobile app development	Identifying a real world problem that could be broken down Recognising that events can control the flow of a program Identifying and fixing coding errors. User input in block based programming. Block based programming using selection and sequencing Project completion.
		Listing examples of representations

	Data representation	Text representation using sequences of symbols Explaining what binary digits are Converting decimal numbers to binary Converting between different units of multiples of representation size.
	Topic	Key Themes
YEAR 9	Cyber Security	You and your data Social engineering Script kiddies Rise of the bots Comparing security threats Under attack
	Data Science	Delving into Data Science Global data Statistical state of mind Data for action Applying data cleansing techniques to a data set. Visualising a data set.
	Media animation	Moving, rotating, scale, colour Animation and names Complex models and colour Organic modelling Lights, camera, render
	Physical computing	Introducing the microbit Writing a program for the microbit Writing a program which uses input Designing a physical computing artefact Implementing a physical computing project Revising, testing and evaluating the project
	Python programming with sequences of data	Using selection and introducing lists Performing common operations on lists Using iteration to control the flow of a program Using iteration to iterate over lists Using variables to keep track of counts and sums Mini project completion
	Representations, going audio visual.	Binary mosaic Calculating the size of digital images Image manipulation functions Introduction to binary and sound Calculating sound file size Learning about compression

Curriculum Overview Key Stage 4

Our link with the NCCE (National, Centre for Computing, Education) continues to inform medium term plans and ensures an exciting curriculum offer which responds to the demands of the chosen Edexcel GCSE specification.

The 9-1 Edexcel GCSE Computer Science course comprises two examined units both studied over the two years and taken in the Summer of Year 11.

Paper one 'Principles of Computer Science' consists of 6 units covering computational thinking, data, computers, networks, issues and impact and programming. The exam is 1 and a half hours and is marked out of 75. It constitutes 50% of the overall grade.

In Paper 2 'Application of Computational Thinking' students learn to debug, rearrange and write their own code in Python. This is a practical exam which last 2 hours and is worth 75 marks. In preparation for this exam, students will learn a range of algorithms to provide the knowledge they need to respond to all questions on this paper. It constitutes the remaining 50% of the overall grade.

KEY STAGE 4		
Examination Specification:		
	Topic	Key Themes
YEAR 10	Principles of Computer Science term 1 Data Representation	Introduction to the course Binary conversion Unsigned integers Binary arithmetic Two's complement (negative binary numbers) Logical binary shifts Arithmetic binary shifts Hexadecimal ASCII
	Computational Thinking term 1 Introduction to programming	Introduction to programming Decomposition and algorithms Data types and variables Input and integer functions. Flowcharts String manipulation If and else relational operators If ,elif, else readability Boolean operators Repetition using while loops
	Principles of Computer Science term 2 Computers and operating systems	Stored program concept Fetch decode execute part 1 Fetch decode execute part 2 Secondary storage 1 Secondary storage 2 Operating systems File management Process management Peripheral and user management Utility software
	Computational Thinking term 2 Programming essentials	One dimensional lists For loops range function Procedures Functions Sub programs String format

		Two dimensional lists Validation Linear search one dimensional Linear search two dimensional
	Principle of Computer Science Term 3 Cyber Security and Networks	Malware and anti-malware Hackers Social engineering Data level protection Robust software LANs and WANs Network speed Connectivity Wired v wireless Network topologies
	Computational Thinking term 3 Reading and writing to files and python turtle	Merge sort Reading files String processing Writing to files Authentication Turtle introduction, pens and lines Turtle movement and sub programs Turtle pens, colours and fillings Turtle, combining sub programs and layers Turtle big problem
	Topic	Key Themes
YEAR 11	Principles of Computer Science term 1 The Internet of Things and issues and impact	Embedded systems The Internet of things Packet switching TCP/IP 1 TCP/IP 2 Issues and impact Environmental issues 1 Environmental issues 2 Intellectual property
	Computational Thinking term 1 Advanced programming skills	Programming recap Sub-programs Local and global variables Math and time library modules Problem solving Trace tables Errors Bubble sort Binary search Problem solving
	Principles of Computer Science term 2	Bitmaps 1 Bitmaps 2 Representation of sound 1 Representation of sound 2 Compression AI, Machine learning and Robotics 1

	Data representation and computing in the future	AI, Machine learning and Robotics 2 Personal data Privacy Data protection and computer misuse
	Computational Thinking	Data Types, string manipulation, validation and testing with data One dimensional data structure Trace tables Errors Problem solving Two-dimensional data structures Sub-programs Problem solving Flowcharts, trace tables and bubble sort Problem solving and testing with data
	Revision Resources	Smart Revise website. Exam board revision guide and workbook.
	Exams	Paper 1: Principles of Computer Science Paper 2: Application of Computational Thinking

Extracurricular and Enrichment opportunities

- Company visits. E.g. a trip to Zebra Tech to learn about new technology in the workplace
- NCCE Consultant visits and masterclasses for students.
- Cyber First challenge for girls in year 8 and 9

