



# Curriculum *Newsletter*

## COMPUTER SCIENCE

### What are your next steps?

Why studying Computer Science is important:

Computers are a central part of our everyday lives whether at work, at home or in education. The importance of being able to confidently, appropriately and safely use digital technologies cannot be overemphasised. Being digitally literate is essential to being able to thrive in the 21st century. Our curriculum aims to increase our students' interest in, and their understanding of, a wide range of digital technologies and software applications. Understanding how computers work, what information about you companies track, how to stay safe from on-line crime, how to use computers and the internet appropriately are all important aspects of living in the digital world. What is arguably more important is being able to become the master of technology and not a slave to it, and how to make technology work best for you. Studying Computer Science will give you the opportunity to do just that.

### Curriculum intent for Computer Science:

We want our students to understand and play an active role in the digital world that surrounds them, not to be passive consumers of an opaque and mysterious technology. A sound understanding of computer science concepts will help students see how to get the best from the systems they use, and how to solve problems when things go wrong. In a world full of technology, every school-leaver

should have an understanding of computer science and be digitally literate.

Computer science at Hermitage Academy is an immersive experience, exposing students to fundamentals such as Microsoft Office, which is an essential tool for most jobs in today's workforce. Creative computing such as image manipulation, website and computer game development, teaches young people how to express their creativity in an informed and responsible way and encourages them to reflect on what they produce and strive for excellence. Finally, computer science concepts such as how computers work and developing coding solutions, using multiple programming languages, to real-world problems, develop critical thinking and problem-solving skills that are essential in future life.

Throughout the key stages, students will encounter a range of software, completing project-based tasks, providing solutions to given scenarios. Students will also be encouraged to think about e-safety and cultural issues of computer science. These include the impact of technology on daily life, the "digital divide" and globalisation.

As well as following the curriculum, students will be encouraged to read for pleasure, experiencing a diverse range of literature as a platform for exploring new ideas, developing critical thinking skills and learning more about the world around them.

Students enjoy computer science because it is varied, fast-paced and fun. Every student is inspired to believe in their potential and to aim high. Careers within

coding and the digital sector are the fastest growing sector today, predictions estimate there will be twice as many jobs than candidates to fill them in the coming years. We have devised our computer science curriculum, students acquire a grounding towards knowledge, skills and understanding that a growing number of employers are demanding.

### **What students will study throughout Key Stage 3:**

Each year in Key Stage 3 includes lessons covering aspects of safety.

#### **Year 7 Units**

**Office Skills-** This teaches the fundamentals of Microsoft Office applications, email, the internet and file management.

**Introduction to Computer Systems-** This unit provides an introduction to hardware, software, storage devices, networks and network security.

**Graphic Design** Students will learn about image manipulation in the media and use the skills they learn to create composite digital images.

**Scratch Programming-** Students will use this block-based programming language to start their coding journey and develop a game based around the classic game PONG.

#### **Year 8 Units**

**Intermediate computer systems-** This builds on the introduction to computer systems unit from year 7 and covers binary, sorting algorithms, network topologies, computer logic and data representation.

**Website Development-** Students will create websites containing text, images, and interactive elements such as videos. They will also gain an introduction to HTML.

**Vector graphics** This unit explores the creation of vector mages using specialised illustration software.

**GameMaker** Students will use this high-level visual programming language to learn coding concepts, basic scripting and develop a maze game of their own theme, similar to PAC-MAN.

#### **Year 9 Units**

**Python-** Students will learn and apply the use of sequence, selection, iteration and string manipulation in this high-level industry standard programming language.

**Interactive Multimedia Products-** Students design and create an interactive multimedia product for a given scenario. The product will incorporate text, images, videos, sound and hyperlinks.

**Image Editing with Photoshop-** This unit introduces students to more complex photo editing techniques.

**Digital Literacy-** This unit increases students' understanding of the digital world and how to navigate it safely and effectively.

### **What students will study throughout Key Stage 4:**

At Key Stage 4 Students have the option to study Computer Science or ICT.

Computer Science

Course: OCR GCSE Computer Science (9-1) - J277

The course is assessed through two external examinations at the end of year 11. Each exam contributes 50% of the final course grade. Students will study a wide range of topics covering:

- **Systems architecture** including the CPU, its purpose and how it impacts performance, Von Neumann Architecture, and embedded systems.

- **Memory and storage** including primary, secondary, units, data representation and compression.
- **Programming fundamentals** including sequence, selection, iteration, and string manipulation.
- **Computer networks**, connections and protocols including types of factors affecting the performance of, hardware required for networks. Also, network topologies and methods of connection.
- **Network security** including threats to computer systems and how to protect against vulnerabilities.
- **Systems software** including both operating, application and utility software
- **Ethical, legal, cultural & environmental impacts of Digital Technology.**
- **Programming fundamentals** including sequence, selection, iteration, and string manipulation.
- **Additional programming techniques** including records to store data, SQL, arrays, and subprograms.
- **Producing robust programs** including defensive design and testing.
- **Boolean logic** including common arithmetic operators.
- **Programming languages and Integrated Development Environments** including characteristics of the purpose of and facilities available in.

### What students will study throughout Key Stage 5:

Course: OCR A-level Computer Science H446

This course comprises three components which are outlined below:

**Computer Systems** – This component is assessed by external examination at the end of year 13 and contributes 40% of the marks towards the overall grade. The component covers a wide range of Computer Science topics and includes:

- Structure and function of the processor
- Types of processor

- Input, output, and storage
- Compression, Encryption and Hashing
- Databases
- Networks
- Web Technologies
- Systems Software
- Applications Generation
- Software Development
- Types of Programming Language
- Data Types
- Data Structures
- Types of Programming Language
- Boolean Algebra
- Computing related legislation
- Moral and ethical Issues

**Algorithms and Programming** - This component is assessed by external examination at the end of year 13 and contributes 40% of the marks towards the overall grade. The component includes:

- Thinking abstractly
- Thinking ahead
- Thinking procedurally
- Thinking logically
- Thinking concurrently
- Programming techniques
- Computational methods
- Algorithms, including the use of algorithms to describe problems and standard algorithms

**Programming Project** – This component is a non-examined assessment which is internally marked and externally moderated. It contributes 20% of the marks towards the overall grade. Students will choose a problem to solve and produce a report alongside their program which includes:

- An analysis of the problem
- The design of the solution
- The development and testing of the solution
- An evaluation of their solution

Studying Computer Science can lead to many existing and in-demand careers as well as build transferable skills in problem solving, algorithmic thinking and organisation that are useful in a range of industries. Possible careers include:

- Programmer
- Web developer
- Systems Architect
- Games developer
- Mobile application developer
- Database administrator
- Artificial Intelligence Engineer