OUR CURRICULUM

COMPUTER SCIENCE

PHILOSOPHY & NARRATIVE


Computers are incredibly fast, accurate, and stupid.
Human beings are incredibly slow, inaccurate, and brilliant.
Together they are powerful beyond imagination.
Albert Einstein

OUR PHILOSOPHY

We are living in the Computer Age; it engulfs us, pervading every aspect of our daily routines: our work, our leisure, our social interactions and our general communication.

In the 21st century it is almost as important to be digitally literate as it is to be literate. To live life to the full and embrace all the wonders of the modern age, an understanding of how technology works and the effects that it has on our everyday lives is critical for all students in the future lives they will lead.

The global village in which we live is closer than ever before; the other side of the world is accessible at the touch of a button, or a screen, in fact just a nanosecond away. We live as global citizens and as such we need to understand, embrace and utilise the digital technology at our finger tips in an appropriate and responsible way.

The digital world in which we live is inspiring and powerful; it expands our learning opportunities and offers boundless, unimaginable possibilities.

As world-wide citizens we need to be discerning of the information available, to be able to interpret it, use it, analyse and create it, in a morally and ethically unassailable manner.

KEY STAGE THREE

The focus in year 7 is to introduce students to the inner workings of technology that surrounds them in their day to day life. This includes the Internet and the World Wide Web; invented by Sir Tim Berners-Lee. We look at the differences between the two, how they both work together and how to stay safe whilst using them.

We then start to look at digital devices and the combination of input, output and storage using real world examples. Students will also grasp how hardware and software both work harmoniously together within modern systems. Students then begin their journey into computational thinking. Students are tasked to analyse and solve problems, and also design algorithms to model the real world. We look at how the works of Ada Lovelaceand Alan Turingpaved the way for modelling algorithms and writing basic computer programs. We'll examine how this has now evolved into the programming we see today. Our students will then journey from a simple algorithm, such as a flowchart or sequence of written instructions, to a working text-based program written in an introductory programming language.

In Year 8 students study data representation by a computer system at its deepest "bit-level". Number bases are introduced and conversions between binary, denary and hexadecimal values are understood.

We build on students' knowledge of the internet by looking at how it is created, the hardware behind it, and the various different types of networks. Cyber Security is an important topic; how we keep computer systems safe from hackers and malicious software. Subsequently students continue to enhance their programming skills. The concept of abstraction is introduced, and the use of simple data structures are explored. Finally, we learn about image manipulation and user interfaces. Students will undertake creative projects, developing assets for specific real-world scenarios but also investigating legal and ethical issues such as airbrushing, false images and copyright.

Year 9 draws a distinction between Computer Science and Information Technology. The Computer Science pathway places a key focus on computational thinking, further enhancing programming skills. We look at how those components work together as a stored-program computer, a concept and architecture used by most devices today created by John von Neumann. We also build on data representation knowledge and start to look at binary shifts and their effect, and how images and sound is represented by a computer system. Students will be able to extract key knowledge from a given scenario and program a solution.

Our Digital IT pathway begins by exploring modern technologies. The impact and threats a particular technology has had on society, such as 3D printing and virtual reality. We then examine communication technologies such as Wi-Fi, 4G and even 5G. We move on to data-modelling, ensuring students become proficient with spreadsheet functions, but also look at 'big data', data collection methods and ethical issues. Students enhance their creative skills by designing and creating a user interface.

For both pathways, the end of the year consists of students undertaking a mini-project in which they plan, design, implement, test and evaluate a piece of software.

KEY STAGE FOUR

In Computer Science, students explore data representation. We learn about systems architecture, and how a key-stroke is translated into a simple binary machine code instruction. Networks and cyber security plays a huge role in current systems and modern lifestyle.

In order to teach students to be safe online and offline, various social engineering methods are examined, malicious code is looked at along with methods to detect and prevent any threats.

We move onto computational thinking and problem solving. Students create a solution to basic problems, going from a flowchart or pseudocode algorithm, through to a fully-working high-level program. Students are introduced to Boolean operators, string-handling functions, searching and sorting algorithms along with the basics of assembly language programming.

In year 11, students will undertake a programming project; solving a problem specified by the exam board. Students add to their programming repertoire by looking into procedures, functions and passing parameters. We debate the ethical, legal environmental impacts of digital technology on wider society, including issues of privacy, developing critical thinking, articulation, application and evaluating skills.

The alternate route is a technical award where students venture into the realm of 'Digital IT'. In year 10 students look at user-interface design and project planning, undertaking written assignments on bespoke scenarios.

They investigate user interface design for individuals and organisations; look at audience needs and design principles; they then plan and design a user interface, reviewing its success. In year 11, students focus on data, how it is collected, presented and interpreted. They investigate the role and impact of using data on individuals and organisations, and create a dashboard using data modelling.

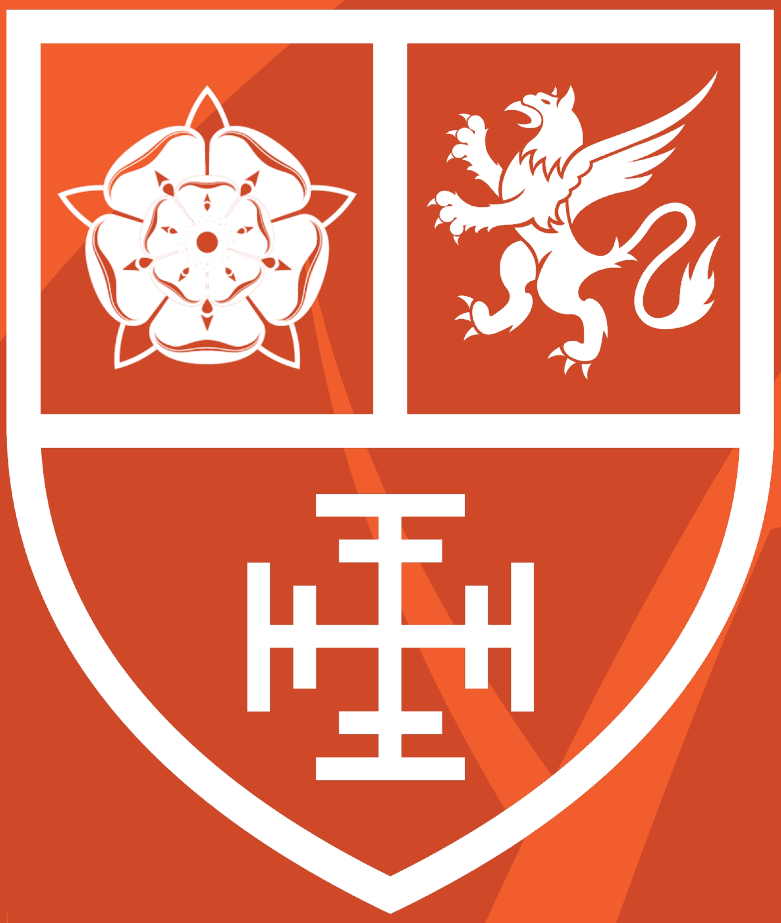
KEY STAGE FIVE

At KS5, students are not only learning a variety of computing theory topics, they are tasked to solve a complex problem of their choice. In addition, students explore complex mathematics including Boolean Algebra, as introduced by George Boole.

Key algorithms such as the merge sort, designed by John von Neumann are studied, along with enhancing and shaping an attitude to the ethics of computing as a whole.

On the BTEC IT courses, students plan and create a social media campaign; web design is studied; how user interface and user experience both work hand in hand when developing websites.

They also look at how businesses handle vast amount of data, preparing students for higher education.



BUILDING ON THE KNOWLEDGE OF THE PAST
TO HELP THE CHILDREN OF TODAY
MEET THE CHALLENGES OF TOMORROW