Subject overview for: Computer Science

1. Subject overview

We live in a society in which we are heavily dependent on the use of computers and ever-changing technology. Within the JMHS Computer Science department, we aim to equip our students with the practical skills and knowledge to enable them grow and thrive in the digital world. Throughout the curriculum, we endeavour to share our passion and enthusiasm for the subject whilst highlighting its increasing importance.

Our main aims for our Computer Science students to:

1. Learn how to use computer programming and common software packages.
2. Develop transferable ICT skills with business standard software packages to improve employment opportunities.
3. Gain knowledge of the wider digital world around them and the influences it has on our daily lives.
4. Nurture interest and understanding of how computer architecture has developed and its scope for future development.
5. Understand the potential threats of system security and their impacts on people & society.
6. Enhance their numeracy skills and logical reasoning skills through methods such as developing algorithms.
7. Strengthen their problem-solving skills eg through programming.

2. Key Stage Three summary (Year 7 and Year 8)

Within the Computer Science department, all students in Year 7 and 8 will follow an 'Introduction to essential computing skills' curriculum of 1 hour per week. We aim to equip our students with the practical skills and knowledge to enable them to thrive in the world of computing.

All students will:

- Understand the way the JMHS computer systems work and classroom expectations.
- Introduce then develop skills with products from the Microsoft suite.
- Be able to gather, refine, sort, search and extract data in different forms.
- Be able to use basic programming techniques within Python & Scratch.
- Strengthen their independent thinking through completion of projects based on advertising and sharing of information.

The two-year Key Stage 3 course has been carefully planned to meet the National Curriculum requirements. We endeavour to exceed the National Curriculum by implementing a website design and development unit, along with the essential life skills of how to utilise the office applications in the workplace.

3. Key Stage Four summary

a. Year 9: Transition year

Year 9 is a transition year that we use as an opportunity to extensively, and exclusively teach the programming language, Python, to an industry level. Year 10 and 11 is where the theory content is taught along with Python tasks, to sustain students Python programming skills at a level above that required by the GCSE course.

b. Year 10 and Year 11: GCSE Computer Science

The solid foundation gained in Year 9 underpins the essential knowledge and understanding required in Year 10 and Year 11. By the end of Key Stage 4, students are able to identify all internal components of a computer and explain the need of each component, and its factors that effect the overall performance. They are also able to develop complex programs with Python, that use functions, procedures, modules and make use of search and sort algorithms.

The course has been structured linearly and the modules are ordered to incorporate learning and is planned cyclically to revisit pervious content. Students start by learning the small internal components of the computer, then how they fit together to make specialised machines for individuals' requirements. Then we study the hardware and software required to network computers together and the dangers that come along with networked devices, and how best to protect these networks.

4. Sixth Form courses

Computer Science A Level

Our A Level Computer Science qualification splits learning into three sections: Computer Fundamentals, Programming Techniques and Logical Methods along with completing a Programming Project. It provides the perfect springboard for students looking at specialising in a computing-based career. Within the course, students study a range of theory topics, which include the principles and understanding linked to programming, including hardware and software, networks, systems development lifecycles and implications of computer use.

ICT Level 3 Cambridge technicals introductory diploma

As part of our IT introductory diploma Students will learn the skills of how IT is used in the business digital world. We will instil an understanding of the range of threats, vulnerabilities and risks that impact both individuals and organisations, and how to prevent or deal with cyber security incidents resulting from these challenges. Students will create a virtual reality (VR) application prototype, and the digital marketing campaign of the product produced.

ICT Level 3 Cambridge technicals diploma

The diploma course builds upon the units of the introductory diploma, by teaching units based around, developing a smarter planet, internet of everything (IOE), Mobile technology, project management, project development, and computer systems hardware.

5. Contribution to preparing for life in modern Britain/equalities

Throughout the computer science department, we teach our students how to stay safe online, promoting E-safety at Key Stage 3, then teaching different online cyber-attack methodologies and preventative measures at Key Stage 4 and Key Stage 5. In Key Stage 4 and Key Stage 5 we also teach ethical units about topics such as the digital divide, artificial intelligence (AI), recycling e-waste. This is done to provide students with an understanding of how the use of technology affects people domestically and abroad.

6. Contribution to careers provision

From Key Stage 3 we promote a variety of possible pathways where computer skills are a requirement of the role. This is done to foster any passion and interest students show when they start at JMHS.
In Key Stage 4 we further advertise job roles to students around the areas of computer science such as programmers, network engineers and developers, and discuss the requirements of the roles.
In Key Stage 5 we get external visitors in that work in the digital sector to deliver practical sessions to our students. We also have one-to-one conversations with all students who study a computing subject at Key Stage 5 and discuss their next steps, and together look at apprenticeships, university courses and job opportunities - allowing students to ask any questions they may have to subject specialists to help them make informed decisions about their futures.