



Computer Science

Engage

Endeavour

Excel



Entry Requirements:

Grade 6 or higher in GCSE Maths, plus Grade 5 in GCSE Computer Science (if taken)

Pass Rate: 100% (A*-C in 2019 and 2020)

Exam Board: OCR

Trips & Events:

The Computing department regularly undertakes visits to local technology companies including UKFast for their Digital Careers Masterclass. You can enter national competitions including CyberDiscovery and CyberCenturion. Study towards an industry-standard Networking qualification through the Cisco Networking Academy alongside your A-level and look out for collaboration with our local Universities' Computing departments in the 2019-20 academic year.

Student Voice: "Through studying A-Level Computer Science you gain problem solving techniques and methods that can be carried on to whatever field you decide to go into. At WHGS, a strong Computer Science department has helped me excel and become more confident in the subject during Year 12. Matching that with high-quality teaching techniques will inevitably help you achieve your maximum potential in the subject."

Student Voice: "The Computing department at WHGS is great, the teachers are very knowledgeable about the whole course, and are quick with marking any work you give them, as well as being available for one to one help whenever you need it."



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A Level Computer Science

OCR Course Code H446

Year 12

- The characteristics of contemporary processors, input, output and storage devices
- Computational Thinking: thinking abstractly, ahead, procedurally, logically, concurrently.
- How computers and programs can be used to solve problems.
- Data exchange between different systems, computer networking.
- Legal, moral, cultural and ethical issues.

Content:

You will study the hardware components that make up a computer system, and how these affect the performance and characteristics of the device. The essential, creative skill of “Computational Thinking” which underpins the art of programming and your coding skill will be developed.

You will learn how to design, implement and test programs using sequence, selection, iteration and subroutines, and data structures including arrays, lists and dictionaries.

The basics of networking are studied in Year 12 including topologies, the client-server model, packet switching and the internet, web hosting, DNS and the TCP/IP protocol stack. You will study Network Security including common threats and countermeasures and how to protect against passive attacks, viruses, brute-forcing and SQL injection.

You will explore the implications of Computing including how to comply with the Data Protection Act, prosecuting hacking through the Computer Misuse Act plus other laws and privacy issues such as the misuse of personal data. You will explore many cultural and ethical issues in computing such as disabled people’s access to technology, the implications of facial recognition, and the issue of bias in algorithms.

Year 13

- Types of software and the different methodologies used to develop software.
- Algorithms and how they can be used to describe and solve problems.
- Binary Arithmetic, Data types, Data Structures and Computational Logic.
- Using Computational Thinking, Algorithms and Programming skill to solve complex problems.

Content:

You will study the purpose and features of an Operating System, types of system software, how software is developed and the different systems analysis models such as Waterfall and Agile. Abstracting real-world information into computer representations such as data structures and algorithms. How integer and floating-point numbers are stored in binary, and how computers perform binary arithmetic and bitwise operations. And how logic gates are combined to make building blocks of computers such as adders and flip-flops.

You will learn how data is stored in different structures such as queues, stacks, linked-lists, graphs and trees, and the computational methods needed to process such data, including searching and sorting, graph and tree traversal and goal-seeking algorithms such as A-star and Dijkstra. You will describe the complexity of algorithms using “Big-O Notation” and select the optimal algorithm for the job.

```
#If the ball hits the bottom this
if pong.hit_bottom or pongtwo.hit
#Declares font
labelfont = ('Arial', 100, 'B

#Gets the final value of the
score = '0'
text = "Your score was ", score

#Opens a window to tell the u
root = Tk()
label = tk.Label(root, text="
label1 = tk.Label(root, text=

#Updates the high score in th
UpdateLeaderBoard4(score)

#Stops the loop
GameOver = True
```



You will extend your programming knowledge to nested loops, exception handling, recursion, external libraries and abstract data structures, then apply this learning and the principles of Computational Thinking to a practical coding project. You need to analyse, design, develop, test, evaluate and document a program written in Python, Java or one of four other languages. Many students create games (see image) while some create practical applications for healthcare, education or the arts.

A-Level Assessment

The course is assessed through two 2.5-hour exams each worth 40%, plus a Programming project worth 20% of the overall mark.



Beyond A-Levels: Future Career Aspirations

There has never been a more exciting time to be a Computer Scientist, with the explosion of important new fields of study such as Artificial Intelligence, Machine Learning, Robotics, Chatbots, Virtual Reality, Big Data and Blockchain technology, while a global shortage of Cybersecurity professionals is expected to top 1.8 million by 2022. And of course, the computer game industry is always looking for new talent.

Studying A-level Computer Science at WHGS opens the door to many undergraduate qualifications, including degrees in Computer Science, Software Engineering, Artificial Intelligence and Health Informatics. Or take a Degree Apprenticeship and get paid £12,000+ as a Web Developer or Data Analyst while earning your degree.

Then, as a Graduate in a Computer Science-related degree, you will command an average starting salary of £25,000. Career mean salaries after several years' experience are as follows: (source: glassdoor.co.uk)

- Website Developer £30,000
- Computer Hardware Engineer £33,000
- Cybersecurity Analyst £38,000
- Game Developer £45,000
- Mobile App Developer £45,000
- Computer System Architect £60,000

A Computer Science career is varied and challenging. As Google would say:

"Challenge your ingenuity and solve world-changing problems with cutting-edge flair."

