Computer Science

A-Level Computer Science at Southborough Sixth

"Computing jobs are among the highest paid and have the highest job satisfaction"

Now that we have your attention, why not learn more about Computing at Southborough on a course geared towards giving you the edge to compete in the arena of innovation. Whether as a stand alone discipline, or as a path to university, our course is one of practical hands-on experience coupled with the solid foundations of theory, designed to engage your passion for technology, computers, and problem solving. Essentially, reviving the creativity needed to drive the 21st century.

This modern qualification gives an insight into a range of computing systems, including an understanding of the principles of programming and the solving of problems.

THROUGH THIS QUALIFICATION, YOU CAN DEVELOP:

- The capacity to think creatively, innovatively, analytically, logically and critically

- An understanding of the organisation of computer systems

- The ability to apply skills, knowledge and understanding of computing, Including programming, in a range of contexts to solve problems

- The capacity to see relationships between different aspects of the subject

- An understanding of the consequences of using computers, an awareness of emerging technologies and an appreciation of their potential impact on society.

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Why choose A level Computing?

. It includes more computer science than traditional ICT
. It includes a practical coursework unit — which is the best way to demonstrate your level of practical skills in computing
. There is a simple assessment method, and examination papers are externally assessed
. It Is excellent preparation for students looking to take computing studies at degree level, or for anyone considering any kind of career In computing.
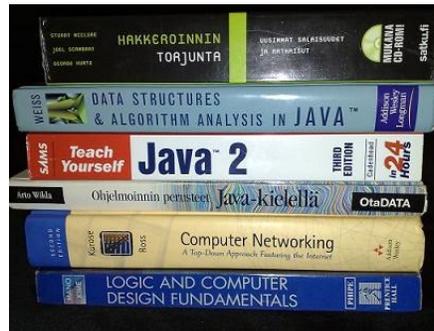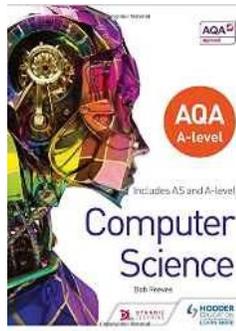
This course is a full A-Level, run over two academic years (five terms)

First Year Content

1. Programming – imperative procedural-oriented
2. Data structures – arrays, fields, records, files (text & binary)
3. Systematic approach to problem solving – analysis, design, implementation, testing, evaluation
4. Theory of computation – abstraction, automation, FSM without output
5. Data representation – number systems/bases, information coding systems, encryption
6. Computer systems – logic gates, Boolean algebra, program translator types, classification of programming languages, system software
7. Computer organisation and architecture – machine code/assembly language, CPU, internal components of computer, external hardware devices (limited range)
8. Consequences of uses of computing – software and their algorithms embed moral & cultural values, issue of scale brings potential for great good but also ability to cause great harm, challenges facing legislators
9. Communication and networking – communication methods/basics, network topology, wireless

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AS /A2 Computer Science

Second Year Course

1. Programming – Object Oriented Programming, recursive techniques
2. Data structures – lists, dictionaries, hash tables, queue, graph, tree, stack, vector,
3. Algorithms – traversal, search, sort, optimisation
4. Theory of computation – language hierarchy, complexity, Turing machines
5. Data representation – Computer systems – logic gates, Boolean algebra, program translator types, classification of programming languages, system software
7. Computer organisation and architecture – machine code/assembly language, CPU, internal components of computer, external hardware devices (limited range)
8. Communication and networking – the Internet, TCP/IP, CRUD applications and REST, JSON, JavaScript
9. Databases – data modelling, relational database, SQL, client server databases
10. Big Data – volume/velocity/variety, fact-based model and functional programming
11. Fundamentals of functional programming – function type, first-class object, function application, partial function application, composition of functions, map, filter, reduce, lists

HOW IS THIS QUALIFICATION ASSESSED?

On-screen exam covering Programming 40% of total marks 2 1/2 hours
Paper exam covering all aspects of theory 40% of the total 2 1/2 hours
The Computing Project is internally assessed and externally moderated coursework and qualifies for 20% of the overall marks.

WHAT DO I NEED TO HAVE TO ENTER THE COURSE?

You will have been assessed in Computing skills at Key Stage 3 and many will have followed a course in ICT or Computing at Key Stage 4. Whilst not assuming the full knowledge and understanding of the subject at Key Stage 4, the course assumes that you will have a basic understanding of programming and knowledge of both the hardware and software of a standard, stand-alone computer system.
It is likely that you will like technological things and have an interest in how things work.
In addition, you will have both GCSE English Language and Maths at a minimum of grade 4.

FULL PROGRESSION FROM GCSE TO A LEVEL

A Level Computing follows on from GCSE Computing (part of the English Baccalaureate), although it is not essential that you have completed this course.

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