



COMPUTER SCIENCE

A Level Subject Information



YEARS 12 & 13 Computer Science A-Level

Knowledge Skills & Understanding

- An understanding and ability to apply the fundamental principles and concepts of computer science, including: abstraction, decomposition, logic, algorithms and data representation
- The ability to analyse problems in computational terms through practical experience of solving such problems, including writing programs to do so
- The capacity to think creatively, innovatively, analytically, logically and critically
- The capacity to see relationships between different aspects of computer science
- Mathematical skills.

Course Outline

Computer Systems (Component 01)

- Written Test Paper
- 140 marks
- 2.5 hours
- The characteristics of contemporary processors, input, output and storage devices
- Software and software development
- Exchanging data
- Data types, data structures and algorithms
- Legal, moral, cultural and ethical issues

Algorithms & Programming (Component 02)

- Written Test Paper
- 140 marks
- 2.5 hours
- Elements of computational thinking
- Problem solving and programming
- Algorithms to solve problems and standard algorithms

Programming Project (Component 03)

- Coursework done throughout the year
- 70 marks
- Analysis of the problem
- Design of the solution
- Developing the solution
- Evaluation

Summer Preparation

Below are some tips to prepare for a great start in Computer Science at North Halifax Grammar School. Read technology blogs, and magazines. Start to learn a programming language and stick with it. In school we use Python as the main programming language to teach coding concepts. You will also need to use HTML, CSS, JavaScript and SQL. There are lots of resources online to guide you on your journey with Python. Use <https://learnpython.org> as a starting point. You will also find useful tutorial videos on YouTube. The more you code, the more you will enjoy the subject and it will help you build key concepts, knowledge and understanding.

Why Study Computing?

Computer Science is the study of principles and practices that underpin an understanding and modelling of computation, and of their application in the development of computer systems. At its heart lies the notion of computational thinking: a mode of thought that goes well beyond software and hardware, and that provides a framework within which to reason about systems and problems. This mode of thinking is supported and complemented by a substantial body of theoretical and practical knowledge, and by a set of powerful techniques for analysing, modelling and solving problems.

Computer Science is a practical subject, where invention and resourcefulness are encouraged. Pupils are expected to apply the academic principles they have learned to the understanding of real-world systems, and to the creation of purposeful artefacts. This combination of principles, practice, and invention makes it an extraordinarily useful and an intensely creative subject, suffused with excitement, both visceral (“it works!”) and intellectual (“that is so beautiful”).

Benefits of studying Computing

Computer Science is a discipline

Education enhances pupils’ lives as well as their life skills. It prepares young people for a world that doesn’t yet exist, involving technologies that have not yet been invented, and that present technical and ethical challenges of which we are not yet aware. To do this, education aspires primarily to teach disciplines with long-term value, rather than skills with short-term usefulness, although the latter are certainly useful. A “discipline” is characterised by:

A body of knowledge, including widely-applicable ideas and concepts, and a theoretical framework into which these ideas and concepts fit.

A set of techniques and methods that may be applied in the solution of problems, and in the advancement of knowledge.

A way of thinking and working that provides a perspective on the world that is distinct from other disciplines. Longevity: a discipline does not “date” quickly, although the subject advances.

Independence from specific technologies, especially those that have a short shelf-life.

Computer Science is a STEM discipline

Computer Science is a quintessential STEM discipline, sharing attributes with Engineering, Mathematics, Science, and Technology:

- It has its own theoretical foundations and mathematical underpinnings, and involves the application of logic and reasoning.
- It embraces a scientific approach to measurement and experiment.
- It involves the design, construction, and testing of purposeful artefacts.
- It requires understanding, appreciation, and application of a wide range of technologies.

Source: <http://www.computingatschool.org.uk>