Group 4

COMPUTER SCIENCE

Computer Science is the study of computers and computational systems. It covers the theory of computing, such as algorithms and software design, and the practical use of computer science to solve real-world problems. As one well-known saying puts it, computer science is no more about computers than astronomy is about telescopes.

The course focuses on computational thinking – the process of working out how to solve problems and express the solution so that a computer can carry it out. Students study two main areas: Concepts of Computer Science, which includes computer fundamentals, networks, databases and machine learning, and Computational Thinking and Problem-Solving, which covers programming and object-oriented programming.

Students have six hours of lessons per week at Higher Level and four hours per week at Standard Level. Lessons are usually organized as theory and practical work, giving some time to write code and build projects.

The main programming language used on the course is Python (with Java also offered as an alternative). Practical activities are a central part of the subject. The Internal Assessment project, called the computational solution, takes 35 hours of course time. In this project each student designs and builds a software solution to a problem of their own choice, applying everything they have learned about computational thinking, programming and testing. The Case study is another important practical element, with 15 hours allocated for Standard Level and 15 hours for Higher Level. Students research a pre-seen scenario involving emerging technologies and then answer questions about it in the examinations. Both activities help students develop skills that are useful far beyond computer science.

Assessment consists of two written papers. Paper 1 covers the theoretical concepts of computer science together with questions based on the Case study. Paper 2 focuses on programming and problem-solving, with questions written in Python (or Java optionally). Together these papers and the practical project give students a balanced way to show what they know and can do.

Modern computer science places strong emphasis on cybersecurity and artificial intelligence. Students learn about network security, encryption and how to protect systems from attacks. Machine learning is a core topic for everyone, and the course also looks at the ethical side of artificial intelligence, including fairness, privacy and the impact on society. These skills are valuable for future careers in technology and security.

Computer science is a useful and complementary subject. Computational thinking can be applied in many other areas, such as mathematics and the sciences, wherever computing helps to solve problems. The problems computer scientists tackle often come from the real world, and their solutions can change everyday life, business and industry. Within the IB programme, the subject helps students become inquirers, thinkers, communicators and reflective learners, and develops skills like research, collaboration and self-management.

Computer Science course gives students future-relevant skills in cybersecurity and artificial intelligence, while showing how computer science supports learning across all other subjects.