Computer Science

Nature of the Subject

The Computer Science course in the International Baccalaureate Diploma Programme (IBDP) is designed to provide students with a comprehensive understanding of key concepts, principles, and skills related to computer science. The course is structured to foster critical thinking, problem-solving, and creativity in the context of computing.

Distinction between Higher and Standard Level:

While the skills and activities of computer science are common to students at both SL and HL, students at HL are required to study additional topics in the core, a case study and also extension material of a more demanding nature in the option chosen. The distinction between SL and HL is therefore one of both breadth and depth.

Additionally, the HL course has 240 hours devoted to teaching, compared with 150 hours for the SL course.

Syllabus outline

The core topics that must be studied, including some practical work, are:

- Topic 1: System fundamentals
- Topic 2: Computer organization
- Topic 3: Networks
- Topic 4: Computational thinking, problem-solving and programming

The Higher-Level extension topics relating to the core are:

- Topic 5: Abstract data structures
- Topic 6: Resource management
- Topic 7: Control

Additional subject content will be introduced at HL by the annually issued case study. Finally, students study one of the following options:

- Option A: Databases
- Option B: Modeling and simulation
- Option C: Web science
- Option D: Object-oriented programming (OOP)

Prior Learning

The study of computer science demands a higher level of problem-solving skills and the ability to understand and manipulate abstract concepts. Although no previous knowledge of computer science is required, some exposure to programming is desirable.

Assessment Objectives

- Demonstrate knowledge and understanding of specified content, methods, terminology.
- Apply and use relevant facts and concepts, relevant design methods and techniques, appropriate communication methods to present information.
- Construct, analyse, evaluate and formulate success criteria, solution specifications including task outlines, designs and test plans, appropriate techniques with a specified solution
- Demonstrate the personal skills of cooperation and perseverance as well as appropriate technical skills for effective problem solving in developing a specified product.

Teaching Approach

Computer science requires an understanding of the fundamental concepts of computational thinking as well as knowledge of how computers and other digital devices operate.

The Diploma Programme computer science course is engaging, accessible, inspiring and rigorous. It has the following characteristics:

- draws on a wide spectrum of knowledge
- enables and empowers innovation, exploration and the acquisition of further knowledge
- interacts with and influences cultures, society and how individuals and societies behave
- raises ethical issues
- is underpinned by computational thinking.

Computational thinking involves the ability to:
- think procedurally, logically, concurrently, abstractly, recursively and think ahead
- utilize an experimental and inquiry-based approach to problem-solving
- develop algorithms and express them clearly
- appreciate how theoretical and practical limitations affect the extent to which problems can be solved computationally

During the course the student will develop computational solutions. This will involve the ability to:
- identify a problem or unanswered question
- design, prototype and test a proposed solution liaise with clients to evaluate the success of the proposed solution and make recommendations for future developments.

Why students might choose this subject

Students might choose Computer Science in the IBDP for a variety of reasons, reflecting both personal interests and the perceived value of the subject. Here are several reasons why students may opt for CS:
- Interest in Technology:
- Problem-Solving Skills
- Programming Enthusiasts
- Future Career Aspirations
- Critical Thinking Development
- Innovation and Creativity
- Understanding the Digital World
- Preparation for University Studies
- Versatility of Skills

Course Assessment

The final Diploma grade in the subject is determined by two assessment components:

1. Internal assessment:

The development of a computational solution, including a product and a 2,000-word written supporting documentation.

2. External assessment: Written examinations

Paper 1, which consists of two compulsory sections:

- Section A consists of several compulsory short answer questions
- Section B consists of five compulsory structured questions.

Paper 2, which is linked to the option studied.

Paper 3, for HL only, which consists of four compulsory questions based on a pre-seen case study.