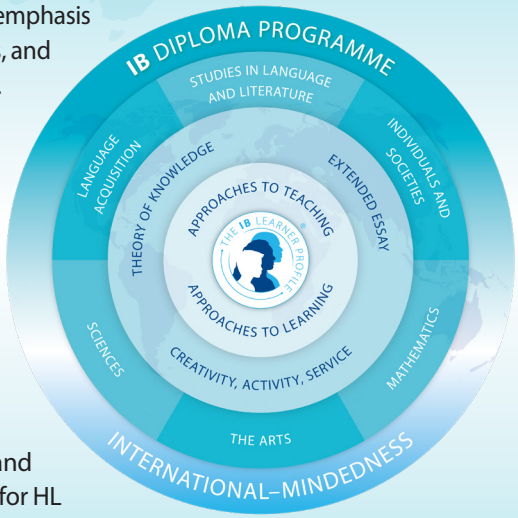
International Baccalaureate
Diploma Programme Subject Brief

Sciences: Computer science

First assessment 2027

The Diploma Programme (DP) is a rigorous pre-university course of study designed for students in the 16 to 19 age range. It is a broad-based two-year course that aims to encourage students to be knowledgeable and inquiring, but also caring and compassionate. There is a strong emphasis on encouraging students to develop intercultural understanding, open-mindedness, and the attitudes necessary for them to respect and evaluate a range of points of view.



The course is presented as six academic areas enclosing a central core. Students study two modern languages (or a modern language and a classical language), a humanities or social science subject, an experimental science, mathematics and one of the creative arts. Instead of an arts subject, students can choose two subjects from another area. It is this comprehensive range of subjects that makes the Diploma Programme a demanding course of study designed to prepare students effectively for university entrance. In each of the academic areas students have flexibility in making their choices, which means they can choose subjects that particularly interest them and that they may wish to study further at university.

Normally, three subjects (and not more than four) are taken at higher level (HL), and the others are taken at standard level (SL). The IB recommends 240 teaching hours for HL subjects and 150 hours for SL. Subjects at HL are studied in greater depth and breadth than at SL. In addition, three core elements—the extended essay, theory of knowledge and creativity, activity, service—are compulsory and central to the philosophy of the programme.

I. Course description and aims

The DP computer science course requires an understanding of the fundamental concepts of computing systems and the ability to apply the computational thinking process to solve problems in the real world. The course also requires students to develop skills in algorithmic thinking and computer programming.

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

- draws on a wide spectrum of knowledge of computer systems
- develops skills in algorithmic thinking and computer programming
- is underpinned by the computational thinking process
- enables and empowers innovation, exploration and the acquisition of further knowledge
- includes the study of machine learning
- raises ethical issues.

Computational thinking involves the ability to:

- specify problems in terms of their computational context and determine success criteria
- decompose complex real-world problems into more manageable problems
- abstract problems and generalize them to enable algorithmic thinking and to develop solutions
- test and evaluate solutions for improvements.

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During the course, students will develop a computational solution. This will develop their ability to identify a problem or unanswered question, and design, develop and evaluate a proposed solution.

The course enables students to:

- develop conceptual understanding that allows connections to be made between different areas of the subject, and to other DP subjects
- acquire and apply a body of knowledge, methods, tools and techniques that characterize computer science
- analyse and evaluate solutions developed through computational thinking in a range of contexts
- approach unfamiliar situations with creativity and resilience
- use computational thinking to design and implement solutions to local and global problems
- develop an appreciation of the possibilities and limitations of computer science
- evaluate the impact of emerging technologies in computer science
- communicate and collaborate effectively
- develop awareness of the environmental, economic, cultural and social impact of computer science, its applications and ethical implications.

II. Curriculum model overview

The DP computer science course is organized into two key themes:

- Theme A: Concepts in computer science
- Theme B: Computational thinking and problem-solving

Theme A focuses on how computing systems work. Theme B focuses on how we can use computing systems to solve real-world problems.

The course also has a practical dimension, comprising the computational solution (internal assessment) and the collaborative sciences project.

The course can be studied in either the Python or Java programming languages.

Component	Recommended teaching hours	
	SL	HL
Syllabus content	**105**	**195**
A Concepts of computer science		
A.1 Computer fundamentals	11	18
A.2 Networks	11	18
A.3 Databases	11	18
A.4 Machine learning	5	18
B Computational thinking and problem-solving		
B.1 Computational thinking	5	5
B.2 Programming	40	42
B.3 Object oriented programming (OOP)	7	23
B.4 Abstract data types (HL only)	0	23
Case study	15	30
Internal assessment	**35**	**35**
The computational solution	35	35
Collaborative sciences project	**10**	**10**
Total teaching hours	**150**	**240**

III. Assessment model

There are four assessment objectives for the DP computer science course. At the end of the course, students are expected to have met the following objectives:

Assessment Objective 1—Demonstrate knowledge and understanding of:
- facts, concepts, principles and terminology in computer science
- appropriate methods, techniques and skills to solve problems using computational thinking.

Assessment Objective 2—Apply and use:
- facts, concepts, principles and terminology in computer science
- appropriate methods, techniques and skills to solve problems using computational thinking
- appropriate methods to present information in computer science.

Assessment Objective 3—Construct, synthesize, analyse and evaluate:
- problem specifications, system requirements, success criteria, testing strategies, and programs
- appropriate techniques to the solution of a problem
- relevant data, information and technological explanations for solutions.

Assessment Objective 4—Demonstrate the application of computational thinking skills to solve real-world problems using computer science solutions.

Assessment at a glance

Type of assessment	Format of assessment	Time (weighting of final grade)	
		SL	HL
External		**2 hours 30 minutes (70%)**	**4 hours (80%)**
Paper 1	• Questions focused on the four topics in theme A, "Concepts of computer science". • The paper also consists of three questions related to the case study.	1 hour 15 minutes (35%)	2 hours (40%)
Paper 2	• Questions for SL and HL focused on the three topics in theme B, "Computational thinking and problem-solving". • Additional questions for HL, focused on OOP and abstract data types. Students can answer questions in either Java or Python.	1 hour 15 minutes (35%)	2 hours (40%)
Internal			
The computational solution	Students develop a computational solution to a real-world problem of their own choosing. The solution should use the concepts, skills and tools acquired in the course and the computational thinking process.	35 hours (30%)	35 hours (20%)

Programming is required to answer some of the questions on Paper 2. Questions that require programming will have equivalent versions for students to choose from, one in Java and the other in Python, according to the programming language they have studied.

About the IB: For over 50 years, the IB has built a reputation for high-quality, challenging programmes of education that develop internationally minded young people who are well prepared for the challenges of life in the 21st century and are able to contribute to creating a better, more peaceful world.

For further information on the IB Diploma Programme, visit: **https://ibo.org/en/dp**.

Complete subject guides can be accessed through the Programme Resource Centre or purchased through the IB store: **https://www.ibo.org/new-store**.

For more on how the DP prepares students for success at university, visit: **https://ibo.org/en/university-admission**.