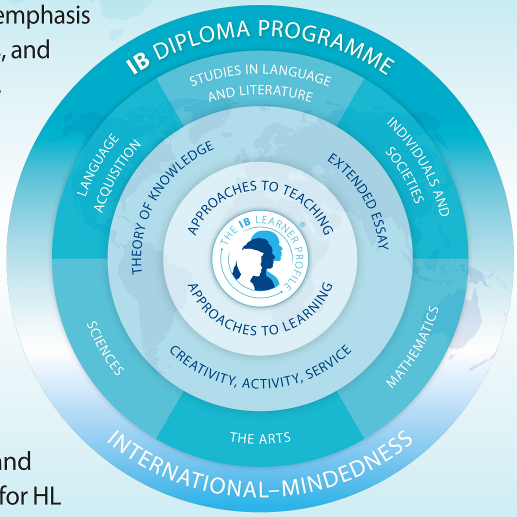
Sciences: Computer science

First assessment 2025

Diploma Programme

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

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

The course:

- draws on a wide spectrum of knowledge
- enables and empowers innovation, exploration and the acquisition of further knowledge
- raises ethical issues
- and is underpinned by computational thinking.

Computational thinking involves the ability to:

- think procedurally, logically, concurrently, abstractly and recursively
- 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 students will develop a computational solution. This will involve the ability to:

- identify a problem or unanswered question
- design, prototype, program and test a proposed solution
- liaise with clients and end users to evaluate the success of the proposed solution and make recommendations for future developments.

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The course aims to enable students to:

1. develop conceptual understanding that allows connections to be made between different areas of the subject, and to other DP sciences subjects
2. acquire and apply a body of knowledge, methods, tools and techniques that characterize computer science
3. develop the ability to analyse, evaluate and synthesize information and claims relating to technological systems
4. develop the ability to approach unfamiliar situations with creativity and resilience
5. design, model and implement solutions to local and global problems to meet the requirements of clients, users and systems
6. develop an appreciation of the possibilities and limitations of computer science
7. develop the ability to evaluate the impact of emerging technologies on a range of stakeholders
8. develop the ability to communicate and collaborate effectively
9. develop awareness of the ethical, environmental, economic, cultural, and social impact of computer science
10. develop a critical awareness and understanding of threats to computer systems and their countermeasures.

II. Curriculum model overview

Syllabus component	Recommended teaching hours	
	SL	HL
Syllabus content	**105**	**195**
A. Systems in theory	38	79
B. Systems in practice	47	85
C. Systems in context	20	31
Practical programme	**45**	**45**
Computational solution report Practical application of skills through the development of a 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. Having followed the DP computer science course, students will be expected to meet the following objectives.

1. Demonstrate knowledge and understanding of:

a. facts, concepts, principles and terminology
b. appropriate methods, techniques and technology
c. methods of communicating and presenting technological information.

2. Apply and use:

a. facts, concepts, principles and terminology
b. software design methodology, techniques and technology
c. methods of communicating and presenting technological information.

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3. Construct, analyse and evaluate:

a. user needs, system requirements, success criteria, system overview diagrams, testing strategies and programs

b. appropriate techniques within a specified solution

c. data, information and technological explanations.

4. Demonstrate the appropriate research, development, programming, modelling and personal skills necessary to carry out effective problem solving when developing a solution.

Assessment at a glance

Type of assessment	Format of assessment	Time (Weighting of final grade)	
		SL	HL
External		2 hours 45 minutes (70%)	4 hours (80%)
Paper 1	A problem-solving paper that includes questions requiring the reading, understanding, interpretation and writing of code in Java or Python.	1 hour 15 minutes (35%)	2 hours (40%)
Paper 2	This paper focuses on applying theory and practice to real-world contexts, and includes a structured question framed by a given technology context.	1 hour 30 minutes (35%)	2 hours (40%)
Internal		45 hours (30%)	45 hours (20%)
Computational solution report	An individual computational solution development project. Students produce a report that details the development of a computational solution following the software development life cycle (SDLC) process.	35 hours (30%)	35 hours (20%)

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IV. Sample questions

Paper 1

When presented with code used by a company to assist the organisation of a music festival.

- State the relationship between the classes “Festival” and “Artist”.
- Construct the code required to create the linked list “ticketsSold” which is declared in the “Festival” main class.
- Explain one reason why a singly linked list would be used rather than a doubly linked list.

Paper 2

When presented with a scenario about software that uses sentiment analysis and autonomous trading agents.

- Identify two features of agile development.
- Justify the choice of either polling or interrupts as a means of notifying the central computer that an input device has recorded a conversation that is ready for analysis.
- Evaluate one positive and one negative consequence on society of using autonomous trading agents.

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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**.