

International Baccalaureate Diploma Programme

Subject Brief Sciences: Chemistry

First assessment 2025

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.



Nature of chemistry

As one of the three natural sciences in the IB Diploma Programme, chemistry is primarily concerned with identifying patterns that help to explain matter at the microscopic level. This then allows matter's behaviour to be predicted and controlled at a macroscopic level. The subject therefore emphasizes the development of representative models and explanatory theories, both of which rely heavily on creative but rational thinking. Integral to the student experience of the DP chemistry course is the learning that takes place through scientific inquiry both in the classroom and the laboratory.

Aims

The course enables students, through the overarching theme of the nature of science, 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 science
3. develop the ability to analyse, evaluate and synthesize scientific information and claims
4. develop the ability to approach unfamiliar situations with creativity and resilience
5. design and model solutions to local and global problems in a scientific context
6. develop an appreciation of the possibilities and limitations of science
7. develop technology skills in a scientific context
8. develop the ability to communicate and collaborate effectively
9. develop awareness of the ethical, environmental, economic, cultural and social impact of science.

Course content

The DP chemistry course offers a balanced experimental programme. Students are encouraged to become familiar with traditional experimentation techniques, as well as the application of technology where possible. These opportunities help them to develop their investigative skills and evaluate the impact of error in scientific inquiry. The scientific investigation then places a specific emphasis on inquiry-based skills and the formal communication of scientific knowledge. Finally, the collaborative sciences project extends the development of scientific communication in a collaborative and interdisciplinary context, allowing students to work together beyond the confines of chemistry.

Syllabus outline

Syllabus component	Recommended teaching hours	
	SL	HL
Syllabus content	110	180
Structure 1. Models of the particulate nature of matter Structure 1.1 - Introduction to the particulate nature of matter Structure 1.2 - The nuclear atom Structure 1.3 - Electron configurations Structure 1.4 - Counting particles by mass: The mole Structure 1.5 - Ideal gases	17	21
Structure 2. Models of bonding and structure Structure 2.1 - The ionic model Structure 2.2 - The covalent model Structure 2.3 - The metallic model Structure 2.4 - From models to materials	20	30
Structure 3. Classification of matter Structure 3.1 - The periodic table: Classification of elements Structure 3.2 - Functional groups: Classification of organic compounds	16	31
Reactivity 1. What drives chemical reactions? Reactivity 1.1 - Measuring enthalpy change Reactivity 1.2 - Energy cycles in reactions Reactivity 1.3 - Energy from fuels Reactivity 1.4 - Entropy and spontaneity (Additional higher level)	12	22
Reactivity 2. How much, how fast and how far? Reactivity 2.1 - How much? The amount of chemical change Reactivity 2.2 - How fast? The rate of chemical change Reactivity 2.3 - How far? The extent of chemical change	21	31
Reactivity 3. What are the mechanisms of chemical change? Reactivity 3.1 - Proton transfer reactions Reactivity 3.2 - Electron transfer reactions Reactivity 3.3 - Electron sharing reactions Reactivity 3.4 - Electron-pair sharing reactions	24	45
Experimental programme Practical work Collaborative sciences project Scientific investigation	40 20 10 10	60 40 10 10
Total teaching hours	150	240

Skills in the study of chemistry

The skills and techniques students must experience through the course are encompassed within the tools. These support the application and development of the inquiry process in the delivery of the chemistry course.

Tools

- **Tool 1:** Experimental techniques
- **Tool 2:** Technology
- **Tool 3:** Mathematics

Inquiry process

- **Inquiry 1:** Exploring and designing
- **Inquiry 2:** Collecting and processing data
- **Inquiry 3:** Concluding and evaluating

Teachers are encouraged to provide opportunities for students to encounter and practise the skills throughout the programme. Rather than being taught as stand-alone topics, these skills should be integrated into the teaching of the syllabus when they are relevant to the syllabus topics being covered.

Assessment outline

Type of assessment	Format of assessment	Time (hours)		Weighting
		SL	HL	
External		3	4.5	80%
Paper 1	Paper 1A: Multiple-choice questions Paper 1B: Data-based questions and questions on experimental work	1.5	2	36 %
Paper 2	Short answer and extended-response questions	1.5	2.5	44%
Internal		10		20%
<p>The internal assessment consists of one task: the scientific investigation. This component is internally assessed by the teacher and externally moderated by the IB at the end of the course.</p> <p>The scientific investigation is an openended task in which the student gathers and analyses data in order to answer their own formulated research question. The outcome of the scientific investigation will be assessed through the form of a written report. The maximum overall word count for the report is 3,000 words.</p>				

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