

# International Baccalaureate Middle Years Programme Subject Brief

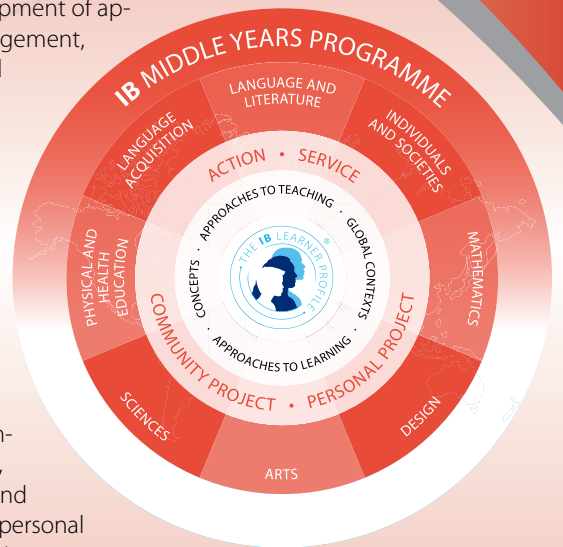
## Sciences

From 2014

The IB Middle Years Programme (MYP) is designed for students aged 11 to 16. It provides a framework of learning that emphasizes intellectual challenge and encourages connections between studies in traditional subjects and the real world. The MYP focuses on “learning how to learn” through the systematic development of approaches to learning (ATL) skills for communication, collaboration, organization, self-management, reflection, research, informational literacy, media literacy, creative and critical thinking, and transfer of learning. It also fosters intercultural understanding and global engagement—essential qualities for young people today.

Interdisciplinary teaching and learning builds a connected curriculum that addresses the developmental needs of students and prepares them for further academic study and life in an increasingly interconnected world. The MYP uses concepts and contexts as starting points for meaningful integration and transfer of knowledge across eight subject groups.

For students seeking a formal qualification at the end of the programme’s Year 5, the IB offers eAssessments that lead to the IB MYP certificate or course results for individual subject areas. To earn the MYP certificate, students must complete 2 hour on-screen examinations in each of the following: language and literature, individuals and society, sciences, mathematics and interdisciplinary learning; submit an ePortfolio in language acquisition and one of the following: design, arts or physical and health education; complete a moderated personal project; and complete school-based expectations for service as action (community service).



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## I. Course description and aims

With inquiry at the core, the MYP sciences framework aims to guide students to independently and collaboratively investigate issues through research, observation and experimentation. The MYP sciences curriculum explores the connections between science and everyday life. As they investigate real examples of science applications, students discover the tensions and dependencies between science and morality, ethics, culture, economics, politics, and the environment.

Scientific inquiry fosters critical and creative thinking about research and design, as well as the identification of assumptions and alternative explanations. Students learn to appreciate and respect the ideas of others, gain good ethical-reasoning skills and further develop their sense of responsibility as members of local and global communities.

The MYP sciences group aims to encourage and enable students to:

- understand and appreciate science and its implications
- consider science as a human endeavour with benefits and limitations
- cultivate analytical, inquiring and flexible minds that pose questions, solve problems, construct explanations and judge arguments
- develop skills to design and perform investigations, evaluate evidence and reach conclusions
- build an awareness of the need to effectively collaborate and communicate
- apply language skills and knowledge in a variety of real-life contexts
- develop sensitivity towards the living and non-living environments
- reflect on learning experiences and make informed choices.

## II. Curriculum overview

Although schools may vary the structure of the curriculum throughout the five years of the programme, they generally develop discrete, modular or integrated science courses. Discrete sciences courses typically encompass biology, chemistry and physics, but may include other science disciplines, such as environmental sciences, life sciences or physical sciences. Modular sciences courses include two or more discrete sciences taught in rotation.

The MYP promotes **inquiry** in sciences by developing **conceptual understanding** within **global contexts**.

**Key concepts** such as *change*, *relationships* and *systems* broadly frame the MYP curriculum.

**Related concepts** promote deeper learning grounded in specific disciplines. Examples of related concepts in MYP sciences include *energy*, *movement*, *transformation* and *models*. Additional concepts may also be identified and developed to meet local circumstances and curriculum requirements.

Students explore key and related concepts through MYP **global contexts**.

- Identities and relationships
- Orientation in space and time
- Personal and cultural expression
- Scientific and technical innovation
- Globalization and sustainability
- Fairness and development

These same global contexts are discussed across the curriculum, supporting transfer and interdisciplinary learning.

The MYP curriculum framework offers schools flexibility to determine engaging, relevant, challenging and significant content that meets local and national curriculum requirements. This inquiry-based curriculum explores factual, conceptual and debatable questions in the study of sciences.

The MYP requires at least 50 hours of teaching time for each subject area in each year of the programme. For students participating in MYP eAssessment, the IB recommends 70 hours of guided learning each year in MYP years 4 and 5.

### III. Assessment criteria

Each sciences objective corresponds to one of four equally weighted assessment criteria. Each criterion has eight possible achievement levels (1–8), divided into four bands with unique descriptors that teachers use to make judgments about students' work.

#### Criterion A: Knowing and understanding

*Students develop scientific knowledge (facts, ideas, concepts, processes, laws, principles, models and theories) and apply it to solve problems and express scientifically supported judgments.*

#### Criterion B: Inquiring and designing

*Students develop intellectual and practical skills through designing, analysing and performing scientific investigations.*

#### Criterion C: Processing and evaluating

*Students collect, process and interpret qualitative and/or quantitative data, and explain conclusions that have been appropriately reached.*

#### Criterion D: Reflecting on the impacts of science

*Students evaluate the implications of scientific developments and their applications to a specific problem or issue. Varied scientific language is applied to demonstrate understanding. Students should become aware of the importance of documenting the work of others when communicating in science.*

### IV. MYP eAssessment

Students seeking IB MYP course results or the IB MYP certificate must demonstrate their achievement of the subject group's objectives by completing an end-of-course on-screen examination. On-screen examinations are formal external examinations, and are available in *biology, chemistry, physics* and *integrated sciences*.

Topics explored in MYP sciences on-screen examinations include:

- atomic structure and bonding
- cells
- cycles
- electromagnetism
- evolution
- interactions between organisms
- forces

- states and properties of matter
- metabolism
- organisms
- waves.

Examination blueprints define the structure of tasks that simulate, replicate and sample formative internal assessments. In MYP science courses, on-screen examinations comprise three tasks.

Task	Assessment criteria	Marks
Knowing and understanding	Assesses knowledge and understanding of science (criterion A).	30
Investigation	Assesses the skills involved in inquiring, designing, processing and evaluating. May involve a single investigation or a number of discrete scenarios. Students must formulate hypotheses, plan investigations and collect, present, interpret and evaluate data (criteria B and C).	60
Applying science	Requires students to reflect on the impact of science, and explain how science addresses real-life issues (criterion D).	30

MYP sciences on-screen examinations are aligned with understanding and skills that prepare students for high levels of achievement in IB Diploma Programme courses in **sciences**.

### Sample questions (from biology eAssessment)

- **Outline** one advantage and one disadvantage of using a model to understand interaction between organisms.
- The designers of a water filter claim that particles up to 0.2  $\mu\text{m}$  (micrometres) in size will be removed. From your measurements in parts (a) and (b) **deduce** whether the filter will remove both viruses and bacteria.
- **Evaluate** two methods for preparing drinking water. In an extended piece of writing:
  - explain what makes these methods effective
  - explain the strengths and limitations of each method

**Use** scientific knowledge and understanding to support your answer.

About the IB: For over 45 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 Middle Years Programme, and a complete list of MYP subject briefs, visit: [www.ibo.org/myp/](http://www.ibo.org/myp/).

Complete subject guides can be accessed through the IB online curriculum centre (OCC) or purchased through the IB store: <http://store.ibo.org>.