



Welcome to IB Biology

IB Biology explores the complexities of living organisms, from molecular processes to ecosystems. This course combines rigorous scientific study with hands-on experimentation, emphasizing conceptual understanding, scientific inquiry, and real-world applications. Students will develop skills in research, analysis, and communication while engaging with the ethical, environmental, and societal implications of biological sciences.

Course Overview

The curriculum is structured around four themes: Unity and Diversity, Form and Function, Interaction and Interdependence, and Continuity and Change. These themes provide a conceptual framework to explore the levels of biological organization: molecules, cells, organisms, and ecosystems.

Year 1: September 2025 – January 2026

1. Cells and Biomolecules

- **Topics:**
 - Origin and structure of cells
 - Prokaryotic vs. eukaryotic cells
 - Biomolecules (water, proteins, carbohydrates, lipids)
- **Activities:**
 - Microscopy labs (e.g., observing prokaryotic and eukaryotic cells)
 - Protein folding simulations and calorimetry experiments
- **Assessment:** Quizzes, lab reports, and an investigation on membrane permeability.

2. Cell Processes and Energy

- **Topics:**
 - Enzyme action and metabolism
 - Cellular respiration and photosynthesis

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- **Activities:**
 - Enzyme catalysis experiments
 - Chromatography lab to analyze pigments in plants
- **Assessment:** Multiple-choice quizzes and practical lab evaluations.

3. Research Methods and Ethics

- **Focus:**
 - Introduction to internal assessment (IA) and collaborative sciences project (CSP).
 - Understanding research methodologies and ethical considerations in biology.
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Year 2: September 2026 – May 2027

1. Genetics and Evolution

- **Topics:**
 - DNA replication and protein synthesis
 - Genetic inheritance, mutations, and speciation
- **Activities:**
 - Modeling meiosis and analyzing genetic crosses
 - Case studies on epigenetics and natural selection
- **Assessment:** Practice with inheritance problem sets and a karyotype analysis lab.

2. Systems Biology

- **Topics:**
 - Integration of body systems
 - Chemical and neural signaling, homeostasis, and reproduction
- **Activities:**
 - Monitoring physiological changes during exercise
 - Investigating hormonal regulation using simulations

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- **Assessment:** Summative unit tests and collaborative presentations.
3. **Biodiversity and Ecology**
- **Topics:**
 - Population dynamics and energy flow in ecosystems
 - Human impacts on biodiversity and climate change
 - **Activities:**
 - Field studies using quadrat sampling and data analysis
 - Conservation project proposals and debates
 - **Assessment:** Ecology lab reports and short-answer assessments.
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Assessments

1. **Internal Assessment (IA):**
 - Independent research project investigating a biological question.
 - Includes data collection, analysis, and a written report.
 2. **Collaborative Sciences Project (CSP):**
 - Group investigation addressing a real-world scientific issue.
 3. **External Assessments:**
 - **Paper 1:** Multiple-choice questions on core concepts.
 - **Paper 2:** Short- and long-answer questions.
 - **Paper 3 (HL only):** Questions on additional topics and experimental skills.
 4. **Formative and Summative Assessments:**
 - Regular quizzes, practical lab evaluations, and mock exams.
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Skill Development

- **Scientific Inquiry:** Design and perform experiments, collect data, and draw conclusions.
- **Critical Thinking:** Evaluate scientific claims and analyze complex biological systems.

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- **Collaboration:** Work in teams for research projects and fieldwork.
 - **Communication:** Present findings through reports, discussions, and visual media.
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Resources

- **Primary Materials:**
 - Biology textbooks, IB Biology resources, and scientific journals.
 - **Lab Equipment:**
 - Microscopes, gel electrophoresis tools, and calorimeters.
 - **Digital Tools:**
 - Online databases, graphing software, and simulation platforms.
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Why Study IB Biology?

This course equips students with the knowledge and skills to pursue careers in the life sciences, healthcare, and environmental management. Through its interdisciplinary approach, IB Biology fosters a deep understanding of the natural world and the scientific methods used to explore it.