Organization of IB Biology

The Diploma Programme aims to develop in students the knowledge, skills and attitudes they will need to fulfill the aims of the IB, as expressed in the organization's mission statement and the learner profile.

The Diploma Programme Model*

*From the IB Biology Guide First Assessment2016; 2014

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Learner Profile*

Inquirers

They develop their natural curiosity. They acquire the skills necessary to conduct inquiry and research and show independence in learning. They actively enjoy learning and this love of learning will be sustained throughout their lives.

Knowledgeable

They explore concepts, ideas and issues that have local and global significance. In so doing, they acquire in-depth knowledge and develop understanding across a broad and balanced range of disciplines.

Thinkers

They exercise initiative in applying thinking skills critically and creatively to recognize and approach complex problems, and make reasoned, ethical decisions.

Communicators

They understand and express ideas and information confidently and creatively in more than one language and in a variety of modes of communication. They work effectively and willingly in collaboration with others.

Principled

They act with integrity and honesty, with a strong sense of fairness, justice and respect for the dignity of the individual, groups and communities. They take responsibility for their own actions and the consequences that accompany them.

Open-minded

They understand and appreciate their own cultures and personal histories, and are open to the perspectives, values and traditions of other individuals and communities. They are accustomed to seeking and evaluating a range of points of view, and are willing to grow from the experience.

Caring

They show empathy, compassion and respect towards the needs and feelings of others. They have a personal commitment to service, and act to make a positive difference to the lives of others and to the environment.

Risk-takers

They approach unfamiliar situations and uncertainty with courage and forethought, and have the independence of spirit to explore new roles, ideas and strategies. They are brave and articulate in defending their beliefs.

Balanced

They understand the importance of intellectual, physical and emotional balance to achieve personal well-being for themselves and others.

*From the IB Biology Guide First Assessment2016; 2014

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Reflective

They give thoughtful consideration to their own learning and experience. They are able to assess and understand their strengths and limitations in order to support their learning and personal development.

Approaches to teaching and approaches to learning*

The five approaches to learning (developing thinking skills, social skills, communication skills, self management skills and research skills) along with the six approaches to teaching (teaching that is inquiry based, conceptually focused, contextualized, collaborative, differentiated and informed by assessment) encompass the key values and principles that underpin IB pedagogy.

Science and theory of knowledge*

TOK lessons can support students in their study of science, just as the study of science can support students in their TOK course. TOK provides a space for students to engage in stimulating wider discussions about questions such as what it means for a discipline to be a science, or whether there should be ethical constraints on the pursuit of scientific knowledge. It also provides an opportunity for students to reflect on the methodologies of science, and how these compare to the methodologies of other areas of knowledge.

It is now widely accepted that there is no one scientific method. Instead, the sciences utilize a variety of approaches in order to produce explanations for the behavior of the natural world. The different scientific disciplines share a common focus on utilizing inductive and deductive reasoning, on the importance of evidence, and so on. Students are encouraged to compare and contrast these methods with the methods found in, for example, the arts or in history.

Examples of TOK in Biology include:

- How do we distinguish science from pseudoscience?
- When performing experiments, what is the relationship between a scientist's expectation and their perception?
- How does scientific knowledge progress?
- What is the role of imagination and intuition in the sciences?
- What are the similarities and differences in methods in the natural sciences and the human sciences?

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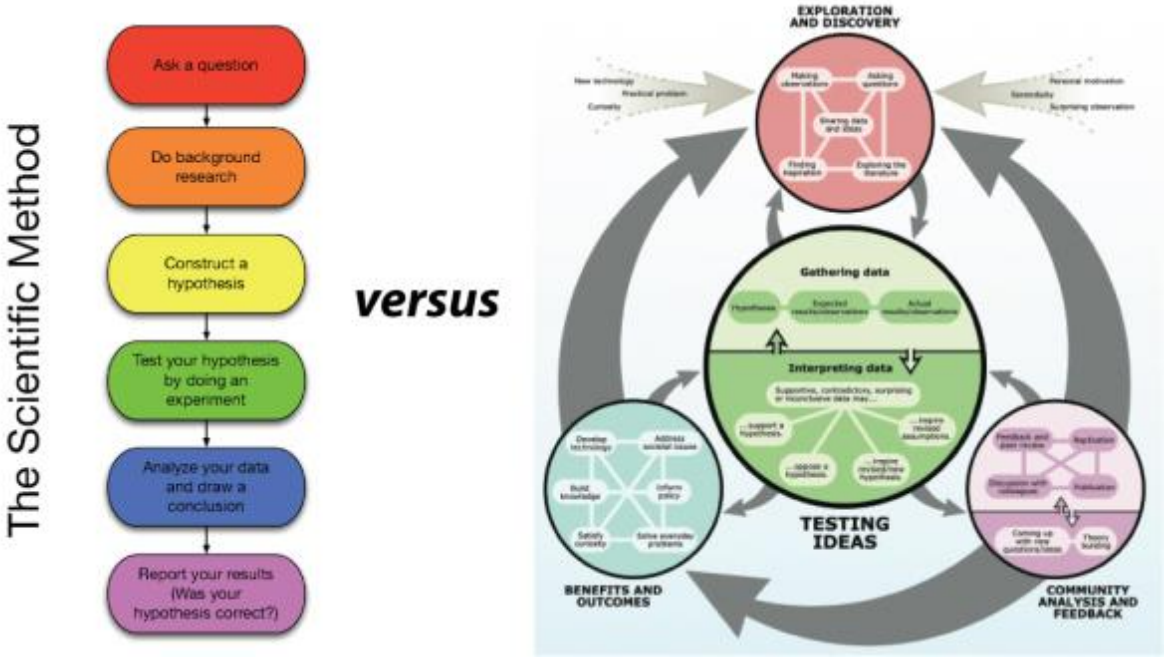

Group 4 Aims*

Through studying biology, chemistry or physics, students should become aware of how scientists work and communicate with each other. While the scientific method may take on a wide variety of forms, it is the emphasis on a practical approach through experimental work that characterizes these subjects. The aims enable students, through the overarching theme of the Nature of science, to:

1. Appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. Acquire a body of knowledge, methods and techniques that characterize science and technology
3. Apply and use a body of knowledge, methods and techniques that characterize science and technology
4. Develop an ability to analyse, evaluate and synthesize scientific information
5. Develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
6. Develop experimental and investigative scientific skills including the use of current technologies
7. Develop and apply 21st century communication skills in the study of science
8. Become critically aware, as global citizens, of the ethical implications of using science and technology
9. Develop an appreciation of the possibilities and limitations of science and technology
10. Develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

*From the IB Biology Guide First Assessment2016; 2014

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Group 4 Experimental Skills

Integral to the experience of students in any of the group 4 courses is their experience in the classroom, laboratory or in the field. Practical activities allow students to interact directly with natural phenomena and secondary data sources. These experiences provide the students with the opportunity to design investigations, collect data, develop manipulative skills, analyze results, collaborate with peers and evaluate and communicate their findings. Experiments can be used to introduce a topic, investigate a phenomenon or allow students to consider and examine questions and curiosities.

Assessment

Both external and internal assessments are used in the Diploma Programme. IB examiners mark work produced for external assessment, while work produced for internal assessment is marked by teachers and externally moderated by the IB.

Assessment Outline—SL

Component	Overall weighting (%)	Approximate weighting of objectives (%)		Duration (hours
		1+2	3	
Paper 1	20	10	10	3/4
Paper 2	40	20	20	1 1/4
Paper 3	20	10	10	1
Internal Assessment	20	Covers objectives 1, 2, 3 and 4		10

Group 4 Assessment Objectives

1. Demonstrate knowledge and understanding of:
    a. facts, concepts and terminology
    b. methodologies and techniques
    c. communicating scientific information.
2. Apply:
    a. facts, concepts and terminology
    b. methodologies and techniques
    c. methods of communicating scientific information.
3. Formulate, analyse and evaluate:
    a. hypotheses, research questions and predictions
    b. methodologies and techniques
    c. primary and secondary data
    d. scientific explanations.

*From the IB Biology Guide First Assessment2016; 2014

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4. Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.

External Assessment Details—SL

Paper 1

Duration: ¾ hour
Weighting: 20%
Marks: 30

- 30 multiple-choice questions on core material, about 15 of which are common with HL.
- The questions on paper 1 test assessment objectives 1, 2 and 3.
- The use of calculators is not permitted.
- No marks are deducted for incorrect answers.

Paper 2

Duration: 1¼ hours
Weighting: 40%
Marks: 50

- Data-based question.
- Short-answer and extended-response questions on core material.
- One out of two extended response questions to be attempted by candidates.
- The questions on paper 2 test assessment objectives 1, 2 and 3.
- The use of calculators is permitted.

Paper 3

Duration: 1 hour
Weighting: 20%
Marks: 35

- This paper will have questions on core and SL option material.
- Section A: candidates answer all questions, two to three short-answer questions based on experimental skills and techniques, analysis and evaluation, using unseen data linked to the core and AHL material.
- Section B: short-answer and extended-response questions from one option.
- The questions on paper 3 test assessment objectives 1, 2 and 3.
- The use of calculators is permitted.

*From the IB Biology Guide First Assessment2016; 2014

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Internal Assessment*

Guidance and Authenticity

- The work submitted for internal assessment must be the student's own work.
- The IB animal experimentation policy and the biology course safety guidelines must be adhered to.
- Teachers and students must discuss the internally assessed work.
- Students should be encouraged to initiate discussions with the teacher to obtain advice and information.
- As part of the learning process, teachers should read and give advice to students on **one draft of the work**.
- The teacher should provide oral or written advice on how the work could be improved, but not edit the draft. The next version handed to the teacher must be the final version for submission.
- It is the responsibility of teachers to ensure that all students understand the basic meaning and significance of concepts that relate to academic honesty, especially authenticity and intellectual property.
- Teachers must ensure that all student work for assessment is prepared according to the requirements and must explain clearly to students that the internally assessed work must be entirely their own. Where collaboration between students is permitted, it must be clear to all students what the difference is between collaboration and collusion.
- All work submitted to the IB for moderation or assessment must be authenticated by a teacher, and must not include any known instances of suspected or confirmed academic misconduct. Each student must confirm that the work is his or her authentic work and constitutes the final version of that work. Once a student has officially submitted the final version of the work it cannot be retracted.
- The requirement to confirm the authenticity of work applies to the work of all students, not just the sample work that will be submitted to the IB for the purpose of moderation.
- Authenticity may be checked by discussion with the student on the content of the work, and scrutiny of one or more of the following:
  - the student's initial proposal
  - the first draft of the written work
  - the references cited
  - the style of writing compared with work known to be that of the student
  - the analysis of the work by a web-based plagiarism detection service such as http://www.turnitin.com.
- The same piece of work cannot be submitted to meet the requirements of both the internal assessment and the extended essay.

*From the IB Biology Guide First Assessment2016; 2014

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Internal Assessment Component

Duration: 10 hours
Weighting: 20%
Individual investigation.
This investigation covers assessment objectives 1, 2, 3 and 4.

Internal assessment criteria

The assessment model uses five criteria to assess the final report of the individual investigation with the following raw marks and weightings assigned:

Personal engagement	Exploration	Analysis	Evaluation	Communication	Total
2 (8%)	6 (25%)	6 (25%)	6 (25%)	4 (17%)	24 (100%)

Personal engagement

This criterion assesses the extent to which the student engages with the exploration and makes it their own.
Personal engagement may be recognized in different attributes and skills. These could include addressing personal interests or showing evidence of independent thinking, creativity or initiative in the designing, implementation or presentation of the investigation.

Exploration

This criterion assesses the extent to which the student establishes the scientific context for the work, states a clear and focused research question and uses concepts and techniques appropriate to the Diploma Programme level. Where appropriate, this criterion also assesses awareness of safety, environmental, and ethical considerations.

Analysis

This criterion assesses the extent to which the student's report provides evidence that the student has selected, recorded, processed and **interpreted** the data in ways that are relevant to the research question and can support a conclusion.

Evaluation

This criterion assesses the extent to which the student's report provides evidence of evaluation of the investigation and the results with regard to the research question and the accepted scientific context.

Communication

This criterion assesses whether the investigation is presented and reported in a way that supports effective communication of the focus, process and outcomes.

*From the IB Biology Guide First Assessment2016; 2014

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Practical Scheme of Work*

The practical scheme of work (PSOW) is the practical course planned by the teacher and acts as a summary of all the investigative activities carried out by a student. Students at SL and HL in the same subject may carry out some of the same investigations.

Group 4 Project*

The group 4 project is an interdisciplinary activity in which all Diploma Programme science students must participate. The intention is that students from the different group 4 subjects analyze a common topic or problem. The exercise should be a collaborative experience where the emphasis is on the **processes** involved in, rather than the **products of, such an activity.**

The project can be practically or theoretically based.

The choice of scientific or technological topic is open but the project should clearly address aims 7, 8 and 10 of the group 4 subject guides

The group 4 project allows students to appreciate the environmental, social and ethical implications of science and technology. It may also allow them to understand the limitations of scientific study, for example, the shortage of appropriate data and/or the lack of resources.

*From the IB Biology Guide First Assessment2016; 2014