

Subject group and course title: Group 4 - BIOLOGY

Course purpose:

Through the DP Biology course, students not only acquire a broad body of knowledge, but they also learn to appreciate how science works, demonstrating how acquired knowledge always leads to new questions. The course focuses on the practical and ethical challenges scientists face and how these are overcome through communication and collaboration within and between scientific fields. Students are guided to understand not only the vast possibilities Biology can offer in an ever changing world, but also the limitations of both science and technology against the challenges humanity faces i.e., climate change. Students develop the ability to analyse and critically evaluate scientific information and experimental data, as well as effectively communicate their findings using 21st century tools.

Topics covered:

DP Biology covers a broad and ever growing body of knowledge, from the molecules found in all living organisms and the complex chemical reactions taking place inside cells (molecular and cell biology, biochemistry) to genetics and heredity, as well as the multiple interactions, between organisms and between organisms and their environment, found within ecosystems (biodiversity, ecology and evolution). Students taking the subject at Higher Level examine certain topics further in depth.

How are key concepts served (methodology)?

Teaching is based on lectures, using PowerPoint presentations and videos, to help students grasp the main concepts of each topic. A strong emphasis is given to practical work; through laboratories and field trips, students use their understanding of each topic to study and analyze data from existing biological research, as well as to design their own experiments, collect and analyze data and evaluate their findings. Class activities (peer- and self-assessment sessions, debates, collaborative writing and poster creation, flipped classes and student presentations) are used to help students develop not only their inquiry, but also their social and communication skills.

How does the course foster international mindedness?

Throughout the curriculum, students are encouraged to engage with issues of global importance, through class discussions and activities. Some examples:

- When studying the basic biological macromolecules, students discuss the health problems arising from obesity and how this is affected by the cultural background of different populations, as reflected through their feeding habits (student presentation)
- Scientific cooperation is examined using the story of DNA discovery as a starting point; sexual/cultural discrimination in science is also discussed (Rosalind Franklin) (poster creation)
- When studying Genetics, students argue on the rights of biotech companies to patent the base sequence of genes to prevent other companies from using them, possibly hindering medical breakthroughs (class debate)

- When studying Biodiversity and Classification, students reflect on how Taxonomy and the binomial system developed by Linnaeus is a universal language that all scientists understand and can work with (class discussion).

How are IB Learner Profile attributes promoted?

Each Syllabus Unit is structured to help students develop certain attributes of the student profile, i.e.:

Unit 2_The cell as the fundamental unit of life: Students become

- **Communicators**, by presenting the results of their experiments on osmosis in a scientifically appropriate manner

Unit 4_DNA, genetics and inheritance: Students become

- **Inquirers**, by learning to use databases to acquire information about the sequence and position of different genes
- **Open minded**, by considering the ethical implications about the use of GMOs from the point of view of developed/developing/least developed countries

Unit 5 (HL)_Structure and function of plants: Students become

- **Risk-takers**, by encouraged to use "trial and error" in different experimental designs

How does the course meet student needs via ATL?

The DP Dept. teachers collaborate on identifying the ATL skills to be developed during each month i.e., for Unit 2_The cell as the fundamental unit of life, students are encouraged to develop the following skills:

- **Thinking**, by comparing and contrasting different methods of acquiring knowledge (What methods are used in cell biology? What are the assumptions underlying these methods? What are the limitations/constraints of these methods?)
- **Communication**, by improving their in-class presentation skills and scaffolding the development of a lab report
- **Self-management**, by organising studying time and meeting deadlines (break down lab report in manageable steps and use feedback provided to improve first draft)

Assessment model:

The assessment in DP Biology is based on both summative and formative assessment. Formative is based on in-class quizzes that are then peer/self-assessed, student presentations on subjects related to each chapter (often on debatable issues) and assessed lab reports. Summative assessment is based on revision questions, tests at the end of each unit and mid-year and end-of-year exams. Questions for these tests and exams are taken from the official IB Questionbank, to ensure that students are practising IB standards, and they are marked according to the relevant mark schemes. Lab reports are also used to assess the Exploration, Analysis, Evaluation, and Communication criteria of the IB. For each assessed task, students are given detailed instructions and marking rubrics, as well as detailed feedback.

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