

Diploma Programme subject outline—Group 4: sciences			
School name	International School of Tallinn	School code	
Name of the DP subject <i>(indicate language)</i>	Biology (English)		
Level <i>(indicate with X)</i>	Higher <input checked="" type="checkbox"/>	Standard completed in two years <input checked="" type="checkbox"/>	Standard completed in one year * <input type="checkbox"/>
Name of the teacher who completed this outline	Abraham Eifert	Date of IB training	27-29 Sept 2018
Date when outline was completed	15/10/2021	Name of workshop <i>(indicate name of subject and workshop category)</i>	IBDP Biology Category 1

* All Diploma Programme courses are designed as two-year learning experiences. However, up to two standard level subjects, excluding languages ab initio and pilot subjects, can be completed in one year, according to conditions established in the *Handbook of procedures for the Diploma Programme*.

1. Course outline

- Use the following table to organize the topics to be taught in the course. If you need to include topics that cover other requirements you have to teach (for example, national syllabus), make sure that you do so in an integrated way, but also differentiate them using italics. Add as many rows as you need.
- This document should not be a day-by-day accounting of each unit. It is an outline showing how you will distribute the topics and the time to ensure that students are prepared to comply with the requirements of the subject.
- This outline should show how you will develop the teaching of the subject. It should reflect the individual nature of the course in your classroom and should not just be a “copy and paste” from the subject guide.
- If you will teach both higher and standard level, make sure that this is clearly identified in your outline.

	Topic/unit (as identified in the IB subject guide) <i>State the topics/units in the order you are planning to teach them.</i>	Contents	Allocated time		Assessment instruments to be used	Resources <i>List the main resources to be used, including information technology if applicable.</i>
			One class is	minutes.		
				45		
			In one week there are	6	classes.	
Year 1	Topic 1 - Cells	Core topics: <ul style="list-style-type: none"> - Introduction to cells - Ultrastructure of cells - Membrane structure - Membrane transport - Origin of cells - Cell Division 	SL/HL: 20 classes - 3.5 weeks		Topic Worksheets Unit Exams (with past paper questions) <ul style="list-style-type: none"> ● Based on Paper 1 and Paper 2 formatting 	A/V Presentations Topic Slides Pearson Baccaureate Biology Cambridge Biology for the IB Diploma
	Topic 4 - Ecology	Core topics: <ul style="list-style-type: none"> - Species, communities and ecosystems - Energy flow - Climate change 	SL/HL: 16 classes - 2.5 weeks		Lab Practicals and write ups	Oxford Study Course Home - BIOLOGY Explorelearning.com
	Topic 2 - Molecular Biology, Topic 7 - Nucleic Acids HL & Topic 8 - Metabolism HL	Core topics: <ul style="list-style-type: none"> - Molecules to Metabolism - Water - Carbohydrates and Lipids - Proteins - Enzymes - Structure of DNA & RNA - DNA Replication, Transcription, 	SL: 28 classes - 5 weeks AHL: 31 classes - 5.5 weeks		PhET simulations BioNinja BioZone Biology Summary Sheets IB QuestionBank	

		<ul style="list-style-type: none"> Translation - Cell Respiration - Photosynthesis <p>Additional HL topics:</p> <ul style="list-style-type: none"> - DNA structure and replication - Transcription and gene expression - Translation - Metabolism - Cell Respiration - Photosynthesis 			
	Topic 3 - Genetics & Topic 10 HL	<p>Core topics:</p> <ul style="list-style-type: none"> - Genes - Chromosomes - Meiosis - Inheritance - Genetic Modification and Biotechnology <p>Additional HL topics:</p> <ul style="list-style-type: none"> - Meiosis - Inheritance 	SL: 20 classes - 3.5 weeks AHL: 8 classes - 2.5 weeks		
	IA Topic Exploration	<p>Introduction of IA Requirements</p> <p>Exploration of Topics</p>	SL/HL: 2 classes - 0.5 weeks		
Year 2	IA Planning and Proposal	<p>Proposal of specific IA experiment</p> <p>Pending approval, planning of method</p>	SL/HL: 3 classes - 0.5 weeks	<p>Topic Worksheets</p> <p>Unit Exams (with past paper questions)</p> <ul style="list-style-type: none"> ● Based on Paper 1 and Paper 2 	<p>A/V Presentations</p> <p>Topic Slides</p> <p>Pearson Baccaulaureate Biology</p>

	Topic 5 - Evolution and Biodiversity	<p>Core topics:</p> <ul style="list-style-type: none"> - Evidence for Evolution - Natural Selection - Classification of Biodiversity - Cladistics <p>Additional HL topics:</p> <ul style="list-style-type: none"> - Gene Pool and Speciation 	<p>SL: 16 classes - 2.5 weeks</p> <p>AHL: 2 classes - 0.5 weeks</p>	<p>formatting</p> <p>Lab Practicals and write ups</p>	<p>Cambridge Biology for the IB Diploma</p> <p>Oxford Study Course Home - BIOLOGY</p> <p>Explorellearning.com</p> <p>PhET simulations</p>
	IA Lab Work	<p>In-Class time to perform experiments and begin the writing process</p>	<p>SL/HL: 6 classes - 1 week</p>		<p>BioNinja</p> <p>BioZone</p>
	Topic 6 - Human Physiology & Topic 11 - Animal Physiology	<p>Core topics:</p> <ul style="list-style-type: none"> - Digestion and absorption - The blood system - Defence against infectious disease - Gas exchange - Neuron and synapses - Hormones, homeostasis and reproduction <p>Additional HL topics:</p> <ul style="list-style-type: none"> - Antibody production and vaccination - Movement - The Kidney and osmoregulation - Sexual reproduction 	<p>SL: 27 classes - 4.5 weeks</p> <p>AHL: 22 classes - 3.5 weeks</p>		<p>Biology Summary Sheets</p> <p>IB QuestionBank</p>

	Topic 9 - Plant Biology	Additional HL topics: <ul style="list-style-type: none"> - Transport in xylem of plants - Transport in Phloem of plants - Growth in plants - Reproduction in plants 	AHL: 18 classes - 3 weeks		
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2. The group 4 project

As the IB guides say, “The group 4 project is a collaborative activity where students from different group 4 subjects work together on a scientific or technological topic, allowing for concepts and perceptions from across the disciplines to be shared in line with aim 10—that is, to ‘encourage an understanding of the relationships between scientific disciplines and the overarching nature of the scientific method.’” Describe how you will organize this activity. Indicate the timeline and subjects involved, if applicable.

The group 4 project will be crafted to be largely student led. The science team will pick a broad theme or category that all groups must work within (such as ‘sustainability’, ‘forestry’ or a similar topic). At least one student enrolled in each discipline will be placed into groups and devise a project, experiment, or exploration related to the larger theme. Elements from all scientific disciplines will be identified and included in the projects.

3. **IB practical work and the internal assessment requirement to be completed during the course**

As you know, students should undergo practical work related to the syllabus.

- Physics, chemistry and biology: 40 hours (at standard level) or 60 hours (at higher level)

Use the table below to indicate the name of the experiment you would propose for the different topics in the syllabus.

An example is given. Add as many rows as necessary.

Name of the topic	Experiment	Any ICT used? <i>Remember you must use all five within your programme.</i>
Acids and bases	Titration	Yes
Topic 1.1 - Introduction to Cells	Light Microscopy Lab	
Topic 1.1 - Introduction to Cells	Surface Area-to-Volume Lab	
Topic 1.2 - Ultrastructure of Cells	Ultrastructure Microscopy Lab	
Topic 1.4 - Membrane Transport	Potato Osmolarity Lab	
Topic 1.6 - Cell Division	Cell Division Gizmos Lab	Yes
Topic 2.5 - Enzymes	Catalase Enzyme Reaction Rate Lab	
Topic 2.6 - DNA and RNA Structure and Function	DNA Building Gizmos Lab	Yes
Topic 2.7 - DNA Replication, Transcription, and Translation	RNA to Protein Gizmos Lab	Yes
Topic 2.9 - Photosynthesis	Chlorophyll Chromatography Lab	
Topic 3.2 - Chromosomes	Genebank Lab	Yes
Topic 4.1 - Species, Communities, and Ecosystems	Mesocosm Lab	

Topic 4.1 - Species, Communities, and Ecosystems	Chi-Square Test Lab	
Topic 4.2 - Energy Flow	Biomass Calorimeter Lab	
Topic 4.3 - Carbon Cycling	Carbon Cycle Gizmos Lab	Yes
Topic 5.2 - Natural Selection	Rainfall and Bird beaks Gizmos Lab	Yes
Topic 5.2 - Natural Selection	Natural Selection Gizmos Lab	Yes
Topic 5.3 - Classification of Biodiversity	Dichotomous Key Gizmos Lab	Yes
Topic 5.3 - Classification of Biodiversity	Dichotomous Key Creation Lab	
Topic 6.2 - The Blood System	Heart Dissection Optional Lab	
Topic 6.4 - Gas Exchange	Human Respiration Lab	
Topic 9.1 - Transport in the Xylem of Plants	Plant Transpiration Lab	

4. **Laboratory facilities**

Describe the laboratory and indicate whether it is presently equipped to facilitate the practical work that you have indicated in the chart above. If it is not, indicate the timeline to achieve this objective and describe the safety measures that are applicable.

Currently there is a limited laboratory space in the school. Students can perform small experiments at their desks and in the windowsills. Hotplates are used in lieu of bunsen burners. Safety goggles and gloves are provided when needed. In addition, laboratory simulations are performed using PhET and explorelearning. A full laboratory space is being built in the new school (2022-23) which will allow for students to perform additional practical work.

5. **Other resources**

Indicate what other resources the school has to support the implementation of the subject and what plans there are to improve them, if needed.

The school has access to explore learning simulations and is planning to get IB QuestionBank for the purpose of Exam making and mark scheme practice.

6. **Links to TOK**

You are expected to explore links between the topics of your subject and TOK. As an example of how you would do this, choose one topic from your course outline that would allow your students to make links with TOK. Describe how you would plan the lesson.

Topic	Link with TOK (including description of lesson plan)
Topic 5.2 - Natural Selection	The Theory of Natural Selection - What level of evidential support is required to consider something a scientific theory, and what kinds of evidence are acceptable? Research the types of evidence that support the theory of evolution by natural selection and compare this with the other 'theories' (of the non-scientific variety) that explain the origins of living things.

7. **Approaches to learning**

Every IB course should contribute to the development of students' approaches to learning skills. As an example of how you would do this, choose one topic from your outline that would allow your students to specifically develop one or more of these skill categories (thinking, communication, social, self-management or research).

Topic	Contribution to the development of students' approaches to learning skills (including one or more skill category)
Topic 2 - Molecular Biology	Critical Thinking skills in labs and tests. Self- management skills in course projects and IA.

8. **International mindedness**

Every IB course should contribute to the development of international-mindedness in students. As an example of how you would do this, choose one topic from your outline that would allow your students to analyse it from different cultural perspectives. Briefly explain the reason for your choice and what resources you will use to achieve this goal.

Topic	Contribution to the development of international mindedness (including resources you will use)
Topic 1.1 - Introduction to Cells	Stem Cell Research - Explore the legality and arguments (both moral and scientific) related to stem cell research throughout the world. This topic is a great way to get students engaged in scientific discourse from the very first topic of study and there is a great wealth of knowledge available on the internet.

9. **Development of the IB learner profile**

Through the course it is also expected that students will develop the attributes of the IB learner profile. As an example of how you would do this, choose one topic from your course outline and explain how the contents and related skills would pursue the development of any attribute(s) of the IB learner profile that you will identify.

Topic	Contribution to the development of the attribute(s) of the IB learner profile
Topic 3.5 - Genetic Modification and Biotechnology	Open-minded learners critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow for the experience. As we study genetic modification of food crops and other organisms we will explore the benefits and risks associated with these practices without pre-judgement of the technologies in question.

