| Diploma Programme subject outline—Group 4: experimental sciences | | | | | | | | | | |
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| School name | Downtown Magnets High School | | | | | | School code | 006435 | | |
| Name of the DP subject | Biology – PLEASE SEE” ATTACHMENT A” ON PAGE 14 FOR EXPLANATION OF THE NEW 2016 IB BIO GUIDE | | | | | | | | | |
| Level  (indicate with X) |  |  |  | |  |  | | |  |  |
| Higher |  | Standard completed in two years | |  | Standard completed in one year \* | | | X |  |
|  |  |  | | |  |  |
| Name of the teacher who completed this outline | Dinh | | | **Date of IB training** | | | March 2014 | | | |
| **Date when outline was completed** | 8/6/2020 (With 2016 IB BIO GUIDE) | | | **Name of workshop**  (indicate name of subject and workshop category) | | | IB 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)  State the topics/units in the order you are planning to teach them. | Contents | Allocated time | Assessment instruments to be used | | | | Resources  List the main resources to be used, including information technology if applicable. |
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| One class is | |  | minutes. |  |
| 107 |
| In one week there are | |  | classes. |
| 2.5 |
|  | |  |  |
| Year 1 | Topic 1 – Cell Biology  Topic 2 – Molecular Biology  Topic 3 – Genetics  Topic 4 - Ecology  Topic 5 – Evolution and biodiversity  Topic 6 – Human Physiology and Option D | Cells, Structure of Cells, Membrane structure, Membrane Transport, Origin of cells, Division of Cells  Metabolism, Carbs and Lipids, Proteins, Enzymes, Structure of DNA and RNA, DNA Replication, Transcription and translation, Cell Respiration, Photosynthesis  Meiosis, Inheritance, Gene Pools and Speciation  Species, Communities, and ecosystems, Energy Flow, Carbon Cycling, Climate Change  Evidence for evolution, Natural Selection, Classification of biodiversity, Cladistics  Digestion and Absorption, The Blood System, Defence against infectious disease, Gas Exchange | 12  8  15  21 | The assessments are divided into two categories, which include internal assessments and external assessments. External assessments will be 80% of the grades and internal assessments will be 20% of the grade.  The Internal Assessment is an Individual Scientific Investigation consisting of 10 hours of work, not including the hours used to write the internal assessment covering objectives 1, 2, 3, and 4. The write-up of the scientific investigation should be 6-12 pages long. Any paper exceeding 12 pages will be penalized for lack of conciseness. The same piece of work may not be submitted for IA and Extended Essay.  During the latter half of the first year, IA assessment shall start. After a number of trial experiments to ensure student readiness, students shall be assessed for Personal Engagement 2(8%), Exploration 6 (25%), Analysis 6 (25%), Evaluation 6 (25%), Communication 4 (17%), for a Total of 24 (100%).  Internal Assessments will be graded with IB Methods of Assessment. IB Assessment criteria will be used for open-ended questions along with the marking notes. Analytic mark schemes will be used for examination questions that require a particular response. Best-fit approach will be used for markbands.  Such assessment shall be conducted in accordance with the expectations laid out in the Biology HL guide and in the Handbook of Procedures.  In addition to the formal IB assessment (EA and IA), Biology HL students will receive regular informal feedback on assignments, experiments, unit tests, etc. Such assessment shall in be in compliance with the IB emphasis on criterion-based rather than norm-based assessment. This informal assessment shall be used to indicate interim student progress throughout the course and shall form the basis of the students’ report card marks, for example.  Student self-assessment will be encouraged where appropriate. | | | | <http://click4biology.info/index.htm>.  IB Prepared Biology HL  Oxford Biology HL  Oxford IB Study Guides  IB Question Bank  ICT in Biology <https://dl.dropboxusercontent.com/u/7568523/Site/home.html>  Open Door Websites  EBSCO (enormous web-based source of periodicals and scholarly resources)  Biology: An Inquiry Approach, by Lawson, 2008, Kendall Hunt.  *National Geographic*  *Scientific American*  Lab Carts  Oxygen Probes  Log Pro  Graphing Calculators |
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1. 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.

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| The Group 4 project will take place in the second half of the first year, with the exact date to be determined through the discussion with the other IB teachers to avoid overloading the students. The total time allocated to this project shall be 10 hours. This project will likely be based on student choice and inquiry, spanning the breadth of the life and physical sciences. This topic allows for inter-disciplinary connections with related field and laboratory work.  For example, the Group 4 project can be based on sustainability of life and the biotic and abiotic factors involved in it. In doing so students will create various Biomes to visually see the factors in action and notice what happens when the Biome is no longer able to sustain itself. Local opportunities are available for field and laboratory studies to develop a meaningful Group 4 project for the students.  In order to meet Aim 7, communications will be encouraged to be electronic. In order to meet Aim 8, students will have to come up with a technological solution to the imbalance of the biomes and the ethical implications of using technology for science. |  |

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

As you know, students should undergo 40 hours (at standard level) or 60 hours (at higher level) of practical work related to the syllabus. Use the table below to indicate the name of the experiment you would propose for the different topics in the syllabus. Indicate which experiments you would use for assessing each of the internal assessment criteria—design (D), data collection and processing (DCP) and conclusion and evaluation (CE).

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

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| Name of the topic | Experiment | Indicate the experiments you would use for assessing design (D),  data collection and processing (DCP) and conclusion and evaluation (CE)  (use D, DCP or CE) | Any ICT used?  Remember you must use all five within your programme. |
| Acids and bases | Titration | DCP | Yes |
| Topic 1 – Cell Biology | Diffusion and Osmosis (10hrs) | Personal Engagement, Analysis, Exploration, Evaluation, Communication | Yes |
| Topic 1 – Cell Biology | Comparison of prokaryotic and eukaryotic cells (10hrs) | Personal Engagement, Evaluation, Analysis | Yes |
| Topic 2 – Molecular Biology | Cellular Respiration (3hrs) | Personal Engagement, Analysis, Exploration, Evaluation, Communication | Yes |
| Topic 2 – Molecular Biology | Photosynthesis and Paper Chromatography (10hrs) | Personal Engagement, Analysis, Exploration, Evaluation, Communication | Yes |
| Topic 2 – Molecular Biology | Enzymatic Experimentation (10hrs) | Personal Engagement, Analysis, Exploration, Evaluation, Communication | Yes |
| Topic 3 - Genetics | Mitosis vs. Meiosis (2hrs) | Personal Engagement, Analysis, Exploration, Evaluation, Communication | Yes |
| Topic 4 - Ecology | Mesocosms and Sustainable Ecosystems (10hrs) | Personal Engagement, Analysis, Exploration, Evaluation, Communication | Yes |
| Option D – Human Physiology | Respiration Experimentation (4hrs) | Personal Engagement, Analysis, Exploration, Evaluation, Communication |  |

1. 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.

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| Laboratory facilities in the classroom are not fully equipped high school science facility; however it is sufficient to perform the tasks stated above. If the current classroom is not adequate for the tasks stated above, there is a classroom in the school that has full laboratory facility therefore the classroom will be shared to fulfil the needs of the tasks. Students currently sit in their lab groups as their desks are already lab benches and are fire retardant. There are four full lab stations that are equipped with full sinks and gas lines. There is also a stock room in the back that is used to store lab equipment and supplies. A refrigerator is available to keep biological samples chilled or frozen. There is also an incubator, micro-centrifuge, microscopes, electrophoresis equipment, etc. There is safety equipment including goggles, aprons, gloves, eyewash, and etc. are provided for individual student use and a fire blanket is also available. Only item lacking for safety is the shower. |

1. 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.

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| The school has a well-supplied science stockroom with adequate chemistry supplies. Some equipment, such as microscopes, hot plates, and bunsen burners are shared with the department, but there are enough to accommodate the needs. Additionally there are computer lab carts just for the science department and also Mac Cart for the whole school with internet connections and access to ICT. The library has excellent resources for further research and the school is in a walking distance to the Los Angeles Central Library. The school also has two minivans that can accommodate students to go outside the school to collect field data. |  |

1. 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.

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| Topic | Link with TOK (including description of lesson plan) |
| Topic 1 – Cell Biology | Students will look at the difference between knowledge gained by sense perceptions and the knowledge gained through technology. In order to achieve these students will first use those senses for an orange (from all dimensions) and then using their smart phones, they will look at an orange. Students will also observe a street using their senses and then observe the same street through a computer screen. Students will come to a conclusion as to see if there is any difference. |

1. 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.

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| Topic | Contribution to the development of international mindedness (including resources you will use) |
| Topic 3 - Genetics | There are many issues facing the world today. One of the biggest global issues facing the world is the lack of food supplies. The emergence of GMOs (Genetically Modified Organisms) has changed how the world views its food supplies. Being able to clone and cultivate beef patties in a laboratory has caused the world to look at food in a whole new perspective. Genetically modifying plants to survive and thrive in climates and terrains in which traditionally these plants would not grow has again allowed the global community to change the perspective of food. At the same time, genetically modifying the plants and animals has caused unforeseen changes in the native ecological species. Students will consider how GMOs are altering the views and ideas of food and the effect it has on the lack of food supplies as well as the social impact of GMOs from cultural, religious, and ecological point of view. The use of GMOs is an international topic |

1. 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.

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| Topic | Contribution to the development of the attribute(s) of the IB learner profile |
| Topic 6 – Human Physiology | Human Physiology embodies many attributes of the learner profile. First and foremost, by doing the investigative labs, students will become inquirers and thinkers. Since the labs are in groups, students will have to be communicators as well. By doing the written work for the investigative labs, students will have to reflect upon their own participation and mistakes for the lab. |

**ATTACHMENT A**

The Group 4 Project Aim 10 will be satisfied through the use of emails, cell phones, and google site. With Group 4 Project, I intend on creating a google site dedicated to Group 4 Project and have students post their results on the site as to create a lively discussion of the Group 4 Project on the website and to satisfy Aim 10.