# DP unit planner (MYP aligned)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Teacher(s)** | Calvin Smith | **Subject group and course** | Group 4, Biology | | |
| **Course part and topic** | Cellular Energetics | **SL or HL/Year 1 or 2** | HL/1 | **Dates** | 10/3/16-11/1/16(Matthew claimed a week) |
| **Unit description and texts** | | **DP assessment(s) for unit** | | | |
| Cellular Respiration(2.8,8.2) and Photosynthesis(2.9,8.3)  Biology Course Companion 2014(Oxford) | | * Paper 1: Multiple Choice * Paper 2: Short and Extended Response * Paper 3: Short and Extended Response * PSOW 4: Rate of Photosynthesis using Leaf Disc, AP Cell Respiration Lab, Design and Perform Fermentation Experiment, TLC of Spinach Leaf Pigments(Practical 4) | | | |



***ACTION: teaching and learning through inquiry***

|  |  |  |  |
| --- | --- | --- | --- |
| **Content/skills/concepts** | | **Learning process**  *Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.* | |
| Students will know the following content:  • Cell respiration is the controlled release of energy from organic compounds to produce ATP.  • Anaerobic cell respiration gives a small yield of ATP from glucose.  • Aerobic cell respiration requires oxygen and gives a large yield of ATP from glucose.  • Cell respiration involves the oxidation and reduction of electron carriers.  • Phosphorylation of molecules makes them less stable.  • In glycolysis, glucose is converted to pyruvate in the cytoplasm.  • Glycolysis gives a small net gain of ATP without the use of oxygen.  • The structure of the mitochondrion is adapted to the function it performs.  • Photosynthesis is the production of carbon compounds in cells using light energy.  • Visible light has a range of wavelengths with violet the shortest wavelength and red the longest.  • Chlorophyll absorbs red and blue light most effectively and reflects green light more than other colours.  • Light-dependent reactions take place in the intermembrane space of the thylakoids.  • Light-independent reactions take place in the stroma.  • The structure of the chloroplast is adapted to its function in photosynthesis.  Students will develop the following skills:  • Analysis of results from experiments involving measurement of respiration rates in germinating seeds or invertebrates using a respirometer.  • Drawing an absorption spectrum for chlorophyll and an action spectrum for photosynthesis.  • Design of experiments to investigate the effect of limiting factors on photosynthesis.  • Separation of photosynthetic pigments by chromatograph. (Practical 4)  • Analysis of diagrams of the pathways of aerobic respiration to deduce where decarboxylation and oxidation reactions occur.  • Annotation of a diagram of a mitochondrion to indicate the adaptations to its function.  • Annotation of a diagram to indicate the adaptations of a chloroplast to its function.  Students will grasp the following concepts:  • In aerobic cell respiration pyruvate is decarboxylated and oxidized, and converted into acetyl compound and attached to coenzyme A to form acetyl  coenzyme A in the link reaction.  • In the Krebs cycle, the oxidation of acetyl groups is coupled to the reduction of hydrogen carriers, liberating carbon dioxide.  • Energy released by oxidation reactions is carried to the cristae of the mitochondria by reduced NAD and FAD.  • Transfer of electrons between carriers in the electron transport chain in the membrane of the cristae is coupled to proton pumping.  • In chemiosmosis protons diffuse through ATP synthase to generate ATP.  • Oxygen is needed to bind with the free protons to maintain the hydrogen gradient, resulting in the formation of water.  • Temperature, light intensity and carbon dioxide concentration are possible  limiting factors on the rate of photosynthesis  • Reduced NADP and ATP are produced in the light-dependent reactions.  • Absorption of light by photosystems generates excited electrons.  • Photolysis of water generates electrons for use in the light-dependent reactions.  • Transfer of excited electrons occurs between carriers in thylakoid membranes.  • Excited electrons from Photosystem II are used to contribute to generate a proton gradient.  • ATP synthase in thylakoids generates ATP using the proton gradient.  • Excited electrons from Photosystem I are used to reduce NADP.  • In the light-independent reactions a carboxylase catalyses the carboxylation of ribulose bisphosphate.  • Glycerate 3-phosphate is reduced to triose phosphate using reduced NADP and ATP.  • Triose phosphate is used to regenerate RuBP and produce carbohydrates.  • Ribulose bisphosphate is reformed using ATP. | | **Learning experiences and strategies/planning for self-supporting learning:**  X Lecture  Socratic seminar  X Small group/pair work  X Powerpoint lecture/notes  Individual presentations  Group presentations  Student lecture/leading  Interdisciplinary learning  Details:  Other/s: | |
| **Formative assessment:**  **1. Cell respiration flow chart**  **2. Photosynthesis pre-test**  **3. Chemiosmosis Discussion Board**  **4. “Lollipop” Experiment Discussion Board**  **5. TLC lab** | |
| **Summative assessment:**  **1. 2.9 photosynthesis quiz**  **2. 2.9/8.3 photosynthesis test**  **3. 2.8/8.2 cell respiration test**  **4. Rate of Photosynthesis Lab**  **5. Cell Respiration Lab** | |
| Differentiation:  *For more information on the IB’s approach to differentiation, please see* [*the guide*](http://ibpublishing.ibo.org/dpatl/guide.html)*.*  Affirm identity—build self-esteem  Value prior knowledge  Scaffold learning | |
| **Approaches to learning (ATL)**  *Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see* [*the guide*](http://ibpublishing.ibo.org/dpatl/guide.html)*.* | | | |
| XThinking: TOK based Discussion Board Questions, completion of flow maps of photosynthesis and cellular respiration  XSocial: Lab activities, Pair-shair  XCommunication: Pair-share  Self-management  XResearch: Formulating hypotheses for labs | | | |
| **Language and learning**  *Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB’s approach to language and learning, please see* [*the guide*](http://ibpublishing.ibo.org/dpatl/guide.html)*.* | **TOK connections**  *Check the boxes for any explicit TOK connections made during the unit.* | | **CAS connections**  *Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the “details” section explaining how students engaged in CAS for this unit.* |
| XActivating background knowledge  Scaffolding for new learning  X Acquisition of new learning through practice  X Demonstrating proficiency  Details: Completing: Flow charts, quizzes, test | Personal and shared knowledge  XWays of knowing  X Areas of knowledge  The knowledge framework  Details: Discussion Board Questions | | Creativity  Activity  Service  Details: |
| **Resources**  *List and attach (if applicable) any resources used in this unit.* | | | |
|  | | | |

***REFLECTION: Considering the planning, process and impact of the inquiry***

|  |  |  |
| --- | --- | --- |
| **What worked well** | **What didn’t work well** | **Notes/changes/suggestions:** |
|  |  |  |