# DP unit planner (MYP aligned)

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

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| **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 acetylcoenzyme 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 possiblelimiting 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 seminarX [ ] Small group/pair workX [ ] Powerpoint lecture/notes[ ] Individual presentations[ ] Group presentations[ ] Student lecture/leading[ ]  Interdisciplinary learningDetails: [ ] 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)*.* |
| X[ ] Thinking: TOK based Discussion Board Questions, completion of flow maps of photosynthesis and cellular respirationX[ ] Social: Lab activities, Pair-shairX[ ] Communication: Pair-share[ ] Self-managementX[ ] Research: 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.* |
| X[ ] Activating background knowledge[ ] Scaffolding for new learningX[ ]  Acquisition of new learning through practiceX[ ]  Demonstrating proficiencyDetails: Completing: Flow charts, quizzes, test | [ ] Personal and shared knowledge[ ] XWays of knowing[ ] X Areas of knowledge[ ] The knowledge frameworkDetails: Discussion Board Questions | [ ] Creativity[ ] Activity[ ] ServiceDetails:  |
| **Resources***List and attach (if applicable) any resources used in this unit.* |
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***REFLECTION: Considering the planning, process and impact of the inquiry***

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