IB Biology - Category 1 Workshop

Session 5: Creating a personalised teaching / learning programme (Telescoping the syllabus)

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SYLLABUS TOPIC / SUB-TOPIC	Estimated time	Practical Skills	Primary NoS topics	Secondary NoS topics	Practical Investigations (These are prescribed in the syllabus)	Comments / considerations (see examples)
						Consider links to other parts of the syllabus. Also consider seasons, national systems, resouces, etc
Core + HL topics		*An example has been provided for you*				
first year						
1.1 introduction to cells	5 hours	1. Light microscope (Wet mount preparation). 2. Surface area to volume ration experiment.	3,1	4,5	1. Calculation of magnification	Possible link to viewing microscopic aquatic organisms in Ecology - Link to physics.
1.5 the origin of cells	1 hour		1.9			
2.1 molecules to metabolism	2 hour	1. Drawing of molecules. 2. Identification of biochemicals.	1.9			
2.2 water	1 hour		2.2			Link to "Water policy" school project.
2.3 carbohydrates and lipids	3 hours	1. Molecular visualization software. 2. Body mass index.	5.2			Link to "Wellness week" school project.
2.4 proteins	2 hours	1.Drawing of proteins.	3.1			
2.6 structure of DNA and RNA	2 hours	1. Drawing DNA and RNA molecules.	1.10			
1.2 ultrastructure of cells	2 hours	1.Drawing prokaryotic and eukaryotic cells. 2.Identify organelles in micrographs.	1.8			
1.3 membrane structure	3 hours	1.Drawing of fluid mosaic model. 2.Analysis of evidence and falsification of Davson-Danielli model.	1.11	1.9		
1.4 membrane transport	4 hours		3.1		2. Osmosis experiment.	
2.7 DNA replic, transcr, transl	3 hours	1.Use of the table of the genetic code. 2.Analysis of Meselson and Stahl's results. 3.Use of mRNA codons table.	1.8			
7.1 DNA structure, replication	3 hours	1.Analysis of results of Hershey and Chase experiment. 2.Nucleosome visualization.	1.8			
7.2 transcription, gene	3 hours	1.Analysis of changes in the DNA methylation patterns.	3.1			
7.3 translation	3 hours	1.Identification of polysomes in electron micrographs. 2.Ribosomes visualization.	3.7			
2.5 enzymes	4 hours	1.Design of an experiment about enzyme activity.	3.2		3.Enzyme activity investigation.	
2.8 cell respiration	2 hour	1.Analysis of results from experiments with respirometer.	4.5			
2.9 photosynthesis	4 hours	1.Drawing of an absorption spectrum and an action spectrum.	3.1		4.Separation of photosynthetic pigments.	
8.1 metabolism	3 hours	1.Calculating an plotting rates of reactions. 2.Distinguishing different types of inhibition from graphs.	3.8			
8.2 cell respiration	5 hours	1.Analysis of diagrams of aerobic respiration pathways. 2.Annotation of a diagram of a mitochondrion.	2.3			
8.3 photosynthesis	6 hours	1.Annotation of a diagram of a chloroplast.	1.8			
9.1 transport in the xylem	5 hours	1.Drawing structure of 1° xylem vessels in stem sections; 2.Design an	1.1		7. Measure transpiration rates	
9.2 transport in the phloem	3 hours	1.Identification of phloem and xylem in microscope images. 2. Analysis of data from experiments measuring phloem transport rates using aphid stylets and radioactively-labelled CO_2.	1.8			
9.3 growth in plants	3 hours		1.8			
9.4 reproduction in plants	4 hours	1.Drawing internal structure of seeds. 2.Drawing of animal pollinated flowers. 3.Design experiments about factors affecting germination.	2.3			
3.1 genes	2 hours	1. Use of NCBI database.	1.8			
3.2 chromosomes	2 hours	1. Use of databases to identify the locus of a human gene.	1.8			
1.6 cell division	2 hours	drawing structure of 1° xylem vessels in stem sections; Design an experiment to test hypotheses about the effect of temp or humidity on transpiration rates	1.4			
3.3 meiosis	2 hours	1.Drawing diagrams to show the stages of meiosis.	1.8			Link to "Down syndrome" school project.

3.4 inheritance	5 hours	1.Construction of Punnet grids. 2.Comparison of predicted and actual outcomes of genetic crosses.3.Analysis of pedigree charts.	3.2			
10.1 meiosis	3 hours	1.Drawing diagrams to show formation of chiasmata.	1.8			
10.2 inheritance	2 hours	1. Calculation of the predicted genotypic and phenotypic ratio in dihybrid crosses. 2.Identification of recombinants. 3.Use of chi-squared test.	3.1			
3.5 genetic modific and biotech	4 hours	1. Design of an experiment about rooting of stem-cuttings. 2.Analysis of examples of DNA profiles. 3.Analysis of data on risks to monarch butterflies of Bt crops.	4.8			
B.2 biotechnology in agriculture	4 hours	1.Evaluation of data on the environmental impact of glyphosphate-tolerant soybeans. 2.Identification of an open reading frame.	4.8			
B.1 microbiology: organisms in industry	4 hours	1.Gram staining of Gram + and Gram - bacteria; 2.Experiments showing zone of inhibition of bacterial growth by bactericides; 3.Production of biogas in a small scale fermenter	1,4			Start of the Internal assessment.
B.3 environmental protection	4 hours	1.Evaluation of data or media reports on environmental problems caused by biofilms.	1.8			
B.4 medicine	5 hours	1.Analysis of a simple microarray. 2. Interpretation of the results of an ELISA diagnostic test.	1.8			
B.5 bioinformatics	5 hours	1.Explore chromosome 21. 2.Alignement of proteins. 3.Construction of cladograms and phylograms.	4.3			
second year						
4.2 energy flow	2 hours	1.Representation of energy flow.	2.2			Start of the Group 4 project.
4.3 carbon cycling	3 hours	1.Construct a diagram of the carbon cycle.	3.1			
4.4 climate change	3 hours		5.2			
4.1 species, communities and ecosystems	4 hours	1.Classifying species. 2.Testing for association between two species using the chi-squared test. 3.Recognizing and interpreting statistical significance.	3.1		5. Setting up sealed mesocosms.	
10.3 gene pools and speciation	3 hours	1.Comparison of allele frequencies of geographically isolated populations.	3.1			
5.1 evidence for evolution	3 hours		3.1			
5.2 natural selection	3 hours		2.1			
5.3 classification of	3 hours	1.Constructing dichotomous keys	4.3			
5.4 cladistics	3 hours	1.Analysis of cladograms	1.9			
6.3 defence against infectious disease	3 hours		4.8			Link to "Leprosy" school project.
11.1 antibody production and vaccination	4 hours	1.Analysis of epidemiological data related to vaccination	4.5			
6.1 digestion and absorption	3 hours	1.Diagram of the digestive system	1.1			
6.2 the blood system	4 hours	1.Identification of blood vessels. 2. Recognition of the chambers and valves of the heart and the blood vessels connected.	1.9			
11.3 the kidney and osmoregulation	4 hours	1.Drawing human kidney. 2.Annotation of diagrams of nephron.	1.5			

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6.4 gas exchange	4 hours		1.8		6. Ventilation at rest and after mild and vigorous exercise.	
6.6 hormones, homeostasis and reproduction	3 hours	1.Drawing of the male and female reproductive systems and structures	1.8			
11.4 sexual reproduction	4 hours	1.Annotation of diagrams of seminiferous tubule and ovary. 2.Annotation of diagrams of mature sperm and egg.	4.8			
6.5 neurons and synapses	3 hours	1.Analysis of oscilloscope traces.	4.3			
11.2 movement	4 hours	1.Annotation of a diagram of a human elbow. 2.Drawing a sarcomere. 3.Analysis of micrographs to find the state of contraction of muscle fibres.	1.8			