

3 “seeds” : Internal Assessment’s individual investigation Preparation recommended Assignment

Dear IB Bio II students for 2023-2024

The internal assessment is traditionally 20% of a student’s IB Biology score. For 2019-2020 IB made it essentially all of the IB score. So, even though IB international is reviewing how to pragmatically approach the year 2020-2021 given the pandemic’s interruption of education, the IA’s individual investigation will undoubtedly remain be essential for the 2020-2021 IB assessments.

My philosophy is work smarter, not harder. A few hours (3-6 hours) of summer work will save you significant stress next year as it will provide you time to let ideas percolate in the back of your mind over days or weeks, this can lead to greater efficiency and inspiration. Below is summer recommended assignment that helps you productively brainstorm up ideas for your internal Assessment project. If you do not have electronic access, then work with the resources you have and neatly hand write your 3 “seeds” assignment. If you have electronic access please join Edmodo, and do your work electronically, as it will be easier to revise and revisit later.

Email me if you have questions or issues with Edmodo (yes you can use Edmodo messaging, but I see email notifications more quickly).

Enjoy your summer,
Ms. McKay
emckay@tusd.net

IA Theme for School year 2021-2022 **The human connection: Agriculture, the environment, or health** (health will have strict limitations according to human subjects/ animal subjects... probably best for computer modeling or databased labs).

-easily relates to SL/HL standards on ... SL/option standards on ecology, HL standards on plants, option standards in biotech and ag, biotech and medicine, microbiology, and bioinformatics or the SL/HL Photosynthesis.

- **Standards with linked resources:** <http://ib.bioninja.com.au/>
- **Standards with guidance (pdf p.35-end):**
<https://www.gresham.k12.or.us/cms/lib/OR02216641/Centricity/Domain/1154/Biology%20Guide.pdf>
- **How does the individual investigation fit in with IB international curriculum guide?**
<https://www.ibo.org/globalassets/publications/recognition/biologyhl2016englishw.pdf>

Pre Reflection:

Think about what you know about _____. Think about why _____ are important in biology. Think about how _____ fits into the macro/ micro/ or both aspects of biology.

Need a starting reference?

- Skim the DOCUMENT: OLD_Biology_for_the_IB_Diploma from the old standards see link http://tfssbio.pbworks.com/w/file/attach/54980708/Biology_for_the_IB_Diploma.pdf
- Or current resources: see Edmodo IB Bio II (2020-2021) Folders → readings

Review the Appendix: Skills in the New IB Biology Syllabus 2016 for a “seed” of an idea. Note not all skills are applicable to the theme.

REFER to DOCUMENT: Practical work and internal assessment IA_Guide_2016 is a description of IB Internal assessment and its rubric.

Some of the possible tasks include:

- **Simulation/ Modeling**
 - using a simulation that is interactive and open-ended. Ex: <http://virtualbiologylab.org/population-genetics/>
 - Using computer science skills to build a virtual lab/ simulation
- **extracting data from a database and analyzing it graphically**
 - Ex: medical data: <https://www.nlm.nih.gov/hsrinfo/datasites.html> , https://www.cdc.gov/nchs/data_access/ftp_data.htm
 - Ex: Ecological Data Wiki <http://ecologicaldata.org/> especially <https://ecologicaldata.org/find-data>
 - If you find interesting raw data from a researcher...do not bug them to ask them mindless and/or time wasting questions...they are VERY BUSY!
 - Go to www.water.ca.gov and <https://cdec.water.ca.gov/> You can search for interesting data on the Delta, the Skinner fish facility’s that samples fish coming through the California Aqueduct, etc.
<https://www.dfg.ca.gov/delta/Data/Salvage/SalvageOverview.asp>
- **using a spreadsheet for analysis and modelling**
- producing a hybrid of spreadsheet/database work with a traditional hands-on investigation (FYI: iNaturalist <http://www.inaturalist.org/> is a resource that might be useful. It is free to sign up. And check out like <https://www.inaturalist.org/places/tdwg-2016-annual-meeting-bioblitz>)
- **Independent field work.**
 - **IA_ecology_methods_BZ.pdf** attachment provides easy background from Biozone 216-221 gives simple examples of how to do ecology experiment methodologies that could be applied any where from your backyard to, to a state park like Caswell state park in Ripon.
 - w/ parental permission, permission of land owner/ proper use of public/state park, and a buddy ...it is rarely a good idea to go into the field on your own ...well unless your using something like your own backyard for research...and yes some discoveries are still being made in our “own backyards” <http://voices.nationalgeographic.com/2014/12/17/the-next-new-species-could-be-in-your-backyard/>)
- **a hands-on laboratory investigation**

- Control group, Independent variable with at least 3 manipulations.
- How many trials of each manipulation? It depends
 - Labs where genetic variation isn't an issue, minimum of where consistency

Assignment:

1. Come up with 3 "seeds" of ideas for an internal assessment (they could be broadly focused to very focused for this assignment).
 - a. Example if the Theme was YEAST and we didn't have to worry about bioethics, safety or laws
 - i. Using baker's yeast to brew beer
 - ii. Determining the growth curve of wild environmental yeast that from San Francisco that makes yummy sour dough French bread.
 - iii. Thrush infections: Is there a difference between breast fed babies and bottle fed?
2. Research EACH idea (3-4 sources suggestions beyond **bioninja!** And **Bozeman biology** –google "Biology for the IB Diploma" there is an old Cambridge IB book pdf on line that a nice level of depth)
3. For EACH idea do a mini write up (150-300 words using APA intext citations and don't forget the works cited)
 - a. **Background Information**
 - Paraphrased information (material that you put into your own words) should be stated then followed by (Smith, 2008).
 - Direct quotations should be placed inside quotation marks and then followed by (Smith, 2008).
 - b. **Rational For The Study (IAMF- Personal Engagement):**
 - You must state WHY you are interested or curious about this problem and state its personal significance to you.
 - c. **Possible Research Question:** Write a possible research question that could lead to a REALISTIC internal assessment lab. Use the format, "What is the effect of X on Y, where X is the independent or manipulated variable and Y is the dependent or responding variable "as measured by." But, if the experiment is more "discovery science style, then feel free to modify the research question format as necessary.

BELOW is a TEMPLATE DOCUMENT

AT the END is the **Appendix: Skills in the New IB Biology Syllabus 2016 (the first year of testing on these standards)**

Internal Assessment Preparation Assignment	Name:
<p>Theme for School year 20192020 The human connection: Agriculture, the environment, or health</p> <p>450-900 words, 3-12 sources</p> <p> <input type="checkbox"/> Idea 1 MUST be a traditional science: wet lab idea <input type="checkbox"/> Idea 2 MUST be something else, Modern Science: databased, virtual/computer model, field work... <input type="checkbox"/> Idea 3- your choice: ecology (old school field work that requires decent shoes or modern databased/modeling) </p>	
<p>"Seed" of an idea 1 (150-300 words including 3-4 sources using APA in text citations)</p> <p style="text-align: center;">TRADITIONAL Science: WET LAB EXPERIMENT IDEA</p> <p>A. Background Information</p> <p>B. Rational For The Study (IAMF- Personal Engagement):</p> <p>C. Possible Research Question:</p>	
<p>"Seed" of an idea 2 (150-300 words including 3-4 sources APA in text citations)</p> <p style="text-align: center;">Modern Science: databased, virtual/computer model,</p> <p>A. Background Information</p> <p>B. Rational For The Study (IAMF- Personal Engagement):</p> <p>C. Possible Research Question:</p>	
<p>"Seed" of an idea 3 (150-300 words including 3-4 sources APA in text citations)</p> <p style="text-align: center;">Ecology: field work, databased, virtual/ computer model</p> <p>A. Background Information</p> <p>B. Rational For The Study (IAMF- Personal Engagement):</p> <p>C. Possible Research Question:</p>	
<p>Works Cited (total of 3-12 sources using APA format)</p>	

Appendix-Skills in the New IB Biology Syllabus 2016...might give you jumping off point ideas

Topic 1

- Use of a light microscope to investigate the structure and ultra structure of cells and tissues, with drawing of cells and calculation of the magnification of drawings and the actual size of structures shown in drawings or micrographs. (Practical)
- Estimation of osmolarity in tissues by bathing samples in hypotonic and hypertonic solutions. (Practical 2)
- Identification of phases of mitosis in cells viewed with a microscope or in a micrograph.
- Determination of a mitotic index from a micrograph.

Topic 2

- Use of molecular visualization software to compare cellulose, starch and glycogen. Design of experiments to test the effect of temperature, pH and substrate concentration on the activity of enzymes
- Experimental investigation of a factor affecting enzyme activity (Practical3). Analysis of results from experiments involving measurement of respiration rates in germinating seeds or invertebrates using a respirometer.
- Design of experiments to investigate the effect of limiting factors on photosynthesis. Separation of photosynthetic pigments by chromatograph. (Practical4)

Topic 3

- Use of a database to determine differences in the base sequence of a gene in two species.
- Use of karyograms to deduce sex and diagnose Down syndrome in humans
- Use of a database to identify the locus of a human gene and its polypeptide product
- Design of an experiment to assess one factor affecting the rooting of stem-cuttings.

Topic 4

Setting up sealed mesocosms to try to establish sustainability (Practical 5). Testing for association between two species using the chi squared test with data obtained by quadrat sampling.

Topic 6

- Monitoring of ventilation in humans at rest and after mild and vigorous exercise.

(6th practical.) Topic 7

- Utilization of molecular visualization software to analyse the association between protein and DNA within a nucleosome.
- The use of molecular visualization software to analyse the structure of eukaryotic ribosomes and a tRNA molecule.
- Calculating and plotting rates of reaction from raw experimental results.

Topic 9

- Measurement of transpiration rates using potometers. (Practical 7)
- Design of an experiment to test hypotheses about the effect of temperature or humidity on transpiration rates.
- Design of experiments to test hypotheses about factors affecting germination.

Option B

- Gram staining of Gram positive and Gram negative bacteria.
- Experiments showing zone of inhibition of bacterial growth by bacteriocides in sterile bacterial cultures.
- Production of biogas in a small scale fermenter.
- Explore the chromosome 21 in databases (for example in Ensembl). Use of software to align two proteins.
- Use of software to construct simple cladograms and phylograms of related organisms using DNA sequences

Option C

- Use of a transect to correlate the distribution of plant or animal species with an abiotic variable.
- Investigation into the effect of an environmental disturbance on an ecosystem. Analysis of the biodiversity of two local communities using the Simpson reciprocal index.
- Modelling the growth curve using a simple organism such as yeast or species of Lemna.
- Assess the nutrient content of a soil sample.

Option D

- Determination of the energy content of food by combustion.
- Use of databases of nutritional contents of foods and software to calculate intakes of essential nutrients from a daily diet.
- Identification of pneumocytes, capillary endothelium cells and blood cells in light micrographs and electron micrographs of lung tissue
- Measurement and interpretation of the heart rate under different conditions. Interpretation of systolic and diastolic blood pressure measurements. Mapping of the cardiac cycle to a normal electrocardiogram (ECG) trace.