Experimental Design Protocol- Answer Key #1 (11 Questions, 30 marks)

Due at the end of your lab **January 17-21st**

1. What is the problem or question you have sought out to answer? Be sure that your description includes known factors (what is already known about the problem(s)) and unknowns (what your study is trying to understand). Then restate the problem in the form of a question or questions that will guide your research. (3 marks)

Should include clear articulation of the variables of interest addressed in a manner that is testable and conducive to articulating a hypothesis, and should be concise.

1. Using what you know about the problem, state the hypothesis. Remember from BIOL116, a hypothesis must be a testable statement. (2 marks)

Should be directly connected to the research question.

1. What do you already know about this problem and/or the organism you will be working with. (2 marks)
2. Look over your hypothesis and define the variable(s) you will use to test your hypothesis? What is your independent and dependent variable? Next describe the predicted relationship among your variables or describe what relationships have already been found. (3 marks). Need a memory jog on variables? Revisit the content from BIOL 116 - <https://ubco-biology.github.io/BIOL-116-Lab-Manual/designing-the-experiment.html>.
3. In detail, describe how you will go about replicating this experiment. How many “runs/trials” will you be able to do in the time provided? The experiment will have a control and a treatment group. Make sure you have clearly identified these groups. Outline the methods you will use in order to replicate this experiment. Review the content on “Designing the Experiment” from BIOL116 if needed - <https://ubco-biology.github.io/BIOL-116-Lab-Manual/designing-the-experiment.html>. Make sure you have completed a detailed schedule outlining what you will be doing each week. (5 marks)

The week of January 17-21st:

The week of January 24-28th

The week of January 31st – February 4th:

February 7th – 11th

February 14-18th:

1. What is your “experimental group” and what are your treatment levels? What is your “control group”? What is your sample size? (3 marks)
2. What “data” are you going to collect? For each variable you’re collecting data on, list the data type and measure ie, is it numeric or categorical? If it’s numeric is it discrete or continuous? Is it ratio or interval? If it’s categorical is it nominal or ordinal? For numeric data, what will your units be and to how many decimal places will you record? (2 marks)
3. How will you record your data? Will you use a simple table in excel? Draw a quick sketch of the table you will use to record your data. Remember to think about the relationship between your recorded data and the principles of Tidy Data to facilitate analysis - <https://ubco-biology.github.io/Procedures-and-Guidelines/tidy-data.html>. (2 marks)
4. How will you manage your data (3 marks)?
   1. Where will you store your data (usb key, external hard drive, laptop, UBC OneDrive etc)?
   2. What file naming conventions will you use for your
      1. Data
      2. Report
      3. Figures & Images
   3. What directory structure will you use for your data? Take a screen shot of or sketch out your directory structure including all appropriate readme files – the readme files don’t need to have content yet, they just need to be created as placeholders.

Ideally this will have a root folder with at least 3 sub-directories, one for each data, report and figures and each folder will have a readme – so 4 readme files – and the data folder should also have a data-dictionary.

1. How will you try to limit experimental error, biological variation and increase your statistical power? (2 marks)
2. List all the equipment and supplies that you will require to conduct your experiment. Ensure you have determined the amount you will need each week and how many in total. (3 marks)