# Marine Productivity Project Instructions

(this includes original graphing activity, but incorporates some assessment and caption writing)

## Week 1: 20 minutes of class time

1. Introduction to Marine Productivity Graphing Project
2. Watch Harmful Algal Blooms Video in class, have students take notes (could be done out of class to avoid using class time).
3. Out of class Assignment:
    a. Read the Biology Background information document and submit answers to the questions at the end of the article. Answers are to be turned in next class period.
    b. Review the Statistics Background information (definitions) document

## Week 2: 20-45 minutes of class time

1. Assess: Take the video/reading quiz (10minutes; could be done online to avoid using class time)
2. Discuss the importance of graphing and statistics in Science. Talk about Excel and how important it is to know how to properly use it.
3. Pull up data set and students instructions.
    a. Tell them their Goal:
        i. Review data as a group
        ii. Each group member select a parameter to graph
        iii. Out of class assignment: Complete the activity (due week 4)
            1. Read through each step and complete task.
            2. Answer questions in last column
            3. Be sure to copy raw data into raw data copy tab and manipulate data as needed
            4. Create a Stats Tab and complete that task
            5. Produce graph for their chosen parameter (include graph in graphs tab)
            6. Create a Monthly Means tab and complete that task

## Week 3: No class time

1. Out of Class Assignment: Due week 4
    a. Complete the $I^2$ graphing exercise to practice interpreting graphs and writing meaningful captions.
    b. Using $I^2$ technique, write a meaningful caption for the graph you completed.

## Week 4: 20-45 minutes of class time

1. Share among classmates. Have groups with different parameters compare graphs. Have students who developed graphs on the same parameter compare graphs.
2. Out of Class Assignment: Due Week 5

a. Write a results paragraph that could be included with this project (based on their graph and parameter). Use the framework listed below) to write a results paragraph based on the graph you generated.
    1. Begin the results paragraph with a "to" statement describing the purpose of the experiment including a brief summary of the method (include what you can; you didn't do this experiment, but you must be able to surmise what they did).
    2. Next summarize your first key finding.
    3. State the direction of any difference observed.
    4. Add in your statistical analysis.
    5. Repeat for other conditions.
    6. Avoid a long list of results—you need only highlight your key findings or trends. For example, if you saw no change in several different conditions you don't need to list the averages for each but rather summarize the trends. i.e. The heart rates were similar at 28, 30, and 32°C, averaging around 190 BPM; variation in heart rates was not significant ($p>0.05$).

References:

BSCS (2012a). Identify and Interpret ($I^2$) strategy [student edition]. https://media.bscs.org/icans/icans_I2_SE.pdf

BSCS (2012b). Identify and Interpret ($I^2$) strategy [teacher edition]. https://media.bscs.org/icans/icans_I2_TE.pdf

DOST-PNRI. (2017, March 30). *Harmful Algal Blooms* [Video]. YouTube. https://youtu.be/706kZXlHZRw