

Full Lab Report Assignment

Purpose: This assignment is designed to help you practice constructing a scientific manuscript in [REDACTED] using data and citing journal articles. This lab report will roughly follow the standardized format that scientific articles follow. You will work with a partner to write the paper using the feedback from your lab report earlier in the semester.

Audience: You are writing for [REDACTED] students at other schools; people who have similar knowledge of [REDACTED] but not about this particular experiment. And your instructor.

Format: Aim for *no more* than 4 pages of 1.5- spaced text (12 point standard font), not including figures. I describe the structure below.

Subject: Choose one of the two bacterial experiments we performed in class this semester:

- 1) Environmental Resistance in water samples
or
- 2) Evolving Antibacterial Resistance using selection in UV-exposed and non-UV-exposed lineages

Title: Use a title that summarizes your findings.

Abstract: The abstract is a stand-alone summary of the paper, typically around 200 - 300 words. Aim for 1-2 sentences summarizing each of the introduction, methods, results, and discussion. Do not reference figures or literature in the abstract.

Introduction: The introduction starts broadly by describing the background and motivation for the project and then narrows to identify the question and hypotheses.

- Write 1-2 longer paragraph(s) broadly introducing the topic of your paper. Use this paragraph as an opportunity to frame the context of this research in a broad sense.
- Write 1-2 longer paragraph(s) that narrows down your research topic. Write more specifically about the study species or study system you will examine and explain why the research topic is important.
- Write 1 paragraph that introduces a broad question that you want to study (for example: "We assessed the relationship between group X and group Y" or "we assessed the relationship between independent variable X and dependent variable Y".) Follow that up with a specific set of hypotheses you want to test (for example: "We hypothesized that the mean of group X will be higher than the mean of group Y because..." or "We hypothesized that variable Y will increase as variable X decreases because..."). Aim for at least 3-4 comparisons that are related to the broader question.

- Cite at least 4 relevant sources in the introduction. ***Each partner should find and reference two sources.*** Cite your sources in-text where information from that source will support an assertion made. You should have read a paper all the way through when you cite it, and reference the **main ideas** that originate from that paper. Think back to your library session – Web of Science is a great search tool.

Methods: Think about the data you need to use to answer your question. You definitely collected more data than you will use in this report.

- Precisely describe the methods used to obtain the data with sufficient detail that the experiment could be replicated.
- Describe the reason for gathering the variables in question and why the methods used for obtaining the data were used. (e.g. “we transferred bacteria growing at the edge of the Zone of Interference in order to specifically sample the population exposed to the antibiotic”)
- Write at least one paragraph describing your analytical methods, including both a description of your statistical tests used for each comparison and a description of any figures you will make.

Results:

- Start the results section off by briefly summarizing the data you examined. It may be productive to answer these questions:
 - How many samples were collected?
 - How many successful trials were completed?
 - What is the range of measurements recorded?
 - What are mean values of measurements recorded?
 - What patterns emerge from the data?
 - What kind of variability or outliers exist in the data?
- Report the results of statistical tests performed, including whether the results was significant ($P < 0.05$) or not ($P > 0.05$) in a significance statement. A typical significance statement includes not only the P-value, but also the characteristics of your statistical test (see R code for more details).
 - For example, I would write, “There was no significant difference between the antibacterial resistance of bacteria collected in flowing water and bacteria collected in still water ($P = 0.83$, $t = 0.0001$, d.f. = 25).”
- Produce at figures that are relevant to your question and assesses your hypotheses; include a stand-alone figure legend for each. ***Each person should make two figures.***
- Reference figures in-text by either directly stating which figure readers should reference (e.g. “...as can be seen in figure 1”) or using a parenthetical after making a statement that would be supported by the figure in question (e.g. “the mean value for group A was higher than for group B (Fig 1)”)
- Remember, you shouldn’t interpret the results here, just report them.

Example Figure + Caption:

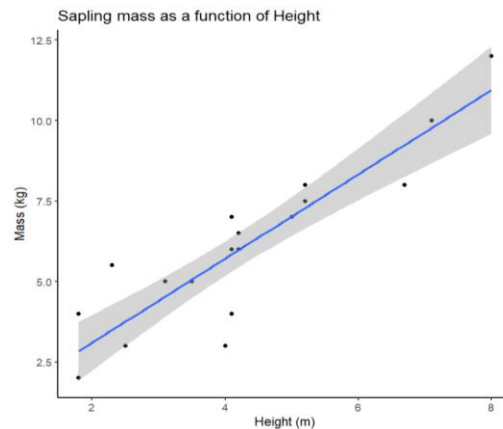


Figure 1. The relationship between the mass and height of saplings measured at St. Olaf Natural Lands, Northfield, Minnesota, USA.

Discussion: This is the section where you try to explain the results you found and reflect on what these results may indicate. Did your results match your predictions? Why might that be the case? You should connect your results to your hypothesis and use concepts from class as well as cited literature to explain your findings.

- Contextualize, contextualize, contextualize! Place your results in the context of the literature and class concepts we have covered.
- This is where you get to talk about whether your results matched the expectations you put forward in your hypotheses or didn't. If they didn't why do you think you observed the patterns you did?
- It is important to identify limitations of a study, but your discussion should focus on what can be learned rather than solely on errors.
- Cite at least **2** sources in the discussion section to place your research in the context of other published literature.
- At the end of this section, highlight the significance of what was learned and suggest some ideas for further investigations of the study system going forward.

Acknowledgements: Thank those who helped you with the work who are not co-authors.

Author Contributions: Before you begin, decide what each of you will contribute. Once you have written the paper, describe who contributed what to the final paper. Eg. EKM wrote the first paragraph of the introduction and the methods and created Fig. 1. MKE wrote the second paragraph of the introduction and the results and created Fig. 2. We wrote the discussion together.

References: Use the style for the journal *Ecology*.

Harville, E. W., G. Giarratano, J. Savage, V. Barcelona de Mendoza, and T. Zotkiewicz. 2015. Birth outcomes in a disaster recovery environment: New Orleans women after Katrina. *Maternal and Child Health Journal* 19: 2512–2522. [doi: 10.1007/s10995-015-1772-4].

In-text citations should use the (Author Year) format (Harville et al. 2015)

Turn in: The initial draft of your report should be ready for peer review by the week of April 22nd.

The final draft of your Lab Report is due May 3rd.

Remember: This assignment should be your own team's work in your own words. No assignment is worth sacrificing your integrity.