ZOOLOGY 430 Laboratory
Guidelines for Writing Lab Reports

All lab reports are required to be typed, and should concise – **5 double-spaced pages** not including figures. (longer lab reports ≠ better grades). Each lab report should consist of the following sections (w/ rough page length suggestions):

	Grade	
1. Title & Introduction	~1pg	15%
2. Materials & Methods	< 1pg	15%
3. Results	0.5-1pg	20%
4. Discussion	1.5-2pgs	45%
5. References/Contributions		5%

1. Title
Report titles should be concise (usually 10 words or less), straightforward, and reflect the content/purpose of the lab. E.g.,

"The effect of temperature on heart rate in toads."

2. Introduction
The introduction should clearly identify the main idea of the report to a scientific audience (i.e. to other scientists).

A. *What is the physiological mechanism under study?*

1. Why is it important?
2. Use proper terminology and include important definitions.

B. *Build **argument** leading to **hypothesis***. Make sure to cover

(1) *How the physiological mechanism works* You will test the mechanism by measuring particular variables and performing treatments, so provide sufficient detail so that it is obvious why this experimental design makes sense. (2) *Background on what is known about the mechanism.* End with what is unknown/what you want to find out. Make sure that only information *directly relevant to the experiment* is included. *Remember, short, concise, focused* – irrelevant info will result in points lost.

D. *What, specifically, is being studied?*

This is the hypothesis section at the end of the intro. Avoid predictions, the hypothesis is a statement about how the *physiological mechanism might work*.

*In summary, the introduction should set up **Why this experiment was performed.*** After reading the intro, the reader should have an idea about information will be gained through the experiment and why this information is important.

3. Materials and Methods
This section concisely describes the experiment in enough detail that so that a physiologist will understand the experiment and be able to replicate it. *It should be obvious how these procedures test the hypotheses*. Include:

A. *The subject* (organism, tissue, etc.) and *sample size* (number of individuals) used in the experiment.

B. *A brief explanation of the design of the experiment.* It should illustrate the logic in approaching a test of the hypotheses.

It should include **which instruments** were used to collect **which physiological data** (in this lab, generally the sensors, the PowerLab data acquisition system, the LabChart software, etc.).

Please cite which standard protocols you used (i.e., cite any protocols already published in the lab manual).

Do explain anything relevant about **how or where the sensors were applied, any changes from the protocol, or non-standard procedures** so that a physiologist could repeat the experiment. Also include **sampling rate** and any changes to the channel settings.

e.g., "Blood pressure was measured at the upper arm using a sphygmomanometer following standard protocols (Butler, 2022)."

Make sure that the methods clearly illustrate how the procedures relate to testing the hypotheses.

Describe the **experimental treatments** and **controls** and the **relevant details of their implementation**, including the sequence of experiments, measurements taken at specific intervals, and how many trials, etc.

e.g., "Dive responses were simulated by facial immersion in an ice bath. Blood pressure and leg volume were measured at standard intervals: resting, after immersion for XX sec., and in recovery at XX time."

C. *How the data were analyzed to inform the hypotheses.*

This section connect the dots from your **raw data** to your **physiological variables** presented in the figures (results). **Include how you compared treatments vs. controls (or examined a trend, etc) in order to evaluate hypotheses.**

e.g. "Heart rate (HR) was obtained from the pulse wave data using the cyclic

measurement menu in LabChart."

"The effect of exercise was evaluated by comparing HR at rest, during exercise, and after recovery."

4. Results

Organize your results around the experiments or the hypotheses you tested, so that the reader can clearly see whether your hypotheses were supported. The text states what happened, and takes the readers through the figures and tables where the data are presented. **It is NOT a report of the raw data, but rather the presentation of the *analysis of the data*.** Include:

A. A **verbal description of of your findings**.

Begin the results section with text. *Concisely describe general trends seen in the data or differences between treatment groups with reference to your figures.*

e.g. "Heart rate remained elevated post-exercise and into 1 min of recovery (Fig. 1)."

Point to specific results/trends that support or do not support each hypothesis. A sentence or two for each hypothesis or question is may be enough to cover the major results of your experiment. It is a **brief section** that **summarizes** the **factual findings**.

B. Well organized **figures and/or tables** showing the important results of the experiment.

The figures and tables present the data in relation to the hypotheses. *Design each figure or table to make it easy for the reader to see whether the data support the hypothesis.*

Each figure should make a important point and be cited in text. Do not be repetitive: **present your data in figure or table form, not both.** (Figures are best when you want to see a trend or comparison, tables are best when exact numbers are important).

Figures should include:
- A caption with brief description of what the figure shows.
- An explanation of any symbols or abbreviations.
- Labeled axes (with units).

Tables (if included) should include a title (similar to a brief figure caption). Label columns/rows. Any notes go under the table.

5. Discussion

This section should interpret the results of your experiment *relating them to the physiological mechanisms under study*. It is about finding meaning in your results and generalizing from them. You should not simply restate the results! A good discussion will:

A. Explain what the results tell us

Dive into the numbers. Why did you find the results you obtained? Can you infer anything more about the relationships studied?

B. Explain what you learned or demonstrated about how the physiological mechanism works.

C. Explain how your results fit into the existing body of knowledge.

D. (Optional - If anything went wrong during your experiment, mention how it may have affected your results and conclusions. Keep this very brief.)

E. Broader Significance.

Generalize - how broadly could your results apply? Are there any further questions raised by your results? Could this be important to future research?

Note: Here and in the introduction you want to demonstrate that you *understand the physiological basis of the experiment* you just performed.

6. Literature Cited

We do not require primary sources for lab reports, your textbook or lab manuals are fine. We expect **all factual statements** to be **cited in-text**, and a small, but properly formatted literature cited section, alphabetical by author's last name and in the following formats, for example:

Withers, P.C. (1992). Comparative Animal Physiology. Saunders College Publishing; New York.

Butler, M. (2022). Animal Physiology Lab, Zoology 430 Manual: Lab #1.

In text citations refer to the source by the author's name and date. E.g.,

a. Muscle force is proportional to cross sectional area (Withers, 1992).
b. Withers (1992) showed that force is proportional to cross sectional area.

7. Respective Contributions

Please explain in a sentence or two what each group member contributed to the report.