

# COMPUTATIONAL NEUROSCIENCE

SYDE 552 / BIOL 487

University of Waterloo, Winter 2022

## 1 General Project Concerns

Assessing project work is challenging, and can be hard to nail down to a precise marking scheme. Below we lay out the things we are looking for in each of the different sections of your final report. Keep in mind that negative results are acceptable for this project, and the scope of the question you are answering don't have to be world-changing.

That said, we view this project as practice for research projects or other investigatory work, so we do expect the following:

1. Clear writing.
2. References that contextualize your work. (no plagiarism, no inventing references)
3. Figures and tables that are referenced in the text, with meaningful captions, and that are labelled clearly and legibly. Presbyopia comes for us all, please make figure font sizes comparable to the text font size.
4. That experiments are conducted over multiple trials, a minimum of 5 repetitions for any experiment. Report on the variability of the results.

Remember - if you use ChatGPT (or similar) to cite that in your article. Also remember, you are liable for all of ChatGPT's mistakes. All numbers below are guidelines. Do reach out to us if you have any questions.

## 2 Paper Structure Breakdown

With respect to the document itself, we propose the following structure, with marks divided equally among the sections. This structure is based on the FAST paper writing template from [1]. Note that the marks assigned can be affected by the characteristics laid out in Section 1.

**Abstract** [8 pts] The abstract should describe your project, it is a summary of what the rest of the document contains. A rough outline of an abstract follows

1. Rationale for the paper (*i.e.*, what is the question you think needs answering): 1 sentence.
2. Objective or Hypothesis: 1-2 sentences
3. Methods: 2-3 sentences. Briefly describe the experiment you conducted.
4. Results: 3-5 sentences. Report what you found ("we changed X and found Y")
5. Conclusions: 1-2 sentences. Explain the significance of your findings and future research needs.

**Introduction** [8 pts]

1. Briefly state the problem or hypothesis that justifies doing the work.
2. (Literature Review) Summarize the findings of others that you will develop/extend or challenge.
3. Explain the general approach and objectives.

4. *Bonus*: Is the model you're looking at something interesting/surprising?

**Methods** [8 pts]

1. Describe the model you are working with and any baselines you are comparing against.
2. Describe the intervention you are making in your model.
3. Describe what you are trying to test and how, in detail. Describe how your experiment will reveal the effect of the intervention you are planning on making.
4. Describe the analysis and statistics you are using to assess the results of your intervention.
5. *Bonus*: Is your model more complicated than the average model?

**Results** [8 pts]

Before writing this section, prepare your outputs (figures, tables, etc.) according to the desired presentation format. If you have questions about presentation – reach out.

1. Identify the what you observed in the data. Highlight any important or surprising observations.
2. Make sure that you make efficient use of the space. Twenty pages of illegible figures which are later summarized in a table or in text is much less good than one figure which summarizes the findings. You can lose style points for this.
3. Make use of appendices to report high-volume raw data. Material in the appendix should be referenced in the main text.

**Discussion** [8 pts]

1. After finishing your outputs, describe your most important findings in the text, then discuss them in relationship to the literature reviewed in the Introduction.
2. State what you found (if anything) to be new, different, and/or exciting.
3. Summarize your findings; may list them in order: 1)..., 2)..., etc.
4. It is important to properly interpret the results of your experiments - you can lose marks for presenting incorrect analyses (*i.e.*, saying a trend goes in the opposite direction of what is visible in the graph).
5. Consider future work and describe what you would like to do next if you had the opportunity.

### 3 Frequently Asked Questions

1. **How many references do I need?** As many as necessary to make your case. However, less than five is probably too few, ten is more reasonable, more than 30 is probably too much for the purposes of this course. What is more important is that they are *relevant* references, *e.g.*, “Neuroscience is important field (Kandel et al., 2014)”, is not a terribly useful reference.
2. **How long should the paper be?** Rough guidelines, less than six pages is too few, more than 30 is probably too long.
3. **Do I need to cite references?** Absolutely, yes. Also, use quotation marks where you take text directly from a source.
4. **Can I change my project after the proposal has been submitted?** Yes, changing projects is not a bad idea, but do talk to us so we know, and can help you shape the project to try and maximize success.

## References

- [1] Elena Mikhailova and Linda Nilson. Developing prolific scholars: The. *The Journal of Faculty Development*, 21(2):93–100, 2007. [1](#)