

Formatting Instructions for a Neuroscience Honors Thesis
Revised October 2018

You should prepare the thesis with an easy to read 12 point font with line spacing set to 1.25 or 1.5. Unless you receive permission from the UPiN Director to do otherwise, format your thesis as described in this document.

1) Order of Sections -

- a. Cover page include the following: The thesis tile, your name, the name of your sponsor and readers and their official University titles, the date the thesis will be submitted and the statement “A thesis submitted in partial fulfillment of the Degree of Bachelor of Science in Neuroscience with Honors”) No page number.
- b. Abstract -250 words maximum (Page i – Use lowercase Roman numerals for all pages prior to the Introduction)
- c. Table of contents (Page ii)
- d. Scientific Acknowledgements. (Begins on Page iii, or the next Roman numeral if your table of contents is more than one page).
- e. Personal acknowledgements in which you thank anyone who has helped you in your work (Begins on page iv or whatever the next available Roman numeral is)
- f. Introduction (Page 1 - Use Arabic numerals for all the rest of the thesis)
- g. Materials and Methods
- h. Results – It is preferred that figures and tables be embedded within the results, but it is also permissible to put them after the references. Make sure each figure or table has a complete legend, as in the Journal of Neuroscience.
- i. Discussion
- j. References – Use the Journal of Neuroscience format
<http://www.jneurosci.org/content/preparing-manuscript#references>

2) Additional Comments on the sections of the thesis

- a. Scientific Acknowledgements (Section d) - In this section clearly indicate any experiments included in the thesis that were done in full or in part by a collaborator in the lab and that you have their permission to include their data. If any figures show data generated by anyone other than you working alone, there should be a table in this section indicating exactly who was responsible for each panel of each figure. Here is an example of what this section might look like:

The experiments presented in this thesis resulted from a close collaboration with Mary Smith, a postdoctoral fellow in our lab, and she has granted me permission to include in this thesis some of the data she collected and analyzed. The person who conducted each illustrated experiment is indicated in this table:

Figure #	Person who was responsible for the illustrated experiment
1	Mary Smith
2	Mary Smith collected the data, I did the analysis
3	Mary Smith designed the experiment, I carried it out and analyzed the data
4	Panel a- Mary Smith; Panels b-d Me and Mary Smith; e-f me
5-8	All data in these figures was collected and analyzed entirely by me

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- b. Introduction- It should have three major parts. Use section headers when they would be helpful to the reader. The full introduction usually will be 15-20 typed pages.
 - i. General introduction to the area of neuroscience you are working in- This section should be written at a level appropriate for a college-educated non-scientist. You should define key terms that a neuroscientist would already know, but a nonprofessional would not- Typically 2-5 pages.
 - ii. Critical review of the relevant literature- You should not attempt to summarize all the published literature, but you should demonstrate that you are familiar with the major findings in your field, and the major unanswered questions. This section should describe the key results of at least 10 papers essential to understanding your work, and indicate major unanswered questions in the field (including any issues that you think have been accepted in the field with insufficient evidence). This section should be written at a level appropriate for a neuroscientist who works in an area of neuroscience very different than yours. To get an idea of the type of review we have in mind, look at articles in “Trends in Neuroscience” and “Nature: Neuroscience Reviews”. This section is typically at least 10 pages but may need to be much longer for a thesis that draws heavily from two or more distinct disciplines.
 - iii. Statement of the specific goals of your thesis – It should be written assuming the audience was neuroscientists in your specific sub-area, and so might be the entire introduction if you submitted your work for publication in the Journal of Neuroscience, which has a 650 words maximum. Typically about 1 page.

- c. Materials and Methods
 - i. If you used methods that are standard in your field, do not describe them in detail, unless you made major modifications to them. Instead, write just one or two sentences about each such method and cite a reference that describes the method in detail.
 - ii. If you developed new methods, describe them in sufficient detail so that a scientist with expertise in your field could replicate your experiments.
 - iii. List the sources of all key reagents and equipment.
 - iv. Indicate the type of statistical analysis you used and how you decided it was appropriate.
 - v. If you used vertebrate animals or human subjects, indicate the approval number for your protocol and the authorized PI

- d. Results
 - i. Through the use of narrative text, figures and tables describe what you found. See Appendix 1 for more details on best practices for when you should use each type of data presentation format. You should use the past tense for this entire section.

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- ii. If there are issues with the interpretation of the data themselves (such as points that are outliers, smaller than ideal sample sizes, experiments you tried repeatedly but gave inconsistent or uninterpretable results) discuss them in the Results section.

e. Discussion

- i. The goal of the Discussion section is to relate what you found to the previous knowledge about the topic. Put discussion of the data themselves in the Results section.
- ii. There is no word limit
- iii. You should feel free to speculate more than would be typical in the discussion of a published paper. In particular, it is expected that you will make suggestions about what should be done next if another member of your lab decided to continue the study you carried out (or indicate why the study should not be continued).

Appendix - The best way to present material in Results

Detailed information about the results should be presented once in the way that you think will best communicate it (either in the main text, in a figure or in a table). One common way to do this is that the narrative may describe your results in general, with detailed information in figures or tables. However, if the data are not too voluminous you may simply present the actual data in the narrative. Examples of types of data you might want to present each follow.

Example – Option 1 - Results in text, and no figure or table on this material is used

“We measured the weight of all varsity athletes at the University of Michigan playing football (N=84) or baseball (N= 35) and found that the weight of football players was 250 +/- 25 pounds (mean +/- Standard Deviation), and of baseball players was 195 +/- 10 pounds. A t test showed that the difference between the means was significant at $p < 0.01$.”

Example Option 2 – Very brief narrative, with the actual data in a figure or table

“We measured the weight of all varsity athletes at the University of Michigan playing football or baseball, and found that the average football player weighed much more (Figure 1).”

For Figure 1, the most likely way to present these data would be as a bar graph, with error bars, and asterisks to indicate significant differences. Every figure or table should have a legend that is detailed enough that the reader can understand what is being shown, without needing to refer back to the narrative text.

Bar graphs are great if you want to display average values of many different groups. However, if you want to show the relation between two variables, an X-Y scatter plot would be the most likely way, with a curve fit to the data by a statistical program, and the legend explaining why you chose to fit the data with that function, and the statistics for how good the fit is.

Which option to use

When you are only comparing two groups, as in this example, option 1 is usually best. However had you been comparing data from many groups (for example the average weights of athletes on 10 different varsity men’s teams), a graph with 10 bars would be far easier for your reader to understand than a sentence with 10 data points.

You usually should minimize the use of tables, except for very large amount of data, for which a figure would not work.