

Guide to Preparing and Defending your BMB Honors Thesis

The following guide has been prepared for BMB students who are completing an Honors Thesis. **All BMB students working towards BMB Departmental Honors MUST follow these guidelines in order for their thesis to be accepted for BMB Honors credit.** The BMB thesis organization varies somewhat from that posted by the Honors College, but is accepted by the Honors College – do not substitute any other Honors College format. Note that this format applies to all BMB students, including those completing thesis research with faculty members in other departments. This document is posted on the BMB website for reference and can be found at: <https://www.umass.edu/biochem/undergraduate/current-students/departmental-honors>

THESIS ORGANIZATION:

- 1) **Title Page**
- 2) **Abstract/Summary – Limit one page.** Should introduce the topic and its significance, describe the question addressed and experimental system, and briefly summarize important conclusions and note potential future directions.
- 3) **Acknowledgements** – Should include information on any grant funding that supported your work, including Honors College Research Grant and funding to your advisor.
- 4) **Table of Contents**
- 5) **List of Figures & Tables** – A guide for how Figures and Tables need to be prepared is presented at the end of this document.
- 6) **List of Abbreviations** – All abbreviations used in the text should be listed here. In addition, they should be defined the first time used in the text and then be used consistently throughout. Avoid over use of abbreviations; do not use abbreviations for terms that are used three or fewer times in the document.
- 7) **Thesis body** – Begin numbering pages.
 - The Thesis body, comprising parts a-d below, should be NO LESS THAN 6000 words.**
 - a) **Introduction** – Introduces the topic and reviews relevant literature relating it to the topic of the thesis. Must include the work of previous researchers. Points out how the work in the thesis relates to the information presented. Figures are encouraged to add clarity. Figures taken from the literature must be properly referenced.
 - b) **Methods** – Methods should be complete and free of jargon. All methods should be detailed sufficiently such that others could repeat the experiment. Do not simply cite work of others for methods.
 - c) **Results** – The results section includes a description of all of the experiments performed, along with corresponding data figures and/or tables. Be sure to introduce each experiment with an appropriate description of the rationale behind the data collection. All figures must be numbered consecutively, include detailed legends, and be referred to in the text (see below for more details on figure formatting).

You are encouraged to include details of experimental trials performed to optimize procedures or experiments that were not successful. These will serve as a record for others to refer to when working on the same project. Descriptions of problems and potential ways to change the experimental approach can be very valuable to future lab members.
 - d) **Discussion and Future Directions** – This section interprets the results as a whole and in relation to previous work. It describes open questions and potential further experiments.
- 8) **References.** All BMB students are required to use the reference style of the journal “Cell”, which is described in detail below. Literature cited should go beyond citations of work from the host laboratory and include not only review articles, but appropriate primary papers. **DO NOT** include extensive references that you have not read. A **MINIMUM** of 15 references is required, of which not more than five can be reviews, with the rest representing primary research papers. Primary research papers must include work from outside the lab of your advisor. The following pages provide a detailed description of the required format for References.

Font, margins and line spacing:

- One inch margins all sides
- Font: Consistent throughout; minimum size 11 pt, 12 pt preferred.
- Spacing: Double Spacing (Exceptions: Tables, Figure legends)

Reference Guide for BMB Honors Thesis Students - *Cell* Journal Style

General guidelines: The reference list and citations in your text **MUST** conform to the style used by the journal **CELL** (at cell.com/cell/authors scroll to “References”). The information below describes in detail how you should format different types of references. When in doubt, consult articles recently published in *Cell* at cell.com.

You are STRONGLY urged to implement a citation program to automate generation of your reference list/bibliography. Popular ones that are free include Zotero and Mendelay. These programs can also be used as a way to organize and annotate papers you have read to help you with literature review and interpretation/discussion of the data you collect. The UMass Science library also offers workshops on using Zotero.

Format for the Reference section

- More than 10 authors are followed by a comma and “et al.” without quotes; no space between first and middle initials.
- References are ordered alphabetically by first author.
- The year of publication is listed inside parentheses, followed by a period.
- *Only* the first word of the article title (or title of a volume of a series) and proper nouns are capitalized.
- Journal titles are *not* italicized and use standard abbreviations. See: <http://tinyurl.com/short-titles>
- Book titles and series titles: Main words are capitalized.
- Volume numbers (both journal and book) are *italicized*.
- The bibliography is labeled REFERENCES, left aligned. References are not indented. Line spacing is single. Put one line space between references, or, for ease of sorting references alphabetically, put 12 pt. spacing after each paragraph.

Examples of formatting for different types of references

Butte, A.J. (2013). Should healthy people have their genomes sequenced at this time? *The Wall Street Journal*, February 15, 2013.
<http://wsj.com/news/articles/SB10000872396390443884104577645783975993656>

Chisholm, A.D., and Hardin, J. (2005). Epidermal morphogenesis. In *WormBook*, The *C. elegans* Research Community, ed.
http://wormbook.org/chapters/www_epidermalmorphogenesis/epidermalmorphogenesis.html

Everest, D.A. (1964). The chemistry of beryllium. In *Topics in Inorganic and General Chemistry*, Volume 1, Robinson P.L., ed. (New York: Elsevier).

Hughes, T., ed. (2011). *Handbook of transcription factors*. *Subcellular Biochemistry*, Volume 52 (New York: Springer).

Kuo, T.-H., Yew, J.Y., Fedina, T.Y., Dreisewerd, K., Dierick, H.A., and Pletcher, S.D. (2012). Aging modulates cuticular hydrocarbons and sexual attractiveness in *Drosophila melanogaster*. *J. Exp. Biol.* 215, 814-821.

Paxinos, G., and Franklin, K.B.J. (2001). *The Mouse Brain in Stereotaxic Coordinates*, 2nd edn (New York: Academic Press).

Rainey, F. (2009). *Bergey’s manual of systematic bacteriology*, Second Edition, Volume 3 (New York: Springer).

Singhania, R. (2011). Modeling protein regulatory networks that control mammalian cell cycle progression and that exhibit near-perfect adaptive responses. PhD thesis (Blacksburg, VA: Virginia Tech).

Tembo, M. (2015). Characterization of new familial mutants of Parkinson’s disease protein α -synuclein using yeast models. Senior thesis (Lake Forest, IL: Lake Forest College).

Wolff, S.B.E., Gründemann, J., Tovote, P., Krabbe, S., Jacobson, G.A., Müller, C., Herry, C., Ehrlich, I., Friedrich, R.W., Letzkus, J.J., et al. (2014). Amygdala interneuron subtypes control fear learning through disinhibition. *Nature* 509, 453-458.

News article

Part of a website

Book chapter; volume of a series

Book with volume number & unique title

Journal article

Book edition other than the first

Book has volume Number if other than the first volume

PhD thesis

LFC thesis

Journal article, 10 or more authors

Format for In-text citations

- One author: (Rodriguez, 2011).
- Two authors: (Liao and Smith, 2012).
- Three or more authors: (McCauley et al., 1999)

Journal Abbreviations:

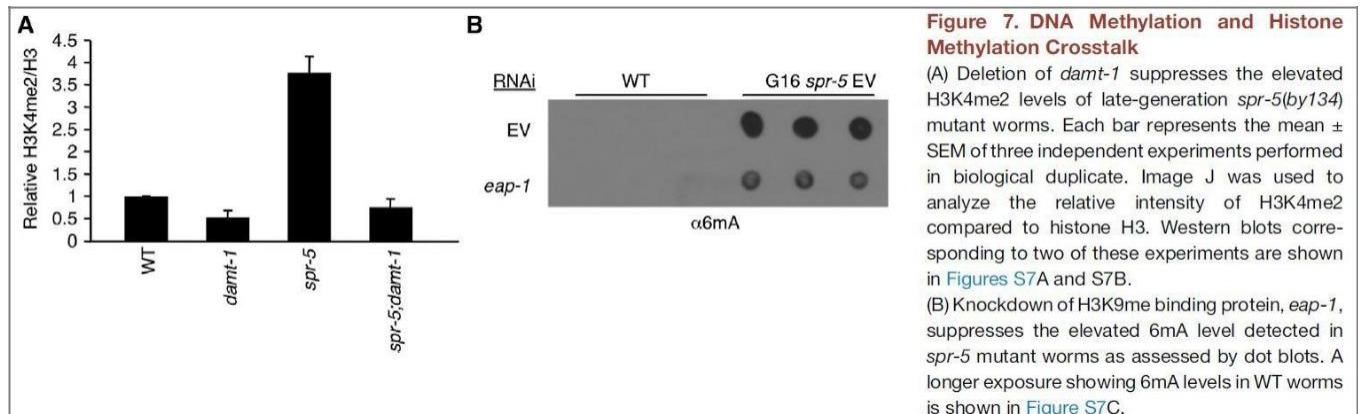
Your citation style needs to use standard abbreviations for the journal titles. Most citation programs will use these titles directly, and should let you choose CELL as the journal style. However, a resource to check if you have the correct abbreviation for journal titles is:

<https://www.library.caltech.edu/journal-title-abbreviations>

Cell Journal Style Guide for Figures and Tables for BMB Honors Thesis

Students Figures

- Below or next to the figure put a legend with the figure title, beginning with the word Figure followed by the number of the figure, a period, a space, and then the title, which has all significant words capitalized. A new paragraph describes the figure.



- Refer to the figure in the text of your thesis as Figure and the number as shown in the box below:

(Greer et al., 2014), also decreases 6mA levels in *spr-5* mutant worms (Figure 7B). Conversely, deletion of the potential 6mA methyltransferase, *damt-1*, decreases H3K4me2 levels in *spr-5* mutant worms (Figure 7A). Consistent with the possibility of crosstalk between H3K4 and adenine N⁶ methylation regula-

See this figure example on page 876 and this text referring to it on page 875 of this article:

Greer, Eric L., Blanco, Mario A., Gu, L., Sendinc, E., Liu, J., Aristizábal-Corrales, D., Hsu, C.-H., Aravind, L., He, C., and Shi, Y. (2015). DNA methylation on N6- adenine in *C. elegans*. *Cell* 161, 868-878.

Tables

- See specifications at www.cell.com/cell/authors (scroll down to Tables).
- Tables should be created from data gathered by the thesis author rather than copied from published works.
- Tables should be formatted using the Word table insert feature.
- Above the table, in **bold**, type Table followed by a space, the table number, a period, a space, and the title of the table.
- Define symbols, terms, and abbreviations in a legend below the table using superscript lowercase letters, ending the explanatory note with a period.
- Refer to the Table in the text of your thesis as Table and the number as shown below:

the only type of AChR functioning in protraction behavior. The double-mutant males behaved in NIC and ARE similarly to wild-type males (Table 2), demonstrating that these drugs act on other receptors.
ARE is implicated in activating muscarinic ACh recep-

See this example of a table at the top of page 781 and this text referring to it on page 782 of this article:
 Garcia, L.R., Mehta, P., and Sternberg, P.W. (2001). Regulation of distinct muscle behaviors controls the *C. elegans* male's copulatory spicules during mating. *Cell* 107, 777-788.

Table 2. Drug Concentrations that Cause Spicule Protraction in 90% of Males

Genotype	EC ₉₀		
	Levamisole ^a	Arecoline ^b	Nicotine ^c
Wild-type	2 μ M	1 mM	258 μ M
<i>unc-38</i>	>1 mM	n.d.	n.d.
<i>unc-29</i>	>1 mM	n.d.	n.d.
<i>unc-38; unc-29</i>	>1 mM	500 μ M	338 μ M
<i>unc-38; egl-30</i>	n.d.	>10 mM	>6 mM
<i>egl-30</i>	35 μ M	1 mM	489 μ M
<i>egl-19(n582)</i>	3.7 μ M	>10 mM	1.4 mM
<i>unc-68</i>	>1 mM	2 mM	>6 mM
<i>unc-38; syEx469[pmyo-3::unc-38]</i>	20 μ M	n.d.	n.d.
<i>unc-68; syEx475[pmyo-3::unc-68]</i>	15 μ M	n.d.	101 μ M
<i>egl-19(n582); syEx465[pmyo-3::egl-19]</i>	n.d.	1 mM	567 μ M

For each concentration, 20–100 males were tested.

^a Seven concentrations between 100 nM and 1 mM were tested.

^b Five concentrations between 10 μ M and 10 mM were tested.

^c Five concentrations between 1 μ M and 6 mM were tested.

THESIS DEFENSE

The preferred format for BMB students working with faculty members in the BMB department is as follows: A 25 minute “public” oral presentation with a minimum of 5 minutes for questions, attended by your faculty sponsor and committee member. Other members of the sponsoring lab are also invited, along with any others interested in hearing about the work. Following this presentation the student should also expect to have time with just the faculty sponsor and committee member to address further questions and discuss the research significance for another 30 minutes.

The BMB Department recognizes that student sponsors outside the Department may have in place other procedures for defense of an Honors thesis. Students may propose the above format to their sponsor. If the sponsor wishes the student to participate in another forum as the defense, such as a poster session or short talk, the student should schedule an appointment of a minimum of 30 minutes to meet with their BMB Committee member to discuss in more detail the content and significance of their thesis.

Your thesis **MUST** be reviewed by your committee prior to the oral defense, so please be sure that they have a copy of it around two weeks prior to your oral defense date to ensure this. After your oral defense, you may make revisions based on the feedback you receive. You should submit your final thesis to CHC via the PATHS system only after you have had your oral defense and, if necessary, implemented any feedback given during the oral defense.