

## Guide to Preparing Final Semester Paper for an Honors Independent Study (ISH)

The following guide has been prepared for BMB students who are completing an Honors Independent Study (ISH) in biochemical and molecular biology research. **All BMB students signed up for BMB ISH credit at any level who are completing original research should follow these guidelines in order for their ISH credit to be approved for BMB Honors credit.** Note that this format applies to all BMB students, including those completing research with faculty members in other departments. This format is very similar to the format required for an Honors Thesis in BMB. This document is posted on the BMB website for reference and can be found at:

<https://www.umass.edu/biochemistry-molecular-biology/undergraduate/current-students/departmental-honors>.

Note that the format for a BMB thesis is also posted on the BMB website and can be found at:

[https://www.umass.edu/biochemistry-molecular-biology/sites/default/files/bmb-thesis-guide\\_updated\\_jan\\_2023.pdf](https://www.umass.edu/biochemistry-molecular-biology/sites/default/files/bmb-thesis-guide_updated_jan_2023.pdf)

### FINAL PAPER FORMATTING:

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

### FINAL PAPER ORGANIZATION:

- 1) **Title Page**
- 2) **Abstract/Summary – 250 words maximum.** The abstract should introduce the topic and its significance, describe the question addressed and experimental system, briefly summarize important conclusions, and note potential future directions.
- 3) **Acknowledgements** – This section should include information on any grant funding that supported your work, including Honors College Research Grant and funding to your advisor.
- 4) **Paper body** – Begin numbering pages.

**The body of your paper, comprising parts a-d below, should be NO LESS THAN 2000 words.**

- a) **Introduction** – The Introduction introduces the topic and reviews relevant literature, relating the work to the broader scientific topic. The Introduction should include the work of previous researchers. 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 other scientists could repeat the experiment. Do not simply cite the work of others for the Methods.
- c) **Results** – The Results section includes a conceptual description of all of the experiments performed and their outcomes, 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 that others can consult 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, including the work of other researchers. This section should describe open questions and potential further experiments.

- 5) **References.** All BMB students are required to use the APA (American Psychological Association) reference style, which is described in detail below. This is also true for the Honors Thesis. Literature cited should go beyond citations of work from the host laboratory and include not only review articles, but also appropriate primary papers. DO NOT include extensive references that you have not read. A MINIMUM of five references is required and should include both review articles and primary research papers. Primary research papers should include work from outside the lab of your advisor. The following pages provide a detailed description of the required format for References.

### Guide for BMB ISH Students – Reference Style

**General guidelines:** The reference list and citations in your text MUST conform to the author, date style; one of the most common versions is APA style or the style used by the journal *The Plant Cell*. The information below summarizes how you should format in-text citations and a reference list in APA style. If you are uncertain, please consult Purdue OWL - [APA Formatting and Style Guide \(7<sup>th</sup> edition\)](#).

**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 Mendeley. These programs can also be used as a way to organize and annotate papers in preparation for the literature review and interpretation/discussion of the data you collect. The UMass Science library offers workshops on using Zotero, and a guide created by UMass BMB students can be found in the undergraduate section of the departmental website, under “Lab Research”:**

[https://www.umass.edu/biochemistry-molecular-biology/sites/default/files/zotero\\_guide.pdf](https://www.umass.edu/biochemistry-molecular-biology/sites/default/files/zotero_guide.pdf)

#### Brief summary of rules for APA format of a reference list

- After the first line of each entry, indent each line 0.5 inch (called hanging indentation).
- All authors' names are inverted, with first and middle names as initials (e.g. Smith, J.M.).
- Write out all authors' names, up to 20, and use a comma between authors. Before the very last author, use an ampersand (&).
- References are ordered alphabetically by last name of the first author. If there is more than one reference by the same author, list these references in chronological order from earliest to most recent.
- 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 (including genus names) are capitalized.
- Journal titles: Journal titles should be written in full and *italicized*. All main words are capitalized.
- Book titles: Only the first word of the main title and subtitle are capitalized.
- Volume numbers (both journal and book) are *italicized*.
- The bibliography is labeled REFERENCES and left-aligned. Line spacing is single. Put one line of space between references, or, for ease of sorting references alphabetically, put 12-point spacing after each paragraph.

### Examples of APA formatting for different types of references

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

News article

Chisholm, A.D., & Hardin, J. (2005). Epidermal morphogenesis. *WormBook: The online review of C. elegans biology* (J.R. Priess & G. Seydoux, eds.). The *C. elegans* research community. doi/10.1895/wormbook.1.35.1

Online book chapter with author, title and editors

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

Book with author, chapter, title, volume and editor

Hughes, T.R., ed. (2011). *A handbook of transcription factors, Subcellular Biochemistry* (Vol. 52). Springer.

Book volume with editor but no author

Kuo, T.-H., Yew, J.Y., Fedina, T.Y., Dreisewerd, K., Dierick, H.A., & Pletcher, S.D. (2012). Aging modulates cuticular hydrocarbons and sexual attractiveness in *Drosophila melanogaster*. *Journal of Experimental Biology*. 215(5), 814-821.  
<https://doi.org/10.1242/jeb.064980>

Journal article

Rainey, F. (2009). *Bergey's manual of systematic bacteriology* (2<sup>nd</sup> ed., Vol. 3). Springer.

Book with author, edition and volume

Singhania, R. (2011). *Modeling protein regulatory networks that control mammalian cell cycle progression and that exhibit near-perfect adaptive responses*. [Unpublished doctoral dissertation]. Virginia Polytechnic Institute and State University.

Unpublished PhD thesis

Tembo, M. (2015). *Characterization of new familial mutants of Parkinson's disease protein  $\alpha$ -synuclein using yeast models*. [Unpublished undergraduate thesis]. Lake Forest College.

Unpublished undergraduate thesis

### 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 should use standard abbreviations for the journal titles. Most citation programs will use these titles directly and should let you choose APA or *The Plant Cell* as the journal style. However, a resource to check if you have the correct abbreviation for journal titles is:

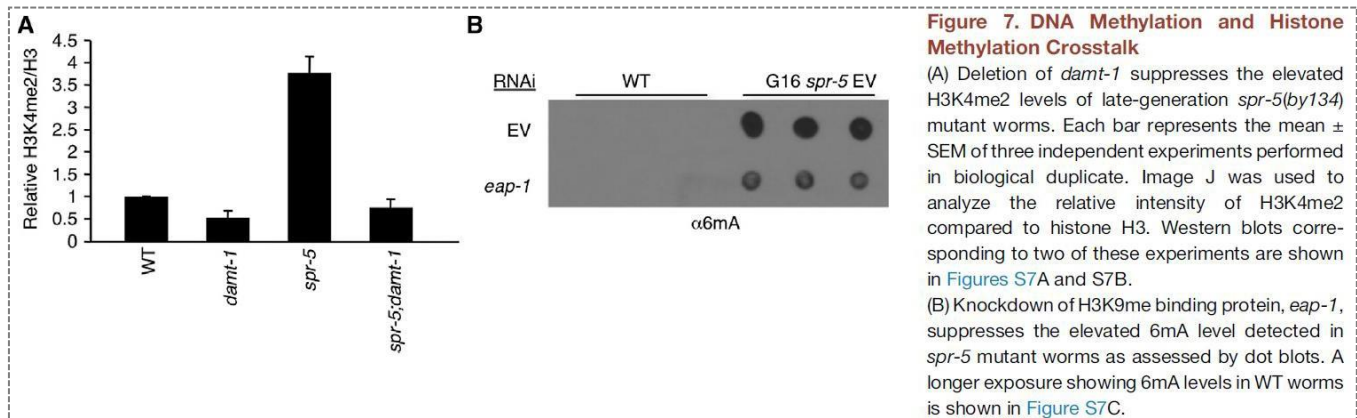
<https://www.library.caltech.edu/journal-title-abbreviations>

## Style Guide for Figures and Tables

Figure and Table styles should follow the standards in the journals *The Plant Cell* or *Cell*. See examples below:

### Figures

- Below or next to the figure, put a legend with the figure title; begin with the word “Figure” followed by the number of the figure, then a period, a space, and the title with 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 N<sup>6</sup> methylation regula-

- These examples are taken from page 876 (image) and page 875 (text) 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 <https://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, type Table followed by a space and the table number, and then add a period, a space, and the title.
- Define symbols, terms, and abbreviations in a legend / footnotes 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.
- These examples of a table, legend and in-text citation can be found at the top of page 781 and 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 <sub>90</sub>		
	Levamisole <sup>a</sup>	Arecoline <sup>b</sup>	Nicotine <sup>c</sup>
Wild-type	2 $\mu$ M	1 mM	258 $\mu$ 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 $\mu$ M	338 $\mu$ M
<i>unc-38; egl-30</i>	n.d.	>10 mM	>6 mM
<i>egl-30</i>	35 $\mu$ M	1 mM	489 $\mu$ M
<i>egl-19(n582)</i>	3.7 $\mu$ 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 $\mu$ M	n.d.	n.d.
<i>unc-68; syEx475[pmyo-3::unc-68]</i>	15 $\mu$ M	n.d.	101 $\mu$ M
<i>egl-19(n582); syEx465[pmyo-3::egl-19]</i>	n.d.	1 mM	567 $\mu$ M

For each concentration, 20–100 males were tested.

<sup>a</sup> Seven concentrations between 100 nM and 1 mM were tested.

<sup>b</sup> Five concentrations between 10  $\mu$ M and 10 mM were tested.

<sup>c</sup> Five concentrations between 1  $\mu$ M and 6 mM were tested.

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-

### Guide for oral presentation

The preferred format for BMB students working with faculty members in the BMB department is as follows: A “public” oral presentation of at least 25 minutes 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 the oral presentation. 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 to meet with their BMB Committee member to discuss in more detail the content and significance of their work.