



Department of Chemistry
UNIVERSITY OF WISCONSIN-MADISON

Chemistry Senior Thesis Guidelines

CHEM 681/682 and 691/692

The Senior Thesis (CHEM 691/692) and Senior Honors Thesis (CHEM 681/682) courses culminate in a written thesis that describes some or potentially all of the research completed during your undergraduate career. General guidelines for your senior thesis are listed below. Overall, your senior thesis should follow a similar format as a Masters or Doctoral thesis.

Please consult with your mentor or research professor/advisor for advice on what research to include in your senior thesis. Research that you have conducted over the past year while enrolled in CHEM 691/692 or CHEM 681/682 should definitely be included. Any additional research from past semesters that is relevant to your overall research question/hypothesis/research aims can also be included.

Attached, you will also find two exemplar theses written by previous UW-Madison Chemistry majors that you can reference when preparing your thesis.

Deadlines:

Proposal: A 2-page, double-spaced thesis proposal and signed coversheet must be completed **by the end of the fourth week of CHEM 681 or CHEM 691**. This proposal must briefly describe (a) your research question/hypothesis, (b) the method(s)/experiment(s) that you plan to conduct, (c) the rationale for the selected method(s)/experiment(s), (d) a timeline that articulates how you will complete your research plan over the two semester thesis sequence, and (e) significance of the work. The proposal may also summarize previous research progress and anticipated results. Relevant literature must be referenced in-text using superscript numbers, consistent with the ACS format (for more information, see section 11 of the thesis guidelines). A copy of the proposal must be provided to your research mentor (graduate student, post-doc, etc.) and your research professor/advisor in the format of their choice for their approval. A hard-copy of the proposal, in addition to the signed proposal coversheet (found at the end of this document), must be turned into the Chemistry Undergraduate Research Office.

Thesis: Your thesis must be turned in **before the last day of classes of the second semester of the thesis sequence** (CHEM 692 or CHEM 682) to: 1) the Chemistry Undergraduate Research Office (Chem 2110) in hard copy; and 2) your research professor/advisor in the format of their choice. Your research professor/advisor will be responsible for evaluating your thesis and submitting an appropriate course grade.

Suggested Timelines:

Often your senior year is an exceptionally busy time! The best advice for finishing your senior thesis on time is to **start early**. Students who are successful at generating high-quality senior theses often work on their thesis throughout the two semester course, instead of leaving it until the very end. It typically is helpful to set small goals for yourself to keep on track. A proposed timeline for your thesis is listed below.

<u>Recommended Deadlines:</u>		
Spring Graduation	Fall Graduation	Thesis Writing Goals
Early September	Late January	Discuss plans for senior thesis with advisor & submit research authorization form
Late September	Mid February	Submit 2-Page Thesis Proposal
October	February	Outline proposed experiments
November	March	Draft of introduction
February	September	Draft of materials/methods or experimental
March	October	Draft of results & discussion
April	November	Complete thesis draft and seek feedback from advisor & mentors

Grading*:

The grade for the thesis is issued by the professor/advisor supervising the thesis. During the first semester of CHEM 681 or 691, only "P" for progress or "I" for incomplete are given as placeholder grades. Once the final senior thesis has been submitted and reviewed, the thesis advisor will assign a letter grade that will serve as the grade for both semesters of CHEM 681/682 or CHEM 691/692.

Organization:

The organization of the sections of your thesis will vary depending on the scope of the research you plan to present. For example, a thesis that contains multiple projects may be organized such that each individual chapter includes an introduction, experimental, results/discussion, conclusion and reference sections, much like a scientific paper. (Look at Eric Touney's thesis for an example.) Contrastingly, if a thesis describes one project, the thesis may be organized such that each chapter contains one part of the thesis. For example, the first chapter may only include the introduction, the second chapter describes the experimental, the third chapter includes the discussion and results, the fourth chapter discusses the conclusions and future directions and the references for the entire thesis are placed at the end as a separate section. As another example, it might make sense for a larger project that has an overarching research goal, but involved several techniques/experiments to be divided into a thesis where the first chapter includes the introduction for the entire project, the second chapter discusses the experimental and the results of one of the experiments, the third chapter discusses the experimental and the results of the second experiment, and the fourth chapter discusses the experimental and the results of the third experiment. The fifth chapter includes the conclusions and future directions, followed by the references for all the chapters. (For an example, look at Zachary Heim's thesis.)

Page Limits:

Although there is no maximum or minimum page limit for a senior thesis, undergraduate research theses are typically no less than 20 pages in length.

Font and Margins:

Use no smaller than 11 pt standard font (typically 12 or 11 pt font is preferred in a font such as Arial or Times New Roman), double-spaced, and 1-inch margins on all sides of the page.

Figures, Tables and Schemes:

Figures, tables and schemes should be numbered consecutively and labeled appropriately using ACS formatting ([ACS Style Guide](#)). Figures, tables and schemes can be inserted into the text as needed or included on the page immediately following the text where the table, figure or scheme has been referenced. Raw data or additional figures, tables, schemes can be included in appendices located at the end of the thesis.

Page Numbering: Page numbers must be included in the upper right-hand corner at least a half inch from the top and one inch from the side of the page. All pages must be numbered with the exception of the title page. Preliminary pages (e.g. Table of Contents, List of Abbreviations, Dedication/Acknowledgments, and Abstract) that precede the main text should be numbered with lower case Roman numerals beginning with numeral i. The main text should be numbered consecutively beginning with Arabic numeral 1.

Contents of a Thesis:

1. Title Page (included as a fillable form on the last page of this document)
2. Abstract (500 words or less)
3. Table of Contents
4. List of Abbreviations (optional)
5. Dedication/Acknowledgements (optional)
6. Introduction
7. Material/Methods or Experimental
8. Results
9. Discussion
10. Conclusions/Future Work
11. References
12. Appendices

1. Title Page

The title page should include:

- a. Title of your Thesis
- b. Your Name
- c. Your Mentor(s) Name(s)
- d. Your Professor(s)/Advisor(s) Name(s)
- e. Your University
- f. Your Major(s)
- g. Your Graduation Year
- h. Place for Professor(s)/Advisor(s) Signature(s)

A template for your title page is included on the last page of this document. Items you need to tailor to your individual thesis are highlighted in red text. (It is modeled after the title page required for a doctoral thesis.)

2. Abstract

Abstracts provide the overall importance of the topic, a brief background of the topic, a brief description of the work done, and the main conclusion(s) of the work. This section is often the last section written, as it is a summary of the work, and should be no more than 500 words.

3. *Table of Contents*

This section should showcase how the thesis is structured and where the reader can find each significant topic within the thesis. Include titles for each chapter, headings for any sub-topics in each chapter and relevant page numbers.

4. *List of Abbreviations (optional)*

If your thesis includes several abbreviations, consider including a list of abbreviations with one column used for the abbreviation and the second column used for the definition. (See Eric Touney's thesis for an example)

5. *Dedication/Acknowledgements (optional)*

This section is intended to acknowledge any funding agencies who provided support for your work, any group members who helped or provided insight, and/or any department members who provided assistance with instrumentation, calculations, insights into your project, etc. You may also use this space to express appreciation to anyone else, research-related or otherwise, who was especially helpful in the duration and/or completion of the work.

6. *Introduction*

Introductions typically begin with a broad overview of the topic and gradually narrow their scope as you begin to talk about your specific research. Overall, introductions typically include:

- The importance of the research (why/how is the research relevant to the scientific and broader/global community)
- Background on the topic, including a review of the relevant literature
- Gaps in the current knowledge of the topic
- Your hypothesis/research question/research aims and how your research seeks to answer what has not been addressed by previous research
- A brief overview of the specific methods/experiments you completed to help answer your research question/hypothesis

7. *Materials/Methods or Experimental*

This section of the thesis should describe the details of the research you conducted and techniques you used. Relevant reagents, cell lines (and passage numbers), synthetic conditions, instrumentation, software for analysis (with version numbers), computational methods, experimental techniques, etc. should all be included in this portion of the thesis. This section should be written in enough detail that another scientist in your field could reproduce the experiment, if desired.

8. *Results*

Data generated from your experiments should be highlighted in this section. Text along with tables, figures, and schemes should be used to convey your research findings. Raw data for any of the tables or figures that you include in your thesis should be placed in the Appendix. Depending on the research, sometimes the results and discussion sections are combined.

9. *Discussion*

A discussion of your data, including overall trends, and how it supports or contradicts your hypothesis/research question should be included in this section. It may be appropriate to mention findings of other investigators in this section and discuss how your results either add to the knowledge base of a specific field, confirm previous findings or contradict current

understandings. Depending on the research, sometimes the results and discussion sections are combined.

10. Conclusions/Future Work

The conclusion section consists of a brief summary of the thesis/chapter findings, including important implications of the research. Suggestions on further studies needed or lingering questions that arise from this work should also be addressed in this section.

11. References

Your references should be cited in-text using superscript numbers, consistent with the ACS format. For rules on how to cite using the ACS format, please consult the attached documents.

12. Appendices

This section includes raw data pertinent to the results and discussion, additional synthetic details, additional spectra, etc. relevant to the research.

Additional Resources:

- [ACS Style Guide](#) – contains details on scientific writing, and guidelines for figures, tables, citations, references, etc.
- Helpful writing guide that can be referenced--https://cbc.arizona.edu/sites/cbc.arizona.edu/files/undergraduate/Sci-Writing_Tischler.pdf
- UW-Madison doctoral thesis guidelines--<https://grad.wisc.edu/current-students/doctoral-guide/>
- UW-Madison Writing Center-- <https://writing.wisc.edu/>

** If you anticipate that you will need additional time to complete your experimentation or research thesis, you must first discuss this with your thesis advisor. If additional time is granted from the thesis advisor, the thesis advisor must inform the Undergraduate Research Director of the revised deadline. If the revised deadline is after the deadline for grade submissions, the student will receive a grade of incomplete (I). If you are graduating and need the thesis credits to fulfill graduation requirements/honors requirements, you will not officially graduate or graduate with honors until the thesis is reviewed and the incomplete is removed.*

*If you receive an incomplete for your thesis course, **the final thesis must be submitted no later than the end of the fourth week of the next semester that you are registered or it will lapse into a Failure.** If an instructor grants an extended incomplete, a grade change will need to be filed by the instructor, approved by the Undergraduate Research Director, and forwarded to the Dean's Office. In such cases, the grade of I is replaced with the grade of extended incomplete (EI). A grade of permanent incomplete (PI) will replace an Incomplete if it was received the last time a student was registered and has not been removed/resolved within five years.*



Department of Chemistry
UNIVERSITY OF WISCONSIN-MADISON

Chemistry Senior Honors Thesis/Senior Thesis Proposal Coversheet

STUDENT INFORMATION		
Date	Last Name	First Name

1. Attach your 2-page, double-spaced thesis proposal to this form. This proposal must briefly describe (a) your research question/hypothesis, (b) the method(s)/experiment(s) that you plan to conduct, (c) the rationale for the selected method(s)/experiment(s), (d) a timeline that articulates how you will complete your research plan over the two semester thesis sequence, and (e) significance of the work. The proposal may also summarize previous research progress and anticipated results. Relevant literature must be referenced in-text using superscript numbers, consistent with the ACS format.
2. After reviewing the proposal with your research mentor (grad student, post-doc, etc.) and your research professor/advisor, please obtain their signatures to indicate that they have read the thesis proposal and approved of their contents.
3. Turn in the signed coversheet and proposal to the Chemistry Undergraduate Research Office before the end of the fourth week of CHEM 681/691.

Preliminary Thesis Title: _____

Course (please circle one): CHEM 681/682 **or** CHEM 691/692

I have read this thesis proposal and I approve of its contents:

Signature of Research Mentor **Printed Name** **Date**

Signature of Research Professor/ Advisor **Printed Name** **Date**

Signature of Student **Printed Name** **Date**

Title of your Thesis

By

Your Publishing Name

A thesis submitted in partial fulfillment of
the requirements for the Senior Thesis/Senior Honors Thesis

Bachelor of Science

(Chemistry)

at the

UNIVERSITY OF WISCONSIN-MADISON

Fall/Spring/Summer 2019

This dissertation was completed under the guidance of the following research mentors:

Grad Student Mentor, Graduate Student**, Chemistry

Post-Doc Mentor, Post-Doc**, Chemistry

Faculty Mentor, Professor**, Chemistry

**Use proper title of your mentor

Signature of Professor: _____ Date: _____