

## Department of Chemistry

### Undergraduate Honors Thesis Guidelines and Requirements

#### Why Complete an Honors Thesis?

The honors thesis provides students with opportunities to engage in scholarship and professional activity that cannot be paralleled by any classroom experience. Preparing a thesis allows students to explore a topic thoroughly, generate new knowledge and contribute to their fields of study. The thesis can satisfy intellectual curiosity, promote creativity and intellectual maturation, and expose students to expectations similar to those in graduate school, professional school and various career positions. The thesis encourages students to develop several important academic and professional skills, such as critical analysis, oral and written communication, problem solving, and time management. The thesis also affords students the opportunity to develop a professional working relationship with their professors which can help to enrich their intellectual development. The thesis improves student marketability by providing students with advanced academic experience, detailed meaningful reference letters from their mentors, and tangible products to show admissions committees and prospective employers. Students who successfully complete an Honors Thesis will be eligible for Graduation with Distinction.

#### Eligible Students

Junior or Senior Chemistry Honors students who have completed Chem 4160, or at the time of application are enrolled in Chem 4160. Non-honors students who meet the Honors College requirements (i.e., minimum 3.3 GPA and in good standing) are also eligible. Students who do not meet these requirements may submit a petition to the Director of Undergraduate Studies to waive the requirements. This petition should include a letter of recommendation from the prospective mentor.

#### Eligible Mentors

Any full-time Chemistry Department Faculty member may supervise an honors thesis in Chemistry (Limited-term faculty are not eligible). Full-time GSU Courtesy Appointed Faculty affiliated with Chemistry or full-time GSU faculty in another STEM discipline may also supervise an honors thesis for Chemistry majors with the approval of the Director of Undergraduate Studies.

#### The Product

The honors thesis will be a substantial report detailing work the student performed under the guidance of the mentor (double-spaced, including data tables & explanatory figures, and ACS style references). The research report must follow the Chemistry Guidelines for Preparing a Research Report at:

<https://chemistry.gsu.edu/files/2017/06/Updated-Research-Form-1.pdf>.

### **Model 1:**

In this option, the student will collect or analyze original data to address a research question. The written report includes a Title, Abstract, Introduction, Methods, Results (including data tables and figures), Discussion, Conclusion and Reference Section in ACS style. Research for the thesis (experiments, data collection, analysis and writing) needs to be done for a minimum of 2 semesters, including Chem 4160 and Chem 4880.

### **Model 2:**

In this option, students write a critical analysis of published empirical literature and data on a particular topic in chemistry or biochemistry. This review summarizes a body of information and provides an original synthesis that organizes the information in a novel way (e.g., a new interpretation of the findings, a timeline of the progression of knowledge, new emerging themes). The goal is for the writer to demonstrate comprehensive sophisticated knowledge of the current literature on a topic and critical analysis of published data. Work on the thesis (literature research, data analysis, and writing) needs to be done for a minimum of 2 semesters, including Chem 4160 and Chem 4880.

In addition to the thesis report in Model 1 or Model 2, the product will include one of the following:

- 1) The student will present their work in poster format at a conference (professional conference or a reviewed University conference such as GSURC).
- 2) The student will give an oral presentation of their work, presented either at a conference or an open seminar in the Department of Chemistry.
- 3) The student will design and create a physical product (for example: model, new laboratory experiment, piece of technology, teaching tool, etc).
- 4) A student can propose an alternative additional product, subject to approval by the thesis mentor and the Director of Undergraduate Studies and the Chemistry Honors Advisor.

### **Proposal and Course Authorization**

In order to obtain approval from the Department of Chemistry to perform an honors thesis, the student must be enrolled in or have completed one semester of Chem 4160 with the research mentor. Students may have worked additional semesters with the research mentor under Chem 4170, 4870, 4950 or 2950. Students must register for Chem 4880 the semester they submit their thesis.

The student must submit a proposal (1 – 2 pages) to the research mentor and the Director of Undergraduate Studies and the Chemistry Honors Advisor, prior to the semester they plan to register for Chem 4880.

The research mentor in consultation with the Chemistry Honors Advisor and the Director of Undergraduate Studies, will evaluate the proposal and approve the student to submit an intent to Conduct a Thesis Form (see next paragraph) so that they may register in Chem 4880 for a minimum of 3 credit hours and a maximum of 6 credit hours in the semester they intend to complete their thesis. The exact number of credit hours depends on variables such as the amount of room in the student's schedule, financial constraints, and/or mentor requirements.

Students must notify the Honors College of their intent to conduct an honors thesis by completing the online Intent to Conduct a Thesis Form, which requires that students: 1) Identify the faculty member who has agreed to supervise their project, 2) write a 200-word summary of their project, and 3) provide a tentative title for their project. The Honors Thesis form is due prior to the second semester of research (Chem 4880), and is due **April 1** for summer registration, **August 1** for fall registration, and **December 1** for spring registration.

### **Timeline and Evaluation**

Students typically apprentice in a research laboratory for at least 1 semester prior to considering work toward a thesis. For Model 1, the thesis project usually takes 2 - 4 semesters to complete, and for Model 2 the literature review will take 2 semesters to complete. The duration depends on many factors, such as the amount of time needed to 1) read the relevant literature, 2) develop a research question or a specific literature review topic, 3) become proficient with necessary bench and literature research skills, 4) conduct the research and analyze results, and 5) write the thesis.

Students are expected to meet regularly with their faculty mentors (at least twice a month, preferably more) to set goals and deadlines, discuss progress and provide feedback. To successfully complete and receive a grade for semester one (Chem 4160), the student must submit a statement of progress following the Chemistry Guidelines for Preparing a Research Report, outlining the work that was done during that semester and what needs to be done to complete the thesis in semester two (Chem 4880). The Chem 4160 report will be evaluated by the mentor.

The thesis will be evaluated by a Thesis Committee, composed of the research mentor as chair and two other faculty; the student will select the Thesis Committee in consultation with the research mentor. The written thesis and additional product (poster, oral presentation, or physical product) must be submitted to the research mentor no later than 30 days before the last day of classes in the Chem 4880 semester. The mentor will then review and suggest edits and changes to the student. The revised final version of the thesis and the final product will be submitted to the research mentor and other Thesis Committee members for final evaluation no later than 15 days before the last day of classes.

The research mentor, in consultation with the Thesis Committee, will use the following checklist to evaluate the thesis and the additional product (poster, oral presentation, or physical product). Grade distribution is 90% thesis and 10% additional product.

Provide rating of A = Excellent, B = Good, C = Satisfactory, D = Poor and E = Unsatisfactory:

Skill	Rating	Comment
Stated a clear and specific research question or hypothesis.		
Demonstrated an understanding of relevant scientific literature, terminology, and theory.		
Critiqued and analyzed relevant studies and presented an integrated synthesis.		
Used concepts in chemistry to describe, explain, and evaluate phenomena and to generate new ideas.		
Demonstrated understanding of the scientific method or scholarly inquiry.		
Demonstrated understanding of results and their interpretation.		
Drawn appropriate conclusions supported by evidence.		
Communicated effectively in written form.		
The thesis is free of typographical and grammatical errors.		

Recommended grade: \_\_\_\_\_

### **Coursework and Deadlines**

Students who receive a passing grade in Chem 4880 must notify the Honors College that they have successfully completed their honors thesis by completing the Certification of Successful Completion Form. This form is due by **the last day of final exams during the semester in which the thesis is completed.**

### **Required Attendance at Honors Thesis Sessions**

Students are required to attend three 2-hr sessions led by the Honors College Thesis Team each semester that they are working on their honors thesis. The three sessions are held at the beginning, middle and end of the semester. The last session is the Thesis Pitch, which is an oral competition event where students have 3 minutes to communicate the importance of their research. Presenting at the Thesis Pitch is voluntary, but attendance is required.

### **Honors College Support**

Honors College students participating in Honors Thesis are eligible to borrow a laptop computer from the Honors College for the semester, contingent on availability. These students may also apply for financial support to present at conferences and purchase supplies for their research. In addition to the three required sessions, there are several workshops held in the Honors College each semester to provide support to Honors College students engaged in research and theses activities.

The Faculty Associate for Research and Theses and the Research Program Coordinator are available to advise students and their mentors.

**Questions**

Contact the Chemistry Director of Undergraduate Studies, the Chemistry Honors Advisor, the Honors College Undergraduate Research Program Coordinator, and/or the Office of Undergraduate Research and Fellowships Director.

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