Writing an Honors Thesis in Chemistry or Biochemistry
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What is expected of an honors thesis?
An honors thesis is a formal written report of research performed by an undergraduate student under the direction of a faculty advisor and should represent a significant contribution to the field. The best theses contain publishable results although publication is not required. A good honors thesis is comparable to a masters degree thesis, but it is often shorter and the research less involved. In any case, however, your thesis will undoubtedly be the most sustained, involved, and rewarding effort of your undergraduate career.

Why should I bother to do an honors thesis?
Although undergraduate research is encouraged of all chemistry and biochemistry majors, a lengthy, formal written report is not expected. However, the ability to justify, organize, document, and discuss research is an important skill for any professional chemist. The process required to produce a finished thesis may be the most important learning experience you will have at BYU. In addition, the thesis experience and the resulting letter of recommendation from your advisor will be an important key to graduate admission into a top PhD program.

Can I write an honors thesis if I am not graduating with university honors?
The honors thesis is required of those who wish to graduate with university honors. However, even if you have not fulfilled all of the other requirements, you can still experience the challenge of writing and defending an honors thesis. Sometimes after successfully defending their thesis, students decide that it is worth it, after all, to go ahead and complete the other requirements. In one case, a student’s thesis was so impressive that the Honors Program waived the minimum GPA requirement, which the student did not officially meet.

How do I choose an advisor and a topic?
After you have completed Chem 352 and Chem 227 (prerequisites for most research areas), you should obtain a copy of the undergraduate research brochure from the department office (C100 BNSN) and identify several faculty members whose research interests you. You should attend a 50-min thesis orientation meeting held regularly by the Honors Program (check the schedule on Blackboard). The Y-Chem Society often has faculty members talk to students and give tours of their labs to help you identify interesting research groups. Additional advice can come from students who have already joined research groups. Visit with several faculty members (make appointments if necessary) to discuss research areas and openings for undergraduate research. Be sure you say you are interested in doing an honors thesis. After a tentative decision, you should plan on attending weekly group meetings and working in the laboratory for several months while you learn about the methods and goals of the group’s research. Often, at first, you will help in a graduate student’s project or that of another, more advanced student. You will also need to read papers from chemical journals, textbooks, and monographs on the subject before you can understand the issues and formulate questions that can be answered. If one research group doesn’t pan out, try another. Usually by the end of your junior year, you can, in consultation with your advisor, agree on a project that is both significant and sufficiently focused to be accomplished in the time available.
What classes do I need to take?

Most students find Chem 391 essential. It teaches you to use the chemical literature, perform searches, and use other tools. It will also teach you to write proposals and research reports and help you improve your writing skills. Chem 201 will teach you the safety regulations that are required when working in the laboratory. Your advisor can tell you what other classes deal with the topic of your research. You should also register for Chem 499R (Honors thesis) at least one semester (one or more hours). Some students register for Chem 499R credit early in the project and receive a T grade until they defend their thesis (after which the T grade is replaced). Some students wait until the semester they defend the thesis. Register for Chem 499R whenever it fits into your needs, but not until your honors thesis proposal has been approved. You are also welcome to register for Honors 300R (Advanced Writing) if you wish, but Chem 391 fulfills the university advanced writing requirement and helps you develop all the skills you will need. Many students successfully adapt parts of their Chem 391 review paper into both their thesis proposal and the first chapter of their honors thesis.

How do I get my thesis proposal written and approved?

You should first download and read the Thesis Proposal Guidelines from the honors program website. Use the suggested format and submission form. Five double-spaced pages is a minimum. All the sixteen suggested sections may not apply to your project. At a minimum, your proposal should: (1) clearly state the problem you want to address and justify its significance, (2) survey prior work in the area including pertinent literature references, (3) state the precise methods you will use to address your question and how you will analyze your data to reach your conclusions, (4) outline tentatively what you expect to be in the thesis. (Note: no one actually goes back to check if you follow this outline in your final version. In fact, as you learn more, you will probably revise it substantially, but a definite tentative plan is needed before you start), (5) list bibliographic sources you have already consulted and which you found will be useful in your research and writing. Start working on the proposal when you start reading the literature on the subject. As you discuss possible topics with your advisor, you should begin to identify one that is scientifically significant, within the expertise of the advisor, can be accomplished within the time remaining using available equipment, and interesting to you. It is unlikely that you will do a job you can be proud of unless you have some passion about it. Once you settle on a project, begin reading about the techniques you will use and the related work that has been done. When you know enough, write your proposal and have your advisor make suggestions. Be sure to follow the format and the guidelines on the honors website. Choose an appropriate referee and get their suggestions and approval. Take it to the Department Honors Coordinator for approval and a signature. The Department Honors Coordinator will suggest additional revisions and corrections. After revision, take it to the Honors Office for final approval. Include a request for funds if appropriate.

What is the role of the department honors coordinator?

The honors coordinator encourages you to complete the thesis process. Get information about university requirements from the Honors Program (350 MSRB). The coordinator will discuss advisor and topic possibilities if you want. When you write your proposal, the coordinator will make suggestions and make sure you are not proposing three or four years of work.
Can I choose an advisor who is in another department or off-campus?
We prefer that the advisor be a regular chemistry faculty member. If you have research opportunities off-campus (for example, summer work at a national laboratory) or in another department (for example, Molecular Biology), you need to get permission from the Department Honors Coordinator. If such a project makes sense, he will require that the referee be a regular chemistry faculty member. If your proposed project is really outside of the areas covered by the department, you should go to the honors coordinator in that department with your proposal. You can still graduate as a chemistry or biochemistry major even though your honors thesis is from another department.

What is the role of the referee?
The referee is a second reader for your thesis. He or she is chosen in conjunction with your advisor to provide advice and expertise that complements the expertise of the advisor. The referee should provide additional feedback on the thesis proposal and the final draft of the thesis. Additional comments could be sought at any other stage of the work as needed. The referee should at least read and approve the proposal before it is taken to the honors coordinator and agree to read and comment on the thesis at the defense.

How do I write a strong thesis?
After final approval, continue working on the project under your advisor’s supervision. The most productive schedule puts the proposal approval in the Winter Semester of your junior year. Do most of the actual work during spring and summer terms before your senior year, and do the writing and revising, along with some final experiments, during Fall semester of your senior year. Defend the thesis during the first part of your senior-year Winter semester. Most theses, like all good writing, require several drafts as your advisor gives you additional suggestions and feedback. Be sure to allow time for this important learning process.

What are the deadlines?
Proposals should be approved before the major work is done and should be submitted about one year before intended graduation. The thesis must be turned in to the Honors Office by Feb. 1 and the thesis defense held by Mar 1 for April graduation.

What happens at the thesis defense?
Students make a 20–30 minute presentation of their research, usually using a PowerPoint presentation. Anyone who is interested or invited can attend, but the advisor, referee, honors representative, and (possibly) the department honors coordinator comprise the examination committee. After the presentation, there may be questions from attendees. Then, guests are excused, and the examining committee asks the student about research methods and the significance of the results. Often, there are questions about great works, the service component, or the honors portfolio. Last, the student is excused for a few minutes while the committee discusses the presentation. The whole process takes 60–90 minutes.

What then?
After correcting any errors found and responding to suggestions made at the defense and after carefully following the Thesis Formatting Guidelines, you make four copies of your thesis on acid-free paper and turn it in to the Honors Office for binding. One copy goes in the BYU library, one goes to the advisor, one is retained by the Honors Program or the department, and one is returned to the student to be cherished fondly and proudly exhibited for children and subsequent generations.