

The Honors Thesis
in Chemistry and Biochemistry
October 17, 2024

The Chemistry Department has long valued the role of collaborative research between students and faculty. Students engaged in undergraduate research develop deeper understanding of scientific phenomena, are better able to link classroom knowledge to current situations, and experience firsthand how scientists discover new knowledge.

The Chemistry Department offers three degrees: a Bachelor of Science degree in Chemistry accredited by the American Chemical Society, a Bachelor of Arts degree in Chemistry and a Bachelor of Science degree in Biochemistry. The accredited BS degree requires a minimum of 2 semester hours of undergraduate research (CHM 4999 or HNR 4998) while the BA degree and the BS-Biochemistry both have elective structures with research as an option. It should be noted, however, that for research to count for an elective in the biochemistry major it must be biochemical in content. Any student conducting 4 semester hours of research is encouraged to present at a local/regional/national conference.

An Honors Thesis is an extension of what is already valued within the Chemistry Department. Requirements of the Honors Program include an 8 semester hour thesis project. Details of the process of an Honors Thesis in Chemistry and Biochemistry follow below.

Selection of Research Mentors

An important component of a successful Honors Thesis is the identification of a faculty mentor. Both student and mentor need a clear understanding of their commitments and responsibilities to such an endeavor. A typical Honors Thesis will require the 8 hour project to be spread over 2 academic years (Junior/Senior). For that reason only full-time faculty of the Chemistry Department can serve as mentors for an Honors project. Furthermore, active or pending sabbaticals may limit the selection of certain faculty members. Faculty members in affiliated departments (Biology and Physics) may offer additional opportunities for biochemistry thesis options with the approval of the Coordinator of Biochemistry Program.

A selection procedure for research mentors already exists in the department, though Honors students may wish to complete the process during (or prior to) the spring semester of their sophomore year. In completing the normal selection process, students interview each faculty member to discuss potential research projects. Students then submit a rank order of the projects and faculty members (minimum of 3) to the department chair for matching purposes. The

department chair consults with faculty before final decisions are made. It is possible that faculty presentations may occur in lieu of individual meetings but students are still encouraged to discuss options directly with faculty members. Honors students should plan to first discuss with the department chair which faculty members are available to mentor Honors projects before they begin their interviews. A biochemistry major may conduct research (including their Honors Thesis research) through a project that is not biochemistry in nature with the understanding that the HNR 4998 credits thus obtained will not count toward the biochemistry degree.

Curriculum Overlay

ACS-Accredited Chemistry Degree

The ACS-accredited degree requires 2 semester hours of research (CHM 4999) which the department agrees can be substituted with 2 hours of Honors Thesis (HNR 4998). However, since the requirements of the ACS degree in chemistry are restrictive the remaining 6 hours of Honors Thesis do not count in the major.

Biochemistry Degree

Similarly, two credits of HNR 4998 can serve as partial fulfillment of the elective credits in the biochemistry major if the research is biochemistry in nature.

An Acceptable Thesis

An Honors Thesis in Chemistry or Biochemistry should be an experimental project based on research extending at least one and a half years in length. Pedagogical development projects are also acceptable, especially for science education majors, and will require both an understanding of the science and the development of assessment strategies in consultation with the Education department.

The final product should be a presentation of original work conforming to the principles of writing for a peer-reviewed scientific journal. Though the department agrees there should be flexibility in the length of a research paper, an acceptable Honors thesis should be at least 20-30 pages in length (not including graphs, tables, or schematics) and consist of multiple sections including background, experimental design, and discussion. It is generally expected that a minimum of 15-20 citations would accompany a research paper.

Expectations for the final product of a pedagogical project will be developed with consultation from the Education Department.

Timeline

Both student and faculty member must realize that an Honors Thesis project is an extended endeavor that must be started no later than the fall semester of the junior year. Both student and mentor are expected to follow the deadlines set forth by the Honors Program for thesis proposals, mid-semester reports, and final project, etc.

Due to the intensive nature of an Honors project, it is suggested that prospective students interview possible mentors by the end of their sophomore year. The department hosts annual research presentations during the fall semester to expose students to the variety of research opportunities. Students should follow up these public presentations with personal conversations on projects of interest to them. After identification of a research mentor in consultation with the department chair, students should enroll in 1 semester hour of HNR 4998 during the semester in which they develop their thesis proposal, preferably no later than the fall of their junior year

After acceptance of the proposal, students most likely will enroll in 2-3 hours of HNR 4998 in each subsequent semester. Final arrangement of the distribution should be made in consultation with the faculty mentor and the department chair.