CHEMISTRY AND CHEMICAL BIOLOGY (PHD)

Graduate School

Program Website (https://chemistry.cornell.edu/graduate-program/)

CIP: 40.0501 | **HEGIS:** 1905.00 | **NYSED:** 13452

Graduate Field

Chemistry and Chemical Biology (https://catalog.cornell.edu/graduate-school/chemistry-chemical-biology/)

Program Description

The program of graduate study is designed to give broad training in the fundamentals of chemistry and in methods of research. Students ordinarily pursue those objectives by taking advanced courses, participating in organized and informal seminars, and carrying out and reporting on research projects in their major subject. Students normally conduct research during the summer and receive financial support for this purpose.

With the consent of the Special Committee, a student may elect one or two minors from the above list or from another field. Entering students are required to register with the Department of Chemistry and Chemical Biology at the beginning of their first term. They consult with the Director of Graduate Studies and with their temporary Special Committee.

Proficiency tests in inorganic, organic, and physical chemistry are required of all entering Ph.D. degree candidates. These tests are given a few days before registration for the fall term. Results are used to help the Special Committee plan the student's program. Remedial course work may be required of students with poor test scores.

Specific inquiries from prospective graduate students are welcomed and should be addressed to the graduate field office or to any faculty member in the field.

Concentrations

- Biophysical chemistry
- Chemical biology
- Inorganic chemistry
- Organic chemistry
- Organometallic chemistry
- Physical chemistry
- Polymer chemistry
- Theoretical chemistry

Program Information

- Instruction Mode: In Person
- Location: Ithaca, NY
- Minimum Credits for Degree: 138

Program Requirements

- Minimum Semesters for Degree: 10

Graduate School Milestones

- Responsible Conduct of Research Training: Required
- Open Researcher and Contributor ID (ORCID): Required
- Student Progress Reviews (SPR) begin: Second Year
- Examination for admission to candidacy (A Exam): Summer of second year
- Defense of Dissertation (B Exam): By spring of seventh year

Field Specific Milestones

- Two semesters of teaching assistantship required

Course Requirements

Additional course requirements may be set by the student's Special Committee. Program specific requirements that apply to all students are included below.

Year 1 (Fall)

- Three courses

Year 1 (Spring)

- Three courses

University Graduation Requirements Requirements for All Students

In order to receive a Cornell degree, a student must satisfy academic and non-academic requirements.

Academic Requirements

A student's college determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. It is the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing their chosen program of study. See the individual requirements listed by each college or school or contact the college registrar's office (https://registrar.cornell.edu/service-resources/college-registrar-directory/) for more information.

Non-academic Requirements

Conduct Matters. Students must satisfy any outstanding sanctions, penalties or remedies imposed or agreed to under the Student Code of Conduct (Code) or Policy 6.4. Where a formal complaint under the Code or Policy 6.4 is pending, the University will withhold awarding a degree otherwise earned until the adjudication process set forth in those procedures is complete, including the satisfaction of any sanctions, penalties or remedies imposed.

Financial Obligations. Outstanding financial obligations will not impact the awarding of a degree otherwise earned or a student's ability to access their official transcript. However, the University may withhold issuing a diploma until any outstanding financial obligations owing to the University are satisfied.

Learning Outcomes

The C&CB field expects students to obtain proficiency in the areas of Scholarship, Research, Communication, and Independence.

- Scholarship: Students must develop the ability to acquire, evaluate and synthesize knowledge in areas relevant to the broad chemical

sciences, with special emphasis on their focused research areas. They must learn and apply principles from graduate courses, assimilate information from literature, and, importantly, critically evaluate published science. Through these skills, students will demonstrate a talent for selecting a scientific problem of note and novelty. We also expect that our students can educate others. This includes standard teaching of undergraduates but also the ability to educate peers and the scientific community with respect to their research results and ideas. True scholarship also requires students to view their work and interests in the greater context of the human condition. We aim to produce Ph.D. students with "curiosity, a free mind, belief in good taste, and belief in the human race." (E.M. Forster).

- Research: Carrying out productive research is of primary importance for a degree in C&CB. Students will apply the general methods of scientific inquiry to conduct observations, formulate hypotheses, design experiments, and acquire data. In short, research is the ability to ask and answer questions. Success in research requires motivation, dedication, curiosity, and the experimental and/or theoretical skills to reveal truth in Nature. Students must apply the rigors of scientific training to the drive for discovery. In our view, graduate level education differs from all others in that acquiring and applying existing knowledge is ultimately only a means to the end of creating new knowledge. Certainly, we aspire to train our students in the methodology of science, but we also teach students how to discover and create. The form discovery takes is highly field dependent, even within Chemistry, but could for example include: discovery of a catalyst to elicit specific molecular transformations, understanding of a chemical mechanism behind a reaction, development of synthetic methodology to construct a complex molecule, the theoretical understanding of molecular and electronic structure, or revealing the molecular basis of a metabolic or cell-signaling pathway. In these endeavors students will gain field-specific technical skills, which could include laboratory techniques in synthetic chemistry, spectroscopy, biochemistry, molecular biology, and analytical methods, mathematical and statistical proficiency, computational acumen and instrument design capability. Finally, a proper understanding of ethical behavior in research and scholastic activities is critical and required of all graduate students.
- Communication: Students must be capable of expressing their ideas, summarizing information and engaging in productive discourse with advisors, colleagues, and less experienced students. They will become effective writers and orators and learn to present and defend material in a concise, succinct manner. Proficient technical writing skills, displayed primarily in journal publications, review articles, thesis dissertations and research proposals are an absolute requirement for a degree in C&CB.
- Independence: Ultimately, students must learn to take ownership of their research project and scholastic development. They must respond to challenges and educate themselves. When they graduate, they are expected to be the primary expert in their area of investigation. Two of the most consistent predictors for success in graduate school are maturity and motivation. Students who are accepted into our program arrive with some degree of these qualities, but we hope to enhance these aspects of their character. Through the course of their studies, many students will mature as young adults, learn to productively interact with others, manage their advisors, manage their time, take responsibility for their actions, and meet challenges in an environment much less structured than an undergraduate educational program.