GRADUATE CHEMISTRY PROGRAM

The Department of Chemistry offers a graduate program leading to the degree of doctor of philosophy. Currently, the program has approximately 40 graduate students and 12 faculty members. The small size ensures that each student knows every faculty member and has the opportunity to become well acquainted with several areas of chemistry. A customized program of study is set up for each student, whose progress is monitored by a three-member faculty advisory committee.

Emphasis within the program is on developing skills for chemical research, rather than on conforming to a uniform program of study. Course requirements, progress examinations, preparation and defense of research proposals, seminar presentation, and teaching assignments are all designed with this goal in mind.

An excellent weekly seminar program affords an opportunity for students to hear and meet informally with a variety of outstanding speakers. In addition, the Peter A. Leermakers Symposium has brought eminent chemists from Europe, Asia, South America, and throughout the United States to Wesleyan for a day of intensive examination of a particular subject. Past topics have included chemical insights into viruses, fullerenes, progenitors and sequels, molecular frontiers of AIDS research, extraterrestrial chemistry and biology, atmospheric chemistry and climate in a changing global environment, where chemistry meets art and archaeology, metals in medicine, the molecular basis of materials science, challenges to chemistry from other sciences, green energy and biofuel technology, and better chemistry through quantum mechanics.

COURSES

Course requirements are intended to achieve two basic goals.

- **Acquisition of background knowledge.** A central core of material is basic for all well-trained chemists. Therefore, graduate students are initially expected to develop or demonstrate knowledge of an appropriate one-semester course in each of the areas of organic chemistry, inorganic chemistry, biochemistry, physical chemistry, and quantum chemistry.

- **Continued scholarly growth.** Graduate students are expected to take one course or its equivalent every semester. This may be a regular advanced course in chemistry or a related discipline, or a seminar, or a tutorial designed to meet the special needs of an individual student.

PROGRESS AND QUALIFYING EXAMS

Progress examinations are given multiple times each academic year. Based on articles in the current literature, these examinations are designed to encourage graduate students to keep up with the latest developments in chemistry. In addition, they are a valuable tool for monitoring the expected steady growth of a student’s ability to read the chemical literature critically, as well as identifying any areas where he or she is deficient. Students are required to pass a specified number of exams, which they usually accomplish in two to three years.

TEACHING

Teaching skills are honed and assisting duties are given to each student as a means of developing communication skills. As these develop, more responsible and demanding tasks will be assigned whenever possible.

A 50-minute seminar talk is expected of each student once a year. For first-year graduate students, this seminar will be scheduled in the second semester. In addition, there will be a number of shorter, less formal talks in classes, research group meetings, and special-interest discussion groups, all of which will contribute to a student’s ability to work up, organize, and present a scientific topic.

RESEARCH

After taking three research rotations in different laboratories through the first semester, students are usually then able to choose a research mentor.

Proposal writing is one of the most important parts of the entire graduate program in chemistry. Writing scientific proposals teaches evaluation of the literature, integration of knowledge from several areas, formulation of scientific questions, design of a research project to answer those questions, scientific writing, and the defense of a project proposal. Two proposals are required: one during the second year related to the student’s research and a second, in the fourth year, on a separate topic.

THESIS | DISSERTATION | DEFENSE

The thesis research and dissertation—an original contribution worthy of publication—is the single most important requirement. Finally, the candidate defends the thesis before his/her committee and then presents a final seminar to the department.

CONCENTRATIONS

CHEMICAL PHYSICS

Guiding Committee: Lutz Hüwel, Physics; Joseph Knee, Chemistry; Stewart E. Novick, Chemistry; Brian Stewart, Physics

Beginning students in the chemistry or physics graduate programs may petition their department for admission to the interdisciplinary program in chemical physics. The philosophy underlying the program is that the solution to contemporary problems must increasingly be sought not within a single traditional specialty but from the application of different disciplines to particular problems. Students in the program will pursue a course of study and research that will familiarize them with both the Physics and Chemistry departments and, in particular, with those areas of overlapping interest that we broadly categorize as chemical physics.

REQUIREMENTS FOR THE Degree of Doctor of Philosophy

Students entering the program will choose an interdepartmental committee to oversee their progress toward the PhD degree. Students will still receive a PhD in either chemistry or physics. Chemical physics students will be expected to take courses from both departments. The core of the program of courses consists of quantum chemistry (offered by the Chemistry Department), quantum mechanics (offered by either department), electrodynamics (offered by the Physics Department), statistical mechanics (either department), and mathematical
physics (Physics Department). For details of the course offerings, see the course listings under chemistry and physics.

Seminars. Students will participate in the weekly chemical physics seminar series and will be expected to present at least one talk per year.

Examinations. Students will follow the examination policy of their sponsoring department. Those chemical physics students pursuing a PhD in chemistry will take periodic progress exams based on the current literature, and in their second year they will take an oral qualifying exam that includes a short written proposal of their future PhD research. A second proposal, external to their research, is submitted in the fourth year. In addition, there is a final oral PhD thesis defense. For details, see the requirements for the PhD in chemistry. For those chemical physics students pursuing a PhD in physics, there are three formal examinations: a written examination at an advanced undergraduate level (taken in the third semester), an oral PhD candidacy examination (taken no later than the fifth semester), and a final oral PhD thesis defense. For details, see the requirements for the PhD in physics.

Research. Students in chemical physics may do research under the direction of any member of either department. To aid the student in this selection and to sample the flavor of research activities in both departments, students will participate briefly in the research of each department. During the first year, students will rotate among as many as two research groups from each department, spending between four and six weeks in each group. It is anticipated that a student will be able to make a formal choice of a research advisor by the end of the first academic year at Wesleyan.

**MOLECULAR BIOPHYSICS**

Guiding Committee: David L. Beveridge, Chemistry; Ishita Mukerji, Molecular Biology and Biochemistry

The Chemistry Department participates in an interdisciplinary program of graduate study in molecular biophysics with the departments of Molecular Biology and Biochemistry (MB&B), Biology, and Physics. The program provides a course of study and research that overlaps the disciplinary boundaries of chemistry, physics, biology, and molecular biology and is designed for students with an undergraduate background in any one of these areas. Students in the program are enrolled in one of the participating departments and fulfill canonical requirements of the department. In addition, they take advanced courses in molecular biophysics and pursue dissertation research with one of the faculty in the program. Centerpieces of the program are the weekly interdepartmental journal club in molecular biophysics and an annual off-campus research retreat. Both activities bring together students, research associates, and faculty from all participating departments and foster interdisciplinary collaborative projects.

The molecular biophysics program receives special support from the National Institutes of Health (NIH) in the form of a training grant. The program is affiliated with interest groups such as the New York Structural Biology (NYSB) and the New York Bioinformatics and Computational Biology (NYBCB) groups. All students are encouraged to join and attend national meetings of the Biophysical Society.

Students interested in this program apply for admission to the Chemistry Department or to the other two participating departments. Application forms for these departments are available at wesleyan.edu/chem (http://wesleyan.edu/chem).