Brandeis University

Chemistry

Knowledge Justice Excellence

Why Chemistry at Brandeis?

Brandeis's chemistry department has a tradition of innovation and excellence, offering students a world-class education in an intimate setting where faculty and students work in close contact. Chemistry majors are offered opportunities to develop extensive, practical experience through laboratory courses using both macro- and microscale techniques. They are encouraged to participate in independent research, which is a very important part of a scientific education. Our BA and BS graduates are welcomed at outstanding graduate and medical schools, as well as in industry.

Curriculum Overview

The chemistry major offers a broad training in modern chemistry, covering the major subfields—organic, inorganic, physical, and biochemistry—and at the same time allowing students to pursue their special interests. Students have the option of completing a bachelor of arts, a more rigorous bachelor of science, or a combined four-year BS/MS program. A minor in chemistry is also offered.

Majors take a year of general chemistry and a year of organic chemistry and their associated labs. Juniors and seniors typically study physical chemistry and inorganic chemistry and take advanced laboratories and graduate-level courses of individual interest. Courses in calculus and basic physics are required.

Practical training is integral to chemistry. In addition to the laboratory courses in general and organic chemistry, there are three advanced laboratory courses and opportunities for interested majors to work in faculty research laboratories, typically during their junior and senior years.

Electives for the chemistry program are divided into four subfields: organic, inorganic, physical, and biochemistry.

Organic courses explore the structure, reactions, preparation, and uses of carbon compounds. Advanced topics covered include modern synthetic and organometallic methods, natural-products chemistry, and structure determination.

Inorganic courses cover symmetry, structure, and bonding in inorganic compounds. Solid-state chemistry, ionic and electronic conductors, molecular orbital theory in organometallic chemistry, and the synthesis, structure, and application of organotransition metal compounds are also explored.

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Physical courses cover principles, tools, and applications of statistical, classical, and irreversible thermodynamics; of macroscopic and microscopic kinetics, including studies of nonlinear dynamics of chemical oscillations and waves; and introductions to quantum chemical calculations and spectroscopy.

Biochemistry electives give students a broad understanding of the chemical and molecular events involved in biological processes. Subject matter includes enzyme mechanisms, information transfer mechanisms, and the physical chemistry of macromolecules.

Career Options

Chemistry is the central science. A chemistry major provides solid preparation for professional work in chemistry and allied fields; for study at the graduate level in chemistry and in related fields (biochemistry, environmental science, pharmacology, polymer science, etc.); for professional schools (e.g., medicine, dentistry); and for developing an understanding of the technological and scientific issues challenging our society today—useful professionally in law and business, as well as in everyday life.

Faculty

Following is a list of department faculty members and their areas of specialization:

- **Jeffrey Agar**
  Development of mass spectrometry methods for the comprehensive identification of proteins and their posttranslational modifications
- **Li Deng**
  Asymmetric catalysis and asymmetric synthesis
- **Milos Dolnik**
  Pattern formation in reaction-diffusion systems
- **Irving Epstein**
  Nonlinear chemical dynamics
- **Bruce Foxman**
  Solid-state reactions, X-ray crystallography
- **Liz Hedstrom**
  Relationship between protein structure and function in enzyme catalysis and inhibitor action
- **Judith Herzfeld**
  Solid-state NMR studies of the structure and function mechanisms of membrane proteins
- **Peter Jordan**
  Statistical mechanics of membranes and of membrane transport
- **Claudia Novack**
  Chemical education
- **Gregory Petsko**
  Protein crystallography
- **Susan Pochapsky**
  Protein structure and function studies by NMR
- **Thomas Pochapsky**
  Biological redox enzymes structure and mechanism
- **Jason Pontrello**
  Solid-phase chemistry, synthetic multivalent biological ligands, chemical education
- **Dagmar Ringe**
  Protein crystallography and structural enzymology
- **Timothy Rose**
  Physical and environmental chemistry
- **Barry Snider**
  Development of new synthetic methods
- **Christine Thomas**
  Synthetic inorganic, bioinorganic, and organometallic chemistry
- **Bing Xu**
  Biofunctional magnetic nanoparticles

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