

Chemistry

Course 5

Chemistry is the study of the nanoworld, the world of atoms and molecules spanning dimensions from one to several thousand angstroms. Chemists study the architecture of this miniature universe, explore the changes that occur, unravel the principles that govern these chemical changes, and devise ways to create entirely new compounds and materials. Chemistry underpins much of the efforts of scientists and engineers to improve life for humankind. Past triumphs of chemistry include the synthesis of pharmaceuticals and agricultural products, while future challenges include chemical memory, solar cells, superconductors, and the solutions to numerous important problems relating to health, energy, and the environment.

Chemistry at MIT

The MIT Chemistry Department is the top-ranked chemistry department in the nation. MIT Chemistry is taking a leading role in discovering new chemical syntheses and catalysts, creating sustainable energy, delving into the theoretical and experimental understanding of chemistry at the most fundamental level, unraveling the biochemical complexities of natural systems, improving the environment, detecting and curing disease, developing new materials with sought after properties, and advancing nanoscience. MIT Chemistry is also quite interdisciplinary. Several faculty have joint or secondary appointments in biology, biological engineering, and chemical engineering. In addition, several of our chemistry courses are linked to the Departments of Biology, Chemical Engineering, and Biological Engineering. Students in these majors find the subjects Organic Chemistry I and II (5.12 and 5.13), Chemical Thermodynamics (5.60), and Introduction to Chemical Experimentation (5.310) helpful. The subject Principles of Chemical Science (5.111 or 5.112) is an excellent introduction for students who are interested in chemistry but who are majoring in another field.

Undergraduate Program

The undergraduate program in chemistry at MIT aims to provide rigorous education in the fundamental areas of chemical knowledge and chemical experimentation. It is designed to provide an education for students intending to immediately pursue professional careers in chemistry or an allied field in which sound knowledge of chemistry is important as well as for students planning to go on to graduate study and other professional programs. With its small number of required major subjects, the program is sufficiently flexible in its electives to provide excellent preparation for careers in many different areas of chemistry as well as related areas such as the life sciences, nanoscience, environmental science, atmospheric science, chemical engineering, and materials. The undergraduate program also aims to help undergraduates develop a strong grounding in research principles and experience. The laboratory curriculum entitled URIECA (Undergraduate Research-Inspired Experimental Chemistry Alternatives) introduces students to cutting-edge research topics in a modular format. Each experimental module is inspired by and/or based on a faculty member's current research at MIT. Finally, the undergraduate program strongly encourages participation in the science of chemistry through independent research projects and faculty research seminars for undergraduates.

Research

The Undergraduate Research Opportunities Program (UROP) at MIT provides firsthand laboratory experience with studies of solar energy conversion, organic and inorganic synthesis, bio-organic chemistry, bioinorganic chemistry, biological chemistry, chemical reaction dynamics, surface chemistry, ultrafast spectroscopy, structure-function relationships in proteins, nanoscience, photochemistry, NMR, and electrochemistry. For freshmen only, the department offers a Chemistry Laboratory Techniques course (5.301) during Independent Activities Period (IAP).

This four-week course prepares freshmen for a chemistry UROP. Freshmen who complete it are guaranteed a UROP position in the department. Undergraduates may use their research as the basis for a senior thesis paper.

Undergraduates also have access to specialized research facilities at MIT like the Department of Chemistry Instrumentation Facility, X-Ray Diffraction Facility, Center of Materials Science and Engineering, Laser Biomedical Research Center, MIT Energy Initiative, Francis Bitter Magnet Laboratory, Institute for Soldier Nanotechnologies, MIT Excitonics Center, and Central Machine Shop.

Chemistry Major Activities

Chemistry majors have an active club called Club Chem. Through Club Chem, majors participate in many social events such as faculty-student dinners and study breaks. Club Chem also sponsors the Chemistry Magic Show, a road show of chemistry experiments designed to stimulate interest in and enthusiasm for science among elementary school children.

Post-Baccalaureate Opportunities

Unrestricted elective time allows students to extend their knowledge in areas of special interest. Students who plan to begin their professional careers immediately after graduation may wish to broaden their knowledge by selecting subjects that offer the fundamentals in other fields of science, engineering, or the humanities and social sciences. Those students intending to do graduate

work may elect to take graduate subjects in the Department of Chemistry or other departments to deepen their knowledge. Approximately 80 percent of the undergraduates majoring in chemistry at MIT go on to graduate or professional school. These students continue their studies in such areas as organic chemistry, biochemistry, physical chemistry, inorganic chemistry, polymer science, materials science, atmospheric and environmental science, medicine, law, and business administration.

Contact Information

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More information is also available at

<http://web.mit.edu/chemistry/www>.

The MIT Course Catalog contains further information on the Institute, including all graduate and undergraduate courses and programs. Please visit the MIT Course Catalog website for more details at <http://web.mit.edu/catalog/index.html>.

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