

CHEMISTRY, PHD

Degree: Doctor of Philosophy (PhD)

Field of Study: Chemistry

Research

The Department of Chemistry is noted for research programs in (1) chemical biology and (2) energy and materials. Projects range from synthetic studies of important bioactive substances, including antibiotics and DNA-binding substances, to detailed examination of the surface properties of materials used in batteries and electrolytic cells. Studies are being performed with molecules as simple as oxygen and as complicated as those which describe the active centers of enzymes or the protein core of insoluble aggregates that deposit in neurodegenerative disease. Efforts are being made to understand the basic chemical properties leading to reactive mediators generated from physiological lipids.

Other research is aimed at developing new drugs for photodynamic therapy and at understanding the mechanism of action of drugs for antiretroviral therapy. The influence of metal ions in modifying reactivity is a common interest of several members of the faculty, as is the development of organometallic compounds for materials and catalysis. Chemical surfaces are being studied, as are various applications of nanoparticles, from cells to the environment. Studies designed to characterize electrode-electrolyte interfaces, the electrochemical properties of new semiconductors, and single-cell microelectrodes are also ongoing. These efforts are complemented by theoretical studies on the interfacial structure and bonding of composite materials.

Case Western Reserve University ranks among the leading universities internationally in its strengths in electrochemistry and has brought these strengths together in the Yeager Center for Electrochemical Studies (YCES). The interdisciplinary nature of electrochemistry involves the interaction of electrochemists in the chemistry and chemical engineering departments with metallurgists, surface physicists, inorganic and organic chemists, polymer membrane chemists, and electrical engineers. Such interactions, lacking on most campuses, are promoted at Case Western Reserve University through YCES. Graduate students in the chemistry department have the opportunity to specialize in electrochemistry in one of the most extensive course and research programs in the United States.

Colloquia and Seminars

The department sponsors a rich program of colloquia and seminars on recent advances in chemical research. Most notable among these is the Frontiers in Chemistry Lecture Series, in which scientists of international distinction lecture on major discoveries and developments in chemistry. In addition, a weekly colloquium series provides lectures by invited speakers in a variety of fields of chemical investigation. Both of these programs are addressed to an audience of faculty, graduate students, and other chemical scientists in the university and the Cleveland area, and are a vital means to broaden current knowledge. Numerous other seminars and meetings are held on a more specialized and informal level. Most individual research groups conduct weekly discussions to evaluate their progress.

PhD Policies

For PhD policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

The PhD degree in chemistry is granted to those students who have shown an extensive knowledge of advanced chemistry and the ability to do original research. The program usually requires four years of full-time study after the bachelor's degree. Besides advanced courses, the program consists of cumulative and oral examinations, seminars and colloquia, and an original research project. At least twelve months must be spent in residence on campus while fulfilling the PhD thesis research requirement.

Full-time graduate students who maintain satisfactory academic performance while pursuing the PhD degree in chemistry normally receive a stipend for teaching and/or research, which includes full tuition and a monthly amount sufficient to cover living expenses.