GRADUATE PROGRAM IN

THE UNIVERSITY OF MAINE

CHEMISTRY

Program of Study

The department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. A wide range of research projects is available in analytical, organic, inorganic, physical, materials, and wood chemistry. In addition, many of our faculty are actively engaged in interdisciplinary research projects. Candidates for advanced degrees in the Department of Chemistry normally are expected to have completed the minimum undergraduate program established by the American Chemical Society Committee on Professional Training. Graduate courses in chemistry include advanced analytical techniques, synthesis, and reaction mechanisms in organic chemistry, molecular modeling and computer simulation methods, physical inorganic and inorganic reaction mechanisms, organometallic chemistry, quantum chemistry, molecular spectroscopy, statistical thermodynamics, and wood chemistry. Special topics courses and seminar courses are also offered. Suitable courses in other departments such as Biochemistry, Chemical Engineering, Geology, Mathematics, or Physics may also be included in a student's program of study. Thesis-based research is an integral part of a student's training. Research normally comprises about one-half of the 30 semester hours required in a master's degree program and about two-thirds of the work in a doctoral program.

All course registrations are made in consultation with the student's advisor and advisory committee. At least 16 and 21 classroom hours are required for the M.S. and Ph.D. degree, respectively; the remaining credits comprise of course credits for research activity. In addition, each student is expected to attend all scheduled Department seminars, and to give one seminar each year except the first.

Research

Each student must complete sufficient research to be able to write a thesis (M.S.) or dissertation (Ph.D.) of publishable quality. The dissertation particularly should give evidence of an exhaustive study of a specialized field, and should be an authoritative statement of knowledge on the subject, as well as an original contribution to modern chemistry. In the work leading to, and in the preparation of, the thesis or dissertation, a committee consisting of the individual faculty member directing the work and at least two (M.S.) or four (Ph.D.) additional faculty members advises each student. This committee is selected by the student in consultation with his or her research advisor, and is subject to approval by the faculty of the Department and the Dean of the Graduate School. All students must select a research advisor and advisory committee by the end of the first semester of graduate study, and thereafter meet with the committee at least once each semester.

Financial Aid

Students are supported by teaching assistantships, fellowships, or research assistantships (the last provided by the research advisor). Every student in good standing will be supported for two and one-half years for an M.S. and four and one-half years for a Ph.D. by some combination of Department and grant funds. An additional semester of support may be granted by the Graduate Committee of the Department on petition by a student and his or her advisor. The current stipend for a teaching assistantship is $16,084 for 12 months; a full tuition waiver and 50% of health insurance premiums is included. Many second- and third-year students are supported by their advisors on research assistantships, which range in value up to $30,000 per year.

Applying

Students who wish to receive first-round consideration for the coming academic year are advised to have a completed application arrive in the department before February 15.

Correspondence

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Graduate Faculty

Alice E. Bruce, Ph.D. (Columbia Univ., 1985), Associate Professor and Chair. Inorganic, organometallic and bioinorganic chemistry; synthesis, structure and reactivity of gold(I) clusters; thiolate-disulfide exchange; detection of environmental mercury(II) using nanostructured supports.

François G. Amar, Ph.D. (Chicago, 1979), Associate Professor. Physical chemistry: computer simulation of reaction dynamics in molecular, ionic, and metallic clusters; theory of photoelectron spectra of clusters; gas-surface dynamics; optical and elastic properties of microspheres. Chemical education research: active learning strategies for large classes and laboratories; improving teaching of spectroscopic principles.

Mitchell R. M. Bruce, Ph.D. (Columbia Univ., 1985), Associate Professor. Inorganic, bioinorganic, and organometallic chemistry involving synthesis and reaction mechanisms; zinc and gold mediated thiol-disulfide exchange; metal-protein chemistry; electrochemical redox processes; calculations; reactivity of mercury and late transition metals; active learning strategies in class and laboratory.

Barbara J. W. Cole, Ph.D. (Washington, 1986), Professor. Wood and paper chemistry, carbohydrates, lignin, biologically active plant extracts.

Scott D. Collins, Ph.D. (Brigham Young Univ., 1980), Professor and Member, LASST (Laboratory for Surface Science and Technology), Cooperating Professor of Electrical and Computer Engineering, Cooperating Professor of Biochemistry, Microbiology, and Molecular Biology, Co-Director MicroInstruments and Systems Laboratory (MISL), Co-Director Institute for Molecular Biophysics (IMB). Micro and Nano Fabrication, surface probe and electron microscopy, electrochemistry of semiconductors, BioMEMS, fractal phase transitions, nanoscience.

Raymond C. Fort, Jr., Ph.D. (Princeton, 1964), Professor. Computational organic and biochemistry; wood chemistry.

Brian G. Frederick, Ph.D. (Cornell, 1991), Associate Professor and Member, LASST (Laboratory for Surface Science and Technology). Physical chemistry, surface science and catalysis. Biofuels, thermochemical catalyst development, materials characterization, reaction mechanisms, spectroscopy, quantum mechanical modeling.

Bruce L. Jensen, Ph.D. (Western Michigan, 1970), Associate Professor. Synthesis of heterocyclic and natural products of medicinal interest. Study of halonium ion rearrangements and chiral allylsilicon reagents. Curriculum development in the undergraduate organic laboratory.

Howard H. Patterson, Ph.D. (Brandeis,1968), Professor. Inorganic and environmental Chemistry. Nanosystems of silver(I) , gold(I) and mixed metal systems showing optical memory, clustering behavior, and energy transfer. Development of methods for early warning detection of harmful pollutants in natural waters. Photocatalysis with metal doped zeolites for pollutant decomposition in natural waters as well as for development of alternative energy sources.

Jayendran C. Rasaiah, Ph.D (Pittsburgh, 1965). Professor. Theoretical and computer simulations studies of the structure and dynamics of liquids, ionic solutions, and polar fluids. Water structure and flow in carbon nanotubes and confined systems. Dynamics of electron transfer reactions.

Touradj Solouki, Ph.D. (Texas A & M, 1994), Associate Professor. Structural mass spectrometry by matrix-assisted laser desorption and electro-spray ionization FT ion cyclotron resonance.

Carl P. Tripp, Ph.D. (University of Ottawa, 1988), Professor and Member, LASST (Laboratory for Surface Science and Technology). Surface chemistry of materials, infrared and Raman spectroscopy chemical sensors, biosensors, sol-gel synthesis of metal oxides, polyelectrolyte/surfactant adsorption on surfaces, silane reactions on metal oxides, molecular studies of paper coatings, supercritical fluids.

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