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Courses of Instruction

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Course and Subject Guide

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Department of Chemistry

Main Departmental Office
Chemistry Building, Room 101

Mailing address:
1155 Union Circle #305070
Denton, TX 76203-5017
940-565-2713

Web site: www.chem.unt.edu
E-mail: chem@unt.edu

William Acree, Chair

Graduate Faculty: Acree, Borden, Chyan, Cooke, Cundari, Golden, Kelber, J. Marshall, P. Marshall, Mason, Omary, Petros, Richmond, Schwartz, Theriot, Thomas, Verbeck, Wilson, Youngblood.

Student stipends, including teaching assistantships and research fellowships, are available from a variety of sources. Stipends may range up to \$25,000 per year depending upon demonstrated academic and research competence. Further information may be obtained from the chair of the Graduate Affairs Committee.

Research

A variety of research programs are in progress involving analytical, computational, inorganic, organic and physical chemistry, as well as chemistry education. Specific areas of study include synthesis, properties and kinetic investigations of transition metal carbonyls; syntheses and properties of nitrogen heterocycles; NMR applications to organometallic chemistry; gas phase kinetics; spectroelectrochemistry; morphology of inorganic precipitates; thermodynamics; Raman scattering; materials analysis and development; properties of surface adsorbed molecules; crystallography; polymer liquid crystals; interfacial processes; organosilicon synthesis and kinetics; polycyclic cage compounds; ferroelectric thin films; basis set development; computer-aided catalyst design; computational organic chemistry; chemical vapor deposition; and reactivities of metal and oxide surfaces.

The department possesses more than \$6.3 million of capital equipment, including 200 MHz, 300 MHz and 500 MHz multinuclear FT-NMR with CP/MAS solids capability, Auger/ESCA, FT-IR, Raman, mass spectrometers, HPLC GCs, GCMSs, Powder XRD, single crystal XRD, AA, uv-vis, electrochemical analyzers stopped-flow kinetic analyzer, pulsed-laser flash photolysis, laser-induced fluorescence

spectrometers. Within the chemistry department, there are four computer server rooms, which house several state-of-the-art Linux computer clusters and super computers, entailing more than 500 processors available for the department's computational chemistry research endeavors.

Studies are conducted with the assistance of graduate and undergraduate students, research technicians and post-doctoral fellows. Other technical personnel include full-time instrument technicians and a glassblower.

Financial support for research is provided by the Robert A. Welch Foundation, the National Science Foundation, the Air Force Office of Scientific Research, the Army Research Office, the Office of Naval Research and the Department of Energy.

Additional sources of research funding include the Texas Advanced Research and Technology Program, Texas Instruments, Electrical Power Research Institute, Sun Exploration, the UNT Faculty Research Fund and several industrial fellowships.

Admission Requirements

Departmental forms for applying for teaching and research support may be obtained from the Student Services Office in the Department of Chemistry or from the World Wide Web. Complete college transcripts, two letters of recommendation and acceptable GRE scores are required for conditional admission. Contact the department or the Toulouse School of Graduate Studies for information concerning competitive admission test scores.

New students should contact the Student Services Office immediately upon arriving on campus for information on departmental requirements. A departmental policy bulletin that delineates these requirements is available to students.

Students must take placement examinations covering undergraduate analytical, inorganic, organic and physical chemistry. These examinations are given during registration week of each long term/semester. The results of these examinations are used for counseling purposes. The chemistry department employs a core course system that requires its students to take graduate courses in specified areas.

Advisory Program

The chemistry Graduate Affairs Committee serves as advisor to the beginning student. When a field of specialization and a major professor have been selected, a committee is then appointed to serve in an advisory capacity. The minimum number of committee members is two for the master's and four for the doctoral advisory committee. The student meets yearly with this committee for research progress reports and consultation. PhD committees

will also choose an individual from outside the university who is knowledgeable in the student's area of research to serve in an advisory capacity to the committee.

Degree Programs

The department offers graduate programs leading to the following degrees:

- Master of Science with a major in chemistry; and
- Doctor of Philosophy with a major in chemistry.

Concentrations are available at the master's level in analytical, industrial, inorganic, organic or physical chemistry or chemistry education.

Concentrations at the doctoral level are available in analytical, inorganic, organic or physical chemistry or chemistry education.

Below is an abbreviated description of each of the degrees offered. Complete descriptions of degree requirements are contained in the *Department of Chemistry Graduate Policy Bulletin*. A copy can be obtained from the chair of the Graduate Affairs Committee.

Professional Science

Master's Degree Option

The Professional Science Master's (PSM) is an innovative graduate degree option designed to allow students to pursue advanced training in science while simultaneously developing workplace skills highly valued by employers. PSM degrees prepare students for science and technology careers in business, government and nonprofit organizations. PSM degrees are MS degrees in an emerging or interdisciplinary area of science, mathematics or technology and contain a set of professional skills courses selected from such areas as business, communication, policy, law and leadership. Contrary to a traditional master's degree, a thesis is not required but a 3 or 6 semester credit hour internship is included within the science requirement. The Department of Chemistry offers one PSM type degree:

- MS with a major in industrial chemistry

Additional information about this degree can be found at www.psm.unt.edu and www.sciencemasters.com.

Master of Science

Analytical, Inorganic, Organic or Physical Chemistry

The applicant seeking a master's degree in one of these areas will plan a program with the assistance of the advisory professor and the advisory committee. A graduate major must present credit for at least 30 semester hours. The student must maintain a B average in all formal chemistry course work. The student must write a thesis describing his or her research and must defend the thesis at an oral examination administered by the advisory committee.

The Department of Chemistry requires completion of three of the four core courses (one of which must be in the student's area of research) with an average grade of B or above. A thesis is required.

Industrial Chemistry

This degree is recognized as a Professional Science Master's degree and is designed for students with specific interests in selected areas of applied chemistry. The degree requirements are determined by consultation with the graduate affairs committee. The program leads to a non-thesis degree requiring 36 semester hours of formal course work, at least one-half of which (18 hours) must be in chemistry. Supplemental non-chemistry courses must include at least 12 hours and must be approved by the student's committee. In addition to the formal courses, either 3 or 6 hours of the total 36 hours must comprise on-the-job research training in an industrial position (or equivalent on-the-job training).

Chemistry Education

This program is designed primarily for students who do not possess a degree in chemistry (e.g., secondary education majors) but who may desire to enter a graduate program. With the aid of the chemistry advisor, the student may choose a 30-semester-hour program, including thesis, or a 36-semester-hour program without thesis. In order to qualify for this degree, a student must have received teaching certification prior to admission or must obtain this certification prior to receiving the degree.

Under each option above, a minimum of 18 hours of the formal graduate courses must be in the chemistry department. Of these 18 hours, course work must include three 3-hour graduate-level (5000 or above) lecture classes in any of the four traditional areas of chemistry (analytical, inorganic, organic, physical). The other 9 hours may include courses in chemistry education or other approved chemistry courses. The remaining 18 hours required for the chemistry education concentration are the graduate courses required for certification, if the student is not already certified. If the student is already

a certified teacher, the 18 remaining hours may be selected from graduate-level chemistry courses or other approved graduate courses. No more than 3 credits of seminar may be included in the required 30 or 36 hours.

Doctor of Philosophy

The course requirements for the PhD degree require that a student complete core courses in three of the four areas of chemistry (including the student's area of research). Students must complete three additional advanced courses (of which at least two must be in the Department of Chemistry). The student must maintain a B average or better in these six courses. This research must culminate in the writing of a dissertation of demonstrable scientific merit. It is normally required that at least one paper be accepted in a refereed journal by the time of the oral defense.

After completion of the formal course work, tool-subject (course options for the tool-subject are available from the department), and CHEM 6010, the student will apply to the dean of the Toulouse School of Graduate Studies for admission to candidacy for the Doctor of Philosophy degree. This should be done at least one year before graduation.

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