

## Chemistry

### Chemistry, CHEM

#### 5010. Introduction to Graduate Teaching and Research.

2 hours. Topics include university policies, safety in the laboratory, first aid techniques, teaching techniques, audio-visual facilities and operation, use of the university libraries, university/departmental computational facilities, PC facilities and use, and maintaining a research journal. Required for all full-time first-year graduate students. Prerequisite(s): graduate standing in the chemistry department.

**5200. Physical Chemistry.** 3 hours. A survey of selected topics in physical chemistry, including thermodynamics, mechanics, statistical mechanics, heterogeneous and homogeneous equilibria, and chemical kinetics. Prerequisite(s): CHEM 3520 or consent of department.

**5210. Advanced Physical Chemistry.** 3 hours. The basic concepts of quantum mechanics are emphasized utilizing several models to aid in the description, such as the square well model, the rigid rotator, the hydrogen atom and the hydrogen molecule ion. The applications of quantum mechanics to chemical systems are considered in terms of resonance, wave mechanics, perturbation and variation methods. Prerequisite(s): pass exemption examination in physical chemistry, or CHEM 5200.

**5380. Organic Chemistry.** 3 hours. A survey of organic chemistry involving a systematic study of classes of reactions with an integration of fact and theory. Prerequisite(s): CHEM 2380 or consent of department.

**5390. Selected Topics in Analytical Chemistry.** 3 hours. Topics of current interest, which vary from year to year. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**5450. Advanced Techniques in Analytical Chemistry.** 1–3 hours. Methods and instrumentation currently used in the analysis of materials. Presented in modular units of approximately three to four weeks duration. Typical subjects include fundamentals of liquid and gas-liquid chromatography, atomic absorption spectroscopy, polarography and related electroanalytical methods and X-ray fluorescence spectroscopy. Credit: 1 semester hour per module. May be repeated for credit as topics vary. Laboratory fee when laboratory involved.

**5460. Surveys of Modern Analytical Chemistry.** 3 hours. A survey of modern analytical methods with emphasis on instrumental techniques and data handling, including separation methods, electrochemical methods and spectroscopy. Prerequisite(s): consent of department.

**5500. Physical Organic Chemistry.** 3 hours. The mechanisms of organic reactions and the effect of reactant structures on reactivity. Prerequisite(s): pass exemption examination in organic chemistry, or CHEM 5380.

**5530. Materials Chemistry.** 3 hours. Application of quantum chemical principles to understanding the general behavior of materials. Course will include semiconductors, metals, catalysts and “nano-designed” materials (e.g., quantum wells). Prerequisite(s): CHEM 3520 or equivalent, or consent of department.

**5560. Inorganic Chemistry.** 3 hours. A survey of inorganic chemistry involving a systematic study of atomic structure, structure and bonding in inorganic and organometallic compounds, and representative inorganic reactions. Prerequisite(s): consent of department.

**5570. Advanced Analytical Chemistry.** 3 hours. This course covers an advanced treatment of analytical chemistry, including the following topics: advanced separation methods, analytical applications of electrochemistry and spectroscopy, experimental design, sampling and data analysis. Prerequisite(s): pass exemption examination in analytical chemistry, or CHEM 5460.

**5610. Selected Topics in Physical Chemistry.** 3 hours. Topics of current interest, which vary from year to year. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**5620. Selected Topics in Inorganic Chemistry.** 3 hours. Topics of current interest, which vary from year to year. Topics include ligand field theory, physical methods in inorganic chemistry, group theory and molecular symmetry, and recent advances in transition and non-transition metal chemistry. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**5640. Selected Topics in Organic Chemistry.** 3 hours. Topics of current interest, which vary from year to year. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**5650. Kinetics of Chemical Reaction.** 3 hours. Reactions and reaction rates; determination of rate laws for simple and complex reactions; deduction of reaction mechanisms; reaction energetics; chain reactions; theories of elementary reaction rates; reactions at extreme rates; extra-kinetic probes of mechanism. Prerequisite(s): consent of department.

**5660. Computational Chemistry and Biochemistry.** 3 hours. (2;3) Introductory course covering the latest techniques for the study of reactions of interest to chemists and biologists via the use of molecular modeling and quantum mechanical simulations. Prerequisite(s): consent of department.

**5700. Thermodynamics.** 3 hours. Reversible and irreversible thermodynamics of gases, liquids, solids and solutions; free energy relationships of ideal and non-ideal solutions; introduction to statistical calculation of thermodynamic properties. Prerequisite(s): consent of department.

**5710. Advanced Inorganic Chemistry.** 3 hours. An advanced study of the interrelation of structure, bonding and reactivity of inorganic and organometallic compounds; basic applications of molecular symmetry and group theory to chemical problems. Prerequisite(s): pass exemption examination in inorganic chemistry, or CHEM 5560.

**5800. Procedures and Materials for Science Instruction.** 3 hours. (2;4) Problems, techniques and procedures for classroom and laboratory experiences based on current science education research. Recommended for students who desire secondary teacher certification in a science field. Field experience in the public schools is a required component. Prerequisite(s): completion of undergraduate science courses required for certification and consent of department.

**5810. Selected Topics in Chemistry Education.** 3 hours. Topics of current interest that vary from year to year. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**5820. Studies in Chemistry Education: Pedagogical Materials and Curriculum Development.** 3 hours. (2:1) Examines national trends in science education curriculum, explores issues associated with materials development and testing as it applies to chemistry curriculum, and engages students in implementing the protocols used within the discipline focusing on chemical demonstration activities.

**5840. Chemistry Behind the Elements.** 3 hours. The fundamentals of the universe are based on principles of periodicity as revealed in the descriptive chemistry of the elements. Among the areas covered are the characteristics of the families of elements, when and where each element was discovered and by whom the discoveries were made. Also includes the impact these discoveries have had on society and technological advances. Pertinent industrial applications of the elements and materials derived from them are presented.

**5880. Learning Theories in Chemistry Education.** 3 hours. Survey of chemistry education and preparation for teaching and learning as they have developed, along with pertinent research findings and design from the current literature.

**5900-5910. Special Problems.** 1–3 hours each. For students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor.

**5920-5930. Research Problems in Lieu of Thesis.** 3 hours each. An introduction to research; may consist of an experimental, theoretical or review topic. A paper conforming to recommendations outlined in the "Handbook for Authors of Papers in the Journals of the American Chemical Society" must be submitted for credit in each course.

**5940. Seminar in Current Chemistry.** 1 hour. Colloquia covering current topics in chemistry. Required of all full-time graduate students in each term/semester of graduate residence. Prerequisite(s): senior standing. May be repeated for credit. Pass/no pass only.

**5950. Master's Thesis.** 3 or 6 hours. May be repeated for credit. To be scheduled only with consent of department. 6 hours credit required. No credit assigned until thesis has been completed and filed with the graduate dean. Continuous enrollment required once work on thesis has begun.

**5960. Science Institute.** 1–6 hours. Courses for students accepted by the university for enrollment in special institute courses. May be repeated for credit, not to exceed a total of 6 hours in each course.

**6010. Seminar for Doctoral Candidates.** 3 hours. Demonstration of competence in a specific area of chemistry (analytical, organic, physical, inorganic) as evidenced by criteria established by the faculty of each discipline. May be repeated for credit. Six credit hours required.

**6900-6910. Special Problems.** 1–3 hours each. For doctoral students capable of developing a problem independently through conferences and activities directed by the instructor. Problem selected by the student with the consent of the major professor.

**6940. Individual Research.** 1–12 hours. Doctoral research of independent nature. May be repeated for credit. Pass/no pass only.

**6950. Doctoral Dissertation.** 3, 6 or 9 hours. To be scheduled only with consent of department. 12 hours credit required. No credit assigned until dissertation has been completed and filed with the graduate dean. Doctoral students must maintain continuous enrollment in this course subsequent to passing qualifying examination for admission to candidacy. May be repeated for credit.

**6990-6991. Individual Research.** 1–3 hours each. For postdoctoral fellows to further training and research experience in developing and solving research problems independently. Prerequisite(s): consent of department. May be repeated for credit. Pass/no pass only.

---

## Chinese

see *Undergraduate Catalog*

---

## Communication Studies

### **Communication Studies, COMM**

**5080. Introduction to Graduate Study and Research in Communication Studies.** 3 hours. Broad perspective on communication studies content areas.

**5085. Pedagogy and Communication.** 3 hours. Study of pedagogy and communication. Examines philosophical, theoretical and practical issues faced by university instructors.

**5180. Qualitative Research Methods in Communication.** 3 hours. Qualitative research methodologies for communication studies research.

**5185. Quantitative Research Methods in Communication.** 3 hours. Experimental and quantitative techniques usable in research in communication.

**5220. Organizational Communication.** 3 hours. Study of the transmission of information and ideas within an organization with emphasis on the problems encountered in the business world.

**5221. Crisis and Disaster Communication.** 3 hours. Theoretical and practical examination of communication during crises and/or disasters. The role of communication in crisis/disaster planning, real-time crisis response, and post-crisis recovery and sensemaking.

**5223. Communication and Aging.** 3 hours. Examination of the role of communication in the aging process. Theories related to communication and aging are explored in a variety of contexts including intergenerational interactions, interpersonal relationships, family relationships, health care interactions, the workplace, mass media, political communication and cultural contexts.

**5225. Interpersonal Communication.** 3 hours. Contemporary research and theory in the study of communication patterns found at various stages of normal interpersonal interactions.

**5226. Seminar in Health Communication.** 3 hours. Introduction of communication theories and approaches related to health care in interpersonal, organizational and mass communication settings.

**5227. Seminar in Intercultural Communication.** 3 hours. Provides an opportunity to explore existing and emerging issues, theories and practices in intercultural communication.