CHEMISTRY (CHEM)

CHEM 100 - Introductory Chemistry **4 Credits**
An introductory lecture and laboratory course in modern chemistry for non-science majors intended to make chemistry understandable, accessible and applicable. Topics include atomic theory, stoichiometry, bonding, molecular shapes, acid-base theory, ploymers, medicine, and nutrition. Meets Gen Ed - Natural Science Laboratory. 3 hours lecture, 2 hours lab.

CHEM 105 - Basic Chemistry **3 Credits**
Prerequisite(s): Restricted to students of the Health Careers Program. This course will introduce the basic concepts of chemistry. 3 hours lecture.

CHEM 106 - Principles of Chemistry **3 Credits**
Prerequisite(s): Score of 14 or less on the Chemistry Readiness Test; and satisfactory score on the Mathematics Readiness Test or a grade of C- or better in MATH 100. A one-semester introductory lecture and recitation course in the fundamental concepts of chemistry. This course is suitable for students who have a poor background in chemistry. All students who do not get a satisfactory score on department's General Chemistry Readiness Test must complete this course before they can enroll in General Chemistry I (CHEM 120). This course does not meet any General Education requirements. 3 hours lab, 2 hours lecture.

CHEM 113 - Fundamentals of Chemistry **4 Credits**
A one semester introductory lecture and laboratory course in the fundamental concepts of chemistry. This course is suitable for students who have no prior background in chemistry. It is intended for students majoring in Food and Nutrition and other non-science majors. Some aspects of the course are quantitative, and a background in algebra is assumed. This course prepares students to proceed to CHEM 130 Fundamentals of Organic Chemistry. Meets Gen Ed - Natural Science Laboratory. 3 hours lecture, 2 hours lab.

CHEM 114 - Fundamentals of Chemistry for Nursing **3 Credits**
Prerequisite(s): Nursing majors only. A one semester introductory lecture course in the fundamental concepts of chemistry. This course restricted to students who are Nursing majors. Some aspects of the course are quantitative, and a background in algebra is assumed. 3 hours lecture.

CHEM 120 - General Chemistry I **4 Credits**
Prerequisite(s): Satisfactory score on the Mathematics readiness test OR a grade of C- or better in MATH 100 or MATH 111 or MATH 112 or MATH 116 or MATH 122 or MATH 221 or MATH 222 OR concurrent enrollment in MATH 100. Satisfactory score on the Chemistry readiness test OR a grade of C- or better in CHEM 105 or CHEM 106. Introductory lecture and laboratory course for science majors, prerequisite for all advanced chemistry courses. Introduction to atomic and molecular structure, bonding, stoichiometry, states of matter, solutions, and selected topics in descriptive inorganic chemistry. Laboratory stresses techniques and data treatment and their use in examining chemical systems. Meets Gen Ed - Natural Science Laboratory. 3 hours lecture, 3 hours lab.

CHEM 121 - General Chemistry II **4 Credits**
Prerequisite(s): CHEM 120 with a grade of C- or better. Special fee. Introductory lecture and laboratory course for science majors, prerequisite for all advanced chemistry courses. Introduction to thermochemistry, kinetics; general acid base, precipitation, redox equilibria, electrochemistry and selected topics in descriptive inorganic chemistry. Laboratory stresses techniques and data treatment and their use in examining chemical systems. 3 hours lecture, 3 hours lab.

CHEM 130 - Fundamentals of Organic Chemistry **4 Credits**
Prerequisite(s): CHEM 113 with a grade of C- or better. Survey of organic chemistry covering all major classes, nomenclature, and characteristic class reactions. 3 hours lecture, 2 hours lab.

CHEM 190 - Freshman Seminar in Chemistry **1 Credit**
An experience for freshmen majoring in chemistry and biochemistry that will help them to succeed in their major by learning study skills and becoming acquainted with the culture of higher education. Meets Gen Ed - New Student Seminar. 1 hour seminar.

CHEM 195 - Problem Solving-General Chemistry **1 Credit**
Course designed to help students in application of mathematics in chemistry with emphasis on individual needs. 1 hour lecture. 3 hours lecture, 2 hours lab.

CHEM 199 - Laboratory Project **1-3 Credits**
Prerequisite(s): CHEM 120 or equivalent and permission of department. Independent laboratory work in chemistry under the guidance of a faculty mentor. 2 hours lab.

CHEM 220 - Descriptive Inorganic Chemistry **3 Credits**
Prerequisite(s): CHEM 121 with a grade of C- or better. Introduction to the descriptive inorganic chemistry of the chemical elements and selected compounds excluding hydrocarbons and their derivatives. The periodic table and periodic relationships among the elements will be used as an organizing tool to explore the sources, properties, compounds, reactions, and industrial uses of the chemical elements. The primary emphasis will be on the main group elements, but transition metal chemistry will also be described. Selected applications of inorganic substances in biochemistry, environmental chemistry, industrial chemistry, material science, and medicine will be discussed. 3 hours lecture.

CHEM 230 - Organic Chemistry I **3 Credits**
Prerequisite(s): CHEM 121 with a grade of C- or better. Structure and bonding in organic compounds: nomenclature, reactions, properties, and aromatic compounds: stereochemistry; structure analysis by IR, NMR, UV, and MS; introduction to molecular orbital theory. 3 hours lecture.

CHEM 231 - Organic Chemistry II **3 Credits**
Prerequisite(s): CHEM 230 with a grade of C- or better. Nomenclature, reactions, properties, and synthesis of ethers, epoxides, alcohols, amines, and carbonyl compounds; carbohydrates; amino acids, peptides and proteins; pericyclic reactions; synthetic polymers. 3 hours lecture.

CHEM 232 - Experimental Organic Chemistry I **2 Credits**
Prerequisite(s): CHEM 230 is a prerequisite or corequisite. A laboratory course to be taken concurrently with CHEM 230. Basic techniques for the separation, analysis and synthesis of organic compounds: recrystallization, distillation, extraction, GC, HPLC, TLC, GC/MS, IR, H/C13-NMR, chemical safety methods and regulations. 4 hours lab.

CHEM 233 - Experimental Organic Chemistry II **2 Credits**
Prerequisite(s): CHEM 231 and 232 with a grade of C- or better. CHEM 231 may be taken as a prerequisite or corequisite. A laboratory course to be taken concurrently with CHEM 231 and after completion of CHEM 232. Basic techniques for organic synthesis, mechanistic studies, separation and analysis, and chemical safety: multistep syntheses, spectral data-base searching, phase-transfer catalysis, anhydrous procedures, analysis of unknowns by wet-chemical and spectral methods. 4 hours lab.

CHEM 270 - Fundamentals of Biochemistry **5 Credits**
Prerequisite(s): CHEM 130 with a grade of C- or better. Structure and function of the biomolecules and the metabolic interrelationships in the cell. Primarily for foods and nutrition majors. 4 hours lecture, 3 hours lab.

CHEM 310 - Analytical Chemistry **5 Credits**
Prerequisite(s): CHEM 230 with a C- or better OR concurrent enrollment in CHEM 230 OR concurrent enrollment in CHEM 220. Introduction to concepts of classical analytical chemistry including evaluation of data and apparatus, theory and application of volumetric and gravimetric methods and redox equilibrium, and introduction to electrical methods. 3 hours lecture, 4 hours lab.

CHEM 311 - Instrumental Analysis **4 Credits**
Prerequisite(s): CHEM 310 and CHEM 340 with a grade of C- or better in both courses. Introduction to application of instrumental methods of analytical chemistry. Instrument techniques studied will include spectrophotometry, electroanalytical chemistry, chromatography, nuclear magnetic resonance and mass spectrometry. Theory and application will be examined in lecture and laboratory. 2 hours lecture, 6 hours lab.

CHEM 320 - Environmental Chemical Analysis **3 Credits**
Prerequisite(s): CHEM 230 and CHEM 232 with a grade of C- or better. A study of the sources, reactions, transport, effects, and fates of chemical species in the environment. Lecture and lab will stress the theory, methodology, techniques, and instrumentation for air, water and soil analysis for contaminants. 2 hours lecture, 2 hours lab.

CHEM 325 - Atmospheric Chemistry **3 Credits**
Prerequisite(s): CHEM 230 and CHEM 232 with a grade of C- or better. Atmospheric chemistry of the major pollutants of concern in today's environment, the emission sources, air/water and air/soil partitioning and exchange, atmospheric transport pathway, transformation processes (biological degradation, hydrolysis, photochemical transformations), deposition processes, pollutant chronic and acute health impacts, prevention and regulation. Course requirements: 2 field trips. 3 hours lecture.

CHEM 330 - Green Chemistry **3 Credits**
Prerequisite(s): CHEM 231 with a grade of C- or better. The focus of the course will be on the principles and applications of Green Chemistry, and its potential role in the minimization or elimination of negative impacts on the environment by the chemical industry, and the establishment of safe chemical practices. Topics such as, catalysis, development of more environmentally friendly and sustainable chemical processes and industrial case studies will be discussed. 3 hours lecture.

CHEM 340 - Physical Chemistry I **3 Credits**
Prerequisite(s): CHEM 231 and PHYS 192 and MATH 221 with a grade of C- or better in all courses. Thermodynamics, homogeneous and heterogeneous equilibria, gases, electrochemistry, solutions, colligative properties. 3 hours lecture.

CHEM 341 - Physical Chemistry II **3 Credits**
Prerequisite(s): CHEM 340 with a grade of C- or better. Kinetics, photochemistry, molecular physical chemistry. 3 hours lecture.

CHEM 343 - Experimental Physical Chemistry **2 Credits**
Prerequisite(s): CHEM 340 with a grade of C- or better. Corequisite(s): CHEM 341. A laboratory course to be taken concurrently with CHEM 341. Application and experience with experimental techniques of physical chemistry. Students will perform experiments in calorimetry, measurement of thermodynamic variables, electro-chemical phenomena and kinetics. Analysis of experimental data, statistics and applications of microcomputers will be included. Meets the University Writing Requirement for majors in Chemistry. 4 hours lab.

CHEM 347 - Biophysical Chemistry **3 Credits**
Prerequisite(s): CHEM 370 and CHEM 340 with a grade of C- or better in both courses. Thermodynamics, equilibria, transport processes, kinetics, and electrochemistry as applied to biomolecules and cellular processes. Previous course CHEM 447 effective through Spring 2011. 3 hours lecture. 4 hours lab.

CHEM 370 - Biochemistry I **3 Credits**
Prerequisite(s): CHEM 231 with a grade of C- or better. Organization of the living cell; structure, function and chemistry of proteins, carbohydrates and lipids; bioenergetics and oxidation. 3 hours lecture. 4 hours lab.

CHEM 371 - Biochemistry II **3 Credits**
Prerequisite(s): CHEM 370 with a grade of C- or better. The second semester of a two semester course in biochemistry. The course continues the coverage of the chemistry of proteins, carbohydrates, lipids, and nucleic acids, and their role in cellular function and processes. Topics such as the chemistry of hormones, recombinant DNA, mechanisms of enzyme action, protein synthesis, immunoglobulins and membranes are included. 3 hours lecture. 4 hours lab.

CHEM 372 - Experimental Biochemistry I **2 Credits**
Prerequisite(s): CHEM 231 and CHEM 232 with a grade of C- or better in both courses. CHEM 370 may be taken as a prerequisite or corequisite. A lecture and laboratory course of experimental methods in biochemistry. Biochemical applications of spectroscopy, chromatographic methods, enzyme kinetics, DNA and protein purification and electrophoretic techniques. 1 hour lecture, 3 hours lab.

CHEM 373 - Experimental Biochemistry II **3 Credits**
Prerequisite(s): CHEM 370 and CHEM 372 with a grade of C- or better in both courses. Corequisite(s): CHEM 371. A second-semester laboratory in modern techniques in experimental biochemistry to include important applications of major instrumentation. Primarily intended for Biochemistry majors. 6 hours lab.

CHEM 420 - Advanced Inorganic Chemistry **3 Credits**
Prerequisite(s): CHEM 340 is a prerequisite or corequisite. Special fee. Physical basis of bonding and reactivity of inorganic compounds. Electronic structure of atoms, ionic and covalent bonding, symmetry properties, chemistry and structure of transition metal compounds, organometallic chemistry, introduction to solid-state structures. 3 hours lecture.

CHEM 421 - Experimental Inorganic Chemistry **3 Credits**
Prerequisite(s): CHEM 310. Corequisite(s): CHEM 420. Experience utilizing a broad selection of modern techniques for the synthesis, characterization and chemistry of inorganic compounds. Subjects covered will include catalysis, reaction mechanisms, and use in organic synthesis. 1 hour lecture, 4 hours lab.

CHEM 430 - Advanced Organic Chemistry **3 Credits**
Prerequisite(s): CHEM 340 or 370. Consideration of structural and electronic theories which form the basis of organic chemistry. 3 hours lecture. 1 hour lecture, 4 hours lab.

CHEM 440 - Advanced Physical Chemistry **3 Credits**
Prerequisite(s): MATH 420 and CHEM 341. Quantum mechanics, bonding theory, atomic structure, statistical thermodynamical calculations. 3 hours lecture. 1 hour lecture, 4 hours lab.

CHEM 490 - Selected Topics in Chemistry **2-3 Credits**
Prerequisite(s): CHEM 340 or 370. In-depth study of a modern aspect of chemistry. May be repeated once for a maximum of 6.0 credits as long as the topic is different. 1 hour lecture, 4 hours lab.

CHEM 491 - Honors Seminar in Chemistry **2 Credits**
Prerequisite(s): Admission to the honors program in chemistry or permission of the chemistry honors committee. Seminars and discussions on selected areas in chemistry under faculty guidance for students enrolled in the honors program in chemistry. 2 hours seminar. 1 hour lecture, 4 hours lab.

CHEM 492 - Honors Thesis in Chemistry **2 Credits**
Prerequisite(s): CHEM 491. Preparation and oral presentation of a comprehensive written thesis in chemistry under guidance of a faculty mentor for completion of the honors program in chemistry. 2 hours lecture. 1 hour lecture, 4 hours lab.

CHEM 495 - The Chemical Literature **1 Credit**
Prerequisite(s): CHEM 340 or CHEM 370 may be taken as prerequisite or corequisite. Introduction to web-based searching of the chemical and biochemical literature databases, including Scifinder Sholar, Science Citation Index, Science Direct, and ACS Search. Course requirements include a literature search paper and a brief seminar. Meets the University Writing Requirement for majors in Chemistry. 3 hours lab.

CHEM 496 - Biochemistry Literature **1 Credit**
Prerequisite(s): CHEM 370. Corequisite(s): CHEM 371. Introduction to searching the biochemistry literature including computerized searches and exploration of on-line journals and interesting internet sites. After becoming familiar with modern methods of information retrieval, students will conduct individual literature searches and do a group presentation. 2 hours lab.

CHEM 498 - Senior Laboratory **3 Credits**
Prerequisite(s): CHEM 311, and 341, and 343. Multi-disciplinary laboratory study of the synthesis, separation, and characterization of chemical compounds. 1 hour lecture, 4 hours lab.

CHEM 499 - Undergraduate Research **1-3 Credits**
Prerequisite(s): CHEM 233, Experimental Chemistry II, and departmental approval. Laboratory research on a specific problem in chemistry under guidance of a faculty mentor.

CHEM 501 - Teaching Chemistry in the Secondary School **3 Credits**
Prerequisite(s): 16 semester hours in chemistry. Study of objectives, recent trends, methods of presentation, courses of study, lesson planning, instructional aids, and subject matter of high school chemistry. 3 hours lecture.

CHEM 510 - Hazardous Materials Management **3 Credits**
Prerequisite(s): CHEM 230 or equivalent. For majors in College of Sciences and Mathematics or instructor's permission. Exploration of the physical and chemical characteristics of hazardous chemicals, hazardous waste, and mixed waste materials. Their sources, handling, transportation, storage, disposal, and regulation. 3 hours lecture.

CHEM 520 - Advanced Inorganic Chemistry **3 Credits**
Prerequisite(s): CHEM 420 or departmental approval. Major topics include: Covalent, ionic and metallic bonding; molecular structure and polarity; Bronsted-Lowry, Lewis, and hard/soft acid and base theory; symmetry and group theory; periodic trends; structures, isomers, ligand field theory, spectra, and reactions of transition metal coordination compounds; bonding and reactions of organometallic compounds; and the biological and medicinal roles of metal ions. Previous course CHEM 521 effective through Spring 2014. 3 hours lecture.

CHEM 525 - Bioinorganic Chemistry **3 Credits**
Prerequisite(s): CHEM 341 (Physical Chemistry II) or instructor's permission. Exploration of the vital roles that metal atoms play in biochemical processes. Transition metal interactions with proteins will be emphasized. The course will focus on the structural, regulatory, catalytic, transport, and oxidation-reduction functions of metal containing biomolecules. 3 hours lecture.

CHEM 530 - Advanced Organic Chemistry **3 Credits**
Prerequisite(s): CHEM 430 or departmental approval. Structure, reactivity and mechanisms in organic chemistry: Topics include bonding, stereochemistry, aromaticity, study of reaction mechanisms and reactive intermediates, linear free energy relationships, pericyclic reactions and organic photochemistry. Previous course CHEM 531 effective through Spring 2014. 3 hours lecture.

CHEM 532 - Organic Synthesis **3 Credits**
Prerequisite(s): CHEM 430 (Advanced Organic Chemistry). Detailed study of the art, methods, and the philosophy of organic synthesis beginning with a review of classical and modern synthetic methods, followed by the planning theory of synthesis and culminating in a study of elegant syntheses in the literature. 3 hours lecture.

CHEM 533 - Biosynthesis of Natural Products **3 Credits**
Prerequisite(s): CHEM 430 (Advanced Organic Chemistry) or equivalent. A study of natural products with emphasis on the biosynthesis of primary and secondary metabolites. 3 hours lecture.

CHEM 534 - Separation and Analysis **3 Credits**
Prerequisite(s): CHEM 310 (Analytical Chemistry) and CHEM 311 (Instrumental Analysis) or equivalents. Theory and practice of major chromatographic and spectroscopic methods; including GC, HPLC, GC-MS, LC-MS/MS, FTIR, DAD- UV-VIS, and NMR. 3 hours lecture.

CHEM 536 - Nuclear Magnetic Resonance: Theory and Practice **3 Credits**
Prerequisite(s): CHEM 310 (Analytical Chemistry) and 311 (Instrumental Analysis) or equivalents. A combination lecture/hands-on course utilizing the department's FT-NMR's to provide students with theoretical background and practical experience in modern 1-D and 2-D FT-NMR. 3 hours lecture.

CHEM 538 - Drug Design in Medicinal Chemistry **3 Credits**
Prerequisite(s): Matriculation into the graduate program or permission of instructor. A comprehensive course covering the design and action of pharmaceutical agents. 3 hours lecture.

CHEM 540 - Advanced Physical Chemistry **3 Credits**
Prerequisite(s): CHEM 341 (Physical Chemistry II) or instructor's permission. In-depth covering of thermodynamic concepts such as state functions and chemical equilibrium, calorimetry, molecular interactions, activities. Introduction to quantum chemistry. 3 hours lecture.

CHEM 542 - Quantum Chemistry and Spectroscopy **3 Credits**
Prerequisite(s): CHEM 540 or departmental approval. Theoretical development of quantum mechanics as applied to chemistry. Application of theoretical procedure to atomic and molecular structure and bonding. Introduction to the theory of molecular spectroscopy. 3 hours lecture.

CHEM 544 - Chemical Thermodynamics and Electrochemistry **3 Credits**
Prerequisite(s): CHEM 540 or departmental approval. In-depth study of classical thermodynamics. Development of thermodynamic functions describing chemical systems in equilibrium, with emphasis on systems of variable composition. Principles and application of electrochemistry, relationship of electrochemical principles to classical thermodynamics, and practical applications of electrochemistry. 3 hours lecture.

CHEM 546 - Chemical Spectroscopy **3 Credits**
Prerequisite(s): CHEM 341 (Physical Chemistry II). Introduction to the theory of molecular spectroscopy. 3 hours lecture.

CHEM 548 - Chemical Kinetics **3 Credits**
Prerequisite(s): CHEM 341 (Physical Chemistry II). Kinetics in its role of elucidating reaction mechanisms. Discussion of recent problems from the chemical literature including fast reactions and enzyme kinetics. 3 hours lecture.

CHEM 550 - Organometallic Chemistry **3 Credits**
Prerequisite(s): CHEM 420 and CHEM 430 or equivalents. The course will introduce students to organometallic chemistry, mainly involving transition metals, but also including some main group metals. The material covered will focus on the unique chemistry of these compounds and their uses in organic synthesis, material science, and as catalysts. 3 hours lecture.

CHEM 560 - Advanced Analytical Chemistry **3 Credits**
Prerequisite(s): CHEM 310 and CHEM 311 or departmental approval. This course builds on existing knowledge of analytical chemistry to develop a deeper understanding of how quality and quantity of data, propagation of errors, and instrumentation and laboratory protocols affect the uncertainty in measurements. This will be tied into the relevance and importance of validation of equipment and protocols and standard laboratory practices, which are discussed in light of requirements from regulatory agencies. 3 hours lecture.

CHEM 570 - Advanced Biochemistry **3 Credits**
Prerequisite(s): CHEM 370 or instructor's permission. Structure, function, and chemistry of proteins, carbohydrates, nucleic acids, and lipids. Analytical methods biochemists use to study metabolism, regulation, binding, and catalytic activity of biomolecules. 3 hours lecture.

CHEM 574 - Protein Structure **3 Credits**
Prerequisite(s): One semester of introductory Biochemistry or similar background. Primary, secondary and tertiary structure of proteins, protein structural motifs and protein structural families. Globular proteins, DNA binding proteins, membrane proteins, signal transduction systems, immune system protein structure, methods used for determination of protein structure. 3 hours lecture.

CHEM 575 - Enzyme Kinetics and Mechanisms **3 Credits**
Prerequisite(s): CHEM 370 or equivalent. The following properties of enzymes are considered: structure, specificity, catalytic power, mechanism of action, multienzyme complexes, kinetics, regulation, and multienzyme systems. 3 hours lecture.

CHEM 576 - Lipid Biochemistry **3 Credits**
Prerequisite(s): CHEM 370 or equivalent. Chemistry of plant and animal lipids, their occurrence, metabolism, and industrial uses. 3 hours lecture.

CHEM 577 - Nucleic Acid Biochemistry **3 Credits**
Prerequisite(s): CHEM 370 or equivalent. This course will present fundamental aspects of nucleic acid biochemistry including structure and biological function and will be organized according to a systematic consideration of techniques used in the study of nucleic acids. Current literature and key topics such as protein-DNA, protein-drug complexes and nucleic acid repair mechanisms will be considered. 3 hours lecture.

CHEM 578 - Biochemistry Laboratory Techniques **3 Credits**
Prerequisite(s): CHEM 370 or equivalent. Fundamental techniques used to isolate, characterize, and study nucleic acids, proteins, carbohydrates, and lipids. Theory and application of buffers, spectrophotometry, tissue fractionation, centrifugation, extraction, chromatographic separations, electrophoresis, radioactivity, enzyme purification and dinetics, enzymatic assays, NMR and MS structure determination. 2 hours lecture, 3 hours lab.

CHEM 579 - Biomolecular Assay Development **3 Credits**
Prerequisite(s): CHEM 370 or instructor's permission. This course will provide the student with hands-on experience of state of the art techniques used for drug discovery research in the pharmaceutical industry. These techniques include assay development for high throughput screening and molecular docking methods for lead discovery. Using these techniques will allow the student to understand the drug discovery process, which includes a dialogue between crystallographers, medicinal chemists, biochemists, and biologists. 2 hours lecture, 3 hours lab.

CHEM 582 - Biochemical Pharmacology **3 Credits**
Prerequisite(s): CHEM 370 and CHEM 371. How drugs interact with, and influence biochemical pathways relevant to disease in the whole organism. Topics covered in this course deal with a review of fundamental concepts in biochemistry relevant to drug discovery, the process of drug discovery and specific examples of drug interactions with biochemical pathways and how they impact human disease. 3 hours lecture.

CHEM 590 - Selected Topics-Advanced Chemistry **3 Credits**
Prerequisite(s): CHEM 341 (Physical Chemistry II) or instructor's permission. An in-depth study of selected areas in either analytical, inorganic, organic or physical chemistry, with special emphasis upon recent developments in the field. May be repeated three times for a maximum of 12 credits as long as the topic is different each time. 3 hours lecture.

CHEM 595 - Graduate Research **1-3 Credits**
Prerequisite(s): Completion of 12 semester hours in this graduate program; instructor's permission. Directed individual laboratory investigation under guidance of faculty advisor. May be elected once or twice, maximum credit allowed is 3 semester hours.

CHEM 598 - Graduate Literature Search **1 Credit**
Prerequisite(s): Completion of 18 semester hours of 500-level courses in the graduate program. Development of and investigation of a topic from the current chemical literature. Selection and refinement of a topic. Collection and preparation of resources and materials and development of an outline in preparation of writing a literature report and giving a formal seminar on the literature search. This course cannot be taken by students electing the Research/Thesis option for their graduate program. This course may be repeated once for a maximum of 2 credits. 2 hours independent study.

CHEM 599 - Graduate Seminar **1 Credit**
Prerequisite(s): CHEM 598. An individual, non-experimental investigation and a formal presentation of scientific literature. 1 hour lecture.

CHEM 698 - Master's Thesis **3 Credits**
Prerequisite(s): Departmental approval. Independent research project done under faculty advisement. Students must follow the MSU Thesis Guidelines, which may be obtained from the Graduate School. Students should take CHEM 699 if they don't complete CHEM 698 within the semester.

CHEM 699 - Master's Thesis Extension **1 Credit**
Prerequisite(s): CHEM 698. Continuation of Master's Thesis Project. Thesis Extension will be graded as IP (in Progress) until thesis is completed, at which time a grade of Pass or Fail will be given.