After completion of the qualifying exam, a doctoral committee is formed. The examination will begin preparation of a research proposal which will outline the student's thesis research. A chemistry student who successfully completes the Ph.D. thesis requirement may be waived upon application to the department head, after completion of the doctoral comprehensive examination.

Students who complete a Bachelor of Science in Chemistry and wish to complete the Bachelor of Arts in Chemistry must complete 3 additional upper division chemistry credits that are not counted in the Bachelor of Science in Chemistry.

All departmental and nondepartmental requirements may not be taken S/U and must earn a C- or better final grade.

This department does not have a foreign language requirement for any of its degrees.

**Graduate Program Information**

The Department of Chemistry and Biochemistry offers programs leading to the MS and Ph.D. degrees in the areas of physical, organic, inorganic, biological, and analytical chemistry. Admission to these programs without deficiency is based on an undergraduate program essentially equivalent to that pursued by a chemistry or biochemistry major at this university. An entering student is encouraged to take the Graduate Record Examination (aptitude) to increase his or her chances for financial support. All foreign students must take GRE and TOEFL and must demonstrate adequate English speaking and writing skills.

Students who wish to take a minor in chemical toxicology or molecular biology. The core course work required of students entering with no previous graduate study in chemistry or biochemistry consists of basic core courses completed in one of the following options:

1. two courses chosen respectively from two of the five major areas represented in the department apart from a student's elected field of thesis research; or
2. one course chosen from the five major areas apart from the student’s elected field of thesis research plus one graduate-level course in a discipline outside the Department of Chemistry and Biochemistry.

A master's candidate will plan an appropriate program of further study with his or her advisor and is also required to prepare a thesis. The thesis requirement may be waived upon application to the department head, after completion of the doctoral comprehensive examination requirements. A chemistry student who successfully completes the Ph.D. qualifying examination will begin writing the cumulative examinations, which constitute the written portion of the comprehensive examination. A biochemistry student who successfully completes the Ph.D. qualifying examination will begin preparation of a research proposal which will be orally defended for completion of the comprehensive examination. After completion of the qualifying exam, a doctoral committee is formed to assist the student in planning a program appropriate to his or her background and goals. Since research is central in both the master's and doctoral programs, the early selection of a research advisor is encouraged. The student is expected to participate in the colloquia and seminar programs. Financial support is available to graduate students in chemistry and biochemistry through numerous teaching and research assistantships as well as federally supported traineeships and fellowships. Inquiries regarding these opportunities should be directed to the head of the department.

**Degrees for the Department**

- Chemistry - Bachelor of Arts
- Biochemistry - Bachelor of Science
- Chemistry - Bachelor of Science
- Chemistry - Master of Science
- Chemistry - Doctor of Philosophy

**Minors for the Department**

- Biochemistry - Undergraduate Minor
- Chemistry - Undergraduate Minor

**Professor William Quintana, Department Head**

Professors Arterburn, Gopalan, Herndon, Johnson, Quintana, Rayson, Smirnov, Zoski; Associate Professors Houston, Lara, Lusetti, Lyons, Maio; Assistant Professors Ashley, Li, Mera, Talipov, Yukl; Adjunct Professors Wollnik; College Professors Chinnasamy, Dunlavy, Potenza, Emeritus Professor Eiceman, Kuehn

W. Quintana, Department Head, Ph.D. (Pennsylvania) – inorganic chemistry; boron chemistry, chemical education; J. B. Arterburn, Ph.D. (Arizona) – organic chemistry; synthetic medicinal and chemical biology; A. K. Ashley, Ph.D. (Colorado State University) – biochemistry and toxicology; DNA replication and repair; cancer; A. S. Gopalan, Ph.D. (Ohio State University) – organic chemistry; synthetic methods, applications of enzymes in asymmetric synthesis; J. W. Herndon, Ph.D. (Princeton) – organic chemistry; organo-transition metal complexes, synthesis of biologically important cyclic compounds; K. D. Houston, Ph.D. (University of Texas- MD Anderson) – biochemistry; molecular mechanisms of hormone action in tumorigenesis; M. D. Johnson, Ph.D. (New Mexico State University) – inorganic chemistry; kinetics, reaction mechanisms of transition metal complexes; A. S. Lara, Ph.D. (New Mexico State University) – analytical chemistry; exploitation of clays for remediation of environmental pollutants; F. Li, Ph.D. (Minnesota) – inorganic chemistry; bio-inorganic chemistry, small molecule activation; S. L. Lusetti, Ph.D. (Wisconsin–Madison) – biochemistry; enzymology of DNA repair; B. A. Lyons, Ph.D. (Cornell University) – physical biochemistry; NMR spectroscopic studies of signal transduction pathways in breast cancer; W. A. Maio, Ph.D. (Johns Hopkins University) – organic chemistry; total synthesis of marine natural products and explorations of new chemical methods; P. E. Mera, Ph.D. (Wisconsin–Madison) – biochemistry and microbiology; cell-division cycle of bacteria, DNA replication; G. D. Rayson, Ph.D. (Texas-Austin) – analytical chemistry, spectroscopy; S. N. Smirnov, Ph.D. (Novosibirsk State University) – physical chemistry; photo-induced charge separation; M. R. Talipov, Ph.D. (Bashkir State University) – Theoretical Physical Chemistry; electronic structure calculations, ab initio calculations, density functional theory calculations; E. T. Yukl, Ph.D. (Oregon Health and Science University) – biochemistry; x-ray crystallography and spectroscopy
Biochemistry Courses

BCHE 140. Introduction to Biochemistry
1 Credit (1)
A description of the nature of inquiry in biochemistry, especially with respect to the interaction of chemistry and biology. Both historical development and topics of current interest will be discussed. Graded S/U.

BCHE 241. Introduction to Research in Biochemistry
1-3 Credits
Techniques and procedures of biochemical research. May be repeated for a maximum of 3 credits.
Prerequisites: 8 credits of chemistry and 3.0 GPA in chemistry.

BCHE 341. Survey of Biochemistry
4 Credits (3+3P)
Basic principles of biochemical processes and the structure/function of the major classes of biomolecules, with introductions to metabolism and the central dogma of biochemistry. The chemical and biological properties of major biomolecules (DNA, proteins, Prerequisite(s): C or better in CHEM 211 or CHEM 313.

BCHE 395. Biochemistry I
3 Credits (3)
Principles governing chemistry and physics of life processes with emphasis on the relationships between molecular structure and cell function. Basic principles of biochemical processes, enzymology, and the structure/function of the major classes of biomolecules with introductions to metabolism. Introduction to catabolic metabolism. Prerequisite(s): C or better in CHEM 314.

BCHE 396. Biochemistry II
3 Credits (3)
Introduction to anabolic metabolism and hormonal regulation. Biochemical principles of the mechanism and regulation of replication, transcription, recombination and translation in prokaryotes and eukaryotes. Introduction to DNA-based information technology. Taught with BCHE 396 H. Prerequisite(s): C or better in BCHE 395.

BCHE 396 H. Biochemistry II Honors
3 Credits (3)
Taught with BCHE 396 with additional work required.

BCHE 397. Experimental Biochemistry Laboratory
3 Credits (3)
Introduction to fundamental techniques used to explore structure and function of biological macromolecules such as proteins, carbohydrates, lipids, and nucleic acid. Course covers analyzing and reporting experimental data, enzymology; quantitative methods to determine biological molecules; basic principles of electrophoresis, chromatography, and spectroscopic immunochemistry.
Prerequisite: C or better in BCHE 395.
Corequisite: BCHE 396.

BCHE 432. Physical Biochemistry
3 Credits (3)
This course focuses on modern Biophysical techniques used in protein and nucleic acid research. Topics are covered in some detail at the theoretical level. The course content is delivered entirely by podcast. Podcast contributions are from several different faculty from within their particular area(s) of expertise. Topics covered include (but are not limited to): biomolecular NMR, atomic force microscopy, light scattering, circular dichroism, ultracentrifugation, isothermal titration calorimetry, positron emission tomography, computerized tomography, ultrasound, functional MRI, protein fluorescence, mass spec/ proteomics, protein molecular dynamics simulations, and X-ray diffraction. Course credit qualifies for minor degree in chemistry as a physical-analytical chemistry emphasis. CHEM 431, or CHEM 433.
Prerequisite: One semester of undergraduate physical chemistry, e.g.

BCHE 440. Biochemistry Seminar
1 Credit (1)
Introduction to current literature in biochemistry and molecular biology. Selected topics in the field will be presented by the faculty. Students will present written and oral reports from literature searches. Restricted to: BCHE majors.
Prerequisite(s): BCHE 395.

BCHE 441. Advanced Research in Biochemistry
1-3 Credits
Investigation of biochemical problems and the development of special techniques. May be repeated for a maximum of 3 credits.
Prerequisites: consent of instructor, 16 credits of chemistry and 3.0 GPA in chemistry for nonmajors.

BCHE 446. Biochemistry III
3 Credits (3)
Intermediary metabolism of carbohydrates, lipids, amino acids, and nucleic acids. Metabolic pathways discussed with emphasis on biochemical regulation and mechanistic, structural, functional, and evolutionary basis for existence.
Prerequisite(s): BCHE 395 and either BCHE 396 or consent of instructor.

BCHE 451. Special Topics
1-3 Credits
Same as CHEM 451. May be repeated for a maximum of 12 credits.
Prerequisite: consent of instructor.

BCHE 455. Independent Studies
1-3 Credits
Independent studies directed by consulting faculty.
Prerequisite: consent of instructor.

BCHE 494. Biochemical Genetics Laboratory
3 Credits (1.25+6P)
Laboratory techniques required for experimentation with recombinant DNA such as nucleic acid isolation and purification, polymerase chain reaction (PCR), sequence analysis, and directed mutagenesis using genetic material from both prokaryotic and eukaryotic organisms. Consent of Instructor required.
Prerequisite(s): C or better in BCHE 395 and BCHE 396 or GENE 315, and consent of instructor.

BCHE 540. Seminar in Biochemistry
1 Credit (1)
Formal seminar presentation in current topics in biochemical research. May be repeated for a maximum of 3 credits.
BCHE 542. Biochemistry I
3 Credits (3)
Relationship between macromolecular structure and function. Basic enzymology. Energy metabolism.
**Prerequisite(s):** CHEM 314 and CHEM 431 or CHEM 433; or BCHE 395 or equivalent.

BCHE 545. Molecular and Biochemical Genetics
3 Credits (3)
An accelerated treatment of the molecular basis of gene expression. Discussion of chemical, enzymological, and genetic techniques of molecular biology. Same as BIOL 545.
**Prerequisite:** BCHE 542 or equivalent.

BCHE 546. Biochemistry II
3 Credits (3)
Intermediary metabolism: catabolic and anabolic pathways of carbohydrates, lipids, amino acids, and nucleic acids, including their regulation.
**Prerequisite:** BCHE 542 or BCHE 395 with consent of instructor.

BCHE 590. Discussions in Biochemistry
1 Credit (1)
Current research problems in biochemistry. May be repeated for a maximum of 6 credits. S/U Grading (S/U, Audit).

BCHE 598. Special Research Programs
1-3 Credits
May be repeated for a maximum of 6 credits. Same as CHEM 598. Graded S/U.

BCHE 599. Master's Thesis
15 Credits
May be repeated for a maximum of 6 credits. Same as CHEM 599.

BCHE 600. Research
1-15 Credits
May be repeated for a maximum of 20 credits. PR/U grading. Same as CHEM 600.

BCHE 647. Physical Biochemistry
3 Credits (3)
Fundamental applications of physical chemistry to the investigation of biological metabolites and biological macromolecules, including proteins, oligo-nucleotides, and molecular arrays with an emphasis on understanding biological functions based on chemical structures. Taught with BCHE 451.
**Prerequisite(s):** 'C' or better in CHEM 431 or CHEM 433 or BCHE 542.

BCHE 649. Topics in Biochemistry
1-3 Credits
Selected topics of current interest designated by title and credit. May be repeated for a maximum of 3 credits.

BCHE 650. Advanced Seminar
1 Credit (1)
Discussion of biochemical research in progress that relates to a doctoral candidate's thesis research. Intended for students who have earned a master's degree or the equivalent and has made significant research progress for preparation of the doctoral dissertation. May be repeated for a maximum of 3 credits.

BCHE 700. Doctoral Dissertation
20 Credits
May be repeated for a maximum of 20 credits. Graded PR/U. Same as CHEM 700.

**Chemistry Courses**

CHEM 100. Basic Chemistry
3 Credits (3)
For students whose preparatory science or math training has been deficient. Does not meet the chemistry requirement in any curriculum.
**Prerequisite:** Enhanced ACT composite score of at least 18 or a grade of C or better in CCDM 114 N.

CHEM 101. General Supplemental Instruction I
1 Credit (1)
Collaborative workshop for students in General Chemistry I. Course does not count toward departmental degree requirements. May be repeated for a maximum of 2 credits.
**Corequisite:** CHEM 111G.

CHEM 102. General Supplemental Instruction II
1 Credit (1)
Collaborative workshop for students in General Chemistry II. Course does not count toward departmental degree requirements. May be repeated for a maximum of 2 credits.
**Corequisite:** CHEM 112G.

CHEM 103. Principles of Supplemental Instruction III
1 Credit (1)
Collaborative workshop for students in CHEM 110G, Principles and Applications of Chemistry. Course does not count toward departmental degree requirements. May be repeated for maximum of 2 credits.
**Co-requisite:** CHEM 110G.

CHEM 110G. Principles and Applications of Chemistry
4 Credits (3+3P)
A survey of the properties and uses of the elements and their compounds. In addition to classical chemistry, attention is paid to the materials from which consumer products are made, to the production of energy, and to environmental considerations.
**Prerequisite:** 3 years of high school math or CCDM 114N.

CHEM 111G. General Chemistry I
4 Credits (3+3P)
Descriptive and theoretical chemistry. CHEM 111G/112G are General Education alternative to CHEM 110G.
**Prerequisite:** (1) grade of C or better in MATH 120 or a Mathematics Placement Exam Score adequate to enroll in mathematics courses beyond MATH 120; and (2) one of the following: B or better in a second semester high school chemistry course, or grade of at least C in CHEM 100, or an enhanced ACT score of at least 22.

CHEM 112G. General Chemistry II
4 Credits (3+3P)
Descriptive and theoretical chemistry. CHEM 111G/112G are General Education alternative to CHEM 110G.
**Prerequisite(s):** CHEM 111G.

CHEM 115. Principles of Chemistry I
4 Credits (3+3P)
Detailed introduction to analytical, inorganic and physical aspects of chemistry; both descriptive and theoretical explanations. Structured for chemistry and biochemistry majors but appropriate for other physical and life science students. CHEM 115/116 are General Education alternatives to CHEM 110G.
**Prerequisite:** Eligible to take MATH 190G and an ACT composite score of 22 or higher.
CHEM 116. Principles of Chemistry II
4 Credits (3+3P)
Recommended for chemistry majors and other qualified students.
CHEM 115/116 are General Education alternatives to CHEM 110G.
Prerequisites: grade of C or better in CHEM 115.

CHEM 210. Chemistry for the Allied Health Sciences
3 Credits (3)
Discussion and application of the established facts and concepts of general organic chemistry and biochemistry to acquire a molecular understanding of a variety of health related issues, from atmospheric ozone holes to human nutrition.
Prerequisite: CHEM 110G or CHEM 111G.

CHEM 211. Organic Chemistry
4 Credits (3+3P)
A one-semester survey for students requiring a brief coverage of important classes of organic compounds. May be repeated up to 4 credits.
Prerequisite(s): CHEM 112G.

CHEM 217. General Chemistry III
3 Credits (2+3P)
Quantitative aspects of general chemistry: solid state structure, equilibrium, thermodynamics, and kinetics. Required of chemical science majors who have taken CHEM 111G/112.
Prerequisite: CHEM 112G.

CHEM 241. Introduction to Research
1-3 Credits (3+9P)
Techniques and procedures of chemical research. May be repeated for a maximum of 3 credits.
Prerequisites: 8 credits of chemistry and a 3.0 GPA in chemistry.

CHEM 242. Explorations in Chemistry
1 Credit (1)
Historical and current developments, careers in chemistry, computer applications and use of the library by chemists. To be completed before the end of the sophomore year. Graded S/U.

CHEM 251. Special Topics in Chemistry
1-6 Credits (1-6)
Specific subjects in Chemistry. These subjects will be announced in the Schedule of Classes. It may be repeated under different topics for a maximum of 12 credits.

CHEM 303. Organic Supplemental Instruction I
1 Credit (1)
Collaborative workshop for students in Organic Chemistry I. Course does not count toward departmental degree requirements. May be repeated for a maximum of 2 credits.
Corequisite: CHEM 313.

CHEM 304. Organic Supplemental Instruction II
1 Credit (1)
Collaborative workshop for students in Organic Chemistry II. Course does not count toward departmental degree requirements. May be repeated for a maximum of 2 credits.
Corequisite: CHEM 314.

CHEM 313. Organic Chemistry I
3 Credits (3)
Nomenclature, uses, basic reactions, and preparation methods of the most important classes of aliphatic and aromatic compounds.
Prerequisite: CHEM 112G or CHEM 116.

CHEM 314. Organic Chemistry II
3 Credits (3)
Nomenclature, uses, basic reactions, and preparation methods of the most important classes of aliphatic and aromatic compounds.
Prerequisite: C or better in CHEM 313.

CHEM 315. Organic Chemistry Laboratory
2 Credits (6P)
Techniques, preparative and analytical methods in organic chemistry.
Prerequisite: C or better in CHEM 313 or consent of instructor.
Corequisite: CHEM 314.

CHEM 351. Special Topics
1-3 Credits
Specific subjects to be announced in the Schedule of Classes. May be repeated for a maximum of 12 credits.
Prerequisite: consent of instructor.

CHEM 356. Descriptive Inorganic Chemistry
3 Credits (3)
Occurrence and properties of the elements and the chemistry of their compounds. May be repeated up to 3 credits.
Prerequisite(s): CHEM 112G or CHEM 116 and CHEM 211 or CHEM 313.

CHEM 357. Synthetic Inorganic Laboratory
2 Credits (6P)
Explores synthesis and analysis of main group and transition metal inorganic compounds. Inorganic laboratory and spectroscopic techniques will be used.
Prerequisites: CHEM 356.

CHEM 360. General Geochemistry
3 Credits (3)
Same as GEOL 360.

CHEM 371. Analytical Chemistry
4 Credits (2+6P)
The fundamentals of quantitative chemical analysis. May be repeated up to 4 credits.
Prerequisite(s): CHEM 112G or CHEM 116.

CHEM 422. Environmental Chemistry
3 Credits (3)
Chemistry of organic and metal ion pollutants in the environment and principles important to their remediation including bioremediation. Restricted to: Main campus only. Crosslisted with: E S 422
Prerequisite(s): CHEM 112G and either CHEM 211 or CHEM 313.

CHEM 424. Soil Chemistry
3 Credits (3)
Same as SOIL/GEOL 424.

CHEM 431. Physical Chemistry
3 Credits (3)
Principles that govern the physical and chemical behavior of matter. May not be counted toward Bachelor of Science degree in Chemistry.
Prerequisite(s): CHEM 116 or CHEM 217; MATH 192G; PHYS 212 or PHYS 222G or PHYS 214 or PHYS 216G.

CHEM 431 H. Physical Chemistry Honors
3 Credits (3)
Same as CHEM 431. Additional work to be arranged.
Prerequisite(s): CHEM 116 or CHEM 217; MATH 192G or PHYS 212 or PHYS 222G or PHYS 214 or PHYS 216G.
CHEM 433. Physical Chemistry I  
3 Credits (3)  
Laws and theories underlying chemical phenomena.  
Prerequisite(s): CHEM 116 or CHEM 217; MATH 192G; PHYS 214 or PHYS 216G, or consent of instructor.  

CHEM 433 H. Physical Chemistry I Honors  
3 Credits (3)  
Same as CHEM 433. Additional work to be arranged.  
Prerequisite(s): CHEM 116 or CHEM 217; MATH 192G; PHYS 214 or PHYS 216G, or consent of instructor.  

CHEM 434. Physical Chemistry II  
3 Credits (3)  
Laws and theories underlying chemical phenomena.  
Prerequisite: CHEM 302 or CHEM 433.  

CHEM 435. Physical Chemistry Laboratory  
2 Credits (6P)  
Prerequisite: concurrent registration in CHEM 434.  

CHEM 441. Advanced Research  
1-3 Credits (3+9P)  
Investigation of chemical problems and the development of special techniques. May be repeated for a maximum of 3 credits.  
Prerequisites: consent of instructor, 16 credits of chemistry and 3.0 GPA in chemistry for nonmajors.  

CHEM 443. Senior Seminar  
1 Credit (1)  
Discussions of current chemical research, impact of chemistry on society and/or ethics as applied to chemists. Each student will present a written and an oral report on an approved topic.  
Prerequisite: CHEM 431 or CHEM 433.  

CHEM 451. Special Topics  
1-3 Credits  
Specific subjects to be announced in the Schedule of Classes. May be repeated for a maximum of 12 credits.  
Prerequisite: consent of instructor.  

CHEM 455. Independent Studies  
1-3 Credits  
Independent studies directed by consulting faculty.  
Prerequisite: consent of instructor.  

CHEM 456. Inorganic Structure and Bonding  
3 Credits (3)  
Theoretical principles and a systematic study of the periodic table.  
Prerequisite: CHEM 356 or CHEM 431 or CHEM 433.  

CHEM 466. Advanced Organic Chemistry  
3 Credits (3)  
Recent developments in synthesis and theoretical principles of organic chemistry.  
Prerequisite: CHEM 314.  

CHEM 466 H. Advanced Organic Chemistry Honors  
3 Credits (3)  
Same as CHEM 466. Additional work to be arranged.  

CHEM 471. Instrumental Methods of Analysis  
4 Credits (3+3P)  
Analytical techniques, including optical and procedures.  
Prerequisites: CHEM 371 and either PHYS 212G or PHYS 216G.  

CHEM 500. Seminar in Inorganic Chemistry  
1 Credit (1)  
Current topics. May be repeated.  

CHEM 507. Chemistry of the Elements  
3 Credits (3)  
Discussion of the reactions and structures of inorganic compounds.  

CHEM 510. Seminar in Organic Chemistry  
1 Credit (1)  
Current topics. May be repeated.  

CHEM 514. Organic Structure Determination  
3 Credits (3)  
Modern spectroscopic techniques for characterization of organic compounds.  

CHEM 515. Modern Organic Chemistry  
3 Credits (3)  
Recent developments in synthesis and theoretical principles of organic chemistry.  

CHEM 516. Physical Organic Chemistry  
3 Credits (3)  
Physical organic chemistry.  

CHEM 517. Synthetic Organic Chemistry  
3 Credits (3)  
Synthetic methods in organic chemistry.  

CHEM 520. Seminar in Analytical Chemistry  
1 Credit (1)  
Current topics. May be repeated.  

CHEM 521. Chemical Instrumentation  
3 Credits (2+3P)  
Theory and application of electronic devices to chemical analysis.  

CHEM 526. Advanced Analytical Chemistry  
3 Credits (3)  
Equilibria, and the theories of gravimetric, volumetric, and instrumental analysis.  

CHEM 527. Separations  
3 Credits (3)  
Covers the fundamentals of separation methods and relationships to modern analytical techniques such as gas chromatography and liquid chromatography.  

CHEM 528. Electroanalytical Techniques  
3 Credits (3)  
Theory and application of modern electrochemical methods of analysis including voltammetry, amperometry, modern cyclic and pulse methods, and stripping analysis.  

CHEM 529. Spectrochemical Analysis  
3 Credits (3)  
Fundamentals, instrumentation, and applications of spectrochemical analysis.  

CHEM 530. Seminar in Physical Chemistry  
1 Credit (1)  
Current topics. May be repeated.  

CHEM 536. Chemical Thermodynamics  
3 Credits (3)  
First, second, and third laws of thermodynamics, and the concepts, interrelations, and applications of thermodynamic state functions.  

CHEM 537. Quantum Chemistry  
3 Credits (3)  
Fundamentals of quantum mechanics.  
Prerequisite: consent of instructor.
CHEM 538. Chemical Kinetics
3 Credits (3)
Empirical analysis of rate measurements, collision theory, transition state theory, and chain reactions.

CHEM 539. Spectroscopy
3 Credits (3)
Molecular spectroscopy for physical chemistry. Quantum mechanics applied to spectroscopy of polyatomic molecules: UV-VIs, IR, magnetic resonance. CHEM 537 desired but not required. Prerequisite: consent of instructor.

Prerequisite: consent of instructor.

CHEM 560. Discussions in Organic Chemistry
1 Credit (1)
Current research problems in organic chemistry. May be repeated. Graded S/U.

CHEM 570. Discussions in Analytical Chemistry
1 Credit (1)
Current research problems in analytical chemistry. May be repeated. Graded S/U.

CHEM 580. Discussions in Physical Chemistry
1 Credit (1)
Current research problems in physical chemistry. May be repeated. Graded S/U.

CHEM 598. Special Research Programs
1-3 Credits
Individual investigations, either analytical or experimental. Graded S/U.

CHEM 599. Master's Thesis
15 Credits
Thesis preparation.

CHEM 600. Research
1-15 Credits
Course used for assigning credit for research performed prior to successful completion of the doctoral qualifying examination.

CHEM 609. Topics in Inorganic Chemistry
1-3 Credits
Selected topics of current interest designated by subtitle.

CHEM 619. Topics in Organic Chemistry
1-3 Credits
Selected topics of current interest designated by subtitle.

CHEM 629. Advanced Topics in Analytical Chemistry
3 Credits (3)
Discussion of advanced topics in the field of analytical chemistry. May be repeated with different subtitles. Consent of instructor required.

CHEM 639. Topics in Physical Chemistry
1-3 Credits
Selected topics of current interest designated by subtitle.

CHEM 650. Advanced Seminar
1 Credit (1)
Intended for students who have earned a master's degree or the equivalent. A discussion of current topics of interest in chemistry. May be repeated.

CHEM 700. Doctoral Dissertation
17 Credits
Dissertation preparation.

Phone: (575) 646-2505