Chemistry

**CHEM 5314** Advanced Physical Chemistry (3 semester credit hours) Modern concepts from the three pillars of physical chemistry: quantum mechanics, thermodynamics/statistical mechanics, and kinetics. Prerequisite: Undergraduate physical chemistry or instructor consent required. (3-0) Y

**CHEM 5331 (MSEN 5331)** Advanced Organic Chemistry I (3 semester credit hours) Modern concepts of bonding and structure in covalent compounds. Static and dynamic stereochemistry and methods for study. Relationships between structure and reactivity. Prerequisite: Undergraduate organic chemistry or instructor consent required. (3-0) Y

**CHEM 5333 (MSEN 5333)** Advanced Organic Chemistry II (3 semester credit hours) Application of the principles introduced in **CHEM 5331**, emphasizing their use in correlating the large body of synthetic/preparative organic chemistry. Prerequisite: **CHEM 5331** or **MSEN 5331**. (3-0) R

**CHEM 5340 (BMEN 6360 and MSEN 5340)** Advanced Polymer Science and Engineering (3 semester credit hours) Polymer structure-property relations, Glass transition temperature and mechanical properties of polymers, Thermoplastics, thermosets, and elastomers, morphology of polymers, rheology of polymers, biodegradable and biocompatible polymers for drug delivery and tissue engineering applications. (3-0) R

**CHEM 5341 (MSEN 5341)** Advanced Inorganic Chemistry I (3 semester credit hours) Physical inorganic chemistry addressing topics in structure and bonding, symmetry, acids and bases, coordination chemistry and spectroscopy. Prerequisite: Undergraduate inorganic chemistry or instructor consent required. (3-0) Y

**CHEM 5343** Advanced Inorganic Chemistry II (3 semester credit hours) Builds on **CHEM 5341** to explore the synthesis and reactivity of inorganic/organometallic molecules. Practical applications will be demonstrated by discussing industrial processes catalyzed by metal complexes. Prerequisite: **CHEM 5341**. (3-0) R

**CHEM 5355 (MSEN 5355)** Analytical Techniques I (3 semester credit hours) Study of fundamental analytical techniques, including optical spectroscopic techniques, mass spectrometry, and microscopic and surface analysis methods. (3-0) Y

**CHEM 5356 (MSEN 5356)** Analytical Techniques II (3 semester credit hours) Study of chromatography (GC, LC, CZE), statistical methods (standard tests and ANOVA), chemical problem solving, and modern bio/analytical techniques such as biochips, microfluidics, and MALDI-MS. Prerequisite: **CHEM 5355** or instructor consent required. (3-0) R

**CHEM 5361** Advanced Biochemistry (3 semester credit hours) Modern concepts in biochemistry addressing topics in bioenergetics as well as the structure, function, and interaction of macromolecules. Prerequisite: **CHEM 3361** or **BIOL 3361** or equivalent. (3-0) Y

**CHEM 5V84** Special Topics in Chemistry - Science and Mathematics Education (1-9 semester credit hours) Various special topics in chemistry of interest to teachers will be discussed. May not be used to fulfill degree requirements for the MS or PhD degrees except those in the Master of Arts in Teaching (MAT) program. May be repeated for credit. Instructor consent required. ([1-9]-0) R
CHEM 5V87 Independent Study in Chemistry (1-9 semester credit hours) In conjunction with a member of the Chemistry faculty, the student will develop a paper or project which emphasizes the ways in which chemical knowledge is confirmed and extended or which leads to improved instruction in chemistry. May not be counted as credit toward the MS or PhD degrees. May be repeated for credit (9 semester credit hours maximum). Instructor consent required. ([1-9]-0) R

CHEM 6100 Chemistry Department Seminar (1 semester credit hour) A weekly seminar that features accounts of current research by outstanding investigators in chemistry and related scientific areas. Course not eligible for audit. Pass/Fail only. May be repeated for credit. Prerequisite: Graduate standing in chemistry. (1-0) S

CHEM 6317 Industrial Chemistry (3 semester credit hours) Survey of chemical industry including commodities, chemical processes, scale-up and process development, environmental concerns, patents. Study of chemical engineering principles. (3-0) R

CHEM 6361 Physical Biochemistry (3 semester credit hours) Protein structure, fundamental metabolism, structures and properties of macromolecules, interactions with electromagnetic radiation, thermodynamics of macromolecular solutions, transport processes, and other topics. Instructor consent required. (3-0) R

CHEM 6372 Materials Science (3 semester credit hours) Relationship between the properties and behavior of materials and their internal structure. Treatment of the mechanical, thermal and electrical properties of crystalline and amorphous solids including metals, ceramics, synthetic polymers and composites. Instructor consent required. (3-0) R

CHEM 6383 Computational Chemistry (3 semester credit hours) The application of computer techniques to the understanding of molecular structure and dynamics: force field, semi-empirical, ab initio, and molecular dynamics techniques. Information retrieval from large structural databases and use of this information. Instructor consent required. (3-0) R

CHEM 6389 Scientific Literature and Communication Skills (3 semester credit hours) Acquaints students with techniques for searching the scientific literature using hard copy and electronic approaches. Introduces students to important steps in creating and improving technical communications in both written and oral formats. (3-0) Y

CHEM 6V19 Special Topics in Physical Chemistry (1-9 semester credit hours) Examples of topics include spectroscopy, quantum mechanics, computational chemistry, and surface chemistry. May be repeated for credit as topics vary. Prerequisite: CHEM 5314 or instructor consent required. ([1-9]-0) R

CHEM 6V39 Special Topics in Organic Chemistry (1-9 semester credit hours) Examples of topics include organic photochemistry, organometallic chemistry, homogeneous and heterogeneous catalysis, solid state, polymer chemistry, and advanced NMR techniques. May be repeated for credit as topics vary. Prerequisites: CHEM 5331 and instructor consent required. ([1-9]-0) R

CHEM 6V49 Special Topics in Inorganic Chemistry (1-9 semester credit hours) Examples of topics include physical methods of inorganic chemistry, and bioinorganic chemistry. May be repeated for credit as topics vary. Prerequisites: CHEM 5341 and instructor consent required. ([1-9]-0) R
CHEM 6V59 Special Topics in Analytical Chemistry (1-9 semester credit hours) Examples of topics include NMR, X-ray crystallography. May be repeated for credit as topics vary. Prerequisites: CHEM 5355 and instructor consent required. ([1-9]-0) R

CHEM 6V69 Special Topics in Biochemistry (1-9 semester credit hours) May be repeated for credit as topics vary. Instructor consent required. ([1-9]-0) R

CHEM 6V79 Special Topics in Materials Chemistry (1-9 semester credit hours) Examples of topics include polymers, membrane technology, zeolites, nanoscience and technology. May be repeated as topics vary. Instructor consent required. ([1-9]-0) R

CHEM 6V84 Special Topics in Applied Chemistry (1-9 semester credit hours) May be repeated for credit as topics vary. Instructor consent required. ([1-9]-0) R

CHEM 8V91 Research in Chemistry (2-9 semester credit hours) Pass/Fail only. May be repeated for credit. Instructor consent required. ([2-9]-0) S

CHEM 8V98 Thesis (1-9 semester credit hours) Pass/Fail only. May be repeated for credit. Instructor consent required. ([1-9]-0) S

CHEM 8V99 Dissertation (1-9 semester credit hours) Pass/Fail only. May be repeated for credit. Instructor consent required. ([1-9]-0) S