Chemistry Building Room 238
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www.txstate.edu/chemistry (http://www.txstate.edu/chemistry/)

The study of chemistry provides the essential knowledge needed to address many of society's most pressing needs, such as clean water, tapping new sources of energy, improving health and conquering disease, providing renewable substitutes for dwindling resources, strengthening our national security, and monitoring and protecting our environment.

Chemists and biochemists find careers in research, production, teaching, quality control, technical services, and/or sales. Graduates from the Department of Chemistry and Biochemistry have an excellent record of job placement in industrial, academic, and government positions. Many also seek advanced degrees or pursue careers in medicine, dentistry, pharmacy or other health-related professions.

The department fosters innovative research programs that expand knowledge through discovery and development, actively contribute to the broader scientific community, and address critical global needs. We are committed to the professional development and mentoring of a diverse and inclusive community of faculty, staff, and students.

Students are encouraged to actively engage in undergraduate research, and to work as laboratory instructors, learning assistants, and supplemental instructors for lower division courses. Students may also participate in internships and research programs both on and off campus, particularly during the summer.

The faculty, facilities, library holdings, and chemistry curriculum of the Department of Chemistry and Biochemistry have been accredited by the American Chemical Society. Recipients of a B.S. major in Chemistry or B.S. major in Biochemistry who have fulfilled the minimum requirements for professional chemists are awarded certification by the American Chemical Society. Receipt of the ACS certificate is recommended as preparatory training for work in industry or for continued graduate studies in chemistry or biochemistry. The Biochemistry program is also accredited by the American Society for Biochemistry and Molecular Biology and recipients of a B.S. major in Biochemistry are awarded an ASBMB certified degree upon successful completion of a scored examination. Students interested in careers in medicine, dentistry, pharmacy, or as physician's assistants are encouraged to choose a corresponding minor in Pre-Dental, Pre-Medical, Pre-Pharmacy, or Pre-Physician Assistant Studies to prepare for post-graduate professional degrees.

Students seeking a B.S. major in Chemistry begin their studies taking foundation courses in chemistry, physics and mathematics. After completion of the foundation courses, students take advanced courses and laboratories in physical chemistry, analytical chemistry, inorganic chemistry and organic chemistry. A minor is required for this degree. (Chemistry majors are not allowed to double major in Biochemistry or choose a Minor in Biochemistry.)

Students seeking a B.S. major in Biochemistry begin their studies taking foundation courses in chemistry, biology, physics and mathematics. After completion of the foundation courses, students take advanced courses and laboratories to gain knowledge and experience in the modern techniques of biochemistry and molecular genetics. The Biochemistry curriculum meets the standards set by the American Society for Biochemistry and Molecular Biology. A minor is required for this degree. (Biochemistry majors are not allowed to double major in Chemistry or choose a Minor in Chemistry.)

Qualified chemistry or biochemistry majors completing their junior year of chemistry courses who plan to pursue advanced studies have the opportunity to complete both B.S. and M.S. degrees with one additional year of course work and research after receipt of a B.S. degree. Students must be active in undergraduate research prior to their senior year to be eligible for the program.

Teacher Certification

Students may earn a Chemistry (Grades 7-12) certification in Texas, while pursuing a double major with a B.S. major in Chemistry and a B.S. major in Education. Initial or additional certification may also be acquired as a post-baccalaureate or graduate student. Students interested in certification should meet with their academic advisor early in their undergraduate program or certification process.

Bachelor of Science (B.S.)

- Major in Biochemistry (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/biochemistry-bs/)
- Major in Biochemistry (American Chemical Society approved program) (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/biochemistryacs-bs/)
- Major in Chemistry (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/chemistry-bs/)
- Major in Chemistry (Secondary Education; Teacher Certification in Chemistry, Grades Seven through Twelve, with Double Major in B.S. Education) (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/chemistry-teacher-certification-grades-7-12-bs/)

Bachelor of Science (B.S.) and Master of Science (M.S.)

- Major in Biochemistry (Early-Entry Program) (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/biochemistry-early-entry-combined-program-bs-ms/)
- Major in Chemistry (Early-Entry Program) (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/chemistry-early-entry-combined-program-bs-ms/)

Minors

- Biochemistry (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/biochemistry-minor/)
- Chemistry (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/chemistry-minor/)
- Second Teaching Field in Chemistry (Grades 7-12) (http://mycatalog.txstate.edu/undergraduate/science-engineering/chemistry-biochemistry/second-teaching-field-chemistry/)

Courses in Chemistry (CHEM)

CHEM 1135. Engineering Chemistry Laboratory.
This laboratory course is designed to accompany CHEM 1335. This course introduces students to experimental measurements and the study of thermodynamics, kinetics, and equilibria. Corequisite: CHEM 1335 with a grade of "C" or better.
1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1109

CHEM 1141. General Chemistry Laboratory I.
First of two laboratory courses in general chemistry for science-related majors. Course introduces the students to the basics of experimental measurements, including density, separation techniques, formula determinations, titrations, thermodynamics, gas laws, and descriptive chemistry. Corequisite: CHEM 1310 or CHEM 1341 either with a grade of "D" or better.
1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1111

CHEM 1142. General Chemistry Laboratory II.
Second of two laboratory courses in general chemistry. Laboratory techniques are emphasized, and applied to both qualitative and quantitative analysis. Prerequisites: CHEM 1141 and CHEM 1341 both with grades of "D" or better. Corequisite: CHEM 1342 with a grade of "D" or better.
1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1112

CHEM 1310. Introductory Chemistry for Non-Science Majors.
A one semester principles course for students in non-science related majors, this course covers the major concepts of chemistry and the role of chemistry in contemporary society. (It is not intended as an introductory course for general chemistry or for science majors.).
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Life & Phys Sciences Core 030|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1305

CHEM 1320. Foundations of Chemistry.
This course is a preparatory course for CHEM 1335 and CHEM 1341. It provides a background in fundamental chemical mathematics, in writing and understanding chemical formulas and equations and in the application of scientific laws in the behavior of matter from macro to atomic levels. Students have the option to complete online ALEKS modules and test out of this course. Corequisite: [MATH 1315 or MATH 1317 or MATH 1319 or MATH 1329 or MATH 2321 or MATH 2417 or MATH 2471 any with a grade of "C" or better] or [ACT Mathematics score of 24 or better] or [SAT Mathematics score of 550 or better] or [Accuplacer College Mathematics score of 86 or better] or [Compass College Algebra score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Life & Phys Sciences Core 030|Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 1330. Chemistry for Non-Science Majors.
This is the second of two lecture courses for non-science majors. The course surveys organic and biochemistry and current topics which may include energy-related topics, nuclear chemistry, environmental chemistry, medicinal chemistry, and synthetic and natural polymers. Prerequisite: CHEM 1310 or CHEM 1341 either with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Life & Phys Sciences Core 030|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1307

CHEM 1335. Engineering Chemistry.
This course is a one-semester lecture course that focuses on engineering-related applications. Topics include stoichiometry, gases, chemical bonding and structure, periodic trends, materials, energy, kinetics, equilibrium, and electrochemistry. Prerequisite: [[MATH 1315 or MATH 1317 or MATH 1319 or MATH 1329 or MATH 2321 or MATH 2417 or MATH 2471 any with a grade of "C" or better] or [ACT Mathematics score of 24 or better] or [New ACT Mathematics score of 25 or better] or [SAT Mathematics score of 550 or better] or [Accuplacer College Mathematics score of 86 or better] or [Compass College Algebra score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better]] and [[CHEM 1320 with any grade of "C" or better] or [ALCH00 score of 80 or better]].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Life & Phys Sciences Core 030|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1309

CHEM 1341. General Chemistry I.
This course is the first lecture course in the general chemistry sequence for science-related majors, and covers atomic and molecular structure, bonding, states of matter, solutions, and descriptive chemistry. Prerequisite: [[MATH 1315 or MATH 1317 or MATH 1319 or MATH 1329 or MATH 2321 or MATH 2417 or MATH 2471 any with a grade of "C" or better] or [ACT Mathematics score of 24 or better] or [New ACT Mathematics score of 25 or better] or [SAT Mathematics score of 550 or better] or [Accuplacer College Mathematics score of 86 or better] or [Compass College Algebra score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better]] and [[CHEM 1320 with any grade of "C" or better] or [ALCH00 score of 80 or better]].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Life & Phys Sciences Core 030|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1311

CHEM 1342. General Chemistry II.
Second of two lecture courses in general chemistry for science-related majors, covering equilibrium processes, acid-base chemistry, and kinetics, and electrochemistry. A basic knowledge of algebra is needed. Prerequisite: CHEM 1341 with a grade of “C” or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Life & Phys Sciences Core 030|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 1312

CHEM 2130. Laboratory Technique in Organic Chemistry.
An optional laboratory to accompany CHEM 2330, covers experimental techniques of preparation, purification, and determination of physical and chemical properties of organic compounds. Prerequisites: CHEM 1142 and CHEM 1342 both with grades of "D" or better. Corequisite: CHEM 2330 with a grade of "D" or better.
1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 2141. Organic Chemistry Laboratory I.
This laboratory introduces the student to the general techniques of organic chemistry. Prerequisites: CHEM 1342 with a grade of "C" or better and CHEM 1142 with a grade of "D" or better. Corequisite: CHEM 2341 with a grade of "D" or better.
1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 2123

CHEM 2142. Organic Chemistry Laboratory II.
This laboratory involves the study of typical organic reactions. Prerequisites: CHEM 2341 with a grade of "C" or better and CHEM 2141 with a grade of "D" or better. Corequisite: CHEM 2342 with a grade of "D" or better.
1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 2125

CHEM 2150. Biochemistry & Metabolism Lab.
An optional laboratory to accompany CHEM 2350. This laboratory examines the physical properties and chemistry of carbohydrates, amino acids, proteins, lipids and nucleotides. Course is designed for students majoring in nutrition, clinical laboratory science and agriculture. Prerequisites: [CHEM 2130 and CHEM 2330] or [CHEM 2142 and CHEM 2342] any with a grade of "D" or better. Corequisites: CHEM 2350 with a grade of "D" or better.
1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 2330. Fundamentals of Organic Chemistry.
A one-semester course which covers nomenclature, structure and reactions of organic compounds with an introduction to bioorganic molecules. Course is designed for students majoring in nutrition, clinical laboratory sciences and agriculture. Prerequisites: CHEM 1142 and CHEM 1342 both with grades of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 2341. Organic Chemistry I.
This course covers the nomenclature, reactions and reaction mechanisms of the hydrocarbons and the alkyl halides. Prerequisites: CHEM 1342 with a grade of “C” or better. Corequisite: CHEM 1142 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 2323

CHEM 2342. Organic Chemistry II.
This course covers the nomenclature, reactions and reaction mechanisms of the major functional groups. Prerequisite: CHEM 2341 with a grade of “C” or better. Corequisite: CHEM 2141 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: CHEM 2325

CHEM 2350. Biochemistry & Metabolism.
A one-semester study of carbohydrate, proteins, lipids and nucleotides which presents both structure and intermediary metabolism along with an introduction to the function of enzymes and coenzymes. Course is designed for students majoring in nutrition, clinical laboratory science and agriculture. Prerequisites: [CHEM 2130 and CHEM 2330] or [CHEM 2142 and CHEM 2342] any with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3190. Cooperative Education.
This course provides cooperative education students the opportunity to study particular problems in chemistry and biochemistry in an occupational setting. Problems are related to the student's work assignment, culminating in an industrial supervisor's evaluation and the student's technical report or presentation. A total of 3 hours of cooperative education credit may be applied to the student's major elective. Prerequisite: Minimum 2.25 Overall GPA and Instructor Approval.
1 Credit Hour. 0 Lecture Contact Hours. 40 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3210. Chemistry Pedagogy and Learning.
This course provides an introduction to pedagogical ideas relevant to the teaching and learning of chemistry and biochemistry. Students will learn key education theories and methods from STEM education research and cognitive science. Students will evaluate the processes of teaching and learning and examine structures and practices that facilitate and/or inhibit student learning. Students will engage in discussions about chemistry teaching and learning, and they will reflect on their own teaching practice in the role of Chemistry Learning Assistants. Prerequisite: Department approval.
2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Writing Intensive
Grade Mode: Standard Letter

CHEM 3245. Physical Chemistry Laboratory.
Experiments illustrating principles and methods of physical chemistry are performed. Written reports on the experiments are prepared. (WI) Prerequisites: CHEM 3330 with a grade of “C” or better and CHEM 3410 with a grade of "D" or better. Corequisites: CHEM 3340 with a grade of "D" or better.
2 Credit Hours. 1 Lecture Contact Hour. 4 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive
Grade Mode: Standard Letter

CHEM 3276. Experimental Biochemistry.
Course introduces biochemistry minors to the fundamental techniques used in modern biochemistry. Experiments use the essential techniques employed in the study of proteins, enzymes and nucleic acids with emphasis on the use of modern instrumentation and the manipulation and analysis of experimental data. Prerequisites: CHEM 3375 or CHEM 4375 either with a grade of “C” or better.
2 Credit Hours. 1 Lecture Contact Hour. 4 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Lab Required
Grade Mode: Standard Letter

CHEM 3290. Advanced Cooperative Education.
This course provides cooperative education students the opportunity to study particular problems in chemistry and biochemistry in an occupational setting. Problems are related to the student's work assignment, culminating in an industrial supervisor's evaluation and the student's technical report or presentation. A total of 3 hours of cooperative education credit may be applied to the student's major elective. Prerequisite: Minimum 2.25 Overall GPA and instructor approval.
2 Credit Hours. 0 Lecture Contact Hours. 40 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3330. Physical Chemistry I.
The course covers principles of thermodynamics and thermochemistry, phase equilibria, electrochemistry and elementary kinetics including rate laws and mechanisms. Prerequisites: CHEM 1142 with a grade of "D" or better and CHEM 1342 and MATH 2472 both with grades of “C” or better.
3 Credit Hours. 4 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3340. Physical Chemistry II.
The course covers kinetics, quantum mechanics, spectroscopy, and other selected topics. Prerequisite: CHEM 3330 and PHYS 2326 both with grades of "C" or better.
3 Credit Hours. 4 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3341. Descriptive Inorganic Chemistry.
An analysis of atomic, molecular, and solid state bonding and structure with an emphasis on coordination compounds and bioinorganic chemisry. Representative compounds and reactions of the elements will be surveyed. Prerequisite: CHEM 2342 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3375. Principles of Biochemistry.
This course provides biochemistry majors and minors with a rigorous introduction to biochemistry. Topics include the chemical function and structure of proteins, nucleic acids, lipids and carbohydrates, and enzyme mechanisms, kinetics and regulation. Corequisite: CHEM 2342 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3380. Analytical Biochemistry.
This course is designed to acquaint the student with the chemical and physical principles of modern biochemical methods. Emphasis is placed upon the application of the methods to current problems in biochemistry and molecular biology and the interpretation of data. Prerequisite: CHEM 3375 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3381. Biochemistry Techniques.
Course introduces biochemistry majors to techniques in analytical and physical biochemistry. Experiments reinforce fundamental concepts and utilize modern instrumentation. Experimental design, interpretation of results, and data reporting will be emphasized. (WI) Prerequisites: CHEM 3375 with a grade of "C" or better. Corequisite: CHEM 3380 with a grade of "C" or better.
3 Credit Hours. 2 Lecture Contact Hours. 4 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive
Grade Mode: Standard Letter

CHEM 3390. Physical Chemistry for Biochemists.
A study of the theories and laws of physical chemistry as it relates to biochemistry. The topics covered include ideal and real gases, classical thermodynamics, reaction kinetics, phase equilibria, electrochemistry, quantum mechanics, spectroscopy and statistical mechanics. Prerequisite: MATH 2472 with a grade of "C" or better. Corequisite: PHYS 2325 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 3410. Quantitative Analysis.
Course covers the general theory and practice of typical methods of gravimetric and volumetric analysis, satisfies the quantitative analysis requirements for chemistry majors, minors, pre-medical and pharmacy students. Prerequisites: CHEM 1342 with a grade of "C" or better and CHEM 1142 with a grade of "D" or better.
4 Credit Hours. 3 Lecture Contact Hours. 6 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Lab Required
Grade Mode: Standard Letter

CHEM 4099. Predoctoral Biomedical Research Development for Undergraduates.
This course is a weekly professional development seminar for NIH-supported trainees and affiliates in the Texas State U-RISE program (NIH GM136483). Prerequisite: Instructor approval.
0 Credit Hours. 0 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Credit/No Credit

CHEM 4231. Advanced Laboratory I.
An advanced integrated lab illustrating a variety of chemical techniques for the preparation, characterization and analysis of organic and inorganic materials. (WI) Prerequisites: CHEM 3245 and CHEM 3340 and CHEM 3410 all with grades of "D" or better. Corequisites: CHEM 4331 with a grade of "D" or better.
2 Credit Hours. 1 Lecture Contact Hour. 4 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive
Grade Mode: Standard Letter

CHEM 4241. Advanced Laboratory II.
An advanced integrated lab illustrating a variety of chemical techniques for the preparation, characterization and analysis of inorganic and organic materials. (WI) Prerequisites: CHEM 4231 and CHEM 4331 both with grades of "D" or better. Corequisite: CHEM 4341 with a grade of "D" or better.
2 Credit Hours. 1 Lecture Contact Hour. 4 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive
Grade Mode: Standard Letter

CHEM 4295. Laboratory Development and Practice.
This course develops the laboratory instructional abilities of students seeking either 8-12 Chemistry or 8-12 Physical Science Teaching Certification. Topics include both traditional laboratory techniques and guided inquiry techniques, safety, laboratory management, pedagogical theory and practical knowledge of laboratory experiments. Prerequisite: Minimum 2.5 Overall GPA.
2 Credit Hours. 1 Lecture Contact Hour. 2 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Lab Required
Grade Mode: Standard Letter

CHEM 4299. Undergraduate Research.
This course is available to undergraduate chemistry or biochemistry majors only. It may be repeated for credit but a maximum of four semester hours from this course are applicable toward advanced chemistry electives. Prerequisite: Instructor approval.
2 Credit Hours. 0 Lecture Contact Hours. 4 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Lab Required
Grade Mode: Standard Letter

CHEM 4310. Medicinal Chemistry.
This course surveys modern approaches to drug discovery and mechanisms of drug action with the focus on molecular structures of drugs. Examples of drug discovery for the chemotherapy of cancer, microbial and cardiovascular diseases will be examined. Prerequisites: [CHEM 2342 and CHEM 2350] or CHEM 3375 or CHEM 4375 any with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4312. Organometallic Chemistry.
This course will survey the structure, bonding, and reactivity of organometallic complexes. Homogeneous catalysis of the transition metals as well as the main group elements along with specialized "seminal research papers" in the field of organometallic chemistry will also be presented. Prerequisites: CHEM 2342 and CHEM 3341 both with grades of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4331. Instrumental Analysis.
The theory and methodology associated with the quantitative analysis of materials, i.e., electronics, spectroscopy, electrochemistry and chromatography are presented. Prerequisite: CHEM 3340 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4333. Spectroscopy.
The study of various spectrometric techniques in qualitative and structural analysis of chemical substances. Prerequisite: CHEM 2342 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4341. Advanced Inorganic Chemistry.
This course will use group theory analysis to predict vibrational spectra and bonding in molecules, including metal complexes. Numerous approaches (acid/base, redox, etc.) will be employed to rationalize the products of inorganic and organometallic reactions. The materials properties of solids and nanomaterials will also be discussed. Prerequisites: CHEM 3340 and CHEM 3341 both with grades of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4350. Modern Molecular Modeling.
A study of the application of computational techniques to molecular modeling. Topics covered include quantum mechanical modeling, forcefield based molecular modeling, molecular energy minimization, molecular dynamics, vibrational spectra, solution of crystalline structures, diffraction patterns, molecular blends, phase equilibria, crystal morphology, physical property prediction and mesoscale modeling. Prerequisite: CHEM 3340 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4351. Introduction to Polymers.
This course is designed to develop the student's general understanding of polymer history and importance as well as terminology, structure, and synthesis. The overall scope of the course will be to develop the student's general knowledge of polymer synthesis and structure. Prerequisite: CHEM 2342 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4360. Molecular Biology.
This course provides Biochemistry majors and minors with advanced knowledge of the field of molecular biochemistry. Topics include gene expression (transcription and translation of genes in bacteria and higher organisms), post-translational modification of proteins, chromosomal DNA replication, cell cycle checkpoint controls, DNA damage and repair, as well as theories of cancer and aging. Prerequisite: CHEM 3375 or CHEM 4375 either with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4371. Directed Study.
Independent study on a particular subject area in chemistry or biochemistry. The specific study area, resource material, goals, and achievements will be approved by the instructor. Prerequisites: CHEM 2342 with a grade of "C" or better and instructor approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4375. Biochemistry.
This course provides a challenging introduction to biochemistry, covering the structure and function of nucleic acids, proteins, lipids, and carbohydrates. Major metabolic pathways of carbohydrates and lipids are also examined. This course is not intended for biochemistry majors. Corequisite: CHEM 2342 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4382. Advanced Biochemistry Research Laboratory II.
This course is the second of two laboratory courses providing instruction in the modern techniques of biochemistry. Students will perform independent research projects involving isolation, manipulation and characterization of biomolecules. Results of these experiments and the scientific literature investigations will be used to prepare formal written reports and oral presentations. Prerequisite: CHEM 4481 with a grade of "C" or better. (WI).
3 Credit Hours. 2 Lecture Contact Hours. 4 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive
Grade Mode: Standard Letter

CHEM 4385. Metabolism.
A study of the biodegradation and biosynthesis of carbohydrates, lipids, amino acids, proteins, and nucleic acids. Prerequisite: CHEM 3375 or CHEM 4375 either with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

CHEM 4390. Supramolecular Chemistry.
This course is designed to be a survey of the nature of non-covalent interactions between host and guest species. Emphasis will be focused on the rational design of hosts, themodynamic and kinetic parameters involved in binding and the applications of various binding/recognition phenomena. Prerequisite: CHEM 2342 with a grade of “C” or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive
Grade Mode: Standard Letter

CHEM 4396A. Materials Chemistry.
This course covers chemistry of the synthesis, structure, and properties of materials, including nanomaterials, and inorganic, organic and hybrid materials. An overview of solid-state chemistry and the principles and theory of sol-gel chemistry and materials characterization methods will be provided. Current topics and trends in materials chemistry and applications of materials in energy, electronics, and healthcare will be covered. Students will be equipped with a foundation for advanced coursework and/or research in the field of materials chemistry. Prerequisite: CHEM 3341 with a grade of “C” or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

CHEM 4481. Advanced Biochemistry Lab I.
The first of two laboratory courses providing instruction in the modern techniques of biochemistry. Experiments are performed on the isolation, manipulation and characterization of DNA, RNA and proteins. Students will prepare formal written reports and oral presentations. (WI) Prerequisites: CHEM 3381 with a grade of “C” or better and CHEM 3380 with a grade of "D" or better.
4 Credit Hours. 2 Lecture Contact Hours. 8 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive
Grade Mode: Standard Letter