Rose-Hulman Institute of Technology Course Catalog

Chemistry - Course Descriptions

CHEM 111 General Chemistry I 3R-0L-3C F,W,S

Prerequisites: There are no prerequisites for this course.
Corequisites: CHEM 111L 0R-3L-1C F,W,S
Topics include stoichiometry, nomenclature, phases, and writing balanced chemical equations. Quantum theory is introduced in relation to chemical applications. Atomic structure is introduced. Bonding principles and molecular structure are discussed in terms of Lewis Dot Structures, Valence Bond Theory, VSEPR Theory, Hybridization, and Molecular Orbital Theory.

CHEM 111L General Chemistry I Laboratory 0R-3L-1C F,W,S

Prerequisites: There are no prerequisites for this course.
Corequisites: CHEM 111 3R-0L-3C F,W,S
Fundamental chemistry laboratory skills are introduced along with data analysis in support of topics presented in CHEM111 recitation.

CHEM 112 Chemistry Honors 4R-3L-5C F

Prerequisites: Advanced placement
Corequisites: There are no corequisites for this course.
An accelerated course covering topics in CHEM 111 and CHEM 113. Upon successful completion of this course, an additional 3 credits will be awarded. Enrollment is limited to those students who complete the Rose-Hulman online Chemistry Advanced Placement Examination given prior to the freshman orientation period.

CHEM 113 General Chemistry II 3R-0L-3C W,S

Prerequisites: CHEM 111 F,W,S, and CHEM 111L F,W,S
Corequisites: CHEM 113L 0R-3L-1C W,S
Topics in this course include the fundamentals of thermodynamics and kinetics. The fundamentals of chemical equilibrium are introduced. Definitions of acid and bases are discussed utilizing the Bronsted-Lowry and Lewis models. Nuclear chemistry is also included.

CHEM 113L General Chemistry II Laboratory 0R-3L-1C W,S

Prerequisites: CHEM 111 F,W,S, and CHEM 111L F,W,S
Corequisites: CHEM 113 3R-0L-3C W,S
Fundamental chemistry laboratory skills are introduced along with data analysis in support of topics presented in CHEM113 recitation.

CHEM 115 General Chemistry III 3R-0L-3C W, S

Prerequisites: CHEM 113 W,S, and CHEM 113L W,S or CHEM 112 F
Corequisites: CHEM 115L 0R-3L-1C W,S
Topics in this course include acid-base reactions, electrochemistry, and coordination chemistry.

CHEM 115L General Chemistry III Laboratory 0R-3L-1C W,S

Prerequisites: CHEM 113 W,S, and CHEM 113L W,S or CHEM 112 F
Corequisites: CHEM 115 3R-0L-3C W, S

Fundamental chemistry laboratory skills are introduced along with data analysis in support of topics presented in CHEM113 recitation.

CHEM 199 Professional Experience 1R-0L-1C
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
The professional experiences course captures the practical work experiences related to the student's academic discipline. Students are required to submit a formal document of their reflections, which communicates how their employment opportunity reinforced and enhanced their academic studies. The course will be graded as "S" satisfactory, or "U" unsatisfactory based on the written report of the professional experience.

CHEM 200 Career Preparation 1R-0L-1C W
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
This course is for chemistry and biochemistry majors to be taken in the second year. The course addresses career choices, summer opportunities, employment and graduate school preparation, and curriculum vitae and resumes preparation. Cross-listed with MA200, and SV200.

CHEM 210 Chemistry of Poisons and Potions 2R-0L-2C SeeDept
Prerequisites: CHEM 111 F,W,S, and CHEM 111L F,W,S
Corequisites: There are no corequisites for this course.
This course examines chemical agents found in medicinal plants and their use in different contexts. Specifically, we will investigate the chemical characteristics of these agents commonly used by humans through cultural practices.

CHEM 211 Chemistry of Food and Cooking 2R-0L-2C See Dept.
Prerequisites: CHEM 111 F,W,S, and CHEM 111L F,W,S
Corequisites: There are no corequisites for this course.
The course presents students with the basic structural elements of four categories of food molecules and many of the physical and chemical transformations that occur in food preparation. Among anticipated outcomes will be the ability to assess the role of ingredients and processes in specific recipes thereby allowing participants to make informed decisions about recipe modifications.

CHEM 212 Chemistry of Sport 2R-0L-2C SeeDept
Prerequisites: CHEM 111 F,W,S, and CHEM 111L F,W,S
Corequisites: There are no corequisites for this course.
This course will take a molecule-focused look at the overlap of chemistry and sports. The course will look at types of performance-enhancing drugs and their history, mechanisms of action, claims of efficacy, and detection using case studies

CHEM 213 Chemistry of Art 2R-0L-2 SeeDept
Prerequisites: CHEM 111 F,W,S, and CHEM 111L F,W,S
Corequisites: There are no corequisites for this course.
This course will highlight the intersection of the chemical sciences and visual arts. Focus will be given to understanding the chemical nature and behaviors of dyes, pigments, and paints, pottery and glazes, textiles, and materials used for sculpture. Historical developments of artistic media will be discussed and related to chemical conservation efforts and forgery detection.

CHEM 225 Analytical Chemistry 3R-0L-3C F,S
Prerequisites: CHEM 115 W, S, and CHEM 115L W,S
Corequisites: CHEM 225L 0R-3L-1C F,S
This laboratory-driven course is an introduction to classical and modern quantitative analysis with emphasis on calculations, separations, and precise and accurate measurements. Theoretical and practical perspectives of chemical analysis are considered. Chemical instrumentation includes recording pH/mV meters, constant rate burets, colorimeters, spectrophotometers, high performance liquid chromatographs and gas-liquid chromatographs.

CHEM 225L Analytical Chemistry Laboratory 0R-3L-1C F,S
Prerequisites: CHEM 115 W, S, and CHEM 115L W,S
Corequisites: CHEM 225 3R-0L-3C F,S
This course represents the laboratory component of analytical chemistry. Practicums are part of the grade along with reports.

CHEM 251 Organic Chemistry I 3R-0L-3C F,W
Prerequisites: CHEM 113 W,S, and CHEM 113L W,S or CHEM 112 F
Corequisites: CHEM 251L 0R-3L-1C F,W
An introduction to the classification of organic compounds, their structural features, including stereochemistry, and concepts related to reaction mechanisms and synthetic methods as it relates to compounds with biochemical relevance.

CHEM 251L Organic Chemistry I Laboratory 0R-3L-1C F,W
Prerequisites: CHEM 113 W,S, and CHEM 113L W,S or CHEM 112 F
Corequisites: CHEM 251 3R-0L-3C F,W
Organic Laboratory techniques in running chemical reactions and isolating compounds are developed. Assessment is in part via practicums. Computational chemistry methods and green chemistry approaches are also introduced. Lab will meet 5 times in the term.

CHEM 252 Organic Chemistry II 3R-0L-3C W,S
Prerequisites: CHEM 251 F,W, and CHEM 251L F,W
Corequisites: CHEM 252L 0R-3L-1C W,S
Continuation of Organic Chemistry I with greater emphasis on reaction mechanisms and an introduction to the methods used to determine structure, including IR and NMR spectroscopy and mass spectrometry.

CHEM 252L Organic Chemistry II Laboratory 0R-3L-1C W,S
Prerequisites: CHEM 251 F,W, and CHEM 251L F,W
Corequisites: CHEM 252 3R-0L-3C W,S
A continuation of Organic Chemistry I Lab where additional, more complicated synthetic techniques and methods along with additional spectroscopic techniques are introduced.

CHEM 253 Organic Chemistry III 3R-0L-3C S
Prerequisites: CHEM 252 W,S, and CHEM 252L W,S
Corequisites: CHEM 253L 0R-4L-1C S
Continuation of Organic Chemistry II with a focus on carbon-carbon bond-forming reactions, heterocycles, and polyfunctional molecules.

CHEM 253L Organic Chemistry III Laboratory 0R-4L-1C S
Prerequisites: CHEM 252 W,S, CHEM 252L W,S
Corequisites: CHEM 253 3R-0L-3C S

Project based laboratory where techniques and skills developed in the previous organic laboratories are applied to more open-ended problems.

CHEM 270 Special Topics in Chemistry (1-4)R-0L-(1-4)C See Dept
Prerequisites: Consent of instructor
Corequisites: There are no corequisites for this course.
Studies in topics of current chemical interest not addressed in other named courses. A maximum of 4 total credit hours of CHEM270 and CHEM276 can be counted towards a chemistry major.

CHEM 276 Special Topics in Chemistry with Laboratory (0-3)R-(3-6)L-(1-4)C
Prerequisites: Consent of instructor
Corequisites: There are no corequisites for this course.
Studies in topics of current chemical interest not addressed in other named courses. This course will have a laboratory component. A maximum of 4 total credit hours of CHEM270 and CHEM276 can be counted towards a chemistry major.

CHEM 290 Chemical Research 0R-(4-8)L-(1-2)C F, W, S
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Research performed under the direction of a faculty member selected by mutual agreement. This course is designed for research performed before taking CHEM291. Students may register for 1 to 2 credit hours per quarter.

CHEM 291 Introduction to Chemical Research 2R-4L-3C W
Prerequisites: CHEM 113 W,S, and CHEM 113L W,S or CHEM 112 F declared chemistry or biochemistry major.
Corequisites: There are no corequisites for this course.
Students will be introduced to skills necessary for conducting chemical research. Students will gain proficiency in: (1) literature searching of primary, secondary, and tertiary sources emphasizing the use of online databases; (2) laboratory skills involving synthesis, characterization, analysis, and keeping a notebook; (3) safety practice including MSDS interpretation; and (4) ethical conduct in collecting and reporting data and results. Students will be required to attend all seminars during the quarter. Enrollment is reserved for students who are declared as chemistry or biochemistry majors.

CHEM 326 Bioanalytical Chemistry 3R-4L-4-C W
Prerequisites: CHEM 225 F,S, and CHEM 225L F,S
Corequisites: There are no corequisites for this course.
Addresses instrumental methods of analysis applicable to biochemistry including instrument design, operating principles, theory and application. Topics include molecular spectroscopic techniques in the infrared, visible and ultraviolet regions, including luminescence and Raman spectroscopy. Separation techniques including liquid chromatography and capillary electrophoresis are also addressed.

CHEM 327 Advanced Analytical Chemistry 3R-4L-4C S
Prerequisites: CHEM 326 W
Corequisites: There are no corequisites for this course.
Addresses theory, operating principles, and application of instrumental methods for chemical analysis in the areas of atomic spectroscopy, x-ray techniques, gas chromatography and electroanalytical methods.

CHEM 330 Biochemistry I 4R-0L-4C F,S
Prerequisites: CHEM 251 F,W
Corequisites: There are no corequisites for this course.
Includes the structure and function of biological molecules, enzyme kinetics and mechanisms, and the reactions, strategy, and regulation of carbohydrate metabolism.

CHEM 331 Biochemistry II 4R-0L-4C W
Prerequisites: CHEM 330 F,S, and BIO 210 F
Corequisites: There are no corequisites for this course.
Includes the reactions, strategy, and regulation of the major metabolic pathways in humans and of selected pathways in plants, and the storage, repair, and transmission of genetic information.

CHEM 360 Introduction to Physical Chemistry for Engineers 4R-0L-4C W,S
Prerequisites: CHE 303 F,S, CHE 304 F,W, and CHEM 115 W, S
Corequisites: There are no corequisites for this course.
Introduction to quantum chemistry, statistical thermodynamics, electrochemistry, chemical kinetics, surface chemistry and colloid science.

CHEM 361 Physical Chemistry I 4R-2L-4C F
Prerequisites: CHEM 115 W, S, and CHEM 115L W,S, and MA 113 F,W,S, and MA 223 F,W,S or MA 381 F,W,S* See notes below
Corequisites: There are no corequisites for this course.
Covers the laws of thermodynamics, free energy, gases, phase equilibria and solutions. Emphasizes the applications of differential and integral calculus and includes an introduction to statistical thermodynamics and surface chemistry. The laboratory will meet for 4 hours on alternate weeks and will investigate topics associated with thermodynamics and phase equilibrium.

CHEM 362 Physical Chemistry II 3R-2L-4C W
Prerequisites: CHEM 361 F
Corequisites: There are no corequisites for this course.
Covers chemical equilibria, statistical mechanics, kinetics and electrochemistry. The laboratory will meet for 4 hours on alternate weeks.

CHEM 391 Research Proposal 1R-0L-1C F, W, S
Prerequisites: CHEM 291 W
Corequisites: There are no corequisites for this course.
Students will take online lessons related to the generation and communication of research ideas culminating in the production of a research proposal. The research proposal will be written under the direction of a faculty member of record for the student's CHEM490 or by other faculty member selected by mutual agreement.

CHEM 395 Chemistry Seminar 0R-0L-0C F
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Students will be required to attend and/or present research seminars, the number to be determined by the department. The students will register for the course in the fall of the third year and if all the requirements are met, the students will receive a grade of Satisfactory. Failure to meet the requirements during the fall quarter will result in No Grade and the student must complete the requirements by the end of the third

year. If the requirements are not completed by the end of the third year, a grade of Unsatisfactory is assigned and must be rectified to meet graduation requirements.

CHEM 420 Electronics for Scientists 3R-4L-4C See Dept
Prerequisites: CHEM 326 W or CHEM 327 S or consent of instructor
Corequisites: There are no corequisites for this course.
A fundamental course on understanding important electronic systems as they pertain to chemical signals and instrumentation. Topics include analog systems (RC circuits, diodes, transistors, and operational amplifiers), digital systems (logic gates, shift registers, and lock-in amplifiers), and signal enhancement and noise reduction modules. The laboratory component will showcase basic circuit design and construction, and will culminate with a student-built chemical instrument.

CHEM 421 Biochemical Mass Spectrometry 1R-0L-1C See Dept
Prerequisites: CHEM 330 F,S
Corequisites: There are no corequisites for this course.
This course will explore the theoretical basis and practical aspects of mass spectrometry, with an emphasis on their use for analysis of biological molecules. Topics include ionization mechanisms and methods for sample preparation and mass spectral analysis, and the course will include a project.

CHEM 422 Fluorescence Spectroscopy 1R-0L-1C See Dept
Prerequisites: CHEM 330 F,S
Corequisites: There are no corequisites for this course.
This course will explore the theoretical basis and practical aspects of fluorescence spectroscopy, with an emphasis on their use for analysis of biological molecules. Topics include mechanisms of fluorescence excitation and emission, quenching processes, anisotropy, and time-resolved fluorescence, and the course will include a project.

CHEM 423 NMR Spectroscopy 1R-0L-1C See Dept
Prerequisites: CHEM 252 W,S
Corequisites: There are no corequisites for this course.
This course is designed to provide the basic training and tools necessary to operate the 300MHz Bruker NMR and the associated ICON software. Additionally, the focus will be on sample preparation, acquisition, analysis, and processing of 1H NMR, 13C NMR, COSY and HETCOR (2D NMR), DEPT-90, DEPT-135, heteronuclear NMR, and applications of NMR to related fields. The course will consist primarily of basic and practical NMR instruction.

CHEM 424 Absorption Spectroscopy 2R-0L-2C See Dept
Prerequisites: CHEM 326 W or CHEM 327 S
Corequisites: There are no corequisites for this course.
This course looks at absorption spectroscopy from the microwave to x-ray relating spectra to the molecular and/or atomic processes. The course will consist of both instruction and a project of student choice involving absorption process.

CHEM 425 Raman Spectroscopy 1R-0L-1C SeeDept
Prerequisites: CHEM 225 F,S
Corequisites: There are no corequisites for this course.
This course explores various theoretical and practical aspects of Raman spectroscopy including fundamental vibrational modes of molecules and selection rules, the physicochemical origin of Raman scattering, Raman spectrometers, lasers, resonance

Raman spectroscopy, surface-enhanced Raman spectroscopy (SERS), and applications of Raman spectroscopy. The course includes an independent project in which a Raman spectrum is acquired for a sample of interest.

CHEM 426 Microfluidics 1R-0L-1C SeeDept
Prerequisites: CHEM 225 F,S
Corequisites: There are no corequisites for this course.
This course explores various theoretical and practical aspects of microfluidics. The course addresses the benefits and challenges of microfluidics in chemistry and chemical analysis and the materials and processes available for fabricating microfluidic devices. General characteristics of microfluidic devices including fluid flow regimes, heat transfer and diffusion are addressed as well as practical applications of microfluidic devices and how various functions like valving and detection are performed. The course includes an independent project involving the design and fabrication of a microfluidic device.

CHEM 427 HPLC 1R-0L-1C SeeDept
Prerequisites: CHEM 225 F,S
Corequisites: There are no corequisites for this course.
This course will explore various theoretical and practical aspects of HPLC including a review of separation parameters, equilibrium types, retention mechanisms, stationary phases and their performance, mobile phases and their properties and choosing an appropriate separation type.

CHEM 428 Trace Metal Detection 1R-0L-1C SeeDept
Prerequisites: CHEM 225 F,S
Corequisites: There are no corequisites for this course.
This course aims at providing students with fundamental skills and knowledge in trace metal analysis, for environmental and biological samples. The course will enable students to understand, develop and execute analytical protocols involving recent trace metal analysis methodologies and instrumentation using voltammetry. Students will learn by lectures, class activities, and homework assignments and how to optimize conditions to obtain sufficient analytical performance parameters in terms of selectivity, detection limit, cost, and analysis time.

CHEM 429 Capillary Electrophoresis 1R-0L-1C SeeDept
Prerequisites: CHEM 225 F,S
Corequisites: There are no corequisites for this course.
This course will explore various theoretical principles and chemical/biochemical applications of capillary electrophoresis. Main emphasis will focus on the choice of CE as an alternative form for separations for biochemical samples. Students will learn by lectures, class activities, homework assignments and how to optimize experimental conditions to achieve a good separation.

CHEM 430 Advanced Biochemistry 4R-0L-4C S
Prerequisites: CHEM 330 F,S
Corequisites: There are no corequisites for this course.
An in-depth exploration of selected topics from the current biochemistry scientific literature, including molecular mechanisms of infectious diseases and genetic disorders, methods for rational drug design, and relationships between structure and function for biological molecules.

CHEM 433 Biochemistry Laboratory 0R-3L-1C S
Prerequisites: CHEM 330 F,S
Corequisites: There are no corequisites for this course.
Fundamental techniques employed in isolation, characterization and study of biomolecules, and enzyme kinetics. Techniques used may include homogenization, solvent extraction, centrifugation, salt fractionation, chromatography, and electrophoresis.

CHEM 441 Inorganic Chemistry I 4R-0L-4C F
Prerequisites: CHEM 252 W,S, CHEM 362 W, CHEM 360 W,S
Corequisites: There are no corequisites for this course.
The chemistry of non-metals. This course consists of a systematic study of the properties and reactions of the elements and their compounds based upon modern theories of the chemical bond, as well as from the viewpoint of atomic structure and the periodic law.

CHEM 442 Inorganic Chemistry II 3R-4L-4C W
Prerequisites: CHEM 441 F
Corequisites: There are no corequisites for this course.
The chemistry of metals. Modern theories such as valence bond, molecular orbital, electrostatic and ligand field are used to explain the properties of complex ions. Synthesis and characterization of complexes are done in the lab.

CHEM 451 Organic Structure Determination 2R-8L-4C See Dept
Prerequisites: CHEM 253 S or instructor consent
Corequisites: There are no corequisites for this course.
Chemical and spectroscopic identification of organic compounds. Study of nuclear magnetic resonance and mass spectrometry, infrared spectroscopy and other techniques applied to structure elucidation and stereochemistry.

CHEM 463 Quantum Chemistry & Molecular Spectroscopy 4R-0L-4C S
Prerequisites: CHEM 111 F,W,S, CHEM 111L F,W,S, PH 112 W,S,F, and MA 221 F,W,S
Corequisites: There are no corequisites for this course.
Covers elementary quantum mechanics with emphasis on applications in molecular structure.

CHEM 470 Special Topics in Chemistry (1-4)R-0L-(1-4)C See Dept
Prerequisites: or instructor consent
Corequisites: There are no corequisites for this course.
Studies in advanced topics of current chemical interest not addressed in other named courses.

CHEM 476 Special Topics in Chemistry with Laboratory (0-3)R-(3-6)L-(1-4)C See Dept
Prerequisites: To be taken concurrently with the appropriate elective not accompanied by an identified laboratory component.
Corequisites: There are no corequisites for this course.
Studies in advanced topics of current chemical interest not addressed in other named courses. This course will have a laboratory component.

CHEM 477 Directed Study in Chemistry (1-4)R-0L-(1-4)C F, W, S

Prerequisites: or instructor consent
Corequisites: There are no corequisites for this course.
Allows individual study in a topic not usually offered. A student may take 1 to 4 credits. A maximum of 4 credits is permitted.

CHEM 490 Chemical Research Rotation 1R-4L-2C F, W, S
Prerequisites: CHEM 291 W
Corequisites: There are no corequisites for this course.
Open-ended research projects performed as part of a research group. The students will gain proficiency in advanced lab techniques, the scientific method, data management and communication.

CHEM 491 Senior Thesis 1R-0L-1C F, W, S
Prerequisites: CHEM 490 F, W, S
Corequisites: There are no corequisites for this course.
Students will publish a thesis on their undergraduate research or a literature review of an advanced topic mutually agreed upon with the instructor.

CHEM 495 Chemistry Seminar 0R-0L-0C F
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Students will be required to attend research seminars. If the requirement is not completed by the end of the quarter, a grade of Unsatisfactory is assigned and must be rectified to meet graduation requirements.

CHEM 496 Chemistry Seminar 0R-0L-0C W
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Students will be required to attend research seminars. If the requirement is not completed by the end of the quarter, a grade of Unsatisfactory is assigned and must be rectified to meet graduation requirements.

CHEM 497 Senior Presentation 1R-0L-1C F, W, S
Prerequisites: CHEM 490 F, W, S
Corequisites: There are no corequisites for this course.
Students will deliver a professional seminar on their undergraduate research or a review of an advanced topic mutually agreed upon with the instructor.

CHEM 499 Independent Chemical Research 0R-(4-8)L-(1-2)C F, W, S
Prerequisites: CHEM 291 W
Corequisites: There are no corequisites for this course.
Research performed under the direction of a faculty member selected by mutual agreement. Students may register for 1 or 2 credit hours per quarter.

CHEM 520 Electronics for Scientists 3R-4L-4C See Dept
Prerequisites: CHEM 326 W or CHEM 327 S or consent of instructor
Corequisites: There are no corequisites for this course.
A fundamental course on understanding important electronic systems as they pertain to chemical signals and instrumentation. Topics include analog systems (RC circuits, diodes, transistors, and operational amplifiers), digital systems (logic gates, shift registers, and lock-in amplifiers), and signal enhancement and noise reduction modules. The laboratory component will showcase basic circuit design and construction, and will

culminate with a student-built chemical instrument. For graduate credit there will be an additional project beyond the requirements for CHEM420. A student may not take both CHEM420 and CHEM520 for credit.

CHEM 530 Advanced Biochemistry 4R-0L-4C S
Prerequisites: CHEM 330 F,S
Corequisites: There are no corequisites for this course.
An in-depth exploration of selected topics from the current biochemistry scientific literature, including molecular mechanisms of infectious diseases and genetic disorders, methods for rational drug design, and relationships between structure and function for biological molecules. Students enrolled in CHEM 530 must complete a project not covered in CHEM 430. A student may not receive credit for both CHEM 430 and CHEM 530.

CHEM 531 Biochemical Instrumentation 3R-4L-4C See Dept
Prerequisites: BIO 210 F, and CHEM 330 F,S
Corequisites: There are no corequisites for this course.
This project-based course includes approaches for the analysis of biochemical experimental problems, experimental design for molecular biology and biochemistry, and the theoretical basis and practical aspects of operating instruments used in biochemical research.

CHEM 532 Biochemical Pharmacology 4R-0L-4C See Dept
Prerequisites: CHEM 330 F,S
Corequisites: There are no corequisites for this course.
Topics include medicinal chemistry and molecular pharmacology. The topics will also include a survey of potential drug targets, the molecular interactions between drugs and their targets, the drug discovery and development process and case studies of drugs treating diseases such as cancer, bacterial and viral infection, and neurological disorders.

CHEM 534 Biochemical Physiology 4R-0L-4C SeeDept
Prerequisites: CHEM 330 F,S
Corequisites: There are no corequisites for this course.
An application of the principles of biochemistry to understanding the chemical aspects of the functioning of living organisms. This course covers topics related to the molecular mechanisms involved in the maintenance of physiological homeostasis, and when appropriate examines current research in the relevant systems. These mechanisms will be organized by the chemical signaling systems responsible for integrating and communicating the response to internal changes and external stimuli.

CHEM 535 Toxicology for Chemists 4R-0L-4C SeeDept
Prerequisites: CHEM 251 F,W
Corequisites: There are no corequisites for this course.
A fundamental course on the interaction of chemical agents with the human body. Topics include toxic thresholds and dose-response relationships, toxicological mechanisms of action, and models for physical and aquatic toxicities. Students engage in quantitative structure-activity relationship (QSAR) modeling and hazard assessment.

CHEM 545 Organometallic Chemistry 4R-0L-4C See Dept
Prerequisites: CHEM 115 W, S, and CHEM 252 W,S
Corequisites: There are no corequisites for this course.

A survey of the chemistry of main group organometallic compounds and organo-transition metal complexes. Reaction mechanisms and uses in organic synthesis and catalysis are studied.

CHEM 552 Synthetic Organic Chemistry 4R-0L-4C See Dept
Prerequisites: CHEM 253 S
Corequisites: There are no corequisites for this course.
A survey of contemporary methodology in organic synthesis. Retrosynthetic analysis, functional group transformations, condensation chemistry, and organometallic reagents will be stressed. Includes computer assisted synthesis.

CHEM 554 Theoretical Organic Chemistry 4R-0L-4C See Dept
Prerequisites: CHEM 253 S, and CHEM 361 F or CHEM 360 W,S or permission of instructor
Corequisites: There are no corequisites for this course.
Study of physical and chemical methods used to investigate organic reaction mechanisms; the chemistry of carbenes; organic photochemistry.

CHEM 556 Green Chemistry 4R-0L-4C SeeDept
Prerequisites: CHEM 252 W,S
Corequisites: There are no corequisites for this course.
Advanced topics in green chemistry including industrial applications, atom economy, safer solvent substitutions, alternatives assessment, green metrics (PMI, E-factor), and a brief introduction to chemical toxicology.

CHEM 561 Advanced Physical Chemistry 4R-0L-4C SeeDept
Prerequisites: CHEM 463 S, and CHEM 360 W,S or CHEM 362 W
Corequisites: There are no corequisites for this course.
The course covers advanced topics in quantum mechanics, statistical thermodynamics, and kinetics.

CHEM 570 Special Topics in Chemistry (1-4)R-0L-(1-4)C See Dept
Prerequisites: permission of instructor
Corequisites: There are no corequisites for this course.
Studies in advanced topics of current chemical interest not addressed in other named courses. If cross-listed with CHEM470, students in CHEM570 will need to complete an additional project.

CHEM 581 Polymer Chemistry 3R-4L-4C See Dept
Prerequisites: CHEM 252 W,S Junior class standing
Corequisites: There are no corequisites for this course.
Polymer synthesis, reactions, and characterization techniques. Structure/property relationships and morphology will be discussed, both for industrially relevant polymers as current topics of from the recent literature. Laboratory sequence consists of polymer synthesis and characterization.

CHEM 582 Physical Properties of Polymeric Materials 4R-0L-4C See Dept
Prerequisites: CHEM 361 F or CHEM 360 W,S
Corequisites: There are no corequisites for this course.
In this course the physical properties of polymeric systems will be defined in terms of the models that have been used to characterize them. The behavior of isolated polymers and polymers in solution will be mapped to macroscopic properties of bulk

polymeric systems using theories such as Rotational Isomeric State and Flory's Lattice model. Methods of molecular weight determination will be fully developed. Phase transitions will be characterized and related to polymeric and monomeric structural features. Theories of elasticity and viscoelastic behavior will be used to explain macroscopic behaviors of polymeric materials.

CHEM 595 Chemistry Seminar 0R-0L-0C F
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Chemistry graduate students will be required to attend research seminars. If the requirement is not completed by the end of the quarter, a grade of Unsatisfactory is assigned and must be rectified to meet graduation requirements.

CHEM 596 Chemistry Seminar 0R-0L-0C W
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Chemistry graduate students will be required to attend research seminars. If the requirement is not completed by the end of the quarter, a grade of Unsatisfactory is assigned and must be rectified to meet graduation requirements.

CHEM 597 Chemistry Seminar 0R-0L-0C S
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Chemistry graduate students will be required to attend research seminars. If the requirement is not completed by the end of the quarter, a grade of Unsatisfactory is assigned and must be rectified to meet graduation requirements.

CHEM 599 Thesis Research As assigned F, W, S
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
Graduate students only. Credits as assigned; however, not more than 12 credits will be applied toward the requirements of the M.S. degree.

CHEM 699 Professional Experience 1R-0L-1C See Dept
Prerequisites: There are no prerequisites for this course.
Corequisites: There are no corequisites for this course.
The professional experiences course captures the practical work experiences related to the student's academic discipline. Students are required to submit a formal document of their reflections, which communicates how their employment opportunity reinforced and enhanced their academic studies. The work experiences should be informative or integral to the advancement or completion of the student's program requirements. The course will be graded as "S" satisfactory, or "U" unsatisfactory based on the written report of the professional experience.

Last updated: 06/16/2022

Rose-Hulman
Institute of Technology
5500 Wabash Avenue
Terre Haute, IN 47803
812-877-1511