Chemistry and Biochemistry

Chemistry

Chemistry is the study of the atomic and molecular structure of matter and is, therefore, a widely diverse subject with close links to almost all other areas of science and technology. It offers excellent undergraduate preparation for advanced study in areas ranging from the health professions to the physical and biological sciences and from business to law; an undergraduate degree in chemistry also affords direct entrance into government and industrial work. While offering a comprehensive instructional program supported by modern laboratory equipment, the Chemistry Department at Stetson places special emphasis on undergraduate research, small class size, and close attention to the needs and interests of the individual student.

The department offers the ACS-certified B.S. degree in chemistry and in biochemistry, designated a professional degree by the American Chemical Society's (ACS's) Committee on Professional Training and available only from those departments whose programs are approved by the ACS.

All 200-level courses are foundations courses and 300-level courses are in-depth courses, as specified by the ACS. Chemistry majors take two units of general chemistry, five foundations courses, three in-depth courses, and the senior research project in order to fulfill the requirements for the ACS-certified major.

More information can be found at https://www.stetson.edu/other/academics/undergraduate/chemistry.php.

Biochemistry

Biochemistry--the study of the chemical structures and processes of living organisms--is an interdisciplinary field. To provide an extensive preparatory foundation in both biology and chemistry, the undergraduate major culminates in two years of coursework in biochemistry, advanced biology courses covering topics related to biochemistry, and senior research. The ACS-certified degree in biochemistry is ideal preparation for the student interested in pursuing entrance into medical or other health professional schools, as well as graduate or industrial work in biochemistry or molecular biology.

More information can be found online at https://www.stetson.edu/other/academics/undergraduate/biochemistry.php.

Learning Outcomes

Student learning outcomes describe what students know, understand and are able to do as a result of completing a degree program. The learning outcomes for both majors in this program are:

1. Apply chemical principles to solve relevant, real world quantitative and lab based problems
2. Use chemical instrumentation
3. Retrieve and critically evaluate technical information from the scientific literature and global information databases
4. Effectively deliver a scientific oral presentation
5. Effectively communicate their results in writing in a form consistent with the recommendations in the ACS Style Guide

Majors

Majors in Chemistry

- Bachelor of Science in Chemistry (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/chemistry-bs/)
- Bachelor of Science in Biochemistry (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/biochemistry-bs/)

Minors

Minor in Chemistry - 7 or 8 units

Code	Title	Units
Department Requirements		
CHEM 141P & CHEM 142P	General Chemistry I and General Chemistry II	2
CHEM 201 & CHEM 301	Organic Chemistry I and Organic Chemistry II	2
CHEM 204	Biochemistry I	1
At least one additional chemistry unit selected from the following:		1
CHEM 202	Inorganic Chemistry	
CHEM 203	Physical Chemistry	
CHEM 205	Analytical Chemistry	
CHEM 302	Biological Inorganic Chemistry	
CHEM 303	Advanced Physical Chemistry	
CHEM 304	Biochemistry II	
CHEM 305	Instrumental Analysis: Forensic Chemistry	
CHEM 306	Spectra and Structure	
CHEM 307	Nucleic Acid Structure, Function, and Metabolism	
CHEM 308	Advanced Organic Chemistry	
Collateral Requirements		
Select one unit from the following:		1 to 2
MATH 141Q	Calculus I with Analytic Geometry	
MATH 130 & MATH 131Q	Calculus I with Review Part I and Calculus I with Review Part 2	
Total Units		**7-8**

Advising Course Plans

Advising Course Plans

- Chemistry Major (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/chemistry/)
- Biochemistry Major (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/biochemistry/)

Plans for Transfer Students or Students Changing Their Major

- Chemistry Major 3-Year Plan (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/chemistry-3yr-plan/)
- Chemistry Major 2-Year Plan (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/chemistry-2yr-plan/)

- Biochemistry Major 3-Year Plan (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/biochemistry-3yr-plan/)
- Biochemistry Major 2-Year Plan (https://catalog.stetson.edu/undergraduate/arts-sciences/chemistry/biochemistry-2yr-plan/)

Faculty

York, John T.
Associate Professor of Chemistry, 2007
Chair of Chemistry, 2023
B.S., North Carolina State University
B.A., University of Wyoming
Ph.D., University of Minnesota

Indralingam, Ramee
Professor of Chemistry, 1991
B.S., University of Colombo, Sri Lanka
Ph.D., University of Florida

Delphine Prevote Pinet
Assistant Professor of Practice, Chemistry, 2016
B.S., M.S., Ph.D., University Paul Sabatier, Toulouse, France

Price, Harry L.
Associate Professor of Chemistry, 2001
B.S., Ph.D., University of Illinois at Chicago

Shannon, Matthew
Assistant Professor of Chemistry, 2020
B.S., University of Pittsburgh
Ph.D., The Ohio State University

Sibbald, Paul A.
Associate Professor of Chemistry, 2012
B.S., B.A., Alma College
Ph.D., University of Washington

Courses

CHEM 110P. The Chemistry of Everyday Things. 1 Unit.
This course is a survey of the theories and ideas behind chemicals encountered in daily life. Topics include petroleum and alternative fuels, nutrition, nuclear energy, DNA, plastics, and medicines. No prior knowledge of chemistry is assumed.

CHEM 111P. Beyond Fossil Fuels: Alternative Energy Choices. 1 Unit.
This course is an introduction to the science behind traditional alternative energy sources, such as nuclear, solar, wind and geothermal, with a particular emphasis on emerging technologies like bio-fuels (for combustion) and bio-fuels and hydrogen (for use in fuel cells). The economic, environmental, and other societal advantages and disadvantages associated with the large scale implementation of each are explored and contrasted.

CHEM 112P. The Chemistry of Food. 1 Unit.
This course is an introduction to the chemistry of various foods and drink. Fundamental concepts of biology and chemistry will be addressed in the context of food and cooking. Topics covered in class and in lab will include the nature of foods and their chemical composition, changes caused by cooking, and the principles underlying food processing.

CHEM 141P. General Chemistry I. 1 Unit.
This course is the first in a two-semester introductory course sequence for science majors. The topics covered will include stoichiometry, states of matter, the gas laws, reactions in aqueous solutions including acid-base and oxidation-reduction concepts, atomic structure and the periodic relationships among elements, molecular structure and theories of bonding. The course will consist of three lectures and one three-hour laboratory per week. Prerequisite to all advanced chemistry courses. Offered every fall semester.

CHEM 142P. General Chemistry II. 1 Unit.
This course is the second in a two-semester introductory course sequence for science majors. The topics covered will include intermolecular forces in liquids and solids, the physical properties of solutions, acid-base and redox titrations, chemical equilibria, elementary chemical thermodynamics, kinetics, electrochemistry, and an overview of the descriptive chemistries of the elements including metallurgical principles. The course will consist of three lectures and one three-hour laboratory per week. Prerequisite to all advanced chemistry courses. Prerequisite: CHEM 141P. Offered every spring semester.

CHEM 180. Chemistry Elective. 0.75 to 1 Units.

CHEM 190. Special Topics in Chemistry. 0.5 or 1 Units.

CHEM 201. Organic Chemistry I. 1 Unit.
This course is a survey of fundamental topics in organic chemistry including the properties and reactivities of alkanes, alkenes, alkynes, alkyl halides, alcohols, and radicals. Infrared spectroscopy, nomenclature, stereochemistry, multistep synthesis, electron delocalization, and radicals will also be discussed. The course will consist of three lectures and one four hour laboratory per week. Prerequisite: CHEM 142P. Offered every fall semester.

CHEM 202. Inorganic Chemistry. 1 Unit.
This course consists of a survey of fundamental topics covering the chemistry of the elements. Emphasis is on structure and bonding, periodic trends in atomic and ionic properties, the chemistry of crystalline solids, and the coordination chemistry of metals. The course will consist of three lectures and one three-hour laboratory per week. Prerequisite: CHEM 142P. Offered every spring semester.

CHEM 203. Physical Chemistry. 1 Unit.
This course consists of a broad survey of physical chemistry. Topics include atomic and molecular quantum mechanics, chemical thermodynamics and kinetics. The course will consist of three lectures and one three-hour laboratory per week. Prerequisites: MATH 142Q and either PHYS 122P or PHYS 142P, with CHEM 301 strongly recommended. Offered every fall semester.

CHEM 204. Biochemistry I. 1 Unit.
This course consists of an introduction to biochemistry. Topics include protein structure and function, enzymatic catalysis and kinetics, mechanisms and regulation of DNA replication, RNA transcription, protein translation, and a survey of metabolism. Three hours of lecture and one three hour laboratory per week. Offered every spring semester. Submitted course description change: This course consists of an overview of essential biochemical concepts covering the following areas: 1) acid-base chemistry, 2) thermodynamics, 3) the structures and properties of amino acids, carbohydrates, nucleic acids, and lipids, 4) protein structure and function, 5) mechanisms and kinetics of enzymatic catalysis, and 6) an introduction to key themes of metabolism. Biochemistry I is designed to strengthen problem solving and critical thinking skills. The course will consist of three hours of lecture and one three hour laboratory per week.Prerequisite: CHEM 201. CHEM 301 is recommended. Offered every spring semester.

CHEM 205. Analytical Chemistry. 1 Unit.
This course reviews the fundamentals of analytical chemistry, including statistical methods and selected classical methods of analysis, proceeding to an introduction to instrumental methods, with treatments of electrochemical and elementary spectrochemical analysis, as well as chemical separations. The course will consist of three lectures and one three-hour laboratory per week. Prerequisite: CHEM 201. Offered every spring semester.

CHEM 285. Independent Study. 0.5 to 1 Units.

CHEM 290. Special Topics in Chemistry. 0.5 or 1 Units.

CHEM 298. Pre-Medical Student Clinical Experience. 1 Unit.
This course is a concentrated experience designed to expose the student to actual clinical conditions and techniques. The course is limited to second year pre-med students; selection of participating students will be made by the University Health Professions Advisory Committee in consultation with the cooperating clinical physicians. The course is offered only in four-week summer terms. Also offered as BIOL 298. This course cannot be used to satisfy the Chemistry Minor.

CHEM 300V. Chemistry: A Global Perspective. 1 Unit.
This course focuses on Stetson's Environmental Responsibility Value. This course will introduce students to chemistry from the perspective of the role it plays on a global scale. Students will learn about chemistry from a historical perspective which will be tied into the emergence of chemistry as a global engine of change with respect to socio-economic impact. Junior Seminar.

CHEM 301. Organic Chemistry II. 1 Unit.
This course consists of an exploration of more advanced topics in organic chemistry including the properties and reactivities of benzene and its derivatives, carbonyl compounds, and amines. NMR spectroscopy, redox reactions, and synthetic polymers will also be discussed along with biological molecules such as carbohydrates, proteins, and nucleic acids. The course will consist of three lectures and one four hour laboratory per week. Prerequisite: CHEM 201. Offered every spring semester.

CHEM 302. Biological Inorganic Chemistry. 1 Unit.
This course consists of an exploration of the roles played by metal ions in biological systems. Topics discussed include the importance of various metals in biochemistry, the structure and function of metalloproteins, and the interaction of metal-containing compounds with biological molecules. Prerequisite: CHEM 201. At least one in-depth chemistry course from among CHEM 302, CHEM 303, CHEM 305, CHEM 306, CHEM 307, CHEM 308, and CHEM 309 will be offered each semester.

CHEM 303. Advanced Physical Chemistry. 1 Unit.
This course consists of an in-depth study of selected topics from CHEM 203, with an emphasis on molecular spectroscopy, molecular symmetry, statistical mechanics and the kinetic theory of gases. The course will consist of three lectures and one three-hour laboratory per week. Prerequisite: CHEM 203. At least one in-depth chemistry course from among CHEM 302, CHEM 303, CHEM 305, CHEM 306, CHEM 307, CHEM 308, and CHEM 309 will be offered each semester.

CHEM 304. Biochemistry II. 1 Unit.
This course consists of a more in-depth exploration of the molecular mechanisms behind selected topics covered in CHEM 204, as well as additional topics such as biochemical energetics, organelle function, and the molecular mechanisms of disease. The course will consist of three hours of lecture and one three hour laboratory per week. Prerequisite: CHEM 204 and BIOL 142P. Offered every fall semester.

CHEM 305. Instrumental Analysis: Forensic Chemistry. 1 Unit.
This course consists of a rigorous survey of modern instrumental chemical analysis, including spectroscopic methods, gas chromatography, high performance liquid chromatography, electroanalytical techniques, and capillary electrophoresis. The course will consist of three lectures and one three-hour laboratory per week. Prerequisites: CHEM 205 and CHEM 203. At least one in-depth chemistry course from among CHEM 302, CHEM 303, CHEM 305, CHEM 306, CHEM 307, CHEM 308, and CHEM 309 will be offered each semester.

CHEM 306. Spectra and Structure. 1 Unit.
This courses consists of an intensive study of modern infrared, magnetic resonance, and mass spectral methods of analysis as applied to structure determination in organic chemistry. The course will consist of three lectures and one three-hour laboratory per week. Prerequisites: CHEM 301 and CHEM 203. At least one in-depth chemistry course from among CHEM 302, CHEM 303, CHEM 305, CHEM 306, CHEM 307, CHEM 308, and CHEM 309 will be offered each semester.

CHEM 307. Nucleic Acid Structure, Function, and Metabolism. 1 Unit.
This course consists of an overview of essential concepts from the following areas: 1) prebiotic chemistry and the origins of the components of DNA and RNA, 2) the structure, functionand metabolism (biosynthesis and degradation) of DNA and RNA, 3) an overview of DNA replication, mRNA transcription, and protein translation, and 4) nucleic acid-based technology. The course will consist of three lectures per week and one 3-hour laboratory. Prerequisite: CHEM 204. CHEM301 and CHEM 304 are recommended. At least one in-depth chemistry course from among CHEM 302, CHEM 303, CHEM 305, CHEM 306, CHEM 307, CHEM 308, and CHEM 309 will be offered each semester.

CHEM 308. Advanced Organic Chemistry. 1 Unit.
This course will provide an advanced study of modern synthetic reactions, mechanisms, and spectroscopic methods. The synthesis of complex organic molecules will be discussed with an emphasis on strategy and controlling stereochemistry. The course will consist of three lectures and one four hour laboratory per week. Prerequisite: CHEM 301. At least one in-depth chemistry course from among CHEM 302, CHEM 303, CHEM 305, CHEM 306, CHEM 307, CHEM 308, and CHEM 309 will be offered each semester.

CHEM 309. Advanced Environmental Chemistry. 1 Unit.
This course consists of advanced environmental chemistry topics. Principles of chemistry, such as kinetics and equilibrium, are used to describe the sources, fates and transformations of components in the environment. Topics include renewable energy, ozone depletion, climate change, air and water pollution. The course will consist of three lectures and one three-hour laboratory per week. Prerequisite: CHEM 201. At least one in-depth chemistry course from among CHEM 302, CHEM 303, CHEM 305, CHEM 306, CHEM 307, CHEM 308, and CHEM 309 will be offered each semester.

CHEM 385. Independent Study. 0.5 or 1 Units.

CHEM 390. Special Topics in Chemistry. 1 Unit.
This course is an introduction to the theory and practice of computational chemistry. Topics will build off concepts from CHEM 203 and focus on the field of computational chemistry, including molecular mechanics, semi-empirical and ab initio molecular orbital theory, density functional theory, and wave function theory. Prerequisite: CHEM 203.

CHEM 395. Teaching Apprenticeship. 0.5 Units.
Pass/Fail only. This course provides an opportunity for select chemistry majors or minors to work closely with a faculty member in planning, teaching, and evaluating a lower-division course. The student also pursues independent study in the subject matter of the course. Prerequisite: junior or senior status and permission of the department chair. May be repeated once.

CHEM 397. Internship in Chemistry/Biochemistry. 0.5 or 1 Units.
Students complete an internship in an area related to chemistry and/or biochemistry in an applied setting, working with a professional outside Stetson. Full-unit internships required 140 hours for the semester; half-unit internships require 70 hours for the semester. Specific requirements/expectations will be presented by way of a contract signed by the student. Basic expectations include a journal, research paper, or appropriate work product, and a letter of evaluation from the site supervisor. Prerequisites: permission of department chair, major or minor status, and junior or senior standing. May be repeated for credit with permission of department head, but internship credit may not be applied as a substitute for any major, minor, or collateral requirements. Enrollment in an internship course requires students to attend an orientation prior to beginning work at their internship site. For more information regarding internship orientations, please contact Career & Professional Development at career@stetson.edu or 386-822-7315.

CHEM 485. Independent Study. 0.5 or 1 Units.

CHEM 490. Special Topics in Chemistry. 0.5 or 1 Units.

CHEM 498. Research Proposal. 1 Unit.
This course is an introduction to the Senior Research Project, Including computer searches of chemical literature databases, analysis of peer reviewed chemistry publications, scientific writing and presentation training, the preparation of a written research proposal, and the oral presentation of the research proposal. Prerequisites: CHEM 202, CHEM 203, CHEM 205, and CHEM 301. Co-requisite: CHEM 204. Writing Enhanced course.

CHEM 499. Senior Project. 1 Unit.
This course consists of an original investigation undertaken in the senior year under the direction of a professor, the preparation of a written scientific research report, and an oral presentation of research results. The course will include twelve hours of laboratory work per week. Prerequisites: Three in-depth courses, CHEM 498.