

CHE 099/Orientation to Chemistry **0 course units**
(annually)

Required of all entering chemistry majors, this course provides an orientation to The College of New Jersey community; to chemistry faculty; and to the chemistry liberal arts and chemistry education programs offered by the Department of Chemistry including, among other topics, advisement opportunities, curriculum and scheduling, laboratory safety procedures, facilities, introduction to the library, professional societies and student affiliates, career options, and the American Chemical Society Code of Ethics. The academic component, involving common readings and assignments, is part of the course requirements. Grade is P/U and course is required for graduation.

CHE 201, 202/General Chemistry I, II **2 course units**
(with laboratory)
(every semester)

Prerequisite CHE 201: MAT 096 is a prerequisite or taken concurrently

Prerequisite CHE 202: CHE 201

Laws and theories of matter in its various states: atomic and molecular structure from quantum and orbital interpretations; kinetics and equilibrium; periodicity and properties. Quantitative experiments coordinated with lectures. A working knowledge of elementary algebra is required. Successful completion of a high school chemistry course is strongly recommended.

CHE 310/Analytical Chemistry **1 course unit**
(with laboratory)
(annually)

Prerequisite: CHE 202

A study of quantitative analysis including analytical data treatment, equilibrium calculations, volumetric determinations, and electrochemical analysis.

CHE 316/Sophomore Chemistry Seminar **0 course units**
(annually)

Restriction: Reserved for Chemistry majors

Prerequisite: CHE 099

A seminar course designed for sophomore chemistry majors. Included in this course are an introduction to scientific word processing, molecular-modeling programs, and other software computer programs needed by the chemist. Other topics include use of the chemical literature such as *Chemical Abstracts* and the library computer search program *SciFinder Scholar*. Professionalism and ethics, resumes, cover letters, and internship opportunities will also be discussed. Grade is P/U, and course is required for graduation.

CHE 317/Junior Chemistry Seminar **0 course units**
(annually)

Prerequisite: CHE 316

Designed to explore career options within the field of chemistry. Topics include graduate school applications and opportunities, internships, departmental research, and career presentations. A final oral and written research project is also required. Grade is P/U and course is required for graduation.

CHE 318/Senior Chemistry Seminar **0 course units**
(annually)

Prerequisite: CHE 317

A course designed for senior chemistry majors. Oral and written papers will be presented on current chemical literature and each student will be required to develop, present, and defend an original research proposal to the class. Grade is P/U and course is required for graduation.

CHE 331/Organic Chemistry I **1 course units**
(with laboratory)
(annually)

Restriction: Required for chemistry majors, open to others on space available basis

Prerequisite: CHE 202

A study of the chemistry of organic compounds through an investigation of relationships among structure, reaction dynamics, and synthesis incorporating both lecture and laboratory. The laboratory focuses on the development and use of lab techniques critical to the study of organic chemistry.

CHE 332/Organic Chemistry II **1 course units**
(with laboratory)
(annually)

Prerequisite: CHE 331

A continuation of CHE 331 with an emphasis on conjugated and aromatic systems, amines, carbonyl chemistry, and molecules of biological importance. Lecture and laboratory. Laboratory focuses on synthesis, purification, and instrumental analysis.

CHE 340/History of Chemistry and Physics **1 course units**

The principles of chemistry and physics and the interaction of chemistry, physics, and society from earliest times through modern times and into the future are studied. The work of selected chemists, physicists, the evolution of energy, mechanics, atomic structure, and other modern theories, the development of various chemical industries, the importance of environmental concerns, and other currently important subjects are examined.

CHE 350/Essentials of Biochemistry **1 course unit**
(Fall)

Restriction: Not open to chemistry majors

Prerequisites: BIO 211, CHE 332

A one-semester lecture course covering amino acids and proteins, intermediary metabolism, lipids, carbohydrates, and the biochemistry of nucleotides, DNA and RNA. Designed for science majors with little to no background in physical chemistry.

CHE 360/Forensic Chemistry **1 course unit**
(with laboratory)
(Fall)

Prerequisite: CHE 371 or permission of the instructor

This course approaches the challenges, methods, and analyses of forensic science from a fundamental, chemical perspective. Topics include drug analysis, arson investigation, questioned document analysis, and the analysis of paint and gunshot residue samples.

CHE 370 Selected Topics in Chemistry **1 course unit**
(3 class hours, or 3 class hours and 3 lab hours, or 2 class hours and 4 lab hours)
(occasionally)

Prerequisite: Approval of department chair

Selected topics of current relevance and interest in chemistry will be presented by faculty and guest lecturers with special areas of competency. Topics will be announced in advance.

- CHE 371/Quantum Chemistry** **1 course unit**
(with laboratory)
(annually)
Prerequisites: CHE 331 or HON 321, MAT 128, PHY 202
A study of quantum mechanics as it applies to atoms and molecules, chemical bonding and spectroscopy.
- CHE 372/Chemical Thermodynamics** **1 course unit**
(with laboratory)
(Fall)
Prerequisites: CHE 371, CHE 331 or HON 321, MAT 128, PHY 202
A study of thermodynamics, kinetics, statistical mechanics, and other areas fundamental to an understanding of the physical behavior of matter.
- CHE 393/Independent Research I** **0.5-1 course unit**
(every semester)
Prerequisites: Permission of the instructor
This course is designed as a first semester research experience for students who are majoring in chemistry, and focuses on mentored undergraduate research under the close supervision of a faculty member.
- CHE 399/Internship in Chemistry** **variable course units**
(Spring)
Prerequisite: Permission of department chair
This arrangement provides an opportunity for practical field experience. See department chair for further information.
- CHE 410/Instrumental Analysis** **1 course unit**
(with laboratory)
(Fall)
Prerequisites: CHE 310, 371
A study of principles, applications, and operations of chemical instrumentation.
- CHE 415/Separation Science** **1 course unit**
(annually)
Prerequisite: CHE 371
Separation techniques to be covered include wet-chemistry separation and instrumental separation. Separation instrumentation is emphasized and includes capillary electrophoresis and a variety of chromatograph. Hands-on experiments are arranged for students to practice chemical separation in the laboratory.
- CHE 430/Biochemistry** **1 course unit**
(with laboratory)
(Spring)
Prerequisites: CHE 332, CHE 371 or CHE 372
The fundamental principles of chemistry as they apply to biological and physiological processes. Designed for chemistry majors.
- CHE 451/Inorganic Chemistry—Structure and Bonding** **1 course unit**
(with laboratory)
(Spring)
Prerequisites: CHE 371
A study of inorganic chemistry exploring modern concepts of structure and bonding with considerable emphasis placed on computer-aided molecular modeling, crystallography and spectroscopy (UV and IR).

CHE 452/Inorganic Chemistry—Reactions and Mechanisms **1 course unit**

(with laboratory)

(annually)

Prerequisites: CHE 451

A study of inorganic chemistry exploring modern concepts of synthesis and reactivity with focus placed on reaction mechanism and the role of inorganic complexes in chemical catalysis. Analysis of mechanism by spectroscopic techniques is incorporated.

CHE 457/Organometallic Chemistry Laboratory **1 course unit**

(with laboratory)

(alternate years)

Prerequisites: CHE 371, 372, 451

A study of modern concepts of structure and bonding in organotransition metal chemistry emphasizing synthetic methods, catalysis, and reaction mechanisms.

CHE 470/Selected Topics in Chemistry **1 course unit**

(3 class hours, or 3 class hours and 3 lab hours, or 2 class hours and 4 lab hours)

(occasionally)

Prerequisite: CHE 332 and permission of department chair

Selected topics of current relevance and interest in chemistry will be presented by faculty and guest lecturers with special areas of competency. Recent topics include mass spectrometry of biomolecules, separation science, spectroscopy, medicinal chemistry, stereochemistry, and heterocyclic chemistry. Topics will be announced in advance.

CHE 471/Forensic Applications of Mass Spectrometry **1 course unit**

(with laboratory)

(Spring)

Prerequisite: CHE 372

This course discusses mass spectrometry instrumentation, and the interpretation of mass spectra obtained using GC/MS, using forensic applications and examples such as arson investigations and drug analyses.

CHE 472/Forensic Chemistry II **1 course unit**

(with laboratory)

(Spring)

Prerequisite: CHE 372

This course will discuss the details of one of the most sophisticated chemical challenges to date, DNA analysis, as well as the basis for the many simple spot tests, "presumptive tests", used in the field. Presumptive tests will be developed by understanding the chemistry of inorganic and organic qualitative analysis. Understanding such approaches can lead to powerful and simple chemical tools, not only in forensic laboratories, but wherever questions of structure and composition arise. The class will consider designing new presumptive methods for targets such as drugs and gunshot residue.

CHE 490/Student Teaching Chemistry **2 course units**

(every semester)

Prerequisite: Meeting all criteria for admission to student teaching

Student teaching during the senior year. Teaching is conducted in approved public schools, and supervised and observed by college and public school teachers. Students learn through observation and participation in the classroom, and through responsible teaching.

CHE 493/Independent Research II

variable course units

(every semester)

Prerequisites: Permission of instructor

This course is for students who plan to continue undergraduate research under close supervision of a faculty member. One semester of CHE 493 may be used to satisfy a writing intensive requirement; CHE 493 may be repeated for credit for those students who desire to do more than two semesters of mentored undergraduate research.