

CHEMICAL SCIENCES (CHEM)

CHEM 100 Computers in Chemistry (2 credits)

This course provides students with an introduction to the use of computer applications for doing and communicating chemistry. (It is equally useful for other science majors.) Topics covered include the use of both general purpose (word processors and presentation graphics) and specialized (including two- and three-dimensional molecular graphics programs) applications for communicating technical information. Other topics covered include an introduction to molecular modeling and the technical applications of spreadsheets and databases.

CHEM 102 Chemistry in Everyday Life (3 credits)

A selection of topics from the multitude of chemical and nuclear reactions encountered in the everyday life of the modern person will be presented through lectures and demonstrations. Topics such as the following may be included: evaluation of energy alternatives, radioactive isotopes in diagnosis and treatment of disease, risk-to-benefit evaluation of food additives and environmental impact of chemical waste disposal. *Either semester* (CNSN)

CHEM 131 Survey of Chemistry I (4 credits)

CHEM 132 Survey of Chemistry II (3 credits)

CHEM 131 is prerequisite to CHEM 132

This sequence of courses surveys the broad range of topics that comprise the field of chemistry. Topics covered first semester include atomic structure, chemical bonding, states of matter, solutions, chemical reactions (with an emphasis on acid/base reactions) and nuclear chemistry. Topics covered in the second semester include the structure, nomenclature and reactions of organic molecules, enzymes, and the basics of metabolism (concentrating on energy producing pathways). This sequence is designed for students requiring a yearlong course in chemistry, but who are not planning further study in chemistry (except for instrumentation, CHEM 250). CHEM 131 (4 credits) entails three hours of lecture and one three-hour laboratory weekly. (CNSL) CHEM 132 (3 credits) entails three hours of lecture each week. (CNSN) *CHEM 131 both semesters, CHEM 132 spring semester only*

CHEM 135-136 Freshman Honors Colloquium (1 credit each semester)

Prerequisite: Open to all-college honors students and to others at the discretion of the instructor

Freshman Honors Colloquia in chemistry allow exceptionally able students to explore a challenging topic in small classes under close faculty supervision. Colloquia meet once a week for 50 minutes and culminate in a paper or scientific project, which provides the major part of the grade. The minimum enrollment is two and the maximum is 12. Topics vary from semester to semester. *CHEM 135 fall semester, CHEM 136 spring semester*

CHEM 141-142 Chemical Principles I-II (4 credits for each semester)

CHEM 141 is prerequisite to CHEM 142

Theoretical inorganic chemistry will be studied with emphasis on mass-energy relationships in terms of structure and physical

laws. Laboratory work emphasizes quantitative techniques. Three hours of lecture and four hours laboratory weekly. *CHEM 141 fall semester, CHEM 142 spring semester* (CNSL; CQUR)

CHEM 199 First Year Seminar (3 credits)

Prerequisite: Open to all freshmen with a writing placement score of 3 or above or a SAT score of 500 or above. Students with 24 or more transfer credits will have this requirement waived.

First Year Seminars (FYS) are writing-intensive topic courses that introduce students to academic thought, discourse and practices. FYS courses prepare and orient students toward productive and fulfilling college careers by actively engaging them in a specific academic area of interest. Students will improve their writing, reading, research and basic information and technology skills while learning to work both collaboratively and independently. These courses will fulfill the First Year Seminar requirement and may fulfill other requirements for the core curriculum. Each course may fulfill different requirements and topics may change each semester. Only one FYS course may be taken for credit. (CFYS)

CHEM 241 Quantitative Chemical Analysis (3 credits)

Prerequisite: CHEM 142

The classical and modern methods for the quantitative analysis of organic and inorganic compounds, including volumetric, gravimetric, spectroscopic and chromatographic methods. Topics covered include acid-based, solubility and complex-formation equilibria, as well as an introduction to spectroscopy and chromatography. Two hours of lecture and five hours of laboratory weekly. *Offered every other spring semester*

CHEM 242 Intermediate Inorganic Chemistry (3 credits)

Prerequisite: CHEM 142

The descriptive chemistry, as well as synthesis and reactions, of non-transitional elements and their compounds are studied systematically. Correlations of structure and properties are explained on the basis of modern theories. *Fall semester*

CHEM 250 Instrumentation (3 credits)

Prerequisite: CHEM 132 or CHEM 142 or consent of instructor

The physical chemistry basic to modern analytical instrumentation will be discussed as the basis for the study of instrumental analysis. Two hours of lecture and one two-hour laboratory period weekly. *Offered once in three years, spring semester*

CHEM 286-287 Sophomore Honors Colloquium (1 credit for each semester)

Prerequisite: Open to Commonwealth Honors students and to others at the discretion of the instructor

Sophomore Honors Colloquia in chemistry allow exceptionally able students to explore a challenging topic in small classes under close faculty supervision. Colloquia meet once a week for 50 minutes and culminate in a paper or scientific project, which provides the major part of the grade. The minimum enrollment is two and the maximum is 12. Topics vary from semester to semester. *CHEM 286 fall semester, CHEM 287 spring semester*

CHEM 290 Environmental Chemistry (3 credits)

Prerequisite: CHEM 142

A one-semester course covering the basic principles of aquatic chemistry, atmospheric chemistry, and the chemistry of the geosphere. Topics include energy and the environment, water pollution, water treatment, air pollution, photochemical smog, global warming, the ozone hole and an introduction to "green" chemistry. Offered once in two years, spring semester

CHEM 298 Second Year Seminar (Speaking Intensive) (3 credits)

Prerequisite: ____199; Open to all sophomores and juniors who have completed ENGL 101, and the speaking skills requirement. Students with 54 or more transfer credits will have this requirement waived. Cannot be taken if ____299 is taken for credit.

Second Year Seminars (SYS) are speaking-intensive topic courses that build on the academic skills and habits introduced in the First Year Seminar. SYS courses engage students in a specific academic area of interest and provide them with the opportunity to reinforce, share and interpret knowledge. Students will improve their speaking, reading, research and basic information and technology skills while building the connections between scholarship and action that are required for lifelong learning. These courses will fulfill the Second Year Seminar requirement and may fulfill other requirements for the core curriculum. Each course may fulfill different requirements and topics may change each semester. Only one SYS course may be taken for credit. (CSYS)

CHEM 299 Second Year Seminar (Writing Intensive) (3 credits)

Prerequisite: ____199; Open to all sophomores and juniors who have completed ENGL 101 and ENGL 102. Students with 54 or more transfer credits will have this requirement waived. Cannot be taken if ____298 is taken for credit.

Second Year Seminars (SYS) are writing-intensive topic courses that build on the academic skills and habits introduced in the First Year Seminar. SYS courses engage students in a specific academic area of interest and provide them with the opportunity to reinforce, share and interpret knowledge. Students will improve their writing, reading, research and basic information and technology skills while building the connections between scholarship and action that are required for lifelong learning. These courses will fulfill the Second Year Seminar requirement and may fulfill other requirements for the core curriculum. Each course may fulfill different requirements and topics may change each semester. Only one SYS course may be taken for credit. (CSYS)

CHEM 341-342 Organic Chemistry I-II (Non-Lab) (3 credits each summer session)

Prerequisite: CHEM 142 or consent of instructor is prerequisite to CHEM 341; CHEM 341 is prerequisite to CHEM 342

This course provides the lecture portion independent of the laboratory of CHEM 343-344 Organic Chemistry I and II. CHEM 341 and CHEM 342 are offered summer only

CHEM 343-344 Organic Chemistry I-II (4 credits for each semester)

Prerequisite: CHEM 142 or consent of instructor is a prerequisite to CHEM 343; CHEM 343 is a prerequisite to CHEM 344

An introductory course in organic chemistry organized in terms of the structure of organic compounds, mechanism of organic and biorganic and environmental chemistry. The laboratory includes an elementary, middle, and high school Chemistry OutReach project for students interested in science teaching careers. Three hours of lecture and four hours of laboratory weekly. CHEM 343 is a prerequisite to CHEM 344. The lecture portion of this course may be taken independent of the laboratory under CHEM 341 Organic Chemistry I (Non-Lab) (three credits) and CHEM 342 Organic Chemistry II (Non-Lab) (three credits). CHEM 341 and CHEM 342 are offered summers only

CHEM 381-382 Physical Chemistry I-II (4 credits for each semester)

Prerequisite: CHEM 142 and MATH 152 or MATH 142 and consent of instructor is a prerequisite to CHEM 381; CHEM 381 is a prerequisite to CHEM 382

The laws governing the physical and chemical properties of substances. CHEM 381 covers thermodynamics and kinetics, while CHEM 382 focuses on molecular spectroscopy and quantum chemistry and statistical mechanics. Three hours of lecture and one four-hour laboratory period weekly.

CHEM 390 Research Problems in Chemistry (1-3 credits)

Prerequisite: CHEM 344 and CHEM 382 and consent of the department

The student will work on a research project under the direction of a faculty member. A written report (see department office for preparation guide) must be submitted to the department chairperson by the end of the final exam period. This course may be repeated for up to six credits. Graded on a (P) Pass/(N) No Pass basis.

CHEM 440 Advanced Organic Chemistry (3 credits)

Prerequisite: CHEM 344 and CHEM 382 or consent of instructor
Selected topics in advanced organic chemistry, such as physical organic chemistry, alicyclic and heterocyclic chemistry, natural products and advanced synthetic methods.

CHEM 444 Advanced Inorganic Chemistry (3 credits)

Prerequisite: CHEM 344 and CHEM 382; CHEM 382 may be taken concurrently

The topics of group theory, stereochemistry, ligand field theory, molecular orbital theory, synthesis and kinetics of reactions as applied to transition metal elements will be treated in detail. Hours arranged. Spring semester

tMay be taken for graduate-level credit

CHEM 450 Instrumental Analysis (3 credits)

Prerequisite: CHEM 382, which may be taken concurrently
Theory and practical application of instrumental methods as applied to chemical analysis, including pH measurements, electro-deposition, potentiometry, crystallography, mass spectrometry and spectroscopy. Two hours of lecture and one four-hour laboratory period weekly. *Fall semester*

CHEM 461 General Biochemistry I (4 credits)

Prerequisite: CHEM 344 or consent of instructor
A survey of the chemical components of living matter and the major processes of cellular metabolism. Three hours of lecture and one three-hour laboratory period weekly. *Fall semester*

CHEM 462 General Biochemistry II (3 credits)

Prerequisite: CHEM 461
A survey of the chemical components of living matter and the major processes of cellular metabolism. Three hours of lecture weekly. *Spring semester*

CHEM 466 Advanced Biochemistry Laboratory (2 credits)

Prerequisite: CHEM 461
A study of special laboratory techniques used in biochemical research such as chromatography, enzymology, radiochemical techniques, electrophoresis and metabolic pathways. An individual project will complete the laboratory. One hour of laboratory discussion and three hours of laboratory weekly. *Spring semester*

CHEM 485 Honors Thesis (3 credits)

Prerequisite: Open to Commonwealth and Departmental Honors students
One-hour weekly meetings with the thesis director will culminate in an honors thesis. With the consent of the Departmental Honors Committee and the thesis director, this course may be extended into a second semester for three additional credits depending upon the scope of the project. Whether the final version of the thesis qualifies the student to graduate with honors will be determined by the Departmental Honors Committee. *Either semester*

CHEM 490 Special Topics in Chemistry (3 credits)

Prerequisite: CHEM 382 or consent of instructor
Special Topics in Chemistry will deal with various topics at the "cutting edge" of chemistry. The course will stress the current literature as the "text." Assessment will be based primarily on writing assignments. The topic will change each time the course is offered. The specific topic will be announced prior to registration. *Spring semester*

CHEM 492 Laboratory Techniques (3 credits)

Prerequisite: CHEM 344 and CHEM 382
Special techniques used in the research laboratory, such as glass-blowing, vacuum line technique, vacuum distillation, dry-box operations and advanced synthetic methods. Hours arranged. *Fall semester*

CHEM 498 Internship in Chemical Sciences (3-15 credits)

Prerequisite: Consent of the department; formal application required
Laboratory experience in industrial or government laboratories, regulating agencies or academic laboratories at other institutions. Graded on a (P) Pass/(N) No Pass basis. *Either semester*

CHEM 499 Directed Study in Chemistry (1-3 credits)

Prerequisite: Consent of the department; formal application required
Directed study is open to juniors and seniors who have demonstrated critical and analytical abilities in their studies and who wish to pursue a project independently. May be taken twice for a maximum of six credits. *Either semester*

CHEM 560 Special Topics in Chemistry (variable credit)

The course will cover special topics of current relevance in chemistry education. The topic to be addressed will be announced prior to registration. This course may be taken more than once with the consent of the adviser.

Other Approved Courses

CHEM 338-339 Honors Tutorial
CHEM 502 Research
CHEM 503 Directed Study
CHEM 512 Microcomputers as Laboratory Instruments
CHEM 550 Chemistry and the Environment

†May be taken for graduate-level credit