
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. Satisfies the GER in Physical and Biological Sciences (non-lab course). *Either semester*

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. This course satisfies the GER in Physical and Biological Sciences (laboratory). CHEM 132 (3 credits) entails three hours of lecture each week. *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. CHEM 141 only satisfies the GER in Physical and Biological Sciences.

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*

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 the 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*

Note: This section is arranged in course number order. See course prefix key for assistance in locating department sections.

Note: See Catalog Web Addenda at www.bridgew.edu/catalog/addenda/ as that information supersedes the published version of this catalog.

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 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 (3 credits) and CHEM 342 Organic Chemistry II-Non-lab (3 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, 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. *Fall and Spring semester*

†May be taken for graduate level credit.

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**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*

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 the 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 the 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. Since the topic will change each time the course is offered, please see the course schedule for the current topic. *Offered 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 bases. *Either semester*

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

Prerequisite: Consent of the department; formal application required
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 in pre-registration publications. May be taken more than once with the consent of the adviser.

Other Approved Courses:

CHEM 111 The Art of Chemical Inquiry
CHEM 125 Introductory Chemistry for the Life Sciences I
CHEM 126 Introductory Chemistry for the Life Sciences II
CHEM 210 Chemistry and Society
CHEM 252 Recent Developments in Inorganic Chemistry
CHEM/PHYS 260 Microprocessors-Microcomputer Technology
CHEM 270 Introduction to Toxicology
CHEM 280 Physical Chemistry for the Life Sciences
CHEM 300 Organic Chemistry for the Life Sciences
CHEM 338-339 Honors Tutorial
CHEM 350 Introduction to Laboratory Automation
CHEM 372 Marine Chemistry
CHEM 389 Introduction to the Chemical Literature
CHEM 422 Applied Computational Chemistry
CHEM 440 Advanced Organic Chemistry
CHEM 442 Qualitative Organic Analysis
CHEM 502 Research
CHEM 503 Directed Study

†May be taken for graduate level credit.

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CHEM 510 Chemical Instrumentation
CHEM 512 Microcomputers as Laboratory Instruments
CHEM 520 Molecular Modeling
CHEM/PHYS 525 Problem Solving in Chemistry and Physics
CHEM 530 Computer Assisted Instruction Design in the Physical Sciences
CHEM 550 Chemistry and the Environment
CHEM 561 Recombinant DNA Technology
CHEM 562 Protein Chemistry
CHEM 582 Biochemistry Topics
CHEM 585 Atomic and Molecular Structure
CHEM 591 Advanced Organic Chemistry I: Structure
CHEM 592 Advanced Organic Chemistry II: Mechanism and Synthesis
CHEM 594 Special Topics in Inorganic Chemistry
CHEM 597 Advanced Physical Chemistry I: Chemical Thermodynamics and Statistical Thermodynamics
CHEM 598 Advanced Physical Chemistry II: Chemical Kinetics