DEPARTMENT OF CHEMISTRY

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The Department of Chemistry offers a curriculum designed to enable its majors to work in governmental and industrial laboratories, to pursue graduate degrees in chemistry or closely related areas, to enter medical, veterinary, dental, optometry, or pharmacy schools, or to enter the teaching profession.

Upon graduation chemistry majors are expected to:

1. possess a basic knowledge of analytical, inorganic, organic, physical, and polymer chemistry as well as biochemistry
2. be able to communicate effectively both orally and in writing the results of scientific research
3. understand some aspects of the impact of chemistry on society
4. know how to use computers to collect and analyze data

All chemistry majors are also required to participate in a research project as evidence that they understand the scientific method.

Bachelor of Science with a major in Chemistry

The B.S. degree with a major in chemistry requires a minimum of 41 hours of course work in chemistry plus research and other additional requirements. The program of study is as follows:

Required Courses:

CHEM 201–202: Gen. College Chemistry ... 8 hours
CHEM 251: Quantitative Analysis ..... 4 hours
CHEM 303–304: Organic Chemistry ..... 8 hours
CHEM 315–316: Physical Chemistry ..... 8 hours
CHEM 410: Instrumental Analysis ..... 4 hours
CHEM 405: Junior Seminar ..... 1 hour
CHEM 407: Senior Seminar ..... 2 hours
Chemistry Electives (two courses excluding research and internships) ..... 6–8 hours

Additional Requirements:

PHY 251–252: Essentials of Physics ..... 8 hours
MTH 120, 210, and 220: Calculus I, II, and III ..... 9 hours

TOTAL HOURS FOR THE B.S. CHEMISTRY MAJOR ..... 58–60 hours

Bachelor of Arts with a major in Chemistry

The B.A. degree with a major in chemistry consists of a minimum of 33 hours of course work in chemistry, as well as some additional requirements. The program of study is as follows:

Required Courses:

CHEM 201–202: Gen. College Chemistry ... 8 hours
CHEM 251: Quantitative Analysis ..... 4 hours
CHEM 303–304: Organic Chemistry ..... 8 hours
CHEM 315: Physical Chemistry I ..... 4 hours
CHEM 405: Junior Seminar ..... 1 hour
CHEM 407: Senior Seminar ..... 2 hours
Chemistry Electives: ..... 6 hours

Additional Requirements:

PHY 241–242: Elements of Physics ..... 8 hours
MTH 115: Survey of Calculus or MTH 120: Calculus and Analytical Geometry ..... 3 hours

TOTAL HOURS FOR THE B.A. CHEMISTRY MAJOR ..... 44 hours

Bachelor of Science with a major in Biochemistry

The B.S. degree in Biochemistry is based upon the recommendations of the American Society for Biochemistry and Molecular Biology and requires 35 hours of chemistry, 16 hours of biology, 8 hours of physics, and 6 hours of mathematics. The program of study is as follows:

Required Chemistry Courses:

CHEM 201–202: Gen. College Chemistry .. 8 hours
CHEM 251: Quantitative Analysis ..... 4 hours
CHEM 303–304: Organic Chemistry ..... 8 hours
CHEM 315: Physical Chemistry ..... 4 hours
CHEM 415 and 416: Biochemistry ..... 8 hours
CHEM 405: Junior Seminar ..... 1 hour
CHEM 407: Senior Seminar ..... 2 hours

Required Biology Courses (4 courses, 16 hours)**:**

One or two courses from
- BIO 100: General Biology
- BIO 202: General Zoology
- BIO 203: General Botany

Two or three courses from
- BIO 301: Genetics
- BIO 310: Cell Biology
- BIO 312: Microbiology
- BIO 408: Molecular Biology

Additional Requirements:

PHY 251–252: Essentials of Physics ..... 8 hours
MTH 120 and 210: Calculus I and II ..... 6 hours

TOTAL HOURS FOR THE B.S. BIOCHEMISTRY MAJOR ..... 65 hours

Statistics, computer science, and additional math courses are recommended for all three majors, but are not required. Majors desiring certification to teach must include CHEM 311, CHEM 403, CHEM 415, BIO 202 or 203 plus four more hours in biology, and specific courses in education in their program.

The Chemistry Minor

A chemistry minor requires 24 hours of course work in chemistry (6 courses). The program of study is as follows:

CHEM 201–202: Gen. College Chemistry ... 8 hours
CHEM 251: Quantitative Analysis ..... 4 hours
CHEM 303: Organic Chemistry ..... 4 hours
Chemistry Electives (choose two) ..... 8 hours
- CHEM 304: Organic Chemistry
- CHEM 315: Physical Chemistry I
- CHEM 316: Physical Chemistry II
- CHEM 410: Instrumental Analysis
- CHEM 415: Biochemistry I
- CHEM 416: Biochemistry II

TOTAL HOURS FOR THE MINOR .... 24 hours

The Department of Chemistry also participates in the Environmental Studies minor (see Natural Sciences: Special Programs) and the Pre-Medicine, Pre-Dentistry, and Pre-Pharmacy programs.

*150. CONCEPTS OF CHEMISTRY/
FOUR CREDITS
GEP. Not accepted for major or minor credit. A survey of some of the major concepts of chemistry in order to gain insight into the nature of this science. *Lecture and laboratory, a non-refundable laboratory fee of $25.00 is required.*

*160. INTRODUCTION TO GEOLOGY/
FOUR OR SIX CREDITS
GEP. Not accepted for major or minor credit. A course emphasizing the theories of geology, the techniques of rock, mineral, and fossil identification and classification, their habits and uses, and local geology. Field trips. The course is offered for four credits as an on-campus course and for four or six credits as an off-campus travel course. Off-campus travel costs will be in addition to the regular fees. *Lecture and laboratory. A non-refundable laboratory fee of $25.00 is required. Offered winter term or spring term.*

*199H. FRESHMAN HONORS SEMINAR/
FOUR CREDITS
GEP. Not accepted for major or minor credit in biology, chemistry, or the pre-med program. A course for non-science majors who are interested in understanding some contemporary technological issues within the discipline of chemistry. The course provides the basic scientific knowledge necessary to understand these issues. The laboratory will introduce students to the scientific method and some of the laboratory techniques of chemistry. *Offered periodically in rotation with seminars in other disciplines. Lecture and laboratory. A non-refundable laboratory fee of $25.00 is required.*

*201-202. GENERAL COLLEGE CHEMISTRY/
EIGHT CREDITS
GEP. Required for major and minor. A course suitable for all science majors and pre-med students. Topics covered include atomic and molecular structure, chemical bonding, stoichiometry, chemical reactions, gas laws, thermodynamics, kinetics, equilibria, electrochemistry, qualitative analysis, and some descriptive chemistry. A good background in algebra is required. *Lecture and laboratory. A non-refundable laboratory fee of $25.00 is required.*

251. QUANTITATIVE ANALYSIS/
FOUR CREDITS
Required for major and minor. Prerequisite: Chemistry 202. A study of the principles, methods, and applications of quantitative analysis including some instrumental techniques. *Offered during winter term. Lecture and laboratory. A non-refundable laboratory fee of $25.00 is required.*

299H. INTERDISCIPLINARY HONORS COURSE
This course is team taught by members in two departments and is open to Nisbet Honors Program members and to others who meet Honors Program guidelines. All students registering for these courses must register not only through the Honors Program but also with their adviser and the Registrar's Office.

303-304. ORGANIC CHEMISTRY/
EIGHT CREDITS
Required for major and minor. Prerequisite: Chemistry 202. A systematic survey of the typical compounds of carbon. Study includes nomenclature, reactions, synthesis, and mechanisms. *Lecture and laboratory. A non-refundable laboratory fee of $25.00 is required.*

311. ENVIRONMENTAL CHEMISTRY/
FOUR CREDITS
Major, minor or elective credit. Prerequisites: Chemistry 201-202 and 251. A study of those chemical substances, both naturally occurring and synthetic, which are the major causes of pollution in our environment. *Lecture and Laboratory. A non-refundable laboratory fee of $25.00 is required. Offered during spring term in alternate years.*

315-316. PHYSICAL CHEMISTRY/
EIGHT CREDITS
Chemistry 315 required for majors. Prerequisites: Chemistry 201-202, physics, and calculus. An in-depth study of such topics as thermodynamics, chemical kinetics, bonding theory, molecular and atomic structure, and various properties of gases, liquids, and solids. *Lecture and laboratory. A non-refundable laboratory fee of $25.00 is required. Chemistry 315 is offered every year. Chemistry 316 is offered in alternate years.*

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402. ADVANCED ORGANIC CHEMISTRY/
THREE CREDITS
Major, minor, or elective credit. A course designed as a continuation of study of important theoretical concepts, reaction types, and reaction mechanisms of organic chemistry. Topics that may be included are photochemistry, organic synthesis, carbocations and neighboring group participation, electrocyclic reactions, and linear free energy relationships. *Offered in alternate years.*

403. ADVANCED INORGANIC CHEMISTRY/
THREE CREDITS
Major, minor, or elective credit. This course focuses on the bonding theories and chemical and physical properties of the elements and their inorganic compounds. *Offered in alternate years.*

404. SPECIAL TOPICS/THREE CREDITS
Major, minor, or elective credit. Advanced courses that will be offered depending on the available staff and student interest. Topics that may be included are physical, organic, nuclear, and polymer chemistry, and hazardous wastes.

405. JUNIOR SEMINAR/ONE CREDIT
Required of all majors in the junior year. Not accepted for minor credit. *Offered during spring term.*

407. SENIOR SEMINAR/TWO CREDITS
Required of all majors in the senior year. Not accepted for minor credit. *Offered during spring term*.

410. INSTRUMENTAL ANALYSIS/
FOUR CREDITS
Major, minor, or elective credit. Prerequisites: Chemistry 251 and 303-304. A course which focuses on the principles, instrumentation, and applications of various instrumental methods of analytical chemistry. Some of the topics covered include UV-visible, IR, and NMR spectroscopy, mass spectrometry, gas and high pressure liquid chromatography, electrophoresis, atomic emission and absorption spectroscopy, and electroanalytical methods. *Lecture (2 hours/week) and laboratory (6 hours/week). A non-refundable laboratory fee of $25.00 is required. Offered in alternate years.*

415, 416. BIOCHEMISTRY/EIGHT CREDITS
Major, minor, or elective credit. May be used for biology major credit. Prerequisite: Chemistry 304. A study of the structure, properties, and function of biomolecules and cell membranes and a detailed examination of reactions and mechanisms of metabolism, replication, transcription, and translation. *Lecture and laboratory. A non-refundable laboratory fee of $25.00 is required. Offered in alternate years.*

480. RESEARCH/ONE TO SIX CREDITS
Major, minor, or elective credit. Prerequisite: Permission of department. A special course to allow the student to pursue a research problem. *May be repeated. Maximum of six total credits. A non-refundable laboratory fee of $25.00 is required.*

481. INTERNSHIP IN CHEMISTRY/
FOUR CREDITS
Major credit only. Not accepted for minor credit. Prerequisite: Permission of department and junior or senior standing. A special course to afford the student practical work experience. Three types of chemical internships are offered: industrial (for students planning to work in industrial or governmental laboratories) pharmaceutical (for pre-pharmacy chemistry majors), and environmental. Pass/Fail grading.

490. DIRECTED INDEPENDENT STUDY IN
SPECIAL TOPICS/
ONE, TWO, OR THREE CREDITS
Major credit only. Prerequisite: Permission of department. An independent course of advanced study of a particular topic not covered in any other course. Students receive minimum guidance from faculty. *May be repeated for credit.*