Chemistry

Mitchell Menzmer, Chair

AIMS OF THE CHEMISTRY PROGRAM
The aim of the chemistry program is to develop in students the ability to think critically and creatively. The chemistry curriculum is designed to provide the student with a strong background in the areas of organic, analytical and physical chemistry. The major will serve as a solid foundation upon which the candidate can build a professional career or a more specialized graduate program.

PROGRAMS
B.A. Chemistry
B.S. Chemistry
B.S. Physical Science -- Secondary Certification
Minor in Chemistry

Chemistry, B.A.
The chemistry B.A. major includes the following courses or their equivalents.

CHEM 111, 112 General Chemistry ......................... 8
CHEM 221 Modern Analytical Chemistry .................... 4
CHEM 331, 332 Organic Chemistry.......................... 8
CHEM 341 Physical Chemistry .................................. 4
CHEM 451 Biochemistry ........................................ 3
CHEM 462 Inorganic Chemistry ............................... 3
CHEM 491 Selected Topics ..................................... 1
CHEM 471, 472 Seminar in Chemistry

or

BIOL 380 Research Methods .................................. 2
Electives CHEM 310, CHEM 421 or CHEM 421 .......... 4
TOTAL 37

Required Cognates: MATH 181; PHYS 121, 122.
Recommended Cognates: MATH 282, 283; CSIS 110.

Chemistry, B.S.
The chemistry B.S. major includes the following courses or their equivalents.

CHEM 111, 112 General Chemistry ......................... 8
CHEM 221 Modern Analytical Chemistry .................... 4
CHEM 331, 332 Organic Chemistry.......................... 8
CHEM 341 Physical Chemistry .................................. 4
CHEM 451 Biochemistry ........................................ 3
CHEM 462 Inorganic Chemistry ............................... 3
CHEM 491 Selected Topics ..................................... 1
CHEM 471, 472 Seminar in Chemistry

or

BIOL 380 Research Methods .................................. 2
Electives CHEM 310 or CHEM 421 ......................... 4
TOTAL 41

Required Cognates: CSIS 110; MATH 181, 282, 283; PHYS 121, 122.
Recommended Cognates: MATH 321; an intermediate foreign language.

Chemistry Minor
18 hours including CHEM 111, 112 and 10 hours chosen from courses listed for the major (6 hours u.d.).

TEACHING CERTIFICATION PROGRAM
The following Physical Science major is for teaching certification only. Requirements for certification are listed in the Education section of this bulletin.

You must make formal application for admittance to the Teacher Education Program. Applications are available at the Education Department office.

Physical Science with Chemistry Emphasis, B.S.
Secondary Teaching Area

CHEM 111, 112 General Chemistry .......................... 8
CHEM 331, 332 Organic Chemistry .......................... 8
CHEM 341 Physical Chemistry ............................... 4
CHEM 451 Biochemistry ........................................ 3
CHEM 462 Inorganic Chemistry ............................... 4
CHEM 471, 472 Seminar in Chemistry ..................... 2
PHYS 112 Introductory Astronomy .......................... 3
PHYS 121, 122 General Physics ............................. 8
PHYS 221, 222 General Physics with Calculus ........... 2
PHYS 311 Modern Physics ................................... 3
PHYS Upper Division Physics Elective .................... 3
TOTAL (27 u.d.) 48

COURSES
CHEM 101 Introductory Chemistry:
   General Chemistry 3 hours
   Prerequisite: Acceptable MAP score*, or Corequisite: MATH 110.
   The course is designed as an introduction to the fundamental principles of chemistry. In addition to a wide range of topics from inorganic chemistry, nuclear chemistry and the chemistry of carbohydrates and proteins are also addressed. Not applicable to major, minor or teaching sequence. 3 Lec. (Fall, Spring)

CHEM 102 Introductory Chemistry Laboratory 1 hour
   Prerequisite: Acceptable MAP score*, or Corequisite: MATH 110.
   A laboratory course to accompany CHEM 101. Experiments cover topics from inorganic chemistry, organic, and biochemistry. Not applicable to major, minor or teaching sequence. 3 Lab. (Fall)

CHEM 103 Introductory Chemistry:
   Organic and Biochemistry 3 hours
   Prerequisite: CHEM 101 with grade of C or above.
   Additional introductory topics from organic and biochemistry with emphasis on human metabolism. Not applicable to major, minor or teaching sequence. 3 Lec. (Spring)

CHEM 104 Introductory Chemistry Laboratory 1 hour
   Prerequisite or corequisite: CHEM 103.
   A laboratory course to accompany CHEM 103. Experiments cover basic concepts from organic and biochemistry. Not applicable to major, minor or teaching sequence. 3 Lab. (Spring)

* See Math Aptitude Profile on page 84.
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CHEM 111 General Chemistry I 4 hours
Prerequisite: MATH 110 or acceptable MAP score*, and Corequisite: MATH 121.
This course develops basic topics such as atomic structure, periodicity, chemical equations, chemical bonding, and structure and states of matter. 3 Lec 3 Lab. (Fall)

CHEM 112 General Chemistry II 4 hours
Prerequisite: CHEM 111 with a grade of C or above.
A continuation of CHEM 111. Included are discussions of solutions, acids and bases, equilibrium, and electrochemistry. 3 Lec 3 Lab. (Spring)

CHEM 221 Modern Analytical Chemistry 4 hours
Prerequisite: CHEM 112 with a grade of C or above.
A course in which quantitative and instrumental techniques of chemical analysis are combined. Emphasis will be on developing analytical skills. 3 Lec 3 Lab. (Fall, even years)

CHEM 291 Selected Topics 1 hour
Prerequisite: Permission of the department chair.
This course offers the lower division student opportunity for independent study under the direction of a staff member. This study may involve research, laboratory, or library work. Content and methods of study must be arranged prior to registration. May be repeated for a total of 2 credits.

CHEM 310 Environmental & Geological Chemistry 4 hours
Prerequisite: CHEM 112 or equivalent with a grade of C or above; MATH 181 or permission of instructor.
Chemistry of how geological processes and anthropogenic activities impact Earth's hydrosphere and atmosphere. Application of computer modeling to solve problems will be employed. 3 Lec, 3 Lab (Spring, even years)

CHEM 331 Organic Chemistry 4 hours
Prerequisite: CHEM 112 with grade of C or above.
The course deals with the theory and applications of basic organic chemistry. Included is the study of alkanes, alkenes, alkynes, simple aromatics, alkyl halides, alcohols, ethers and spectroscopic methods. 3 Lec 3 Lab. (Fall)

CHEM 332 Organic Chemistry 4 hours
Prerequisite: CHEM 331 with a grade of C or above.
A continuation of the study of basic organic chemistry. Includes carboxylic acids, aldehydes, ketones, amines, heterocyclics, unsaturated carboxyl compounds, carbohydrates, phenols, glycols and epoxides. 3 Lec 3 Lab. (Spring)

CHEM 341 Physical Chemistry 4 hours
Prerequisite: CHEM 112 or equivalent with a grade of C or above; MATH 181.
Concepts chosen from elementary quantum mechanics, classical and molecular thermodynamics. 3 Lec 3 Lab. (Fall, odd years)

CHEM 342 Physical Chemistry 4 hours
Prerequisite: CHEM 341 with a grade of C or above, MATH 181.
Further development of the quantum and statistical molecular concepts introduced in CHEM 341. Rates and mechanisms of chemical reactions also considered. 3 Lec, 3 Lab. (Spring, even years)

CHEM 412 Modern Analytical Instrumentation 4 hours
Prerequisite: CHEM 221 with a grade of C or above, or CHEM 112 and permission of instructor.
A course in modern analytical instrumentation, including electroanalytical, spectroscopic, separations, and kinetic methods. Application of spreadsheet and computer simulation software. Laboratory emphasis. 3 Lec, 6 Lab. (Spring, odd years)

CHEM 451 Biochemistry 3 hours
Prerequisite: CHEM 332 with a grade of C or above. (CHEM 221 recommended)
The course is designed to expose the students to the fundamental aspects of biochemistry, including protein and nucleic acid chemistry, lipids, carbohydrates, and an introduction to enzymatic and metabolic processes. Quantitative understanding will be emphasized. 3 Lec. (Fall)

CHEM 462 Inorganic Chemistry 3 hours
Prerequisite: CHEM 341 or CHEM 112 and permission of instructor.
A survey course including a study of the elements and their periodic relationships, acid-base theories, current bonding theories, coordination compounds, and other selected topics. 3 Lec. (Spring, odd years)

CHEM 471 Seminar in Chemistry 1 hour
An introduction to the use of the chemical literature as a source of information. While focusing on the reading and study of selected scientific papers, the course can include oral and written reports, attendance at local scientific meetings and guest lecturers. Can be started in junior year. (Offered periodically)

CHEM 472 Seminar in Chemistry 1 hour
A continuation of CHEM 471. Includes an thorough literature research and bibliography with a comprehensive report on an agreed-upon topic. This course meets the upper division writing component for senior year English. (Offered periodically)

CHEM 491 Selected Topics 1-3 hours
Prerequisite: Permission of chemistry faculty.
The subject of study is selected by conference between the student and the chemistry faculty, and will consist mainly of independent study and/or laboratory work summarized by a comprehensive report. Content and method of study must be arranged prior to registration. May repeat for a total of 3 credits.

* See Math Aptitude Profile on page 84.