

Chemistry (CHEM)

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The mission of the chemistry department is to prepare students for lives of service to God and significance in the world through the knowledge and skilled practice of chemistry. Chemistry students will develop an appreciation for the role chemistry plays in the world and will be prepared for careers as responsible citizens in chemical industry, health sciences, education, or governmental service either immediately upon graduation at North Park University or after further study in graduate or professional school programs.

Core Values of the Chemistry Department at North Park University

- Our chemistry students are knowledgeable: Each chemistry major will master fundamental chemistry concepts in the areas of general chemistry, organic chemistry, analytical chemistry, and physical chemistry.
- Our chemistry students are skilled: Each chemistry major will master fundamental laboratory skills, including observation, analysis, and manipulation of chemical reactions and processes in the general chemistry, organic chemistry, analytical chemistry, and physical chemistry settings.
- Our chemistry students are citizens: Each chemistry major understands the critical role chemistry plays by: serving to protect the world's environment, improving the quality of human health, and furthering technological advances by discovering new uses for chemicals and their reactions.
- Our chemistry students are responsible chemists: Each chemistry major understands the importance of participating in the greater scientific community of chemists and contributing to this community through teaching, conferences, research, and publication.

Major requirements for the B.A. degree in Chemistry

Required semester hours

34 sh

Prerequisites and supporting courses

MATH 1150 required. PHYS 1210 and 1220 or PHYS 1110 and 1120 and/or MATH 1510 and 1520 are recommended.

Required core courses

CHEM 1150, 1160, 2310, 2320, 2410, 3010

Electives

8 additional semester hours in Chemistry numbered 2000 and above and 4 additional hours in Chemistry number 3000 and above.

Major requirements for the B.S. degree in Chemistry

Required semester hours

38 sh

Prerequisites and supporting courses

PHYS 1210 and 1220 or 1110 and 1120; MATH 1510 and MATH 1520.

Required core courses

CHEM 1150, 1160, 2310, 2320, 2410, 3010, 3250, 3260.

Electives

8 additional semester hours in Chemistry numbered 2000 and above.

Honors

For Departmental Honors in Chemistry students are required to take CHEM 4000 (4 sh) in addition to the requirements listed above. For general Departmental Honors requirements and CHEM 4000 course description, see appropriate sections of this catalog.

Special programs

CHEM 4910 or 4970 or a summer research experience is recommended for those interested in a research career or graduate school.

Minor requirements in Chemistry

Required semester hours

24 sh

Required core courses

CHEM 1150, 1160, 2310, and 2320.

Electives

8 semester hours numbered 2000 or higher

GE Designates a course that fulfills all or part of a General Education (G.E.) requirement; see the General Education Program section of the catalog for more information.

1011 Survey of Chemistry (2 sh) GE

Basic laws and concepts of chemistry, applications are directed primarily to inorganic compounds. Designed for non-physical science majors. Does not fulfill chemistry requirements for biology majors or the prerequisites for medical schools. Four hours lecture and two hours laboratory per week.

1021 Survey of Organic Chemistry (2 sh) GE

A survey of the major functional classes of organic compounds including structure, nomenclature, properties, and reactions. Includes an introduction to the classes of natural products. Four hours lecture and two hours laboratory per week. Student must have completed one year of high school general chemistry. Prerequisite: CHEM 1011 or one year of high school general chemistry.

1031 Survey of Biochemistry (2 sh)

A survey of chemistry of cellular compounds. Introduction to the different classes of biochemicals. Introduction to bioenergetics and enzymology and to the major pathways of cellular chemical events. Four hours lecture and two hours laboratory per week. Prerequisite: CHEM 1021.

1150 General Chemistry I (4 sh) GE

A presentation of the basic laws of chemistry with emphasis on stoichiometry, atomic and electronic structure, bonding, and the states of matter (gas, liquid, solid, and solution). Properties and reactions of some elements and simple compounds are used to exemplify the principles. Chemistry I and II form a year's sequential study of the principles of chemistry with applications describing elements and compounds and their reactions. This sequence meets the needs of students majoring in the physical and biological sciences. Four hours lecture and two hours laboratory per week. Prerequisite: MATH 1005 or higher.

1160 General Chemistry II (4 sh)

Continuation of Chemistry I with emphasis on the energy changes associated with transformations of matter, kinetics of reactions, and

the equilibrium considerations associated with reactions. General reactions of metals and non-metals and their compounds are also considered (includes an introduction to coordination compounds). Four hours lecture and two hours laboratory per week. Prerequisite: CHEM 1150 and MATH 1010 or higher.

2160 Inorganic Chemistry (4 sh)

A study of the periodic trends and relationships of the elements and their compounds. Discussion of the atomic and molecular structures, and how these give rise to the periodic relationships. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 1160.

2310 Organic Chemistry I (4 sh)

The chemistry of carbon compounds. Properties, synthesis, and reactions of saturated, unsaturated, and aromatic hydrocarbons, with emphasis on modern theoretical, mechanistic interpretations. Introduction to oxygen containing compounds. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 1160.

2320 Organic Chemistry II (4 sh)

Continuation of organic Chemistry I, emphasizing carbonyl and nitrogen containing compounds. Determination of molecular structure via IR, UV, NMR, and mass spectral methods. Introduction to the structure and properties of natural products and biomolecules. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 2310.

2410 Analytical Chemistry (4 sh)

A study of equilibrium with special emphasis on acid-base, oxidation-reduction, and heterogeneous ionic equilibria. The laboratory is aimed primarily at developing quantitative, laboratory skill. Three hours lecture and six hours laboratory per week. Prerequisite: CHEM 1160.

2510 Introductory Environmental Chemistry (4 sh)

A survey of the chemistry of the earth's environment, including atmospheric chemistry, pollution and the greenhouse effect, renewable energy, hazardous and nuclear waste and water pollution. The ethical and moral responsibilities of humans to the environment are also discussed. Four hours lecture and two hours laboratory per week. Prerequisite: CHEM 1160. Co-requisite: CHEM 1031 or 2310.

3010 Seminar in Chemistry (2 sh)

A seminar designed to help students acquire: 1) essential chemistry information technology skills, including use of electronic databases and mastery of chemistry-related software; 2) an understanding of how chemistry research is funded, conducted, and published; and 3) an appreciation of the ethics, responsibilities, and expectations of professional chemists in a global society.

3250 Physical Chemistry: Thermodynamics and Kinetics (4 sh)

Kinetic theory of gases and the elements of thermodynamics applied to physical and chemical systems, including solutions and reactions. Fundamentals of reactions kinetics, including the study of catalysis, reaction mechanisms, and transition state theory applied to unimolecular and bimolecular reactions. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 1160 and MATH 1520.

3260 Physical Chemistry: Quantum Chemistry and Spectroscopy (4 sh)

A study of the fundamentals of quantum mechanics applied to atoms and molecules. Applications to spectroscopy, including the study of lasers. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 1160 and MATH 1520.

3330 Biochemistry (4 sh)

A study of the chemistry of biological compounds. Structure and properties of all classes of biomolecules. Interaction of biomolecules via catabolic generation of phosphate bond energy, and the utilization of this energy in biosynthesis. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 2320.

3910 Topics in Chemistry (2-4 sh)

A study of selected topics in chemistry. Format may be an in-depth study of a selected area of chemistry or coursework off campus through Associated Colleges of Chicago Area (ACCA) chemistry cooperative courses. Laboratory work may be included, depending on topic. Student must be advanced standing in the department or have consent of instructor.

4000 Departmental Honors in Chemistry (4 sh)

Honors study in chemistry. Involves completion of a special project and submission of a formal, oral report at the Spring Honors Symposium and/or ACCA chemistry seminar. Open to Chemistry B.S. and Honors majors only. Prerequisite: CHEM 2320, 2410.

4910 Research (1-4 sh)

An introduction to chemical research. Involves completion of a special project and submission of a report in journal form. Recommended for graduate school aspirants. Open to Chemistry majors only. Prerequisite: CHEM 2320.

4970 Internship in Chemistry (1-4 sh)

An on-site experience in industry. Recommended for BS Chemistry students interested in obtaining placement in the field after graduation.