Chemistry (CHEM)

Rienstra-Kiracofe (chair), Horten

The Chemistry Department is set up practically and philosophically to integrate sensory and intellectual experiences by examining matter and energy and their interactions. The chemistry major prepares the student for placement in industry, for teaching at the elementary or secondary level, or for graduate study in chemistry, pharmacy or medicine.

Major requirements for the B.A. degree in Chemistry

Required semester hours
34 sh

Prerequisites and supporting courses
Courses in physics are recommended but not required.

Required core courses
CHEM 1150, 1160, 2310, 2320, 2410, 3250

Electives
10 additional semester hours in Chemistry numbered 2000 and above.

Special programs
CHEM 4970, Internship, is strongly recommended for those going into industry directly after graduation. CHEM 4910 or a summer research experience is recommended for those interested in a research career or graduate school.

Major requirements for the B.S. degree in Chemistry

Required semester hours
52 sh

Prerequisites and supporting courses
PHYS 1210 and 1220 or 1110 and 1120 MATH 1510 GERM 1010-1020 are recommended for those going to graduate school.

Required core courses
CHEM 1150, 1160, 2310, 2320, 2410, 3250, 3260, 4010 (two terms).

Electives
10 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 a total of 44 semester hours. For general Departmental Honors requirements and CHEM 4000 course description, see appropriate sections of this catalog.

Special programs
CHEM 4970, Internship, is strongly recommended for those going into industry directly after graduation. CHEM 4910 or a summer research experience is recommended for those interested in a research career or graduate school.

Minor requirements in Chemistry

Required semester hours
21 sh

Required core courses
CHEM 1150, 1160, 2310, and 2320.

Electives
5 sh chosen from CHEM 2160, 2410, 2510, 3250, 3330, 3910, 4010 (may be counted once)

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 **General 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.

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 **Introductory 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. Student must have an ACT Math score >= 19; or an SAT Math Score >=440; or MATH 1000 (or equivalent).

1160 **Introductory 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.

2160 **Inorganic Chemistry (5 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 six 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 **Equilibrium and Analysis (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. Three hours lecture and two hours laboratory per week. Prerequisite: CHEM 1160. Co-requisite: CHEM 1031 or 2310.

3250 **Physical Chemistry I (4 sh)**
Kinetic theory of gases and the elements of thermodynamics applied to physical and chemical systems, including solutions and reactions. Physical Chemistry I and II form a year's sequential study of physical chemistry. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 2410.

3260 **Physical Chemistry II (4 sh)**
A study of reaction kinetics, electrochemistry, the elements of quantum and statistical mechanics, applications of spectroscopy, x-ray crystallography, and other techniques for determining molecular structure. Four hours lecture and three hours laboratory per week. Prerequisite: CHEM 3250.

3330 **Biochemistry (5 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)**
An introduction to chemical research at the honors level. Involves completion of a special project and submission of a formal, oral report at the Spring Honors Symposium and/or at the ACCA chemistry seminar. Open to Chemistry B.S. and Honors majors only. Prerequisite: CHEM 2320, 2410.

4010 **Seminar in Chemistry (1 sh)**
Current topics in chemistry. Oral and written reports. One hour per week. Repeatable.

4910 **Research (1-5 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 (1-5 sh)**
An on-site experience in industry. Recommended for BS Chemistry students interested in obtaining placement in the field after graduation.