

# CHEMISTRY AND BIOCHEMISTRY

St. Catherine University's chemistry department offers three different major tracks: an American Chemical Society (ACS)-approved concentration, a core chemistry concentration, and a biochemistry concentration.

The American Chemical Society (ACS)-approved concentration provides for a certified program defining the graduate as a professional chemist with respect to employment, graduate study, and membership in the professional organization - the American Chemical Society - upon graduation. The biochemistry concentration is excellent preparation for careers in medicine, dentistry, veterinary medicine, pharmacy, and medical technology. The core chemistry concentration gives students a more interdisciplinary foundation for pursuing physical sciences or graduate study.

St. Catherine University's chemistry faculty are enthusiastic teachers and diligent researchers with doctorates from nationally recognized chemistry programs in analytical, biochemical, inorganic, organic, and physical chemistry. The majority of our faculty are women. All have research programs designed to offer students an opportunity for laboratory experience in investigative projects.

## Majors

- Chemistry - B (<http://catalog.stkate.edu/undergraduate/humanities-arts-sciences/chemistry-biochemistry/chemistry-ba/>)S
- Chemistry: ACS Certified - BS (<http://catalog.stkate.edu/undergraduate/humanities-arts-sciences/chemistry-biochemistry/chemistry-acb-bs/>)
- Chemistry: Biochemistry - B (<http://catalog.stkate.edu/undergraduate/humanities-arts-sciences/chemistry-biochemistry/chemistry-biochem-ba/>)S

## Minor

- Chemistry - Minor (<http://catalog.stkate.edu/undergraduate/humanities-arts-sciences/chemistry-biochemistry/chemistry-minor/>)

### CHEM 1010 General Chemistry for Health Sciences with Lab — 4 credits

A one-term course designed for non-majors providing an overview of general, organic and biological chemistry. Study of basic concepts related to atomic and molecular structure, bonding, gas laws, chemical thermodynamics and chemical kinetics; survey of the structure and properties of representative organic molecules and functional groups; survey of the structure and function of biologically important molecules including proteins, carbohydrates, lipids and nucleic acids; overview of intermediary metabolic processes related to carbohydrate and fat metabolism; and an overview of molecular genetics. Offered in the College for Women and the College for Adults.

**Prerequisite:** Appropriate score on math/stats placement assessment or ACT math score or college algebra.

### CHEM 1110 General Chemistry I with Lab — 4 credits

The first course in a two semester sequence designed to provide a comprehensive introduction of modern chemical principles. Topics include stoichiometry; modern theories of atomic structure and chemical bonding; chemical periodicity; and the properties of gases, liquids and solids. Lectures and three laboratory hours per week. Offered in the College for Women.

**Prerequisite:** Appropriate level on math placement assessment.

### CHEM 1120 General Chemistry II with Lab — 4 credits

Continuation of CHEM 1110. Topics include properties of solutions; the principles of chemical equilibrium and chemical kinetics; applications to aqueous equilibria including acid-base and solubility equilibria; and the principles and applications of electrochemistry. Lectures and three laboratory hours per week. Offered in the College for Women.

**Prerequisite:** Minimum grade of C- in CHEM 1110 or permission of instructor.

### CHEM 2010 Organic Chemistry I with Lab — 4 credits

Course includes aliphatic and aromatic hydrocarbons, alcohols and ethers and their derivatives; structure, nomenclature and properties of molecules; mechanisms for important classes of organic reactions; energy considerations in molecular structure, conformation and reactions; and separation and analytical techniques. Lectures and four laboratory hours per week. Offered in the College for Women.

**Prerequisite:** Minimum grade of C- in CHEM 1120.

### CHEM 2020 Organic Chemistry II with Lab — 4 credits

A continuation of CHEM 2010, this course involves the chemistry of organic molecules containing oxygen, halogen and nitrogen atoms; reaction mechanisms, infrared, nuclear magnetic resonance and ultraviolet spectra; synthetic and analytical techniques; and structure and chemistry of bio-organic molecules. Lectures and four laboratory hours per week. Offered in the College for Women.

**Prerequisite:** Minimum grade of C- in CHEM 2010.

### CHEM 2994 Topics — 4 credits

The subject matter of the course is announced in the annual schedule of classes. Content varies from year to year but does not duplicate existing courses.

### CHEM 3000 Quantitative Analysis with Lab — 4 credits

Practical approach to data analysis and experimental error. Covers solubility, acid-base and complexation equilibria; the practice of gravimetric and volumetric analysis; an introduction to spectrophotometric and electrochemical methods of analysis. Lectures and four laboratory hours per week. Offered in the College for Women.

**Prerequisite:** CHEM 1120.

### CHEM 3310 Physical Chemistry I with Lab — 4 credits

Chemical Equilibrium focuses on the laws of thermodynamics, their mathematical formulation in terms of the equilibrium state functions, and chemical kinetics. Applications to phase equilibria, material equilibria, and electrochemistry. Lectures and three hours of laboratory per week. Offered in the College for Women.

**Prerequisites:** PHYS 1120, MATH 1140, CHEM 1120.

### CHEM 3320 Physical Chemistry II with Lab — 4 credits

This course is a continuation of CHEM 3310. It covers the physics of atomic and molecular systems, quantum mechanics of atoms and simple molecules; atomic and molecular spectroscopy; statistical mechanics, and computational chemistry. Lectures and three hours of laboratory per week. Offered in the College for Women.

**Prerequisites:** PHYS 1120, MATH 1140, CHEM 1120.

**CHEM 4000W Advanced Inorganic Chemistry with Lab — 4 credits**

A modern study of structure, bonding, methods of synthesis and characterization, and mechanisms of reaction of inorganic compounds. The coordination chemistry of transition metals is emphasized; group theory, thermodynamics and molecular orbital theory serve as unifying concepts. Lectures and three hours of laboratory per week. Offered in the College for Women.

**Prerequisite with concurrency:** CHEM 2020.

**CHEM 4200 Advanced Analytical Chemistry with Lab — 4 credits**

Fundamental principles of chemical instrumentation design and the theory of modern chemical separation and identification techniques. Topics include various electrochemical, spectroscopic and chromatographic methods for chemical separation and analysis. Lectures and three hours of laboratory per week. Offered in the College for Women.

**Prerequisite:** CHEM 3000.

**CHEM 4400 Biochemistry with Lab — 4 credits**

This course is designed to provide an introduction to modern concepts and principles of biochemistry in terms of structure/function, mechanistic, and energetic relationships. Lectures and four-and-one-half hours of laboratory per week. Offered in the College for Women.

**Prerequisite:** CHEM 2020.

**CHEM 4500W Advanced Biochemistry with Lab — 4 credits**

This course is designed to be an in-depth survey in modern concepts and principles of biochemistry exploring nucleic acids, mechanisms of gene regulation, and biochemical signaling. The laboratory for the course will cover a semester-long capstone project that will cover major techniques in biotechnology. Offered in the College for Women.

**Prerequisite:** CHEM 4400.

**CHEM 4602 Internship — 2 credits**

Structured out-of-class learning experience that takes place on or off campus and includes a substantial work component. An internship involves you in a particular profession in an exploratory way to test career interests and potential. To initiate an internship experience, meet with the internship coordinator in the Career Development Office.

**Prerequisites:** Faculty sponsorship and approval by department chair.

**CHEM 4682 Directed Study — 2 credits**

Directed study is provided for students whose unusual circumstances prohibit taking a regularly scheduled course but who need the material of that course to satisfy a requirement. Availability of this faculty-directed learning experience depends on faculty time and may be limited in any given term and restricted to certain courses.

**Prerequisites:** Faculty, department chair and dean approval.

**CHEM 4850 Seminar — 0 credits**

Weekly presentations from students, faculty and guest speakers on a range of topics from throughout the discipline of chemistry. Instruction and practice in library and online literature searching and the preparation and presentation of a scientific/technical talk. Offered in the College for Women.

**Prerequisite:** CHEM 2020 with grade of C- or above.

**CHEM 4851 Seminar — 1 credit**

Weekly presentations from students, faculty and guest speakers on a range of topics from throughout the discipline of chemistry. Instruction and practice in library and online literature searching and the preparation and presentation of a scientific/technical talk. Offered in the College for Women.

**Prerequisite:** CHEM 2020 with grade of C- or above.

**CHEM 4912 Research — 2 credits**

Work on a problem under the direction of a member of the faculty.

**Prerequisites:** Permission of the department chair.

**CHEM 4914 Research — 4 credits**

Work on a problem under the direction of a member of the faculty.

**Prerequisite:** Permission of the department chair.

**CHEM 4954 Independent Study — 4 credits**

Independent study offers students the opportunity for specialized research not covered in a course offering, by the action project or thesis. Students work with a faculty advisor to develop a learning contract, which specifies the content and objectives of the study as well as the requirements and procedures for evaluation. The amount of credit earned for the study also is included in the learning contract.

**Prerequisites:** Permission of the faculty and department chair or program director.

**CHEM 4994 Topics — 4 credits**

The subject matter of the course is announced in the annual schedule of classes. Content varies from year to year but does not duplicate existing courses. Offered in the College for Women.