CHEMISTRY

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St. Olaf traditionally graduates more chemistry majors than any other four-year college in the United States. The college also ranks in the top five as a source of students who obtain the Ph.D. in chemistry and related fields. Chemistry faculty members have a fine record of achievement in teaching and research; several have won prestigious national awards. Students enjoy state-of-the-art instrumentation and computers in both the laboratory and the classroom.

The Chemistry Department offers an array of courses in the traditional areas of chemistry (organic, analytical, physical, inorganic). Courses in biochemistry, organometallic chemistry, medicinal chemistry, and other topics introduce students to interdisciplinary and bridging sciences that utilize a chemical perspective.

The department has an active summer research program in which faculty and students work together to investigate problems of current interest. Students graduating with chemistry majors have had excellent success in gaining admission to graduate and professional schools and in obtaining employment opportunities. A major in chemistry may lead to employment in chemical research and in related areas such as medical applications of chemistry, environmental chemistry, and materials science. A chemistry major also provides an excellent background for continued education in professional schools in medicine, dentistry, pharmacy, and related fields.

An overview of general options for the chemistry major, including the major and the American Chemical Society (ACS) approved emphasis may be found here.

Overview of the Major

Code	Title	Credits
First-Year Options		
Select one of the following options:		
Option A:		
CHEM 122 & CHEM 126	Introductory Chemistry and Energies and Rates of Chemical Reactions	2.00
Option B:		
CHEM 125 & CHEM 126	Structural Chemistry and Equilibrium and Energies and Rates of Chemical Reactions	2.00
Upper-Level Core Courses		
CHEM 247 & CHEM 253	Organic Chemistry I and Synthesis Laboratory I (0.25)	1.25
CHEM 248 & CHEM 254	Organic Chemistry II and Synthesis Laboratory II (0.25)	1.25
CHEM 255 & CHEM 256	Analytical Chemistry and Analytical Laboratory (0.25)	1.25
CHEM 371 & CHEM 357	Physical Chemistry and Physical Laboratory (0.25)	1.25
Department Seminars		
Attendance at 12 departmental seminars after declaration of major		

After the first year, the order of courses is not prescribed, but CHEM 248 Organic Chemistry II does serve as prerequisite to several upper-level courses. Upper-level courses in addition to this core set are also required, as described under requirements for the major. Gaining experience in the laboratory is an important aspect of the major, and students are encouraged to participate in research either on-campus with St. Olaf faculty or at other institutions.

Intended Learning Outcomes for the Major

Distinction

See Academic Honors

The Chemistry Department seeks to encourage and recognize students who give evidence of creative and independent scholarship. A variety of opportunities are available for students to take a much greater responsibility for setting their goals and realizing the achievements of their education. Going beyond the regular course work, which introduces the theory and practice of chemistry, distinction challenges students to raise questions worthy of scientific investigation. Opportunities for distinction projects include, for example, summer research either on or off campus, CHEM 297 Independent Research (0.25, 0.50, 1.00) , CHEM 298 Independent Study, CHEM 396 Directed Undergraduate Research, CHEM 398 Independent Research, and faculty-approved literature research projects. All projects for distinction will be considered on a case-by-case basis.

A full description of the distinction process is available at http://wp.stolaf.edu/chemistry/information-for-current-chemistry-majors/earning-distinction-in-chemistry/.

Recommendations for Graduate and Professional Study

Students planning graduate work in chemistry should expect to take additional optional courses above and beyond the single optional course required for the general major. In particular, students interested in graduate school should take CHEM 386 Advanced Inorganic Chemistry.

American Chemical Society Emphasis

The St. Olaf College Chemistry Department is approved by the Committee on Professional Training of the American Chemical Society (ACS); this enables the Department to award ACS-certified degrees in chemistry. Students can earn an ACS-certified degree if they complete the chemistry major and the American Chemical Society emphasis. This optional ACS emphasis provides a path for students to complete a more rigorous and encompassing chemistry degree. This is especially important for students entering the job market after graduation as it signifies to employers that these students have additional background above the standard major. It should be noted that chemistry courses taken for the ACS emphasis will count toward the elective course for the chemistry major.

Special Programs

St. Olaf chemistry majors have a number of options for special study, both on-campus and elsewhere. On-campus programs that may include chemistry topics include concentrations in biomolecular science, environmental studies, and neuroscience. Study abroad and away programs include the cooperative B.A.-B.S.E. engineering programs at Washington University in St. Louis and the University of Minnesota, where students may earn a degree in engineering; the Oak Ridge Science Semester; biochemistry at Lancaster University (Lancaster, England); and the study of medicinal chemistry on an January term abroad program in Jamaica. Internships in local industrial settings are also possible. Consult the Smith Center for Global Engagement or the Piper Center for Vocation and Career for more information on these programs.

Requirements

Requirements for the Major

Code	Title	Credits
Chemistry Department Seminars		
Attendance at 12 departmental seminars after declaration of major		
Introductory Sequence		
Select one of the following options:		
Option A:		
CHEM 122 & CHEM 126	Introductory Chemistry and Energies and Rates of Chemical Reactions	2.00
Option B:		
CHEM 125 & CHEM 126	Structural Chemistry and Equilibrium and Energies and Rates of Chemical Reactions	2.00
Upper-Level Core Courses		
CHEM 247 & CHEM 253	Organic Chemistry I and Synthesis Laboratory I (0.25)	1.25
CHEM 248 & CHEM 254	Organic Chemistry II and Synthesis Laboratory II (0.25)	1.25
CHEM 255 & CHEM 256	Analytical Chemistry and Analytical Laboratory (0.25)	1.25
CHEM 371 & CHEM 357	Physical Chemistry and Physical Laboratory (0.25)	1.25
Select at least one additional course from the following:		**1.00**
CHEM 252	Organometallic Chemistry	
CHEM 298	Independent Study [1]	
CHEM 363	Environmental Chemistry	
CHEM 379	Biochemistry I	
CHEM 381	Biophysical Chemistry	
CHEM 382	Instrumental Analysis	
CHEM 384	Bioanalytical Chemistry	
CHEM 386	Advanced Inorganic Chemistry	
CHEM 388	Advanced Organic Chemistry	
CHEM 391	Selected Topics in Chemistry	
CHEM 396	Directed Undergraduate Research (1.00 credit)	
CHEM 398	Independent Research [1]	
Physics - select one of the following:		**1.00**
PHYS 125	Principles of Physics II	
PHYS 232	Analytical Physics III	
Mathematics - select one of the following:		**1.00**
MATH 126	Calculus II	
MATH 128	Honors Calculus II	

1 Projects for CHEM 298 Independent Study or CHEM 398 Independent Research must have departmental approval.

Students must earn a grade of C or above in at least six Chemistry Department courses that count for the major, at least four of which must be numbered 240 or above. CHEM 298 (Independent Study), CHEM 396 (Directed Undergraduate Research), and CHEM 398 (Independent Research) may not be used to satisfy this requirement. Completion of at least one course credit in independent research (or completion of a summer research experience) is strongly recommended for students planning careers in chemistry. For more information, see http://wp.stolaf.edu/chemistry/.

Requirements for the Chemistry Major with Grades 9-12 Teaching Licensure

A chemistry major who wishes to teach chemistry in grades 9-12 in Minnesota must hold a valid Minnesota teaching license in chemistry. In addition to the chemistry major, additional science courses and the professional education sequence are required. A license to teach grades 5-8 in science is also available with additional course requirements. Interested students should consult with a faculty advisor in the Education Department for details of requirements and available options.

For a full listing of requirements, see http://wp.stolaf.edu/chemistry/planning-a-st-olaf-college-chemistry-major/

**By completing this major, the student also satisfies the OLE Core Writing in the Major requirement.*

Requirements for the American Chemical Society (ACS) Emphasis

The St. Olaf College Chemistry Department also offers a degree emphasis approved by the American Chemical Society (ACS) through its Committee on Professional Training. Prospective majors in chemistry who desire the American Chemical Society emphasis will complete the following courses:

Code	Title	Credits
Required Courses:		
CHEM 379	Biochemistry I	1.00
CHEM 378	Instrumental Analysis Laboratory (0.25)	0.25
CHEM 382	Instrumental Analysis	1.00
CHEM 386	Advanced Inorganic Chemistry	1.00

Select one of the following elective courses:		**1.00**
CHEM 252	Organometallic Chemistry	
CHEM 298	Independent Study [1]	
CHEM 363	Environmental Chemistry	
CHEM 381	Biophysical Chemistry	
CHEM 384	Bioanalytical Chemistry	
CHEM 385	Biochemistry II	
CHEM 388	Advanced Organic Chemistry	
CHEM 391	Selected Topics in Chemistry	
Additional laboratory hours must be obtained by completing at least 1.25 lab credits. Summer research can substitute for 1.0 credit worth of lab experiences. In order for more than 0.25 credit of research to be used to fulfill this requirement, a comprehensive written report must be submitted. One laboratory experience must include either biochemistry or inorganic topics. Research can be used to fulfill this biochemistry or inorganic topic requirement, pending approval from the chair of the chemistry department. Choose 1.25 lab credits from the following:		**1.25**
CHEM 297	Independent Research (0.25, 0.50, 1.00)	
CHEM 373	Laboratory Research in Biochemistry (0.25)	
CHEM 375	Advanced Laboratory (0.25)	
CHEM 381	Biophysical Chemistry	
CHEM 384	Bioanalytical Chemistry	
CHEM 396	Directed Undergraduate Research	
CHEM 398	Independent Research	
Choose two courses from the following:		**2.00**
MATH 220	Elementary Linear Algebra	
MATH 226	Multivariable Calculus	
MATH 230	Differential Equations I	
SDS 172	Statistics 1	
Total credits above the major: [2]		**5.5-6.5**

1

Project for CHEM 298 must have departmental approval.

2

Some courses listed above can double or triple count toward various requirements. For instance, bioanalytical chemistry counts as the additional elective course, the 1.0 credit toward the laboratory requirement and satisfies the laboratory experience on a biochemistry or inorganic topic for the ACS emphasis. A summer research on a biochemistry or inorganic project counts for 1.0 out of the 1.25 credits for the additional laboratory hours and satisfies the laboratory experience on a biochemistry or inorganic topic for the ACS emphasis.

Courses

CHEM 107: *Forensic Science with Lab*
This course introduces the fundamentals of forensic science. Class periods may focus on the historic development of forensic science, proper collection and storage of evidence, background in scientific concepts, scientific techniques used to analyze evidence, the types of information that can be obtained, and the statistical methods for making a case in a court of law. Some topics that may be covered include hair, drug, paint, fiber, fingerprint, accelerant, or DNA analysis. The laboratory component features the use of forensic techniques to collect and analyze evidence including fingerprinting, drug analysis, alcohol investigation, DNA fingerprinting, and fiber analysis. Students attend three classes and one three-hour laboratory per week. Does not count toward the chemistry major. Offered alternate years during January term (next time 2026).

CHEM 122: *Introductory Chemistry*
This study of chemical stoichiometry, equilibrium, acid-base chemistry, coordination chemistry, and atomic and molecular structure supplies the fundamental background on which all later chemistry courses depend. It includes applications of equilibrium principles to acid-base chemistry. Students attend four classes and one three-hour laboratory each week. Students planning to continue in chemistry should consider concurrent registration in MATH 119 or MATH 120. The course cannot be taken in conjunction with or after credit in CHEM 121. Offered annually during Fall semester. Also counts toward biology major and biomolecular science concentration.
Prerequisites: placement via online placement survey.

CHEM 124: *A Matter of the Environment with Lab*
Students study contemporary questions concerning the environment from the fundamental properties of matter to human impact on natural processes, including damage to and protection of the environment. Students discover how chemistry intersects with everyday living, especially the abilities and limitations of science to address environmental issues. Laboratory work explores the characteristics and analysis of hazardous and beneficial materials. Counts toward environmental studies major (arts and humanities and social science emphases) and concentration; does not count toward chemistry major. Offered alternate years during January term (next time 2025).

CHEM 125: *Structural Chemistry and Equilibrium*
This study of chemical stoichiometry, equilibrium, acid-base chemistry, coordination chemistry, and atomic and molecular structure supplies the fundamental background on which all later chemistry courses depend. It includes applications of equilibrium principles to acid-base chemistry. Students attend three classes and one three-hour laboratory per week. Students planning to continue in chemistry should consider concurrent registration in MATH 119 or MATH 120. The course cannot be taken in conjunction with or after credit in CHEM 122. Offered annually during Fall semester. Also counts toward biology major and biomolecular science concentration.
Prerequisite: placement via online placement survey.

CHEM 126: *Energies and Rates of Chemical Reactions*
This course provides a sequential introduction to physical chemistry. Beginning with an introduction to statistical aspects of chemical equilibria, it explores the relationships between energy, entropy and equilibria (thermodynamics); oxidation-reduction reactions and electrochemistry; transitions between phases; and rates of reactions. Students attend three classes and one three-hour laboratory per week. Offered annually during spring semester. Also counts toward biomolecular science concentration.
Prerequisite: CHEM 125, or CHEM 122, and concurrent or previous enrollment in MATH 119 or MATH 120, or permission of instructor.

CHEM 247: *Organic Chemistry I*
Organic chemistry is the study of compounds containing carbon, emphasizing the structures and mechanisms of reaction of these molecules. This course focuses on structure, nomenclature, and reactions of aliphatic and alicyclic compounds, including aspects of stereochemistry and spectroscopic identification of organic compounds. A full treatment of introductory organic chemistry requires subsequent enrollment in CHEM 248. Offered annually during Fall semester. Also counts toward biomolecular science concentration.
Prerequisite: CHEM 126 or permission of instructor.

CHEM 248: *Organic Chemistry II*
This course is a continuation of CHEM 247 topics. Chemistry 248 delves into the chemistry of functional groups, especially those that play a role in the reactivity of biomolecules such as carbohydrates, lipids, proteins ,and nucleic acids. Together, CHEM 247 and CHEM 248 provide a full treatment of introductory organic chemistry. Offered annually during Spring semester. Also counts toward environmental studies major (natural science emphasis) and biomolecular science concentration.
Prerequisite: CHEM 247 or permission of instructor.

CHEM 252: *Organometallic Chemistry*
Students study the structure, bonding, and reactions of compounds containing metal-carbon bonds. Special topics include applications of organometallic chemistry to the synthesis of organic compounds, homogeneous catalysis, and biochemistry. Examples illustrate organometallic chemistry as a bridge between organic and inorganic chemistry. Students use bibliographic and electronic searching software to prepare research papers based on the current literature. Offered alternate years during January term (next time 2025).
Prerequisite: CHEM 247.

CHEM 253: *Synthesis Laboratory I (0.25)*
This laboratory course introduces students to the synthesis and characterization of organic, organometallic and inorganic compounds and serves as a general introduction to green chemistry. Students purify the materials they produce by techniques such as chromatography and characterize them using optical rotation measurements, infrared spectroscopy, and nuclear magnetic resonance spectroscopy. Students attend one three-hour laboratory each week. P/N only. Offered annually during Fall semester. Also counts toward biomolecular science concentration.
Prerequisite: previous or concurrent registration in CHEM 247.

CHEM 254: *Synthesis Laboratory II (0.25)*
This course is a continuation of CHEM 253. Students gain more experience with techniques used in CHEM 253 and in addition use gas chromatographic/mass spectrometric analyses. Students attend one three-hour laboratory each week. P/N only. Offered annually during Spring semester. Also counts toward environmental studies major (natural science emphasis) and biomolecular science concentration.
Prerequisites: CHEM 253 and previous or concurrent registration in CHEM 248.

CHEM 255: *Analytical Chemistry*
Students not only investigate the theory of modern analytical chemistry, but also examine the statistical treatment of errors, equilibrium, activities, acid/base chemistry, spectroscopy, electrochemistry, and separations. The accompanying lab course, CHEM 256, illustrates the topics discussed in CHEM 255. Students taking this course use computers for solving problems. Offered each semester. Also counts toward environmental studies major (all emphases) and environmental studies and business and management studies concentrations.
Prerequisites: CHEM 126 or permission of the instructor, and concurrent registration in CHEM 256.

CHEM 256: *Analytical Laboratory (0.25)*
Students enrolled in this lab course practice techniques of modern analytical chemistry using state-of-the-art instrumentation, including pH meters, liquid chromatographs, and a variety of spectrophotometers. Data acquisition via computer-interfaced instrumentation and electronic record-keeping is emphasized. Students practice and develop group skills by working in "companies" throughout the semester. Students attend one four-hour laboratory per week. P/N only. Offered each semester. Also counts toward environmental studies major (all emphases) and environmental studies and business and management studies concentrations.
Prerequisite: concurrent registration in CHEM 255.

CHEM 294: *Academic Internship*

CHEM 297: *Independent Research (0.25, 0.50, 1.00)*
Independent research is offered for students dedicated to an in-depth research experience. Emphasis is placed on the iterative process of experimentation and analysis. Students interested in independent research may enroll in CHEM 297 or CHEM 398. Each course requires a faculty supervisor, who will make the decision as to which course is appropriate. May be taken more than once. Pass or No Pass (P/N) only (may not be taken for a grade). Offered each term.
Prerequisite: permission of the instructor.

CHEM 298: *Independent Study*

CHEM 357: *Physical Laboratory (0.25)*
Students perform experiments that illustrate the principles of physical chemistry and utilize modern instrumentation. Students characterize the thermodynamic properties of a biopolymer, perform spectroscopic measurements of molecular energy levels, calculate quantum mechanical quantities using computer workstations, and investigate the thermodynamics and kinetics of chemical reactions. Students also develop their scientific writing skills by preparing reports in the style of scientific publications. Students attend one four-hour laboratory per week. P/N only. Offered each semester.
Prerequisite: concurrent registration in CHEM 371.

CHEM 363: *Environmental Chemistry*
Human demands place immense pressure on finite energy and material resources. This course focuses on concepts and tools employed by environmental chemists to understand the chemical processes and phenomena associated with earth's compartments, chemical fate and transport, toxicity, chemical ecology, energy resources, and life cycle assessments. Through use and discussion of the primary literature students generate a research proposal that attends to the interplay of chemical cycles and systems while considering solutions to contemporary challenges. Offered alternate years during Spring semester (next time 2025).
Prerequisite: Any level II course in biology, chemistry, and physics, or a level II or level III natural science course in environmental studies.

CHEM 371: *Physical Chemistry*
Students delve further into the topics of kinetics, thermodynamics and atomic and molecular structure that were introduced in the first-year courses, with an emphasis on the mathematical aspects of chemistry. Specific topics include reaction mechanisms, the laws of thermodynamics, statistical thermodynamics, equilibrium, quantum mechanics, spectroscopy, and molecular orbital theory. Offered each semester.
Prerequisites: CHEM 126 or permission of instructor and concurrent registration in CHEM 357; MATH 126 or MATH 128; previous completion of PHYS 124 or PHYS 130 is recommended.

CHEM 373: *Laboratory Research in Biochemistry (0.25)*
This lab course is highly recommended to enhance the study of biochemistry and offers an opportunity to explore research in biochemistry and related fields. In this course, students will learn and use several standard biochemical techniques to address novel research questions. Emphasis is placed on experimental design and the collection, interpretation, and presentation of data. P/N only. Offered each semester. Requires previous or concurrent enrollment in Chem 379: Biochemistry I. Also counts toward neuroscience and biomolecular science concentrations.
Prerequisite: previous or concurrent registration in CHEM 379.

CHEM 375: *Advanced Laboratory (0.25)*
Students work on special projects during one afternoon of laboratory per week. Each student must have the sponsorship of a staff member. P/N only. Offered each semester. May be repeated if topic is different.

CHEM 378: *Instrumental Analysis Laboratory (0.25)*
Students explore how instrumentation is used to study analytical applications, problem solving, and how people and instruments operate together to investigate chemical questions. Specific lab experiences include interfacing chemical instruments with computers and subsequent signal processing, mass spectrometry, electrochemistry, and various spectroscopic (AA, ICP, UV) and separation techniques. Students attend one four-hour laboratory per week. A laboratory robot is used for sample preparation and analysis. P/N only. Offered annually.
Prerequisite: concurrent registration in CHEM 382.

CHEM 379: *Biochemistry I*
This course presents fundamental biological processes at the molecular level and serves as a general introduction to biochemistry. Topics include the structure and function of proteins, carbohydrates, lipids and nucleic acids, enzyme catalysis and regulation, bioenergetics and an introduction to carbohydrate metabolism. Subsequent enrollment in CHEM 385 is recommended for students desiring greater breadth and depth in the subject. Offered each semester. Also counts toward biology major and neuroscience and biomolecular science concentrations.
Prerequisite: CHEM 248.

CHEM 381: *Biophysical Chemistry*
This course introduces fundamental topics in biophysical chemistry with an emphasis on the structure, stability, and dynamics of nucleic acids and proteins. Students develop an independent research project agreed upon by the instructor. Possible research topics include enzyme kinetics, protein-ligand binding, biopolymer unfolding or structural change, particle sizing, and computation. Students give oral and poster presentations throughout the semester. Offered alternate years during Spring semester (next time 2025).
Prerequisite: CHEM 371 or concurrent registration in CHEM 371.

CHEM 382: *Instrumental Analysis*
Students study how an instrument functions mechanically, mathematically, optically, and electronically, and then how its parts are linked together. Topics covered include basic electronics and computer interfacing, spectrophotometric instruments, mass spectrometers, electrochemical instrumentation, and various separation methods. Offered annually during fall semester.
Prerequisites: CHEM 255 and CHEM 256; previous or concurrent enrollment in PHYS 125 or PHYS 131 is recommended; concurrent registration in CHEM 378 is required.

CHEM 384: *Bioanalytical Chemistry*
This course introduces the fundamentals of bioanalytical chemistry and the application of modern analysis techniques to biological samples. Current clinical applications and examples of biological problems supplement lecture material. Daily lectures are closely integrated with laboratory experiences. Topics include different types of chromatography used to separate biological mixtures in various ways, 1D- and 2D-gel electrophoresis, capillary electrophoresis, radiochemical and immunological assays, centrifugation techniques, and biological mass spectrometry. Offered during January Term in alternate years. Also counts toward biomolecular science concentration.
Prerequisites: CHEM 255 or CHEM 379 or permission of instructor.

CHEM 385: *Biochemistry II*
This course builds depth of biochemical understanding upon the foundation laid in CHEM 379. Contents may include selected topics in catabolic and anabolic metabolism, integration and regulation of metabolism, photosynthesis and biochemical genetics. In addition, students will gain experience with the primary literature. Offered annually during Spring semester. Also counts toward biomolecular science concentration.
Prerequisite: CHEM 379.

CHEM 386: *Advanced Inorganic Chemistry*
This course examines how modern theories of chemical bonding are applied to an understanding of the chemistry of the elements of the periodic table. Students explore chemical structures and spectra on the basis of molecular symmetry and group theory. Topics covered include inorganic reactions, chemical periodicity, acid-base systems, coordination compounds, organometallic compounds, nonmetal chemistry, and cluster compounds. Offered annually.
Prerequisite: CHEM 248.

CHEM 388: *Advanced Organic Chemistry*
This course explores the subject of organic chemistry at a greater depth and breadth than in CHEM 247 and CHEM 248. Topics may include analysis of reaction mechanisms, reaction kinetics, and reaction thermodynamics. Particular attention is paid to the interdependent relationship between experimental and theoretical results. Textbook subjects are augmented by readings from the primary research literature. Offered alternate years during January term (next time 2026).
Prerequisite: CHEM 248.

CHEM 391: *Selected Topics in Chemistry*
The field of chemistry is constantly expanding into new frontiers. This course provides an in-depth study of advanced topics that are chosen with attention to student interest and available staff. Topics are announced prior to registration for the term; see the current class and lab schedule. May be repeated if topic is different. Offered periodically.
Prerequisite: permission of instructor.

CHEM 394: *Academic Internship*

CHEM 396: *Directed Undergraduate Research*
This course provides a comprehensive research opportunity, including an introduction to relevant background material, technical instruction, identification of a meaningful project, and data collection. The topic is determined by the faculty member in charge of the course and may relate to his/her research interests. Offered at the discretion of the department. May be offered as a 1.00 credit course or .50 credit course.
Prerequisite: determined by individual instructor.

CHEM 398: *Independent Research*

Plan of Study
Chemistry major - Plan of Study

This is a sample plan that meets the prescribed requirements for this major at St. Olaf. This tool is meant as a guide and does not replace working closely with the student's academic advisor.

An overview of general options for planning the chemistry major, including the major and the American Chemical Society (ACS) approved emphasis may be found here.

Course	Title	Credits
First Year		
Fall Semester		
FYS 120 or WRIT 120	First-Year Seminar (or Conversation Program) or Writing and Rhetoric	1.00
CHEM 122 or CHEM 125	Introductory Chemistry or Structural Chemistry and Equilibrium	1.00
MATH 119 or MATH 120 or MATH 126 or MATH 128	Introduction to Calculus or Calculus I or Calculus II or Honors Calculus II	1.00
World Language		
	Credits	**3**
January Term		
MATH 120	Calculus I (if not taken in Fall)	1.00
	Credits	**1**
Spring Semester		
WRIT 120 or FYS 120	Writing and Rhetoric (or Conversation Program) or First-Year Seminar	1.00
CHEM 126	Energies and Rates of Chemical Reactions	1.00
MATH 120	Calculus I (if not taken in Fall or J-Term)	1.00
World Language		
	Credits	**3**
	Total Credits	**7**

Sophomore Year/Junior Year/Senior Year*

* These courses are required for the chemistry major, but most are offered both fall and spring semesters. Students generally progress through the courses in the order listed, but they can be taken in a different order.

Code	Title	Credits
FALL SEMESTER		
CHEM 247	Organic Chemistry I (concurrent with CHEM 253)	1.00
CHEM 253	Synthesis Laboratory I (0.25)	0.25
PHYS 124 or PHYS 130	Principles of Physics I Analytical Physics I	1.00
MATH 126	Calculus II	1.00
CHEM 255	Analytical Chemistry (concurrent with CHEM 256)	1.00
CHEM 256	Analytical Laboratory (0.25)	0.25
CHEM 371	Physical Chemistry (concurrent with CHEM 357)	1.00
CHEM 357	Physical Laboratory (0.25)	0.25
CHEM Elective		1.00
JANUARY TERM		
CHEM Elective		1.00
SPRING SEMESTER		
CHEM 248	Organic Chemistry II (concurrent with CHEM 254)	1.00
CHEM 254	Synthesis Laboratory II (0.25)	0.25
PHYS 125	Principles of Physics II	1.00
MATH 126	Calculus II (if not taken in fall semester)	1.00
CHEM 255	Analytical Chemistry (concurrent with CHEM 256)	1.00
CHEM 256	Analytical Laboratory (0.25)	0.25
CHEM 371	Physical Chemistry (concurrent with CHEM 357)	1.00
CHEM 357	Physical Laboratory (0.25)	0.25
CHEM Elective		1.00

Students must successfully complete the equivalent of 35 St. Olaf credits through a combination of full-credit and fractional-credit courses to earn the Bachelor of Arts.

Visit the Chemistry department webpage for more information.

Chemistry major with ACS emphasis - Plan of Study

This is a sample plan that meets the prescribed requirements for this major at St. Olaf. This tool is meant as a guide and does not replace working closely with the student's academic advisor.

An overview of general options for planning the chemistry major, including the major and the American Chemical Society (ACS) approved emphasis may be found here.

Course	Title	Credits
First Year		
Fall Semester		
FYS 120 or WRIT 120	First-Year Seminar (or Conversation Program) or Writing and Rhetoric	1.00
CHEM 122 or CHEM 125	Introductory Chemistry or Structural Chemistry and Equilibrium	1.00
MATH 119 or MATH 120 or MATH 126 or MATH 128	Introduction to Calculus or Calculus I or Calculus II or Honors Calculus II	1.00
World Language		
	Credits	**3**
January Term		
MATH 120	Calculus I (if not taken in Fall)	1.00
	Credits	**1**
Spring Semester		
WRIT 120 or FYS 120	Writing and Rhetoric (or Conversation Program) or First-Year Seminar	1.00
CHEM 126	Energies and Rates of Chemical Reactions	1.00
MATH 120	Calculus I (if not taken in Fall or J-Term)	1.00
World Language		
	Credits	**3**
	Total Credits	**7**

Sophomore Year/Junior Year/Senior Year*

* These courses are required for the ACS area of emphasis chemistry major, but most are offered both fall and spring semesters. Students generally progress through the courses in the order listed, but they can be taken in a different order.

Code	Title	Credits
FALL SEMESTER		
CHEM 247	Organic Chemistry I (concurrent with CHEM 253)	1.00
CHEM 253	Synthesis Laboratory I (0.25)	0.25
PHYS 124 or PHYS 130	Principles of Physics I Analytical Physics I	1.00
MATH 126	Calculus II	1.00
MATH Elective (MATH 220, MATH 226, or MATH 230)		
SDS 172	Statistics 1 (alternative MATH elective)	1.00
CHEM 255	Analytical Chemistry (concurrent with CHEM 256)	1.00
CHEM 256	Analytical Laboratory (0.25)	0.25
CHEM 371	Physical Chemistry (concurrent with CHEM 357)	1.00
CHEM 357	Physical Laboratory (0.25)	0.25
CHEM 379	Biochemistry I	1.00
CHEM Elective		1.00
JANUARY TERM		
CHEM Elective		1.00
SPRING SEMESTER		
CHEM 248	Organic Chemistry II (concurrent with CHEM 254)	1.00
CHEM 254	Synthesis Laboratory II (0.25)	0.25
PHYS 125	Principles of Physics II	1.00
MATH 126	Calculus II	1.00
MATH Elective (MATH 220, MATH 226, or MATH 230)		
SDS 172	Statistics 1 (alternative MATH elective)	1.00
CHEM 255	Analytical Chemistry (concurrent with CHEM 256)	1.00
CHEM 256	Analytical Laboratory (0.25)	0.25
CHEM 371	Physical Chemistry (concurrent with CHEM 357)	1.00
CHEM 357	Physical Laboratory (0.25)	0.25
CHEM 382	Instrumental Analysis (concurrent with CHEM 378)	1.00
CHEM 378	Instrumental Analysis Laboratory (0.25)	0.25
CHEM 379	Biochemistry I	1.00
CHEM 386	Advanced Inorganic Chemistry	1.00
CHEM Elective		1.00

Students must successfully complete the equivalent of 35 St. Olaf credits through a combination of full-credit and fractional-credit courses to earn the Bachelor of Arts.

Visit the Chemistry department webpage for more information.

Faculty

Department Chair, 2024-2025
Mary Walczak
Professor of Chemistry
chemistry education; analytical and physical chemistry; surface science

Douglas J. Beussman
Professor of Chemistry
analytical area - mass spectrometry; chemical instrumentation; proteomics; forensic science; bioanalytical

Anna Brezny
Assistant Professor of Chemistry

Nancy Carpenter
Adjunct Professor of Chemistry

Maetzin Cruz Reyes
Visiting Assistant Professor of Chemistry
materials chemistry

Maraia Ener-Goetz
Adjunct Assistant Professor of Chemistry

Brice Erickson
Visiting Assistant Professor of Chemistry
analytical chemistry

Peter J. Gittins
Chemist in Residence
organic chemistry

Paul T. Jackson
Professor of Chemistry and Environmental Studies
green chemistry; environmental chemistry; water quality; sustainability

Cassandra Joiner
Assistant Professor of Chemistry
chemical biology and protein biochemistry

Laura L. Listenberger
Professor of Biology and Chemistry
lipid biochemistry; cell and molecular biology

Elodie Marlier
Associate Professor of Chemistry
inorganic chemistry

Greg W. Muth (on sabbatical 2024-25)
Associate Professor of Chemistry
biochemistry

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