

Chemistry and Engineering Science

Daniel W. Black, Chair; Christine A. DeVries; Denis P. Drolet; Shawn M. Ellerbroek; Jingqiu Hu; Leilani L. Zart

Chemistry

Chemistry is often considered the “central science,” because an understanding of chemistry is essential for success in most science-related occupations. The department’s contemporary curricular program equips students for living and working in our modern, technologically advanced society.

Experimentation is at the heart of the program. On campus, students use modern instrumentation in course work and individual research. May Term and summer internships provide authentic research and work experiences at the industrial or university level.

Chemistry faculty members are effective teachers and advisers, and the smaller class size enables faculty and students to become well acquainted.

Program goals:

- To provide a curriculum designed to serve the needs of the following groups of students: (1) chemistry and biochemistry majors intending to continue on to professional study (M.S., Ph.D.), go directly into chemistry- and biochemistry-related employment, or teach chemistry/science at the secondary level; (2) chemistry, biochemistry, and other science majors intending to enter the health professions (M.D., D.O., D.D.S., D.V.M., Pharm D.); (3) other science majors intending to enter allied health fields (medical technology, chiropractic, occupational therapy, optometry, podiatry, physical therapy, and nursing); (4) students interested in environmental studies; and (5) non-science majors interested in the study of chemistry/science as a science component of the liberal arts.
- To challenge students to be critical thinkers and enthusiastic scientists capable of independent laboratory experimentation and continued professional growth after completing their college studies.
- To confront students with the needs and priorities of modern society and to emphasize their responsibility to society as scientists and citizens.

Major in Chemistry

15½ course credits:

CH 113 Principles of Chemistry I
CH 114 Principles of Chemistry II
CH 211 Organic Chemistry I
CH 212 Organic Chemistry II
CH 217 Analytical Chemistry
CH 315 Quantum Chemistry
CH 316 Chemical Thermodynamics and Kinetics
CH 340 Analytical and Physical Measurements
CH 421 Advanced Inorganic Chemistry
CH 461 Science Seminar (½)
MA 214 Statistical Methods
MA 251 Foundational Differential Calculus (½)
MA 252 Foundational Integral Calculus (½)
PHY 203 Classical Physics I
PHY 204 Classical Physics II

or
PHY 101 General Physics I
PHY 102 General Physics II

One course credit from the following:

CH 371, CH 372 Internship
CH 450 Independent Study
CH 455 and CH 456 (with department approval)
CH 471 Research (off-campus)

One chemistry elective from the following:

CH 420 Advanced Organic Chemistry
CH 422 Advanced Analytical Chemistry

By completing the chemistry major, students have met the requirements for OCAC/ILAC.

DEPARTMENT RECOMMENDATIONS

Students planning graduate study and professional work in chemistry should take CH 113 Principles of Chemistry I, CH 114 Principles of Chemistry II, CH 211 Organic Chemistry I, CH 212 Organic Chemistry II, CH 217 Analytical Chemistry, CH 315 Quantum Chemistry, CH 316 Chemical Thermodynamics and Kinetics, CH 325 Biochemistry, CH 340 Analytical and Physical Measurements, CH 420 Advanced Organic Chemistry, CH 421 Advanced Inorganic Chemistry, CH 450 Independent Study (or CH 371 Internship), CH 461 Science Seminar (½), and CH 471 Research. Special Topics courses are recommended when offered. Introductory courses in German or French, computer science courses (CS 120 Introduction to Computers and Programming), and advanced courses in mathematics and physics are also recommended.

Students majoring in chemistry while interested in professional work in medicine should consult with Dr. Shawn Ellerbroek for course recommendations in biology.

Major in Biochemistry

17½ course credits:

CH 113 Principles of Chemistry I
CH 114 Principles of Chemistry II
CH 211 Organic Chemistry I
CH 212 Organic Chemistry II
CH 315 Quantum Chemistry or CH 316 Chemical Thermodynamics and Kinetics
CH 325 Biochemistry
CH 425 Advanced Biochemistry
CH 455 Methods of Biochemical Research (½)
CH 456 Student Originated Research (½)
CH 461 Science Seminar (½) or BI 461 Science Seminar (½)
BI 151 Ecosystems, Cells, and Evolution
BI 152 Phylogeny, Structure, and Function
BI 211 Genetics
MA 214 Statistical Methods
MA 251 Foundational Differential Calculus (½)
MA 252 Foundational Integral Calculus (½)
PHY 203, PHY 204 Classical Physics I, II (or PHY 101, PHY 102 General Physics I, II)
One elective course credit from
BI 221 Cell Biology
BI 304 Developmental Biology
BI 305 Microbiology
BI 335 Neurobiology
BI 416 Molecular Biology of Cancer

One elective course credit from

- CH 217 Analytical Chemistry
- CH 315 Quantum Chemistry
- CH 316 Chemical Thermodynamics and Kinetics
- CH 420 Advanced Organic Chemistry
- CH 421 Advanced Inorganic Chemistry

By completing the biochemistry major, students have met the requirements for OCAC/ILAC.

DEPARTMENT RECOMMENDATIONS

Students planning graduate study and professional work in biochemistry should take additional advanced courses in biology (BI 221 Cell Biology, BI 305 Microbiology, BI 416 Molecular Biology of Cancer) and in chemistry (CH 315 Quantum Chemistry, CH 316 Chemical Thermodynamics and Kinetics, CH 340 Analytical and Physical Measurements, CH 420 Advanced Organic Chemistry, and CH 421 Advanced Inorganic Chemistry).

Students majoring in biochemistry while interested in professional work in medicine should consult with Dr. Shawn Ellerbroek for course recommendations in biology and chemistry.

Minor in Chemistry

9 course credits:

- CH 113 Principles of Chemistry I
- CH 114 Principles of Chemistry II
- CH 211 Organic Chemistry I
- CH 212 Organic Chemistry II
- CH 217 Analytical Chemistry

One of the following:

- CH 315 Quantum Chemistry
- CH 316 Chemical Thermodynamics and Kinetics
- CH 325 Biochemistry

MA 251 Foundational Differential Calculus (½)

MA 252 Foundational Integral Calculus (½)

PHY 203 Classical Physics I

PHY 204 Classical Physics II

or

PHY 101 General Physics I

PHY 102 General Physics II

Chemistry Teaching

For the chemistry teaching major endorsements, see Education Department listings.