

Chemistry

College of Natural Science and Mathematics
Department of Chemistry and Biochemistry
(907) 474-5510
www.uaf.edu/chem/

B.A., B.S. Degrees

Minimum Requirements for Degrees: 130 credits

Graduates qualify for employment as teachers of chemistry; supervisors in industry; technical sales personnel; research chemists in federal, state, municipal, academic or industrial laboratories; in pre-medicine; and as laboratory technicians. Graduates also find positions in the environmental sciences, oceanography and related interdisciplinary fields. Many chemistry graduates elect to pursue advanced M.S., Ph.D., pharmacology or M.D. degrees.

The chemistry curriculum meets the American Chemical Society (ACS) standards of introducing the basics of general, organic, inorganic, physical, analytical and biochemistry. Undergraduate research leading to publications is strongly encouraged and many of the laboratory-based courses have a research component built into them. There are also options for an ACS-accredited degree which provides students additional exposure to environmental chemistry, biochemistry or forensic (juristic) chemistry. Limited teaching assistantships are often available for upper division students, which strengthens leadership and communication skills.

The chemistry and biochemistry department is housed in the Natural Sciences Facility, which is equipped with research-grade instrumentation, including high field nuclear magnetic resonance (NMR) spectrometer, FT Infrared spectrometers, atomic absorption spectrometer, UV-VIS diode array spectrometers, two gas chromatographs interfaced with mass spectrometers, a gas chromatograph with a flame ionization detector, high performance liquid chromatograph (HPLC), capillary electrophoresis and a modern glove box for handling air sensitive chemicals. Equipment for specialized X-ray diffractometry, electron microscopy, liquid scintillation counting, atomic force-field microscopy, dynamic light scattering analyses, etc. is available in cooperation with other UAF departments and institutes. Two computer laboratories equipped with modern chemical software (HyperChem, ACD Labs, ChemDraw, Chem Sketch, Mestrec) and other software such as Word, Excel, PowerPoint and Endnote are available for all students enrolled in 200-level or above courses.

Major—B.A. Degree

1. Complete the general university requirements. (See page 107. As part of the core curriculum requirements, complete: MATH 200X; PHYS 103X and PHYS 104X, or PHYS 211X and PHYS 212X.)
 2. Complete the B.A. degree requirements. (See page 111. As part of the B.A. degree requirements, complete: MATH 201X.)
 3. Complete the following program (major) requirements:*
- | | |
|--|---|
| CHEM 105X—General Chemistry | 4 |
| CHEM 106X—General Chemistry | 4 |
| CHEM 202—Basic Inorganic Chemistry | 3 |
| CHEM 212—Chemical Equilibrium and Analysis | 3 |
| CHEM 313—Chemical Analysis of Dynamic Systems | 2 |
| CHEM 321—Organic Chemistry | 3 |
| CHEM 322—Organic Chemistry | 3 |
| CHEM 324W—Organic Laboratory | 4 |
| CHEM 331—Physical Chemistry | 3 |
| CHEM 332—Physical Chemistry | 3 |
| CHEM 412—Instrumental Analytical Methods | 3 |
| CHEM 413W—Analytical Instrumental Laboratory | 3 |
| CHEM 434W—Instrumental Methods in Physical Chemistry | 3 |
| CHEM 481—Seminar | 1 |
| CHEM 482O—Seminar | 2 |
4. Complete the following:
MATH 202X—Calculus
 5. Minimum credits required

* Student must earn a C grade or better in each course.

Major—B.S. Degree

1. Complete the general university requirements. (See page 107. As part of the core curriculum requirements, complete: MATH 200X; PHYS 103X and PHYS 104X, or PHYS 211X and PHYS 212X.)
 2. Complete the B.S. degree requirements. (See page 114. As part of the B.S. degree, complete: MATH 201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)
 3. Complete the program (major) requirements as listed under Chemistry—B.A. Degree.
 4. Complete the following:*
- | | |
|--|---|
| CHEM 402—Inorganic Chemistry** | 3 |
| CHEM 451—General Biochemistry | 3 |
| CHEM 488—Undergraduate Chemistry and Biochemistry Research** | 4 |
5. Minimum credits required

* Student must earn a C grade or better in each course.

** Advanced courses in the physical or biological sciences or mathematics may be substituted with permission of the head of the chemistry and biochemistry department. However, the student will not receive an ACS-certified degree.

Note: Upon completing the recommended curriculum and fulfilling all general university requirements, the student will receive a baccalaureate degree certified by the American Chemical Society.

Note: The electives must include at least 6 credits at the upper-division level (to satisfy the UAF general degree requirements for 39 upper-division.)

Concentrations: Biochemistry/Molecular Biology, Environmental Chemistry, Juristic Chemistry

Biochemistry/Molecular Biology

1. Complete the general university requirements. (See page 107. As part of the core curriculum requirements, complete: MATH 200X; PHYS 103X and PHYS 104X, or PHYS 211X and PHYS 212X.)
2. Complete the B.S. degree requirements. (See page 114. As part of the B.S. degree requirements, complete: MATH 201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)

- Complete the following program (major) requirements:*
 - BIOL 105X—Fundamentals of Biology I..... 4
 - BIOL 106X—Fundamentals of Biology II 4
 - BIOL 342—Microbiology (4)
 - or BIOL 362—Principles of Genetics (4)
 - or BIOL 418W—Developmental Biology (4)
 - or BIOL 461—Cell Biology (4) 4
 - CHEM 105X—General Chemistry 4
 - CHEM 106X—General Chemistry 4
 - CHEM 212—Chemical Equilibrium and Analysis..... 3
 - CHEM 313—Chemical Analysis of Dynamic Systems..... 2
 - CHEM 321—Organic Chemistry 3
 - CHEM 322—Organic Chemistry 3
 - CHEM 324W—Organic Laboratory 4
 - CHEM 331—Physical Chemistry 3
 - CHEM 332—Physical Chemistry 3
 - CHEM 413W—Analytical Instrumental Laboratory** (3)
 - or CHEM 434W—Instrumental Methods in Physical Chemistry (3) 3
 - CHEM 451—General Biochemistry 3
 - CHEM 452W—Biochemistry Laboratory (3)
 - or CHEM 488—Undergraduate Chemistry and Biochemistry Research (3) 3
 - CHEM 456—Advanced Biochemistry 3
 - CHEM 481—Seminar 1
 - CHEM 482O—Seminar 2
 - Major elective (approved by department head)*** 6
- Complete the following:
 - MATH 202X—Calculus..... 4
- Minimum credits required 130
 - * Student must earn a C grade or better in each course.
 - ** Requires CHEM 412 as prerequisite.
 - *** CHEM 202, 402 required for ACS-accredited degree.

Environmental Chemistry

- Complete the general university requirements. (See page 107. As part of the core curriculum requirements, complete: MATH 200X; PHYS 103X and PHYS 104X, or PHYS 211X and PHYS 212X.)
- Complete the B.S. degree requirements. (See page 114. As part of the B.S. degree, complete: MATH 201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)
- Complete the following:*
 - CHEM 105X—General Chemistry 4
 - CHEM 106X—General Chemistry 4
 - CHEM 202—Basic Inorganic Chemistry 3
 - CHEM 212—Chemical Equilibrium and Analysis..... 3
 - CHEM 313—Chemical Analysis of Dynamic Systems..... 2
 - CHEM 321, 322—Organic Chemistry 6
 - CHEM 324W—Organic Laboratory 4
 - CHEM 331, 332—Physical Chemistry 6
 - CHEM 412—Instrumental Analytical Methods 3
 - CHEM 413W—Analytical Instrumental Laboratory..... 3
 - CHEM 434W—Instrumental Methods in Physical Chemistry 3
 - CHEM 451—General Biochemistry 3
 - CHEM 481—Seminar 1
 - CHEM 482O—Seminar 2
 - CHEM 488—Undergraduate Chemistry and Biochemistry Research (Environmental Topic)..... 2
- Complete the following:
 - MATH 202X—Calculus..... 4
 - STAT 300—Statistics 3

- Complete 2 of the following courses:*
 - BIOL 105X—Fundamentals of Biology I..... 4
 - BIOL 106X—Fundamentals of Biology II 4
 - GEOS 101X—The Dynamic Earth 4
 - GEOS 125X—Humans, Earth, and the Environment 4
 - ATM 101X—Weather and Climate of Alaska..... 4
- Complete 1 of the following advanced courses:*
 - BIOL 271—Principles of Ecology..... 4
 - BIOL 342—Microbiology 4
 - BIOL 443—Microbial Ecology 3
 - BIOL 480—Water Pollution Ecology 3
 - BIOL 483—Stream Ecology..... 3
 - ENVE 458—Energy and the Environment..... 3
 - NRM 380W—Soils and the Environment 3
 - ATM 401—Fundamentals of Atmospheric Science..... 3
 - CHEM 402—Advanced Inorganic Chemistry 3
- Complete 1 of the following advanced courses:*
 - BIOL 442W,O/2—Advanced Microbiology 4
 - CHEM 406—Atmospheric Chemistry..... 3
 - CHEM 456—Advanced Biochemistry 3
 - CE 441—Environmental Engineering..... 4
 - GEOS 417—Introduction to Geochemistry 3
- Minimum credits required 130
 - * Student must earn a C grade or better in each course.

Juristic Chemistry

- Complete the general university requirements. (See page 107. As part of the core curriculum requirements, complete: MATH 200X; PHYS 103X and PHYS 104X, or PHYS 211X and PHYS 212X.)
- Complete the B.S. degree requirements. (See page 114. As part of the B.S. degree, complete: MATH 201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)
- Complete the program (major) requirements as listed under Chemistry—B.A. degree.
- Complete the following chemistry requirements:*
 - CHEM 402—Inorganic Chemistry..... 3
 - CHEM 451—General Biochemistry 3
 - CHEM 488—Undergraduate Chemistry and Biochemistry Research (Environmental Topic)..... 2
- Complete the following justice requirements:*
 - JUST 110—Introduction to Justice 3
 - JUST 222—Research Methods..... 3
 - JUST 251—Criminology 3
 - JUST 300X—Ethics and Justice** 3
 - JUST 354—Procedural Law..... 3
 - JUST 454W—Advanced Problems in Procedural Law 3
- Minimum credits required 130
 - * Student must earn a C grade or better in each course.
 - ** JUST 300X may not be used to fulfill core ethics requirement.

Requirements for Chemistry Teachers (grades 7–12)

- Complete all the requirements of the chemistry B.A. or B.S. degree you wish to seek.
- All prospective chemistry teachers must complete the following:
 - CHEM 451—General Biochemistry 3
 - CHEM 488—Undergraduate Chemistry and Biochemistry Research 4

3. All prospective science teachers must complete one of the following:
 PHIL 380—Conceptual Foundations of Science (3)
 or PHIL 382—Science and Technological Limits (3)
 or PHIL 481—Philosophy of Science (3) 3

Note: We strongly recommend that prospective secondary science teachers seek advising from the UAF School of Education early in your undergraduate degree program so that you can be appropriately advised of the state of Alaska requirements for teacher licensure. You will apply for admission to the UAF School of Education's post-baccalaureate teacher preparation program, a one-year intensive program, during your senior year. Above requirements apply to all candidates who apply to the UAF School of Education Spring 2006 or later for licensure in chemistry.

Minor

Chemistry

1. Complete the following:
 CHEM 105X—General Chemistry 4
 CHEM 106X—General Chemistry 4

2. Complete the following approved electives:
 CHEM 202—Basic Inorganic Chemistry 3
 CHEM 212—Chemical Equilibrium and Analysis* 3
 CHEM 313—Chemical Analysis of Dynamic Systems* 2
 CHEM 321—Organic Chemistry 3
 CHEM 322—Organic Chemistry 3
 3. Minimum credits required 21-22
 * CHEM 324W may be substituted for both of these courses.

Biochemistry

1. Complete the following foundation courses:
 CHEM 105X—General Chemistry 4
 CHEM 106X—General Chemistry 4
 2. Complete the following:
 CHEM 321—Organic Chemistry 3
 CHEM 322—Organic Chemistry 3
 CHEM 331—Physical Chemistry 3
 CHEM 451—General Biochemistry 3
 CHEM lab elective 200-level or above 3
 3. Minimum credits required 23

Note: Page numbers refer to the UAF 2005-2006 academic catalog, which can be viewed online at www.uaf.edu/catalog/.

Baccalaureate Core Requirements

All degrees (e.g. B.A., B.S., etc.) require additional courses. Refer to specific degree and program requirements.

COMMUNICATION (9)

Complete the following:
 ENGL 111X (3) _____
ENGL 190H may be substituted.

Complete one of the following:
 ENGL 211X **OR** ENGL 213X (3) _____

Complete one of the following:
 COMM 131X **OR** COMM 141X (3) _____

PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:
 ANTH 100X/SOC 100X (3) _____
 ECON 100X **OR** PS 100X (3) _____
 HIST 100X (3) _____
 ENGL/FL 200X (3) _____

Complete one of the following three courses:
 ART/MUS/THR 200X, HUM 201X **OR** ANS 202X (3) _____

Complete one of the following six courses:
 BA 323X, COMM 300X, JUST 300X, NRM 303X,
 PS 300X **OR** PHIL 322X (3) _____

- OR** complete 12 credits from the above courses **PLUS**
- two semester-length courses in a single Alaska Native language or other non-English language **OR**
 - three semester-length courses (9 credits) in American Sign Language taken at the university level.

MATHEMATICS (3)

Complete one of the following:
 MATH 107X, MATH 161X **OR** MATH 103X (3-4) _____
 * No credit may be earned for more than one of MATH 107X or 161X.

OR complete one of the following:*
 MATH 200X, MATH 201X, MATH 202X,
 MATH 262X **OR** MATH 272X (4) _____
 *Or any math course having one of these as a prerequisite

NATURAL SCIENCES (8)

- Complete any two (4-credit) courses:**
- ATM 101X (4) _____
 - BIOL 100X (4) _____
 - BIOL 103X (4) _____
 - BIOL 104X (4) _____
 - BIOL 105X (4) _____
 - BIOL 106X (4) _____
 - BIOL 111X (4) _____
 - BIOL 112X (4) _____
 - CHEM 100X (4) _____
 - CHEM 103X (4) _____
 - CHEM 104X (4) _____
 - CHEM 105X (4) _____
 - CHEM 106X (4) _____
 - GEOG 205X (4) _____
 - GEOS 100X (4) _____
 - GEOS 101X (4) _____
 - GEOS 112X (4) _____
 - GEOS 120X (4) _____
 - GEOS 125X (4) _____
 - MSL 111X (4) _____
 - PHYS 102X (4) _____
 - PHYS 103X (4) _____
 - PHYS 104X (4) _____
 - PHYS 115X (4) _____
 - PHYS 116X (4) _____
 - PHYS 175X (4) _____
 - PHYS 211X (4) _____
 - PHYS 212X (4) _____
 - PHYS 213X (4) _____

LIBRARY AND INFORMATION RESEARCH (0-1)

Successful completion of library skills competency test **OR**
 LS 100X or 101X prior to junior standing (0-1) _____

UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:
 Two writing intensive courses designated (W) (0) _____
 One oral communication intensive course designated (O) (0) _____
OR two oral communication intensive courses designated (O/2), at the upper-division level (see degree and/or major requirements) (0) _____

TOTAL CREDITS REQUIRED..... 38-39

