

Chemistry



College of Science, Engineering and Mathematics
Department of Chemistry and Biochemistry
(907) 474-5510

www.uaf.edu/chem/

Degrees: B.A., B.S., M.A., M.S.

Minimum Requirements for Degrees: B.A., B.S.: 130 credits;
M.A., M.S.: 30 credits

Graduates in chemistry qualify for employment in many fields 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. The rapid introduction of chemical techniques in all branches of commerce and the creation of many synthetic products have caused substantial growth in the profession. In addition to the traditional employment opportunities in chemistry, well-qualified graduates find positions in the fields of environmental sciences, oceanography and related interdisciplinary fields.

The curriculum in chemistry offers an opportunity for broad scientific study. All students specializing in chemistry will meet basic requirements in general inorganic, analytical, organic and physical chemistry, as well as mathematics and physics. These may be supplemented by courses in biology, education, engineering, geophysics, geology and advanced courses in biology, chemistry, mathematics and physics according to the interest of the individual student.

The department offers well-equipped laboratories housing instrumentation for nuclear magnetic resonance spectrometry, infrared, ultraviolet/visible, and atomic absorption spectrophotometry, mass spectrometry, gas chromatography and amino acid analysis and HPLC. Additional equipment such as gas chromatograph/mass spectrometer, x-ray diffractometer, electron microscope and liquid scintillating counters are available in cooperation with other UAF departments and institutes.

Master's degree students majoring in chemistry must develop a program in one of the general divisions of chemistry: analytical, biochemistry, inorganic, organic or physical. A student entering without preparation to take these courses may require additional time to earn the degree.

Alaska is a magnificent natural laboratory with unparalleled opportunities for study in many fields. The UAF program in environmental chemistry offers relevant courses and mentored individual research projects in several areas, including: global warming and greenhouse gases; arctic haze and industrial pollution in the arctic; oil spills; and the fate of hydrocarbons in the marine environment.

The chemistry department's curricula are accredited by the American Chemical Society.

UNDERGRADUATE PROGRAM

MAJOR

Chemistry—B.A. Degree

1. Complete the general university requirements (page 28). (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 (page 33). (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 324—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	4
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5. Minimum credits required

130

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

Chemistry—B.S. Degree

1. Complete the general university requirements (page 28). (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 (page 34). (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

130

* 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 credits).



University of Alaska Fairbanks

Admissions • P.O. Box 757480 • Fairbanks, AK 99775-7480 • admissions@uaf.edu • www.uaf.edu

The University of Alaska Fairbanks is accredited by the Commission on Colleges and Universities of the Northwest Association of Schools and Colleges. UAF is an affirmative action/equal opportunity employer and educational institution. 4/03



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

Biochemistry/Molecular Biology

1. Complete the general university requirements (26). (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 (page 34). (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.)
3. 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 324—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
 - CHEM 481—Seminar 1
 - CHEM 482O—Seminar 2
 - Major elective (approved by department head)*** 6
4. Complete the following:
 - MATH 202X—Calculus 4
5. 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

1. Complete the general university requirements (page 28). (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 (page 34). (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 following:
 - BIOL 105X—Fundamentals of Biology I 4
 - CHEM 105X—General Chemistry 4
 - CHEM 106X—General Chemistry 4
 - CHEM 202—Basic Inorganic Chemistry (3)
 - or CHEM 408—Inorganic Chemistry (3) 3
 - CHEM 212—Chemical Equilibrium and Analysis 3
 - CHEM 313—Chemical Analysis of Dynamic Systems 2
 - CHEM 321, 322—Organic Chemistry 6
 - CHEM 324—Organic Laboratory 4
 - CHEM 331, 332—Physical Chemistry 6
 - CHEM 406—Atmospheric Chemistry (3)
 - or CHEM 408—Global Chemical Cycles (3) 3
 - CHEM 412—Instrumental Analytical Methods 3
 - CHEM 413W—Analytical Instrumental Laboratory 3
 - CHEM 451—General Biochemistry 3
 - CHEM 481—Seminar 1
 - CHEM 482O—Seminar 2
 - CHEM 488—Undergraduate Chemistry and Biochemistry Research (Environmental Topic) 2
 - GEOS 101X—The Dynamic Earth 4
4. Complete the following:
 - MATH 202X—Calculus 4
 - STAT 300—Statistics 3
5. Complete 1 of the following environmental chemistry courses:
 - BIOL 271—Principles of Ecology 4
 - CHEM 434W—Instrumental Methods in Physical Chemistry 3
 - GEOS 125X—Humans, Earth, and the Environment 4
 - MSL 111X—The Oceans 4
6. Complete 1 of the following environmental studies courses:
 - NRM 303X—Environmental Ethics and Actions** 3
 - NRM 407—Environmental Law 3
7. Minimum credits required 130

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

** If taken to meet the upper division of baccalaureate core requirement for ethics/values and choices in the perspectives in the human condition, then the student must select another course for the environmental studies requirement.

Juristic Chemistry

1. Complete the general university requirements (page 28). (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 (page 34). (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 chemistry requirements:
 - CHEM 402—Inorganic Chemistry 3
 - CHEM 451—General Biochemistry 3
 - CHEM 488—Undergraduate Chemistry and Biochemistry Research (Environmental Topic) 2



5. 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
6. 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.

MINOR

Chemistry

1. Complete the following foundation courses:
 - CHEM 105X—General Chemistry 4
 - CHEM 106X—General Chemistry 4
2. Complete 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 324 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

GRADUATE PROGRAM

Chemistry—M.A. Degree*

1. Complete the requirements for the M.S. degree in chemistry.

* This is a non-thesis degree program. Substitute a research project (CHEM 698) for thesis.

Chemistry—M.S. Degree

1. Complete the general university requirements (page 43).
2. Complete the master's degree requirements (page 46).
3. Complete a research-based thesis.
4. Complete seminar 2
5. Complete at least 1 semester of assisting in an undergraduate chemistry laboratory.
6. Minimum credits required 30

See Biochemistry and Molecular Biology.

See Chemistry.

See Environmental Chemistry.

