

# CHEMISTRY

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

## B.A., B.S. Degrees

Minimum Requirements for Degrees: 120 credits

Our programs prepare students for employment as research chemists in federal, state, municipal, academic or industrial laboratories, in pre-medicine, as laboratory technicians, as supervisors in industry, as technical sales personnel, and act as the technical base for teachers of chemistry. 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 standards covering the basics of general, organic, inorganic, physical and analytical chemistry, and biochemistry. Undergraduate research leading to publications is strongly encouraged and many of the laboratory-based courses have a research component built into them. The B.S. and B.A. programs may be completed without an optional concentration, or students can opt for an additional focus in biochemistry, environmental chemistry or forensic chemistry. The B.S. programs generally prepare students for a career in chemistry or biochemistry, or professional school. The B.S. in chemistry is an ACS-approved degree program. The environmental chemistry concentration provides courses that assist students to study the chemistry of the natural environment, adding geology, biology or atmospheric courses, and preparing students for graduate studies and/or careers in the environmental industry. The biochemistry concentration provides an enhanced curriculum in biological chemistry for students seeking advanced careers in biochemistry, medicine or health sciences. The B.A. degree provides breadth in the curriculum for study of a minor subject and requires more humanities courses. The B.A. best prepares students for careers in chemistry-related fields like environmental law, forensic science, science education, anthropology, etc. Limited teaching assistantships are often available for upper-division students, which strengthen leadership and communication skills.

The bachelors degrees in chemistry and concentrations in biochemistry and environmental chemistry provide excellent research opportunities and background for undergraduate students through connection to corresponding graduate programs. See graduate programs in chemistry, biochemistry and molecular biology, and environmental chemistry.

The Chemistry and Biochemistry department is housed in the Reichardt Building, where laboratories are equipped with research-grade instrumentation, providing hands-on experience to students for entry into graduate school or industry. See the departmental website for more information, [www.uaf.edu/chem/](http://www.uaf.edu/chem/).

## Major — B.A. Degree

1. Complete the general university requirements. (See page 132. As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)
2. Complete the B.A. degree requirements. (See page 137. As part of the B.A. degree requirements, complete: MATH F201X.)

3. Complete the following program (major) requirements:
 

CHEM F105X—General Chemistry I .....	4
CHEM F106X—General Chemistry II .....	4
CHEM F202—Basic Inorganic Chemistry .....	3
CHEM F212—Chemical Equilibrium and Analysis .....	4
CHEM F321—Organic Chemistry I .....	3
CHEM F322—Organic Chemistry II (3) .....	3
or CHEM F451—Biochemistry .....	3
CHEM F324W—Organic Laboratory (4) .....	3
or CHEM F413W—Analytical Instrumental Laboratory (3) .....	3–4
CHEM F331—Physical Chemistry I .....	4
CHEM F481—Seminar .....	1
CHEM F482O—Seminar .....	2
4. Assure that you have satisfied the university requirement of 39 upper-division credits and two writing-intensive (W) courses, which will typically require either taking more upper-division chemistry courses or a significant number of upper-division courses in other disciplines, likely your minor.
5. Minimum credits required ..... 120
 

\* Students must earn a C grade (2.0) or better in each course.

Note: This degree does not encompass the depth required to be an American Chemistry Society-approved chemistry degree. Students taking this course will not receive a certificate from ACS. Students intending to continue in chemistry or biochemistry careers or graduate studies should select a B.S. degree program.

## Optional Concentration: Forensic Chemistry

1. Complete the general university requirements. (See page 132. As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)
2. Complete the B.A. degree requirements. (See page 137. As part of the B.A. degree requirements, complete: MATH F201X.)
3. Complete the program (major) requirements as listed under chemistry B.A. degree, including:
 

CHEM F413W—Analytical Instrumental Laboratory .....	3
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4. Complete the following:
 

CHEM F332—Physical Chemistry II .....	4
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5. Earn a minor in justice using the following courses to complete the requirements:
 

JUST F110—Introduction to Justice .....	3
JUST F222—Research Methods .....	3
JUST F251—Criminology .....	3
JUST F300X—Ethics and Justice** .....	3
JUST F354—Procedural Law .....	3
JUST F454W—Advanced Problems in Procedural Law .....	3
6. Minimum credits required ..... 120
 

\* Students must earn a C grade (2.0) or better in each course.

\*\* JUST F300X may not be used to fulfill core ethics requirement.

Note: This degree does not encompass the depth required to be an American Chemistry Society-approved chemistry degree. Students taking this course will not receive a certificate from ACS. Students intending to continue in chemistry or biochemistry careers or graduate studies should select a B.S. degree program.

## Major — B.S. Degree (American Chemistry Society-approved)

1. Complete the general university requirements. (See page 132. As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)
2. Complete the B.S. degree requirements. (See page 137. As part of the B.S. degree, complete: MATH F201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)

3. Complete the program (major) requirements:\*
 

CHEM F105X—General Chemistry I .....	4
CHEM F106X—General Chemistry II .....	4
CHEM F202—Basic Inorganic Chemistry .....	3
CHEM F212—Chemical Equilibrium and Analysis .....	4
CHEM F321—Organic Chemistry I .....	3
CHEM F322—Organic Chemistry II .....	3
CHEM F324W—Advanced Organic Laboratory .....	4
CHEM F331—Physical Chemistry I .....	4
CHEM F332—Physical Chemistry II .....	4
CHEM F434W—Chemistry Capstone Laboratory .....	3
CHEM F451—General Biochemistry: Metabolism .....	3
CHEM F481—Seminar .....	1
CHEM F482O—Seminar .....	2
CHEM F488—Undergraduate Chemistry and Biochemistry Research .....	3
MATH F202X—Calculus .....	4
4. Complete two of the following:\*
 

CHEM F402—Inorganic Chemistry .....	3
CHEM F450—General Biochemistry: Macromolecules .....	3
CHEM F413W—Analytical Instrumental Laboratory .....	3
5. Minimum credits required..... 120
 

\* Students must earn a C grade (2.0) or better in each course.

Note: Upon completing the required curriculum and fulfilling all general university requirements, the student will receive a certificate from the American Chemical Society indicating approval of his or her degree program.

#### Optional Concentrations: Biochemistry, Environmental Chemistry

##### Biochemistry

1. Complete the general university requirements. (See page 132). As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)
2. Complete the B.S. degree requirements. (See page 137. As part of the B.S. degree requirements, complete: MATH F201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)
3. Complete the following program (major) requirements:\*
 

CHEM F105X—General Chemistry I .....	4
CHEM F106X—General Chemistry II .....	4
BIOL F115X—Fundamentals of Biology I .....	4
BIOL F116X—Fundamentals of Biology II .....	4
CHEM F202—Basic Inorganic Chemistry .....	3
CHEM F212—Chemical Equilibrium and Analysis .....	4
CHEM F321—Organic Chemistry I .....	3
CHEM F322—Organic Chemistry II .....	3
CHEM F331—Physical Chemistry I .....	3
CHEM F450—General Biochemistry: Macromolecules .....	3
CHEM F451—General Biochemistry: Metabolism .....	3
CHEM F481—Seminar .....	1
CHEM F482O—Seminar .....	2
CHEM F488—Undergraduate Chemistry and Biochemistry Research .....	6
4. Complete four of the following advanced chemistry/math courses:\*\*
 

CHEM F323—Organic Chemistry Laboratory (3) or CHEM F324W—Advanced Organic Chemistry Laboratory (4) .....	3 – 4
CHEM F332—Physical Chemistry II .....	4
CHEM F434W—Chemistry Capstone Laboratory .....	3
CHEM F413W—Analytical Instrumental Laboratory .....	3
CHEM F402—Advanced Inorganic Chemistry .....	3
CHEM F420—NMR Spectroscopy of Natural Products .....	3
MATH F202X—Calculus III .....	4

5. Complete 10 credits of the following biology/biochemistry courses:\*
 

CHEM F261—Introduction to Cell and Molecular Biology .....	4
CHEM F418W—Developmental Biology .....	3
CHEM F455W,O—Environmental Toxicology .....	3
CHEM F470—Cellular and Molecular Neuroscience .....	3
CHEM F474—Neurochemistry .....	3
BIOL F240—Beginnings in Microbiology .....	4
BIOL F310—Animal Physiology .....	4
BIOL F342—Microbiology .....	4
BIOL F362—Principles of Genetics .....	4
BIOL F402W—Biomedical and Research Ethics .....	3
BIOL F417O—Neurobiology .....	3
BIOL F453O/2—Molecular Biology .....	4
BIOL F462O—Concepts in Infectious Disease .....	3
BIOL F465—Immunology .....	3
6. Minimum credits required..... 120
 

\* Students must earn a C grade (2.0) or better in each course.

\*\* Courses selected under numbers 4 and 5 above must meet baccalaureate degree requirements for 39 upper-division credits and two writing-intensive courses.

Note: This degree is intended for students interested in careers in Biochemistry or Pre-Professional students, providing extra depth in Biological Sciences. The selection of optional courses will determine if the curriculum conforms to the ACS-approved chemistry degree. Students desiring an American Chemistry Society-approved chemistry degree should consult with their advisor about optional courses that will meet ACS requirements.

##### Environmental Chemistry

1. Complete the general university requirements. (See page 132. As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)
2. Complete the B.S. degree requirements. (See page 137. As part of the B.S. degree, complete: MATH F201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)
3. Complete the following program (major) requirements:\*
 

CHEM F105X—General Chemistry I .....	4
CHEM F106X—General Chemistry II .....	4
CHEM F202—Basic Inorganic Chemistry .....	3
CHEM F212—Chemical Equilibrium and Analysis .....	4
CHEM F321—Organic Chemistry I .....	3
CHEM F322—Organic Chemistry II .....	3
CHEM F324W—Organic Laboratory .....	4
CHEM F331—Physical Chemistry I .....	4
CHEM F332—Physical Chemistry II .....	4
CHEM F413W—Analytical Instrumental Laboratory .....	3
CHEM F434W—Chemistry Capstone Laboratory .....	3
CHEM F481—Seminar .....	1
CHEM F482O—Seminar .....	2
CHEM F488—Undergraduate Chemistry and Biochemistry Research .....	3
MATH F202X—Calculus III .....	3
4. Complete two of the following:\*
 

ATM F101X—Weather and Climate of Alaska .....	4
BIOL F115X—Fundamentals of Biology I .....	4
BIOL F116X—Fundamentals of Biology II .....	4
GEOS F101X—The Dynamic Earth .....	4
GEOS F262—Rocks and Minerals .....	3
5. Complete two of the following:\*
 

ATM F401—Introduction to Atmospheric Science .....	3
BIOL F342—Microbiology .....	4
CHEM F406—Atmospheric Chemistry .....	3
CHEM F455W,O—Environmental Toxicology .....	3
GEOS F417—Introduction to Geochemistry .....	3
NRM F380W—Soils and the Environment .....	3

6. Minimum credits required ..... 120

\* Students must earn a C grade (2.0) or better in each course.

Note: A course in statistics (e.g. STAT F200X, STAT F300, or GEOS F430) is suggested. The selection of optional courses will determine if the curriculum conforms to the American Chemistry Society-approved chemistry degree. Students desiring an ACS-approved chemistry degree should consult with their advisor about optional courses that will meet ACS requirements..

### Requirements for Chemistry Teachers (grades 7 – 12)

1. Complete all the requirements of the chemistry B.A. or B.S. degree.
2. All prospective science teachers must complete the following:  
PHIL F481—Philosophy of Science ..... 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 F105X—General Chemistry I ..... 4  
CHEM F106X—General Chemistry II ..... 4
2. Complete the following:  
CHEM F212—Chemical Equilibrium and Analysis\* ..... 4  
CHEM F321—Organic Chemistry I ..... 3  
CHEM F322—Organic Chemistry II ..... 3  
CHEM F331—Physical Chemistry I ..... 4
3. Complete one of the following additional chemistry lab courses:  
CHEM F202—Basic Inorganic Chemistry ..... 3  
CHEM F323—Organic Chemistry Lab ..... 3
4. Minimum credits required ..... 25

#### Biochemistry

1. Complete the following:  
CHEM F105X—General Chemistry I ..... 4  
CHEM F106X—General Chemistry II ..... 4
2. Complete the following:  
CHEM F321—Organic Chemistry I ..... 3  
CHEM F322—Organic Chemistry II ..... 3  
CHEM F331—Physical Chemistry I ..... 4  
CHEM F451—General Biochemistry: Metabolism ..... 3
3. Complete one of the following chemistry lab courses:  
CHEM F202—Basic Inorganic Chemistry ..... 3  
CHEM F212—Chemical Equilibrium and Analysis ..... 4  
CHEM F323—Organic Chemistry ..... 3
4. Minimum credits required ..... 24 – 25

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

## Baccalaureate Core Requirements

(Note: all courses for Core must be at C- or higher.)

### COMMUNICATION (9)

Complete the following:

ENGL F111X .....(3) \_\_\_\_\_  
*ENGL F190H may be substituted.*

Complete one of the following:

ENGL F211X OR ENGL F213X .....(3) \_\_\_\_\_

Complete one of the following:

COMM F131X OR COMM F141X .....(3) \_\_\_\_\_

### PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:

ANTH F100X/SOC F100X .....(3) \_\_\_\_\_  
 ECON F100X OR PS F100X .....(3) \_\_\_\_\_  
 HIST F100X .....(3) \_\_\_\_\_  
 ENGL/FL F200X .....(3) \_\_\_\_\_

Complete one of the following three courses:

ART/MUS/THR F200X, HUM F201X OR ANS F202X .... (3) \_\_\_\_\_

Complete one of the following six courses:

BA F323X, COMM F300X, JUST F300X, NRM F303X,  
 PS F300X OR PHIL F322X .....(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 F103X, MATH F107X, MATH F161X OR  
 STAT F200X .....(3 – 4) \_\_\_\_\_  
*\* No credit may be earned for more than one of MATH F107X or F161X.*

OR complete one of the following\*:

MATH F200X, MATH F201X, MATH F202X,  
 MATH F262X OR MATH F272X .....(4) \_\_\_\_\_  
*\*Or any math course having one of these as a prerequisite.*

### NATURAL SCIENCES (8)

Complete any two (4-credit) courses:

ATM F101X .....(4) \_\_\_\_\_  
 BIOL F100X .....(4) \_\_\_\_\_  
 BIOL F103X .....(4) \_\_\_\_\_  
 BIOL F104X .....(4) \_\_\_\_\_  
 BIOL F111X .....(4) \_\_\_\_\_  
 BIOL F112X .....(4) \_\_\_\_\_  
 BIOL F115X .....(4) \_\_\_\_\_  
 BIOL F116X .....(4) \_\_\_\_\_  
 CHEM F100X .....(4) \_\_\_\_\_  
 CHEM F103X .....(4) \_\_\_\_\_  
 CHEM F104X .....(4) \_\_\_\_\_  
 CHEM F105X .....(4) \_\_\_\_\_  
 CHEM F106X .....(4) \_\_\_\_\_  
 GEOG F111X .....(4) \_\_\_\_\_  
 GEOS F100X .....(4) \_\_\_\_\_  
 GEOS F101X .....(4) \_\_\_\_\_  
 GEOS F112X .....(4) \_\_\_\_\_  
 GEOS F120X .....(4) \_\_\_\_\_  
 GEOS F125X .....(4) \_\_\_\_\_  
 MSL F111X .....(4) \_\_\_\_\_  
 PHYS F102X .....(4) \_\_\_\_\_  
 PHYS F103X .....(4) \_\_\_\_\_  
 PHYS F104X .....(4) \_\_\_\_\_  
 PHYS F115X .....(4) \_\_\_\_\_  
 PHYS F116X .....(4) \_\_\_\_\_  
 PHYS F175X .....(4) \_\_\_\_\_  
 PHYS F211X .....(4) \_\_\_\_\_  
 PHYS F212X .....(4) \_\_\_\_\_  
 PHYS F213X .....(4) \_\_\_\_\_

### LIBRARY AND INFORMATION RESEARCH (0 – 1)

Successful completion of library skills competency test **OR**  
 LS F100X or F101X prior to junior standing .....(0 – 1) \_\_\_\_\_

### UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:

Two writing intensive courses designated (W) .....(0) \_\_\_\_\_  
 and 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) \_\_\_\_\_

CORE CREDITS REQUIRED ..... 38 – 39

Minimum credits required for degree ..... 120



UNIVERSITY OF ALASKA FAIRBANKS

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