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PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR/MINOR)

SUBMITTED BY:

Department	Chemistry and Biochemistry	College/School	CNSM
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See <http://www.uaf.edu/uafgov/faculty/cd> for a complete description of the rules governing curriculum & course changes.

PROGRAM IDENTIFICATION:

DEGREE PROGRAM	Chemistry
Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S., Ph.D.)	B.S. and B.A.

A. CHANGE IN DEGREE REQUIREMENTS: (Brief statement of program/degree changes and objectives)

As a result from our Departmental retreat in May 2011, we wish to make the following changes:

- * Allow greater flexibility in our American Chemical Society (ACS)-approved degree programs, while maintaining those rigorous accreditation standards.
- * Refine the concentrations under the B.S. degree, including the Biochemistry and Environmental Chemistry concentrations.
- * Reduce the number of courses required for the B.A. degree with the realization that the university requires many other courses for the B.A. We also shift the Forensic concentration to be under the B.A. to allow greater flexibility of course offerings to the Forensic concentration
- * Change number of required credits to 120 credits.

B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:

Chemistry

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

B.A., B.S., M.A., M.S. Degrees; Minor

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 standards of introducing 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. There are also options for an ACS-accredited degree which provides students additional exposure to environmental chemistry, biochemistry or forensic chemistry. Limited teaching assistantships are often available for upper division students, which strengthens leadership and communication skills.

The Bachelors degree in Environmental Chemistry prepares students for public and private sector jobs related to Environmental Science and Technology, or for graduate programs in

Environmental Chemistry and related disciplines. The degree program is designed to provide students with core training in the chemical sciences, while providing exposure to a broad range of related disciplines. Students work with a faculty advisor to select required elective courses that best meets their interests and academic goals.

Students are also required to enroll in research credits with a focus on an Environmental Chemistry topic. This provides an opportunity for students to gain first hand experience working on advanced topics that are generally outside of the scope of an undergraduate curriculum. For a description of the field of Environmental Chemistry, see the Environmental Chemistry graduate program.

The chemistry and biochemistry department is housed in the Natural Sciences Facility, which is equipped with research-grade instrumentation, including a high field nuclear magnetic resonance 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, 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 F200-level or above courses.

Major -- B.A. Degree

1. Complete the [general university requirements](#). (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](#). (As part of the B.A. degree requirements, complete: MATH F201X.)
3. Complete the following program (major) requirements: *
CHEM F105X--General Chemistry I--4 credits
CHEM F106X--General Chemistry II--4 credits
CHEM F202--Basic Inorganic Chemistry--3 credits
CHEM F212--Chemical Equilibrium and Analysis--4 credits
CHEM F321--Organic Chemistry I--3 credits
CHEM F322--Organic Chemistry II--3 credits
CHEM F324W--Organic Laboratory--4 credits
CHEM F331--Physical Chemistry I--4 credits
CHEM F332--Physical Chemistry II--4 credits
CHEM F413W--Analytical Instrumental Laboratory--3 credits
CHEM F434W--Instrumental Methods in Physical Chemistry--3 credits
CHEM F481--Seminar--1 credit
CHEM F482O--Seminar--2 credits
4. Complete the following:
MATH F202X--Calculus--4 credits
5. Minimum credits required--130 credits

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

Major -- B.S. Degree

1. Complete the [general university requirements](#). (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](#). (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 as listed under Chemistry -- B.A. Degree.
 4. Complete the following:*
- CHEM F402--Inorganic Chemistry**--3 credits
 - CHEM F450--General Biochemistry Macromolecules (3)
or CHEM F451--General Biochemistry Metabolism--3 credits
 - CHEM F488--Undergraduate Chemistry and Biochemistry Research**--4 credits
5. Minimum credits required--130 credits

* 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 bachelor's 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, Forensic Chemistry

Biochemistry/Molecular Biology

1. Complete the [general university requirements](#). (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](#). (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:*
- BIOL F115X--Fundamentals of Biology I--4 credits
 - BIOL F116X--Fundamentals of Biology II--4 credits
 - BIOL F342--Microbiology (4)
or BIOL F362--Principles of Genetics (4)
 - CHEM F105X--General Chemistry--4 credits
 - CHEM F106X--General Chemistry--4 credits
 - CHEM F212--Chemical Equilibrium and Analysis--4 credits
 - CHEM F321--Organic Chemistry--3 credits
 - CHEM F322--Organic Chemistry--3 credits
 - CHEM F324W--Organic Laboratory--4 credits
 - CHEM F331--Physical Chemistry--4 credits
 - CHEM F332--Physical Chemistry--4 credits
 - CHEM F413W--Analytical Instrumental Laboratory** (3)
or CHEM F434W--Instrumental Methods in Physical Chemistry (3)--3 credits
 - CHEM F450--General Biochemistry Macromolecules (3)

or CHEM F451--General Biochemistry Metabolism--3 credits

CHEM F481--Seminar--1 credit

CHEM F482O--Seminar--2 credits

CHEM F488--Undergraduate Chemistry and Biochemistry Research (3)--3 credits

Major elective (approved by department head)***--6 credits

4. Complete the following:

MATH F202X--Calculus--4 credits

5. Minimum credits required--130 credits

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

** Requires CHEM F312 as prerequisite.

*** CHEM F202, F402 required for ACS-accredited degree.

Environmental Chemistry

1. Complete the [general university requirements](#). (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](#). (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:*

CHEM F105X--General Chemistry--4 credits

CHEM F106X--General Chemistry--4 credits

CHEM F202--Basic Inorganic Chemistry--3 credits

CHEM F212--Chemical Equilibrium and Analysis--4 credits

CHEM F312--Instrumental Analysis--4 credits

CHEM F321, F322--Organic Chemistry--6 credits

CHEM F324W--Organic Laboratory--4 credits

CHEM F331, F332--Physical Chemistry--8 credits

CHEM F413W--Analytical Instrumental Laboratory--3 credits

CHEM F434W--Instrumental Methods in Physical Chemistry--3 credits

CHEM F450--General Biochemistry Macromolecules (3)

or CHEM F451--General Biochemistry Metabolism--3 credits

CHEM F481--Seminar--1 credit

CHEM F482O--Seminar--2 credits

CHEM F488--Undergraduate Chemistry and Biochemistry Research (Environmental Topic)--2 credits

4. Complete the following:

MATH F202X--Calculus III--4 credits

STAT F300--Statistics--3 credits

5. Complete two of the following courses:*

BIOL F115X--Fundamentals of Biology I--4 credits

BIOL F116X--Fundamentals of Biology II--4 credits

GEOS F101X--The Dynamic Earth--4 credits

GEOS F125X--Humans, Earth, and the Environment--4 credits

ATM F101X--Weather and Climate of Alaska--4 credits

6. Complete one of the following advanced courses:*

BIOL F271--Principles of Ecology--4 credits

BIOL F342--Microbiology--4 credits

BIOL F443W--Microbial Ecology--3 credits

BIOL F483--Stream Ecology--3 credits

- ENVE F458--Energy and the Environment--3 credits
 - NRM F380W--Soils and the Environment--3 credits
 - ATM F401--Introduction to Atmospheric Science--3 credits
 - CHEM F402--Advanced Inorganic Chemistry--3 credits
 - 7. Complete one of the following advanced courses:
 - CHEM F406--Atmospheric Chemistry--3 credits
 - CE F341--Environmental Engineering--4 credits
 - GEOS F417--Introduction to Geochemistry--3 credits
 - 8. Minimum credits required--130 credits
- * Student must earn a C grade or better in each course.

Forensic Chemistry

1. Complete the [general university requirements](#). (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](#). (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 as listed under Chemistry -- B.A. degree.
 4. Complete the following chemistry requirements:
 - CHEM F402--Inorganic Chemistry--3 credits
 - CHEM F450--General Biochemistry Macromolecules (3)
or CHEM F451--General Biochemistry Metabolism--3 credits
 - CHEM F488--Undergraduate Chemistry and Biochemistry Research--2 credits
 5. Complete the following justice requirements:
 - JUST F110--Introduction to Justice--3 credits
 - JUST F222--Research Methods--3 credits
 - JUST F251--Criminology--3 credits
 - JUST F300X--Ethics and Justice--3 credits
 - JUST F354--Procedural Law--3 credits
 - JUST F454W--Advanced Problems in Procedural Law--3 credits
 6. Minimum credits required--130 credits
- * Student must earn a C grade or better in each course.
- ** JUST F300X may not be used to fulfill core ethics requirement.

Requirements for Chemistry Teachers (grades 7 - 12)

1. Complete all the requirements of the chemistry B.A. or B.S. degree you wish to seek.
2. All prospective chemistry teachers must complete the following:
 - CHEM F450--General Biochemistry Macromolecules (3)
or CHEM F451--General Biochemistry Metabolism--3 credits
 - CHEM F488--Undergraduate Chemistry and Biochemistry Research--4 credits
3. All prospective science teachers must complete the following:
 - PHIL F481--Philosophy of Science--3 credits

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 credits
CHEM F106X--General Chemistry II--4 credits
2. Complete the following approved electives:
CHEM F212--Chemical Equilibrium and Analysis*--4 credits
CHEM F321--Organic Chemistry I--3 credits
CHEM F322--Organic Chemistry II--3 credits
CHEM F331--Physical Chemistry I--4 credits
CHEM F332--Physical Chemistry II--4 credits
3. Complete one of the following additional chemistry lab courses:
CHEM F202--Basic Inorganic Chemistry--3 credits
CHEM F324W--Organic Chemistry Lab--4 credits
4. Minimum credits required--29 - 30 credits

Biochemistry

1. Complete the following foundation courses:
CHEM F105X--General Chemistry I--4 credits
CHEM F106X--General Chemistry II--4 credits
2. Complete the following:
CHEM F321--Organic Chemistry I--3 credits
CHEM F322--Organic Chemistry II--3 credits
CHEM F331--Physical Chemistry I--4 credits
CHEM F451--General Biochemistry -- Metabolism--3 credits
3. Complete two of the following chemistry lab courses:
CHEM F202--Basic Inorganic Chemistry--3 credits
CHEM F212--Chemical Equilibrium and Analysis--4 credits
CHEM F324--Organic Chemistry Lab--4 credits
4. Minimum credits required--28 - 29 credits

C. PROPOSED REQUIREMENTS AS IT WILL APPEAR IN THE CATALOG WITH THESE CHANGES: (Underline new wording ~~strike through old wording~~ and use complete catalog format)

Chemistry

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

~~B.A., B.S., M.A., M.S.~~ Degrees; Minor

~~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 standards of introducing 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. There are also options for an ACS accredited degree which provides students additional exposure to environmental chemistry, biochemistry or forensic chemistry. Limited teaching assistantships are often available for upper division students, which strengthens leadership and communication skills.

The Bachelors degree in Environmental Chemistry prepares students for public and private sector jobs related to Environmental Science and Technology, or for graduate programs in Environmental Chemistry and related disciplines. The degree program is designed to provide students with core training in the chemical sciences, while providing exposure to a broad range of related disciplines. Students work with a faculty advisor to select required elective courses that best meets their interests and academic goals.

Students are also required to enroll in research credits with a focus on an Environmental Chemistry topic. This provides an opportunity for students to gain first hand experience working on advanced topics that are generally outside of the scope of an undergraduate curriculum. For a description of the field of Environmental Chemistry, see the Environmental Chemistry graduate program.

The chemistry and biochemistry department is housed in the Natural Sciences Facility, which is equipped with research grade instrumentation, including a high field nuclear magnetic resonance 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, 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 F200 level or above courses.

Major—B.A. Degree

- 6.—Complete the [general university requirements](#). (As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)
 - 7.—Complete the [B.A. degree requirements](#). (As part of the B.A. degree requirements, complete: MATH F201X.)
 - 8.—Complete the following program (major) requirements:*
- CHEM F105X—General Chemistry I—4 credits
 - CHEM F106X—General Chemistry II—4 credits
 - CHEM F202—Basic Inorganic Chemistry—3 credits
 - CHEM F212—Chemical Equilibrium and Analysis—4 credits
 - CHEM F321—Organic Chemistry I—3 credits
 - CHEM F322—Organic Chemistry II—3 credits
 - CHEM F324W—Organic Laboratory—4 credits
 - CHEM F331—Physical Chemistry I—4 credits
 - CHEM F332—Physical Chemistry II—4 credits

~~CHEM F413W Analytical Instrumental Laboratory 3 credits~~
~~CHEM F434W Instrumental Methods in Physical Chemistry 3 credits~~
~~CHEM F481 Seminar 1 credit~~
~~CHEM F482O Seminar 2 credits~~

~~9. Complete the following:~~

~~MATH F202X Calculus 4 credits~~

~~10. Minimum credits required 130 credits~~

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

~~Major B.S. Degree~~

~~6. Complete the [general university requirements](#). (As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)~~

~~7. Complete the [B.S. degree requirements](#). (As part of the B.S. degree, complete: MATH F201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)~~

~~8. Complete the program (major) requirements as listed under Chemistry B.A. Degree.~~

~~9. Complete the following:*~~

~~CHEM F402 Inorganic Chemistry** 3 credits~~

~~CHEM F450 General Biochemistry Macromolecules (3)~~

~~—or CHEM F451 General Biochemistry Metabolism 3 credits~~

~~CHEM F488 Undergraduate Chemistry and Biochemistry Research** 4 credits~~

~~10. Minimum credits required 130 credits~~

~~* 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 bachelor's 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, Forensic Chemistry~~

~~Biochemistry/Molecular Biology~~

~~6. Complete the [general university requirements](#). (As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)~~

~~7. Complete the [B.S. degree requirements](#). (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.)~~

~~8. Complete the following program (major) requirements:*~~

~~BIOL F115X Fundamentals of Biology I 4 credits~~

~~BIOL F116X Fundamentals of Biology II 4 credits~~

~~BIOL F342 Microbiology (4)~~

~~—or BIOL F362 Principles of Genetics (4)~~

~~CHEM F105X General Chemistry 4 credits~~
~~CHEM F106X General Chemistry 4 credits~~
~~CHEM F212 Chemical Equilibrium and Analysis 4 credits~~
~~CHEM F321 Organic Chemistry 3 credits~~
~~CHEM F322 Organic Chemistry 3 credits~~
~~CHEM F324W Organic Laboratory 4 credits~~
~~CHEM F331 Physical Chemistry 4 credits~~
~~CHEM F332 Physical Chemistry 4 credits~~
~~CHEM F413W Analytical Instrumental Laboratory** (3)~~
~~—or CHEM F434W Instrumental Methods in Physical Chemistry (3) 3 credits~~
~~CHEM F450 General Biochemistry Macromolecules (3)~~
~~—or CHEM F451 General Biochemistry Metabolism 3 credits~~
~~CHEM F481 Seminar 1 credit~~
~~CHEM F482O Seminar 2 credits~~
~~CHEM F488 Undergraduate Chemistry and Biochemistry Research (3) 3 credits~~
~~Major elective (approved by department head)*** 6 credits~~

9. ~~Complete the following:~~

~~MATH F202X Calculus 4 credits~~

10. ~~Minimum credits required 130 credits~~

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

** ~~Requires CHEM F312 as prerequisite.~~

*** ~~CHEM F202, F402 required for ACS accredited degree.~~

~~Environmental Chemistry~~

9. ~~Complete the [general university requirements](#). (As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)~~

10. ~~Complete the [B.S. degree requirements](#). (As part of the B.S. degree, complete: MATH F201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)~~

11. ~~Complete the following:*~~

~~CHEM F105X General Chemistry 4 credits~~

~~CHEM F106X General Chemistry 4 credits~~

~~CHEM F202 Basic Inorganic Chemistry 3 credits~~

~~CHEM F212 Chemical Equilibrium and Analysis 4 credits~~

~~CHEM F312 Instrumental Analysis 4 credits~~

~~CHEM F321, F322 Organic Chemistry 6 credits~~

~~CHEM F324W Organic Laboratory 4 credits~~

~~CHEM F331, F332 Physical Chemistry 8 credits~~

~~CHEM F413W Analytical Instrumental Laboratory 3 credits~~

~~CHEM F434W Instrumental Methods in Physical Chemistry 3 credits~~

~~CHEM F450 General Biochemistry Macromolecules (3)~~

~~—or CHEM F451 General Biochemistry Metabolism 3 credits~~

~~CHEM F481 Seminar 1 credit~~

~~CHEM F482O Seminar 2 credits~~

~~CHEM F488 Undergraduate Chemistry and Biochemistry Research (Environmental Topic) 2 credits~~

12. ~~Complete the following:~~

~~MATH F202X Calculus III 4 credits~~

~~STAT F300 Statistics 3 credits~~

13. Complete two of the following courses:*

BIOL F115X Fundamentals of Biology I 4 credits
BIOL F116X Fundamentals of Biology II 4 credits
GEOS F101X The Dynamic Earth 4 credits
GEOS F125X Humans, Earth, and the Environment 4 credits
ATM F101X Weather and Climate of Alaska 4 credits

14. Complete one of the following advanced courses:*

BIOL F271 Principles of Ecology 4 credits
BIOL F342 Microbiology 4 credits
BIOL F443W Microbial Ecology 3 credits
BIOL F483 Stream Ecology 3 credits
ENVE F458 Energy and the Environment 3 credits
NRM F380W Soils and the Environment 3 credits
ATM F401 Introduction to Atmospheric Science 3 credits
CHEM F402 Advanced Inorganic Chemistry 3 credits

15. Complete one of the following advanced courses:*

CHEM F406 Atmospheric Chemistry 3 credits
CE F341 Environmental Engineering 4 credits
GEOS F417 Introduction to Geochemistry 3 credits

16. Minimum credits required 130 credits

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

Forensic Chemistry

7. Complete the [general university requirements](#). (As part of the core curriculum requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)

8. Complete the [B.S. degree requirements](#). (As part of the B.S. degree, complete: MATH F201X. Chemistry foundation courses may be used toward partial fulfillment of the natural science requirement.)

9. Complete the program (major) requirements as listed under Chemistry—B.A. degree.

10. Complete the following chemistry requirements:*

CHEM F402 Inorganic Chemistry 3 credits
CHEM F450 General Biochemistry Macromolecules (3)
—or CHEM F451 General Biochemistry Metabolism 3 credits
CHEM F488 Undergraduate Chemistry and Biochemistry Research 2 credits

11. Complete the following justice requirements:*

JUST F110 Introduction to Justice 3 credits
JUST F222 Research Methods 3 credits
JUST F251 Criminology 3 credits
JUST F300X Ethics and Justice** 3 credits
JUST F354 Procedural Law 3 credits
JUST F454W Advanced Problems in Procedural Law 3 credits

12. Minimum credits required 130 credits

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

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

Requirements for Chemistry Teachers (grades 7–12)

4. Complete all the requirements of the chemistry B.A. or B.S. degree you wish to seek.

5. All prospective chemistry teachers must complete the following:

CHEM F450 General Biochemistry Macromolecules (3)

- ~~—or CHEM F451 General Biochemistry Metabolism 3 credits~~
~~CHEM F488 Undergraduate Chemistry and Biochemistry Research 4 credits~~
6. ~~All prospective science teachers must complete the following:~~
~~PHIL F481 Philosophy of Science 3 credits~~

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

5. ~~Complete the following:~~
~~CHEM F105X General Chemistry I 4 credits~~
~~CHEM F106X General Chemistry II 4 credits~~
6. ~~Complete the following approved electives:~~
~~CHEM F212 Chemical Equilibrium and Analysis* 4 credits~~
~~CHEM F321 Organic Chemistry I 3 credits~~
~~CHEM F322 Organic Chemistry II 3 credits~~
~~CHEM F331 Physical Chemistry I 4 credits~~
~~CHEM F332 Physical Chemistry II 4 credits~~
7. ~~Complete one of the following additional chemistry lab courses:~~
~~CHEM F202 Basic Inorganic Chemistry 3 credits~~
~~CHEM F324W Organic Chemistry Lab 4 credits~~
8. ~~Minimum credits required 29 30 credits~~

Biochemistry

5. ~~Complete the following foundation courses:~~
~~CHEM F105X General Chemistry I 4 credits~~
~~CHEM F106X General Chemistry II 4 credits~~
6. ~~Complete the following:~~
~~CHEM F321 Organic Chemistry I 3 credits~~
~~CHEM F322 Organic Chemistry II 3 credits~~
~~CHEM F331 Physical Chemistry I 4 credits~~
~~CHEM F451 General Biochemistry Metabolism 3 credits~~
7. ~~Complete two of the following chemistry lab courses:~~
~~CHEM F202 Basic Inorganic Chemistry 3 credits~~
~~CHEM F212 Chemical Equilibrium and Analysis 4 credits~~
~~CHEM F324 Organic Chemistry Lab 4 credits~~
8. ~~Minimum credits required 28 29 credits~~

Chemistry

College of Natural Science and Mathematics

Department of Chemistry and Biochemistry

907-474-5510

www.uaf.edu/chem/

B.A., B.S., M.A., M.S. Degrees; Minor

Minimum Requirements for Degrees: 120 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 covering 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. There are also options for degree programs that provide students additional exposure to biochemistry, environmental chemistry, and 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, 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 for 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 strengthens 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 students for entry into graduate school or industry. See the departmental website for more information, <http://www.uaf.edu/chem/>.

Major -- B.A. Degree

1. Complete the [general university requirements](#). (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](#). (As part of the B.A. degree requirements, complete: MATH F201X.)
3. Complete the following program (major) requirements:*
CHEM F105X--General Chemistry I--4 credits
CHEM F106X--General Chemistry II--4 credits
CHEM F202--Basic Inorganic Chemistry--3 credits
CHEM F212--Chemical Equilibrium and Analysis--4 credits
CHEM F321--Organic Chemistry--3 credits
CHEM F322--Organic Chemistry--3 credits or CHEM F451--Biochemistry--3 credits
CHEM F324W--Advanced Organic Laboratory—or CHEM F413W Advanced Analytical 3-4 credits
CHEM F331--Physical Chemistry I--4 credits

CHEM F481--Seminar--1 credit

CHEM F482O--Seminar--2 credits

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 credits

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

Note: This degree does not encompass the depth required to be an ACS-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.

Concentrations: Forensic Chemistry

Concentration – Forensic Chemistry

1. Complete the [general university requirements](#). (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](#). (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—Advanced Analytical --3 credits.
4. Complete the following Chemistry courses:
CHEM F332--Physical Chemistry II --4 credits
5. Earn a minor in Justice using these courses:*
JUST F110--Introduction to Justice--3 credits
JUST F222--Research Methods--3 credits
JUST F251--Criminology--3 credits
JUST F300X--Ethics and Justice**--3 credits
JUST F354--Procedural Law--3 credits
JUST F454W--Advanced Problems in Procedural Law--3 credits
6. Minimum credits required--120 credits.

* Student must earn a C grade 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 ACS-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 (ACS-approved)

1. Complete the [general university requirements](#). (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](#). (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 credits

- CHEM F106X--General Chemistry II--4 credits
- CHEM F202--Basic Inorganic Chemistry--3 credits
- CHEM F212--Chemical Equilibrium and Analysis--4 credits
- CHEM F321--Organic Chemistry I--3 credits
- CHEM F322--Organic Chemistry II--3 credits
- CHEM F324W--Advanced Organic Laboratory--4 credits
- CHEM F331--Physical Chemistry I--4 credits
- CHEM F332--Physical Chemistry II--4 credits
- CHEM F434W--Instrumental Methods for Physical Chemistry--3 credits
- CHEM F451--General Biochemistry: Metabolism--3 credits
- CHEM F481--Seminar--1 credit
- CHEM F482O--Seminar--2 credits
- CHEM F488--Undergraduate Chemistry and Biochemistry Research--3 credits
- MATH F202X--Calculus--4 credits
- 4. Complete two of the following courses:
 - CHEM F402--Inorganic Chemistry--3 credits
 - CHEM F450--General Biochemistry: Macromolecules--3credits
 - CHEM F413W--Analytical Instrumental Laboratory--3 credits
- 5. Minimum credits required--120 credits

* Student must earn a C grade 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 the approval of their degree program.

Concentrations: Environmental Chemistry, Biochemistry

Concentration – Environmental Chemistry

1. Complete the [general university requirements](#). (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](#). (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 credits
 - CHEM F106X--General Chemistry II--4 credits
 - CHEM F202--Basic Inorganic Chemistry--3 credits
 - CHEM F212--Chemical Equilibrium and Analysis--4 credits
 - CHEM F321--Organic Chemistry I--3 credits
 - CHEM F322--Organic Chemistry II--3 credits
 - CHEM F324W--Advanced Organic Laboratory--4 credits
 - CHEM F331--Physical Chemistry I--4 credits
 - CHEM F332--Physical Chemistry II--4 credits
 - CHEM F434W--Instrumental Methods for Physical Chemistry--3 credits
 - CHEM F413W--Analytical Instrumental Laboratory--3 credits
 - CHEM F481--Seminar--1 credit
 - CHEM F482O--Seminar--2 credits
 - CHEM F488--Undergraduate Chemistry and Biochemistry Research--3 credits
 - MATH F202X--Calculus--4 credits
4. Complete two of the following courses:*

- BIOL F115X--Fundamentals of Biology I--4 credits
- BIOL F116X--Fundamentals of Biology II--4 credits
- GEOS F101X--The Dynamic Earth--4 credits
- GEOS F262--Rocks and Minerals--3 credits
- ATM F101X--Weather and Climate of Alaska--4 credits
- 5. Complete two of the following advanced courses:*
 - BIOL F342--Microbiology--4 credits
 - NRM F380W--Soils and the Environment--3 credits
 - ATM F401--Introduction to Atmospheric Science--3 credits
 - CHEM F406--Atmospheric Chemistry--3 credits
 - CHEM F455W,O--Environmental Toxicology--3 credits
 - GEOS F417--Introduction to Geochemistry--3 credits
- 6. Minimum credits required--120 credits

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

Notes: A course in statistics (e.g. STAT F200, STAT F300, or GEOS F430) is suggested. The selection of optional courses will determine if the curriculum conforms to the ACS-approved chemistry degree. Students desiring an ACS-approved chemistry degree should consult with their adviser about optional courses that will meet requirements for an ACS-approved degree.

Concentration – Biochemistry

1. Complete the [general university requirements](#). (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](#). (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 credits
 - CHEM F106X--General Chemistry II--4 credits
 - BIOL F115X--Fundamentals Biology I--4 credits
 - BIOL F116X--Fundamentals Biology II--4 credits
 - CHEM F202--Basic Inorganic Chemistry--3 credits
 - CHEM F212--Chemical Equilibrium and Analysis--4 credits
 - CHEM F321--Organic Chemistry I--3 credits
 - CHEM F322--Organic Chemistry II--3 credits
 - CHEM F331--Physical Chemistry I--4 credits
 - CHEM F451--General Biochemistry: Metabolism--3 credits
 - CHEM F450--General Biochemistry: Macromolecules--3 credits
 - CHEM F481--Seminar--1 credit
 - CHEM F482O--Seminar--2 credits
 - CHEM F488--Undergraduate Chemistry and Biochemistry Research--6 credits
4. Complete four of the following advanced chemistry/math courses:
 - CHEM F332—Physical Chemistry II--4 credits
 - CHEM F323 or 324W—Organic Chemistry Laboratory—3 or 4 credits
 - CHEM F434W—Instrumental Methods for Physical Chemistry—3 credits
 - CHEM F413W—Analytical Instrumental Laboratory—3 credits
 - CHEM F402—Advanced Inorganic Chemistry--3 credits
 - CHEM F420—NMR Spectroscopy of Natural Products--3 credits

- MATH F202X—Calculus III --4 credits
5. Complete 10 credits of the following Biology / Biochemistry courses:
CHEM F261—Introduction to Cell and Molecular Biology--4 credits
CHEM F418W—Developmental Biology--3 credits
CHEM F474—Neurochemistry--3 credits
CHEM F470—Cellular and Molecular Neuroscience--3 credits
CHEM F455W,O—Environmental Toxicology--3 credits
BIOL F240—Beginnings in Microbiology--4 credits
BIOL F342—Microbiology--4 credits
BIOL F362—Principles of Genetics--4 credits
BIOL F417O—Neurobiology--3 credits
BIOL F465—Immunology--3 credits
BIOL F462O—Concepts in Infectious Disease--3 credits
BIOL F453O/2—Molecular Biology--4 credits
BIOL F310—Animal Physiology--4 credits
BIOL F402W—Biomedical and Research Ethics--3 credits
BIOL F450W,O—Women and Science--3 credits
 6. Note that the selection of courses under points 4 and 5 must be made to give you 39 upper division credits plus two writing-intensive courses. Assure that your selections satisfy these University-wide rules.
 7. Minimum credits required--120 credits

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 ACS-approved chemistry degree should consult with their adviser about optional courses that will meet requirements for an ACS-approved degree.

Requirements for Chemistry Teachers (grades 7 - 12)

1. Complete all the requirements of the chemistry B.S. degree or B.A degree
2. All prospective science teachers must complete the following:
PHIL F481--Philosophy of Science--3 credits

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 credits
CHEM F106X--General Chemistry II--4 credits
2. Complete the following approved electives:
CHEM F212--Chemical Equilibrium and Analysis*--4 credits
CHEM F321--Organic Chemistry I--3 credits

CHEM F322--Organic Chemistry II--3 credits

CHEM F331--Physical Chemistry I--4 credits

3. Complete one of the following additional chemistry lab courses:

CHEM F202--Basic Inorganic Chemistry--3 credits

CHEM F323--Organic Chemistry Lab--3 credits

Minimum credits required-- 25 credits

Biochemistry

1. Complete the following foundation courses:

CHEM F105X--General Chemistry I--4 credits

CHEM F106X--General Chemistry II--4 credits

2. Complete the following:

CHEM F321--Organic Chemistry I--3 credits

CHEM F322--Organic Chemistry II--3 credits

CHEM F331--Physical Chemistry I--4 credits

CHEM F451--General Biochemistry -- Metabolism--3 credits

3. Complete one of the following chemistry lab courses:

CHEM F202--Basic Inorganic Chemistry--3 credits

CHEM F212--Chemical Equilibrium and Analysis--4 credits

CHEM F323--Organic Chemistry Lab--3 credits

4. Minimum credits required--24 - 25 credits

D. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

These changes keep essentially the same courses, but just allow more flexibility for students with the intended outcome of helping Chemistry major students to achieve their degree in a timely manner, and possibly encourage others to major in Chemistry. This change might add to student enrollment in upper-division chemistry and biology (for the Biochemistry concentration) courses. However, there is capacity available in upper division courses, so this change probably will not require new sections to be offered.

E. IMPACTS ON PROGRAMS/DEPTS:

What programs/departments will be affected by this proposed action?

Include information on the Programs/Departments contacted (e.g., email, memo)

The B.S. Chemistry degree, Biochemistry concentration lists a series of biology courses as electives. Our current Biochemistry students already are taking these courses, so there is little effect of that change. However, we have sent our revised description of the degree to the Biology Department for their information.

F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:

Description of the student learning outcomes assessment process.)

The Department of Chemistry and Biochemistry has a well developed SLOA process, with documentation on the Provost's website. The B.S. SLOA plan is effectively unaltered by these changes, as they are mostly reorganization and clarification of the main degrees we grant (B.S. Chemistry, with possible concentrations in Biochemistry or Environmental Chemistry).

The Department's B.A. SLOA summary from last year noted the lack of B.A. graduates. In fact, we have had very few B.A. graduates in recent memory, so our SLOA summary (2010-11) indicated that we would either restructure or eliminate the B.A. degree. We are choosing to try to restructure the B.A. with a different mission. The new mission is essentially that the B.A. should be used by students not continuing in Chemistry or Biochemistry, instead for students seeking Chemistry-related careers (e.g. environmental law, forensic science, science education, anthropology, etc). A new B.A. SLOA plan reflecting these changes will be used

for next academic year. The University-wide program review process also identified the B.A. degree, with the statement: "The department should further investigate the utility of the BA program." Therefore, we are responding to the program review and our department's SLOA process.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize program/degree change applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you drop a course, is it because the material is covered elsewhere? Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the program is not compromised as a result.

These curricular changes were discussed in the Spring 2011 department retreat (24 May 2011) and subsequently in Department meetings during Fall 2011. The changes were voted upon and the revised curriculum was selected by the majority of voting (six of eight) faculty members.

These changes are primarily a reorganization of the requirements, and the B.S. Chemistry degree is nearly unaltered so as to maintain American Chemical Society (ACS) accreditation. The B.S. Chemistry: concentration Environmental Chemistry generally maintains the prior requirements, but allows more flexibility in course offerings. The B.S. Chemistry: concentration Biochemistry has been revised based upon considerations of the faculty who identify with the Biochemistry area and is significantly improved by specifying a list of acceptable elective courses plus allowing flexibility in selection of these options. The B.A. degree was previously very close to the B.S. degree in Chemistry course requirements; however, the University's requirements for the B.A. add significant numbers of humanities courses plus requirement for a minor. Thus, the B.A. required more courses overall and was very difficult to obtain. The outcome of that choice was that we have had very few B.A. graduates in recent history. To address that problem, we have defined a new goal for the B.A. program, which is defined in the introductory remarks of the new catalog program description: "The B.A. degree provides for 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." To that end, we have greatly reduced the B.A. Chemistry requirements, while maintaining a distribution across the ACS-recognized sub-disciplines of Chemistry. The Forensics concentration was moved from the B.S. to the B.A. for the reason that students could use this option better with an "arts" type degree than with a B.S. degree. However, we realize that students intending to work in an active forensics laboratory situation need more extensive experience in Analytical chemistry and methods studied in Physical chemistry, so we added two more chemistry courses plus the courses required by Justice.

APPROVALS:

See attached signatures.

	Date	
Signature, Chair, Program/Department of: <u>Chemistry and Biochemistry</u>		
	Date	
Signature, Chair, College/School Curriculum Council for: <u>CNSM</u>		
	Date	
Signature, Dean, College/School of: <u>CNSM</u>		

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		

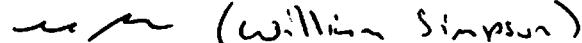
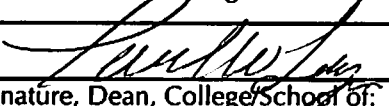
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APPROVALS:

	Date	28 Sep 2011
Signature, Chair, Program/Department of: <u>Chemistry and Biochemistry</u>		
	Date	10/5/2011
Signature, Chair, College/School Curriculum Council for: <u>CNSM</u>		
	Date	Oct 6, 2011
Signature, Dean, College/School of: <u>CNSM</u>		

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		