FINAL REVISION: 3/2/2012.

B.A., B.S., and Minor(s) FORMAT 5

Submit originals and one copy and electronic copy to Governance/Faculty Senate Office (email electronic copy to fysenat@uaf.edu)

PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR/MINOR)

SUBMITTED BY:

Department	**Chemistry and Biochemistry**	College/School	**CNSM**
Prepared by	**William Simpson**	Phone	**474-7235**
Email Contact	**wrsimpson@alaska.edu**	Faculty Contact	**William Simpson**

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

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
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

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

~~requirements, complete: MATH F200X; PHYS F103X and PHYS F104X, or PHYS F211X and PHYS F212X.)~~

~~7. Complete the~~

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

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

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--Chemistry Capstone Laboratory --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.

Optional 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

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

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

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:

CHEM F323--Organic Chemistry Lab--3 credits

4. Minimum credits required--24 - 25 credits

D. ESTIMATED IMPACT

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:

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curriculum for study of a minor subject and requires more humanities courses. The B.A. best prepares students for

SEE ATTACHED SIGNATURES.

JUSTIFICATION FOR ACTION REQUESTED