

UNIVERSITY OF ALASKA FAIRBANKS  
**Student Learning Outcomes Assessment Plan**  
**Chemistry & Biochemistry B.S Program**  
 College of Natural Sciences and Mathematics  
 May 2018

**MISSION STATEMENT:**

The Department of Chemistry and Biochemistry seeks to educate all levels of students in chemical principles, practice, and safety and to attract students to further study in Chemistry and Biochemistry. We educate majors broadly through study of Organic, Inorganic, Physical, Analytical, and Biochemistry in accordance with the guidelines of the American Chemical Society Committee on Professional Training and provide concentrations in Biochemistry and Molecular Biology, Environmental Chemistry, and Forensic Chemistry.

**GOAL STATEMENT:**

To prepare undergraduate students for careers in Chemistry, Biochemistry, or Chemistry-related occupations or for further study in graduate or professional schools.

Intended Objectives/Outcomes	Assessment Criteria and Procedures	Implementation (what, when, who)
1. Introductory courses provide fundamental chemical knowledge consistent with national standards for chemistry competency.	<p>Instrument: American Chemical Society Standardized Exams in General Chemistry and Organic Chemistry.</p> <p>Instrument: Nationally-recognized curriculum resources, both written and online, will be utilized and consistently used across the General Chemistry curriculum.</p>	<p>Instructors will assess chemical knowledge of students in General Chemistry and Organic Chemistry courses by administering the ACS Exams. Student performance will be assessed by instructors and department chair annually with respect to subject knowledge. Results will be shared with Faculty and plans will be developed to address deficiencies.</p> <p>General Chemistry faculty will meet annually to discuss textbooks, online resources and effectiveness.</p>
2. BS Graduates attain baccalaureate level chemistry knowledge in accordance with American Chemical Society Guidelines.	Instrument: American Chemical Society Diagnostic of Undergraduate Chemical Knowledge (DUCK), a senior level exam.	Instructor of Capstone Chemistry Course (Chem F434) will assess chemical knowledge of graduating seniors by administering the ACS DUCK Exam. Student performance will be assessed by instructor and annually with respect to subject knowledge. Results will be shared with Faculty and plans will be developed to address deficiencies.

<p>3a. Graduates will have problem solving, laboratory, and safety skills.</p> <p>3b. Graduates will have hands-on experience with modern chemical instrumentation.</p>	<p>3a. Instrument: All laboratories throughout the curriculum will convey modern safety protocols to the students at the start of each semester.</p> <p>Instrument: Undergraduates research students in Chem F488 will meet with the Safety Officer in the department.</p> <p>Instrument: Undergraduate research students are required to take at 3-6 credit hours of undergraduate research Chem F488 as part of the BS Chemistry major.</p> <p>3b. Instrument: All laboratory courses will incorporate hands-on use of modern instrumentation, including Chem F314 Instrumental Analysis, Chem F321,325 Organic Chemistry, Chem F331,332, Physical Chemistry, and Chem F434, Capstone Chemistry.</p>	<p>All teaching assistants will be provided safety training by faculty and/or staff prior to teaching the laboratory.</p> <p>Research students will write standard operating procedures (SOPs) for research and discuss with the Safety Officer. The Safety Officer and faculty will provide additional safety training when required.</p> <p>Faculty will review research posters and reports annually to assess quality. Posters and reports are archived for use in American Chemical Society accreditation (five-year cycle).</p> <p>The ACS Duck exam tests student knowledge in instrumental techniques, including all commonly employed spectroscopic and chromatographic techniques. Results will be evaluated annually.</p>
<p>4. Communication skills.</p> <p>4a. Oral: Student effectively communicate their work through oral/audiovisual presentations.</p> <p>4b. Written: Student writing skills are consistent with professional standards.</p>	<p>4a. Oral Instrument: Oral presentation of posters is required for all Chem F488 research students.</p> <p>Oral Instrument: All undergraduate chemistry majors are required to take 3 credit hours of Seminar Chem F481 and F482.</p> <p>4b. Writing Instrument: Written reports in journal format are required for all Chem F488 research students.</p> <p>Writing Instrument: Senior Capstone students (Chem F434) are required to write reports in either journal format or as a technical report.</p>	<p>Faculty will review oral presentations of posters at end-of-semester event. Copies of oral posters will be archived.</p> <p>Students presentations of seminars will be formally peer- and faculty-reviewed using a standard evaluation form. Students will be required to review external seminars by professional chemists and biochemists.</p> <p>Written Chem F488 reports will be evaluated by assigned faculty mentors. Reports will be archived for future accreditation.</p>

4. Communications Skills (cont'd)	Writing Instrument: Students are encouraged to write research proposals with guidance of their mentor.	Students are encouraged to submit written internal proposals to URSA, BLaST and INBRE. Overall funding rates will be used to assess overall writing competitiveness.
5. Graduates are employed or continue education following graduation.	Graduates will be surveyed upon graduation using anonymous online forms.	Surveys will be evaluated with respect to acceptances into professional schools and employment. Students will provide answers to online questions about overall preparedness for further study or employment.