Assessment report for the 2013/2014 academic year

Department of Chemistry and Biochemistry

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During the 2013/2014 academic year, the assessment that was performed in the Department of Chemistry and Biochemistry was focused on learning outcomes 1, 2, 3, 5, 6, 7, and 8. For learning outcomes 1, 2, and 6, the students’ proficiencies were evaluated during their CHMY 494 and BCH 494 capstone seminar courses. They were also evaluated during the department’s annual undergraduate research poster symposium. For learning outcomes 3, 5, and 7, the American Chemical Society (ACS) standardized subject exams in organic, inorganic, analytical, and physical chemistry were administered. Learning outcome 4 and part of learning outcome 3 were not assessed during the 2013/2014 academic year; these learning outcomes will be assessed by administering the biochemistry and physical chemistry ACS subject exams during the 2014/2015 academic year. Learning outcome 8 was assessed using the endorsement data for high school teacher certifications.

**Overall Summary**

All of the learning objectives are being met programmatically, indicating that this is a strong and successfully program for chemistry and biochemistry majors when compared to other programs in the United States.

**(1) Learning Outcome 1**

Professional, biochemistry, and teaching options: Students will be able to clearly communicate research findings in an oral presentation and poster session format.

Assessment for Learning Outcome 1

Twenty-five senior undergraduate students were evaluated for clarity and depth of oral presentation during a 25 minute PowerPoint presentation to their peers in CHMY 494 and BCH 494 senior capstone seminar during the spring semester of 2014. These students also presented posters (which were evaluated) at the Undergraduate Research Poster Symposium that is held annually by the Department of Chemistry and Biochemistry in April. All of the students successfully communicated their research findings in both formats.

**(2) Learning Outcome 2**

Professional, biochemistry, and teaching options: Students will be able to solve problems related to chemistry and biochemistry.

Assessment for Learning Outcome 2

The ability of twenty-five senior undergraduate students to comprehensively solve problems related to chemistry and biochemistry were evaluated during their 25 minute oral PowerPoint presentations to their peers in CHMY 494 and BCH 494 senior capstone seminar during the spring semester of 2014. These students also presented posters (which were evaluated) at the Undergraduate Research Poster Symposium that is held annually by the Department of Chemistry and Biochemistry in April. All students mastered the problem solving learning objective as demonstrated by their presentation of the progress that they were able to make and then describe for their research projects.

**(3 and 7) Learning Outcomes 3 and 7**

Professional and teaching options:

Students will have a broad knowledge required in organic, inorganic, physicaland analytical chemistryas well as in biochemistry.

Assessment for Learning Outcomes 3 and 7

Organic, Inorganic, and Analytical areas were assessed for all majors. Physical chemistry was assessed for the teaching major.

Twenty (15 biochemistry, 4 professional, 1 teaching option) majors in CHMY 323 took the ACS organic subject exam (2012) as the final exam for their course. The average score for this cohort placed them at the 67th percentile nationally, with a median score at the 63rd/66th percentile. Thus, this learning objective was achieved for the organic subject area.

Sixteen majors (eight biochemistry, seven professional, one teaching option) in CHMY 401 took the ACS inorganic chemistry subject exam (2009) as the final exam for their course. The average score for this cohort placed them at the 59th percentile nationally, with a median score at the 54th percentile. Thus, the learning objective was achieved for the inorganic subject area.

Twenty-seven majors (17 biochemistry and 10 professional) in CHMY 311 took the ACS analytical chemistry subject exam (2013) as the final exam for their course. Because this is a newer exam, less percentiled data is available now from ACS. The average score that ACS can currently report is 26/50 questions, and the currently reported median score is 25/50. The average for our cohort was 28.3, which places them well above the current national average. The median score for our cohort was 28, again well above the national average.

The physical chemistry component of this learning outcome was not assessed during the 2013/2014 academic year for the professional option. The biochemistry component was not assessed during the 2013/2014 academic year for the teaching option.

**(4) Learning Outcome 4**

Biochemistry option:

Students will have a solid foundation in all aspects of biochemistry.

Assessment for Learning Outcome 4

This Learning Outcome was not assessed during the 2013/2014 academic year.

**(5) Learning Outcome 5**

Biochemistry option:

Students will be able to apply mathematical tools and computational methods to biochemical problems.

Assessment for Learning Outcome 5

Sixteen majors with the biochemistry option took the ACS physical chemistry comprehensive subject exam (1995) during CHMY 361. The average score for this cohort placed them at the 32nd percentile nationally, with a median score at the 26th percentile. Since this exam is meant for professional option students who have had two courses in physical chemistry (CHMY 371 and CHMY 373), these scores indicate that this learning objective is being met very well by our curriculum.

**(6) Learning Outcome 6**

Biochemistry option:

Students will understand the problems in another biological science (e.g., microbiology, cell biology, neuroscience, plant or animal science) that biochemical techniques help solve.

Assessment for Learning Outcome 6

Twenty-five senior undergraduate students were evaluated for clarity and depth of oral presentation during a 25 minute PowerPoint presentation to their peers in CHMY 494 and BCH 494 senior capstone seminar during the spring semester of 2014. All of the students demonstrated extremely high mastery of this learning option.

**(8) Learning Outcome 8**

Teaching option:

Students will develop instructional and pedagological competence such that they meet state certification standards.

Assessment for Learning Outcome 8

According to the Field Placement Office's data on endorsements between Sept 1, 2012 and August 31, 2013, as provided by Bill Freese (iedbf@montana.edu), three people were endorsed for Montana high school teaching in chemistry. One of those was a spring 2013 chemistry teaching graduate, one was a Northern Plains Transition to Teaching participant, and one was a fall 2009 chemistry teaching graduate who took her time about getting endorsed.

None of the graduates from the Department of Chemistry and Biochemistry were endorsed between Sept. 1, 2013 and August 31, 2014, but there were eight people endorsed in chemistry, one for Colorado, five for Montana and two for Wyoming. The Colorado endorsement went to a person who already had Montana and Washington endorsements in chemistry, math and physics from 2005. The other seven were all Northern Plains Transition to Teaching students. One of those was last enrolled in spring 2011, one in fall 2013, and the rest in the past year.

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