Assessment report for the 2015/2016 academic year

Department of Chemistry and Biochemistry

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During the 2015/2016 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. For learning outcomes 3, 5, and 7, the American Chemical Society (ACS) standardized subject exams in organic, analytical, and physical chemistry were administered. Learning outcome 4 and part of learning outcome 3 were not assessed during the 2015/2016 academic year; these learning outcomes will be assessed by administering the biochemistry and physical chemistry ACS subject exams during the 2015/2016 academic year. Assessment for learning outcome 8 will be assessed using the endorsement data for high school teacher certifications. This data is pending because of a computer problem in the Field Placement Office.

**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-nine senior-level 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 2016. 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 fourteen senior-level 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 2016. 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 and Analytical areas were assessed for all majors.

Twenty majors (17 biochemistry, 3 professional option) 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 between the 51st and 54th percentile nationally. Eight of the majors completed the honors organic chemistry sequence, which is not scheduled to be assessed until spring of 2016. After assessment of both CHMY 323 and CHMY 333 during the spring semester of 2016, we will determine whether any changes need to be made so that this learning objective can be met more strongly in future years.

Twenty-eight majors in CHMY 311 took the 2013 ACS analytical chemistry subject exam as the final exam for their course. The average score that ACS reports for the 2013 exam is 26/50 questions, and the average score for the six MSU students who took this exam was 32. This average is at the 78th percentile nationally. Only three students out of the 28 scored below that national 50th percentile mark. For analytical chemistry, our students are well above the national average overall. This course was taught in the TEAL classroom.

The inorganic chemistry, physical chemistry, and biochemistry component of this learning outcome was not assessed during the 2015/2016 academic year for the professional 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 2015/2016 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

Ten majors with the biochemistry option took the ACS physical chemistry comprehensive subject exam during CHMY 361. However, they were given 50 minutes rather than 110, so the national norms are not particularly helpful. The average score for this cohort placed them at the 23rd percentile nationally, with a median score at the 20th percentile. Since this exam is meant for professional option students who have had two courses in physical chemistry (CHMY 371 and CHMY 373), and is meant to be given during 110 minutes rather than 50 minutes, these scores indicate that this learning objective is being met very well by our curriculum. The point for our majors was to assess the ability to apply mathematical tools and computational methods to biochemical problems, and this was accomplished well.

**(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 2016. All of the students demonstrated extremely high mastery of this learning option.

**(8) Learning Outcome 8**

Teaching option:

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

Assessment for Learning Outcome 8

Data was collected from the Field Placement Office. Data on endorsements was provided by Bill Freese (iedbf@montana.edu) for students who graduated between September 1, 2015 and August 31, 2016 and is shown below.

During the 2015-16 academic year (9/1/2015 to 8/31/2016) the Office of Field Placement and Licensure at Montana State University-Bozeman recommended six individuals for licensure in chemistry teaching. None of these six were Chemistry majors, teaching option. (This is a small program that doesn’t have graduates every year.) One person was a 2015-16 graduate of the MSU undergraduate Teacher Education Program (TEP) recommended for licensure in Montana. Two of them were 2015-16 graduates of the Northern Plains Transition to Teaching (NPTT) graduate program, both recommended for licensure in Montana, with one also recommended for licensure in Wyoming. One was a 2014-15 TEP graduate recommended for licensure in Iowa. One was a 2014-15 NPTT graduate recommended for licensure in Minnesota, and one was a 2011-12 NPTT graduate recommended for licensure in Colorado.

**Overall Summary**

All of the learning objectives that were tested during the 2015/2016 academic year were 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.