Assessment report for the 2016/2017 academic year

Department of Chemistry and Biochemistry

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During the 2016/2017 academic year, the assessment that was performed in the Department of Chemistry and Biochemistry was focused on learning outcomes 1, 2, 3, 5, 6, and 7. 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 will be assessed by administering the biochemistry and physical chemistry ACS subject exams during the 2017/2018 academic year. Assessment for learning outcome 8 was assessed using the endorsement data for high school teacher certifications in all previous years and will be assessed again during the 2017/18 academic year.

**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-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 2017. 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-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 2017. 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-five majors in CHMY 323 and CHMY 333 took the ACS organic subject exam (2012) as the final exam for their course. The average score for this cohort placed them at the 60th percentile nationally (39.3/70), with a median score at the 58th percentile (38/70). Thus, this component of the learning objectives was well met.

Forty-one students in CHMY 311 took the 2013 ACS analytical chemistry subject exam as the final exam for their course. The national average on that 50-question exam is 26/50 (this is 50th percentile). Our class average was 33/50, which puts the MSU students in the 81st percentile nationally. 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 2016/2017 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 2016/2017 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

Fifteen 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 (23.1/60) placed them at the 20th percentile nationally, with a median score (24/60) that placed them at the 23rd 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 2017. 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

This Learning Outcome was not assessed during the 2016/2017 academic year.

**Overall Summary**

All of the learning objectives that were tested during the 2016/2017 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.