

## Biology PLO Assessment Report

### PLO Assessed:

Apply the fundamental knowledge, principles, processes and systems in the natural sciences to solve biological problems.

### Assessment Plan

All Biology students take the full General Chemistry series as part of their degree progression. Our choice to assess student performance on a Chemistry exam was two-fold: an understanding of chemistry is fundamental to understanding biology and, in this series of courses; students are introduced to the critical thinking necessary to solve biological problems. A standardized examination is given at the end of this sequence of courses. This exam, published by the American Chemical Society, covers content spanning such topics as atomic structure, molecular structure, stoichiometry, energetics, dynamics, equilibrium, and electrochemistry. This content *typically* matches the material delivered in the CHEM2050 series at HPU and, we feel, is a good representation of a student's fundamental knowledge as well as their critical thinking skills. In addition, this standardized exam allows us to compare our composite scores against the national average.

### Assessment Findings

Scores on the final ACS exam administered in CHEM 2052 were requested from the Instructors of the course in the 2016 and 2017 spring semesters. Because the vast majority of the students taking this course series are either Biology or Marine Biology majors, the aggregate scores for all students were analyzed as a proxy for Biology student performance

#### During the 2015-2016 AY:

- 57 students took the ACS exam
- The mean score was  $54\% \pm 19$  (mean  $\pm$  SD). The median score was 51%.
- 10 out of 57 students, 18%, scored >70%.
- 7 out of 57 students, 12%, scored >80%.

#### During the 2016-2017 AY:

- 93 students took the ACS exam
- The mean score was  $53\% \pm 16$  (mean  $\pm$  SD). The median score was 52%
- 12 out of 93 students, 13%, scored >70%.
- 8 out of 93 students, 9%, scored >80%.

Clearly, we were far from meeting either the ideal, 80%, or even the acceptable, 70%, goal defined in our assessment plan. However, after further discussion with Chemistry faculty, scores of 70% on the ACS exam represent approximately the 90<sup>th</sup> percentile in the nation. Clearly, our assessment goals were rather overestimated.

An average national score on the ACS exam is ~50% and HPU scores certainly fall in that range. One aspect of this to consider is that the ACS exam topics may not match perfectly those which are covered in the individual courses across the nation, including the CHEM2050 series at HPU. Thus students may not have even covered all the material on which they are being

tested, which helps to explain why a score of 50% would represent the national average score. HPU students scored slightly above 50% on the ACS exam in both years covered by this assessment plan. Thus matching the national average.

Without prior knowledge of the national averages at the time that these goals were developed, 70% was considered to be an average score on an exam. Given this knowledge, it has been determined that HPU Biology students are performing at the “acceptable” level, the national average, in this early stage of developing their critical thinking skills towards solving biological problems.