Annual Academic Assessment Report Cover Sheet

Assessment reports are due the 1st Wednesday after the Fall Term

Email to: assessment@unlv.edu

Program Information:

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<th>Program Assessed</th>
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<td>Department</td>
<td>School of Life Sciences</td>
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<td>College</td>
<td>Sciences</td>
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<td>Department Chair</td>
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<td>Date Submitted</td>
<td>9 December 2016</td>
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Contact Person for This Report

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Please attach a narrative (not to exceed 4 pages, excluding appendices) addressing the following:

- What are the student learning outcomes? Please provide a numbered list.
- Which learning outcomes were assessed?
- How were they assessed? (Programs must use at least one direct assessment of student learning.)
- Undergraduate programs should assess at least one University Undergraduate Learning Outcome (UULO) each year, which may or may not overlap with a program learning outcome.
- Graduate programs should assess at least one outcome related to one of the following graduate level requirements each year:
  - student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.
  - activities requiring originality, critical analysis and expertise.
  - the development of extensive knowledge in the field under study.
- What was learned from the assessment results?
- How did the program respond to what was learned?

Please limit the narrative portion of your report to no more than four pages. You may attach appendices with data, tables, charts, or other materials as needed. Please explain the relevant conclusions from any appendices in your narrative. Please contact the Office of Academic Assessment if you have questions or need assistance.
School of Life Sciences BS Annual Academic Assessment Report
December 2016

This report covers the Fall 2015 and Spring 2016 semesters and includes reports on the School’s efforts in several undergraduate courses (Principles of Modern Biology I: Biol. 196, and II: Biol. 197; Human Anatomy and Physiology I: Biol. 223, and II: Biol. 224; Molecular Genetics: Biol. 304; General Microbiology: Biol 351; and Evolution: Biol. 415).

A. Principles of Modern Biology I (Biol. 196)

As reported last year, on the final exam there are 20 standard questions formulated to address the general concepts covered in Biol. 196 (Table 1). Matching the time spent on these topics during the semester, six questions map to Program Learning Objective (LO) #1 [Understand cell structures and function], four map to LO #5 [Understand the metabolic complexity of cells and organisms], and ten map to LO #3 [Understand the physical nature of genetic information]. The content involved in LO#3 and #5 is historically the most challenging for introductory biology students. Reflecting this challenge, students met our target 70% correct benchmark in 6 of 6 questions mapping to LO#1, 1 of 4 questions mapping to LO#5, and 2 of 10 questions mapping to LO#3. From Year 2014/15 to Year 2015/16, student performance improved in 5/6 LO#1 questions and in 5/10 LO#3 questions. Performance stayed the same or improved in 3/4 LO#5 questions. While the success benchmark for two LOs was not met, these data do show improved student learning during the last academic year. The Biol. 196 teaching team is currently re-evaluating the 20 conceptual questions to improve mapping to Program LOs and student mastery of concepts. Specifically, we will evaluate improper phrasing and clarity of both question statements and answer choices.

Other data obtained in the student writing assignments (Program LO#7) support the need for rephrasing these 20 standard multiple choice questions (Table 2). In Year 2015/16, Writing Assignments on Cellular Respiration and Photosynthesis (LO#5 content) and on Meiosis and Genetics (LO#3 content) showed 82.8% and 92.3%, respectively, of students answering correctly. These data suggest that student mastery and ability to explain core concepts may not be adequately represented by a multiple choice assessment tool. Our 196 instructors are researching best practices in generating better multiple choice question types that better assess student learning.

B. Principles of Modern Biology II (Biol. 197)

In Biol. 197, for each of the 3 content essays per semester, we exceeded our benchmark of 70% of the students receiving a passing score. The number of students that turned in a satisfactory essay surpassed 90% in all but one instance (Fall 2015 essay, which had nearly 89% pass) (Table 3).

We have made progress on establishing a core set of questions that would be implemented on all 197 finals. Twelve questions have been identified and agreed upon by several 197 instructors (Table 4). Upon review of the questions by the committee, the consensus was that the questions represent an excellent set to begin with but will need to be edited for clarity and content, and then aligned to the objectives of the course. The goal here would be to ensure the data being collected are appropriate for assessment.
purposes and to re-word the questions more generally so that they would be applicable to any instructor that teaches the course.

C. Human Anatomy and Physiology I and II (Biol 223, 224)

Although our planned assessment activities focus on the core courses taken by all biology majors, meaningful assessment activities are also taking place in some of our non-majors courses as well. For example, within the Human Anatomy & Physiology series (Biol. 223 & 224) a nationally standardized exam has been incorporated. The exam is developed and administered by the Human Anatomy and Physiology Society (HAPS). The exam is designed to be given at the end of a two-semester undergraduate series. After the exam is completed, the instructor is provided with a category report indicating the overall performance of students on question sets (e.g., the cardiovascular or the respiratory system). The instructor is also provided with cumulative information for all students, including students from other institutions, who took the exam the same semester. The HAPS exam was first administered to 100 Biol. 224 students at the end of the Spring 2016 semester. The average score for our students was 61.2% (median: 62.0%) (Fig. 1); the national average for 4-year colleges was 51.8% (median: 50.0%) (Fig. 2). The category report for BIOL 224 students and the category report for all students who took the exam in Spring 2016 are included below. The UNLV team of Human Anatomy and Physiology instructors are utilizing this information to inform the development of both lecture and laboratory components of the course.

D. Molecular Genetics (Biol. 304)

Over the last few years, a priority for the SoLS Assessment Committee has been developing assessment instruments for the introductory courses (BIOL 196 & 197). Although assessment within the introductory course series is still maturing, we are now beginning to focus more attention on developing activities within the upper division core genetics and evolution courses.

Most biology majors take BIOL 304, Molecular Genetics. Each of the instructors in Biol. 304 includes 10 comprehensive questions as a component of the final exam. The comprehensive questions are open questions on fundamental topics emphasized throughout the course and are answered in short response format (typically 1 to 2 paragraphs). Each instructor selects 10 questions from a list of about 40 to 50 questions; this list is distributed to students in advance of the exam. Although the composition of questions on each exam is distinct, because the questions are taken from a common pool of questions, we may be able to track student performance on these questions across multiple semesters. The Assessment Committee will collaborate with the team of BIOL 304 instructors throughout the upcoming spring semester to map the BIOL 304 comprehensive questions to corresponding Undergraduate Learning Outcomes. Many of the questions relate to outcomes 3 and 4, which are focused on the nature of genetic information and the evolution of genetic information. Preliminary evaluation of student achievement on these questions indicates most students are achieving our benchmarks for success. For 69 students who took BIOL 304 during the summer term, the average score for the comprehensive questions was 80%.
E. General Microbiology (Biol. 351)

The data in Table 5 show that more than 80% of students are meeting our goal of 70% score or better for both Fall 2015 and Spring 2016. The numbers increased slightly between Fall 2015 and Spring 2016. We note that we have 80% compliance, surpassing our previous 75% goal. We also note that % completion is up, reaching 100% for Fall 2015 and only falling slightly to 98% for Spring 2016. We will continue to collect this data and discuss with the faculty if and how we should expand these evaluations.

F. Evolution (Biol. 415)

All biology majors take BIOL 415, Evolution towards the end of their degree program. The Assessment Committee will continue conversations with the team of BIOL 415 instructors about the development and implementation of assessment activities within this course. Although the 415 instructors do not think any additional material can be incorporated into their final exams, they are open to administering questions for assessment purposes in other ways, such as through the i>Clicker system. They are also open to the possibility of using questions from concept inventories, standardized and validated sets of questions focused on specific concepts such as natural selection. The incorporation of concept inventories would provide valuable insight into the developing knowledge of our students as well as an external perspective. Oftentimes data from similar institutions is available for comparison.

In summary, throughout the last year the Assessment Committee has initiated discussions within the upper division courses about expanding assessment activities. These discussions are ongoing, and we will continue expanding the implementation of our plan throughout the next academic year. We are pleased with the progress of our undergraduates. We will continue working with undergraduate faculty to further refine assessment practices.