

2016-2017 Annual Program Assessment Report

Please submit report to your department chair or program coordinator, the Associate Dean of your College, and to james.solomon@csun.edu, Director of the Office of Academic Assessment and Program Review, by September 30, 2017. You may, but are not required to, submit a separate report for each program, including graduate degree programs, which conducted assessment activities, or you may combine programs in a single report. Please identify your department/program in the file name for your report.

College: Science and Mathematics

Department: Biology

Program: Biology B.A., B.S., and M.S.

Assessment liaison: Cheryl Hogue

1. Please check off whichever is applicable:

- A. **Measured student work within program major/options.**
- B. **Analyzed results of measurement within program major/options.**
- C. **Applied results of analysis to program review/curriculum/review/revision major/options.**
- D. **Focused exclusively on the direct assessment measurement of General Education Basic Skills outcomes**

2. Overview of Annual Assessment Project(s). On a separate sheet, provide a brief overview of this year's assessment activities, including:

- an explanation for why your department chose the assessment activities (measurement, analysis, application, or GE assessment) that it enacted
- if your department implemented assessment **option A**, identify which program SLOs were assessed (please identify the SLOs in full), in which classes and/or contexts, what assessment instruments were used and the methodology employed, the resulting scores, and the relation between this year's measure of student work and that of past years: (include as an appendix any and all relevant materials that you wish to include)
- if your department implemented assessment **option B**, identify what conclusions were drawn from the analysis of measured results, what changes to the program were planned in response, and the relation between this year's analyses and past and future assessment activities
- if your department implemented **option C**, identify the program modifications that were adopted, and the relation between program modifications and past and future assessment activities
- if your program implemented **option D**, exclusively or simultaneously with **options A, B, and/or C**, identify the basic skill(s) assessed and the precise learning outcomes assessed, the assessment instruments and methodology employed, and the resulting scores
- in what way(s) your assessment activities may reflect the university's commitment to diversity in all its dimensions but especially with respect to underrepresented groups
- any other assessment-related information you wish to include, including SLO revision (especially to ensure continuing alignment between program course offerings and both program and university student learning outcomes), and/or the creation and modification of new assessment instruments

3. Preview of planned assessment activities for 2017-18. Include a brief description as reflective of a continuous program of ongoing assessment.

2. Overview of Annual Assessment Project(s).

Undergraduate Biology Programs

Five Student Learning Outcomes (SLOs) were assessed in our undergraduate B.A. and B.S. programs in Biology:

SLO 1: Students can demonstrate knowledge of: a) the structure and metabolism of cells, b) the transmission and expression of genetic information, and c) the immediate and long-term (evolutionary) consequences of interactions between organisms and their environment.

SLO 2: Students can demonstrate specialized knowledge in one or more disciplines of biology.

SLO 3: Students are aware of and/or capable of using new and existing methods and technologies in these disciplines.

SLO 4: Students must demonstrate critical thinking in applying the methods of scientific inquiry, including observation, hypothesis testing, data collection and analysis.

SLO 5: Students will have the ability to engage the biology literature and to communicate scientific information verbally and in writing.

Assessment of Biology Core Classes

The five core classes assessed were Biology 106 (Biological Principles I), 107 (Biological Principles II), 322 (Evolutionary Biology), 360 (Genetics), and 380 Cell Biology). The specific SLOs assessed in each of these core classes and the mean score on the assessment exams for academic years (AY) 2015-2016 and 2016-2017 are presented in Table 1.

The assessment tool we use for the core classes are multiple choice questions developed by faculty in Core Curriculum Groups (CCG) that were established for each core class. Assessment questions are usually embedded in the final exam for a course, but in some cases the questions were given as a separate exam that could be done on Moodle or Canvas. Our performance goal for students on the assessment questions is to achieve an overall mean score of 60%. This assessment goal was met in all core classes except BIOL 322 (mean score 58% for 2016-17 AY). This is the first time since the 2011-2012 AY that we reached the 60% mean score on assessment questions for BIOL 107.

Table1. Mean number of correct answers (%) on assessment questions for five core classes in the Biology Undergraduate Programs (B.A. and B.S.) for academic years 2015-2016 and 2016-2017.

Course	SLOs Assessed	Mean Number Correct (%) 2015-2016	Mean Number Correct (%) 2016-2017
Biol 106	1	65	61
Biol 107	1	57	60
Biol 322	1, 2	61	58
Biol 360	1, 2, 3	75	64
Biol 380	1, 3, 4	75	75

The Peer Learning Facilitator (PLF) Program has been instrumental in helping to improve student performance on assessment questions along with requiring a “C” or better in the BIOL 106 & 107 prerequisite courses for the upper division core classes (BIOL 322, 360 & 380). Students who participate in PLF sessions can enhance their level of understanding of course material. For example, BIOL 106 students who attend PLF sessions do better overall in the course compared to those that do not participate in these sessions (Figure 1). PLF sessions are available for all of our core classes.

We have also integrated new technologies into our core classes such as tablets that help to keep students actively engaged in course material and to facilitate learning.

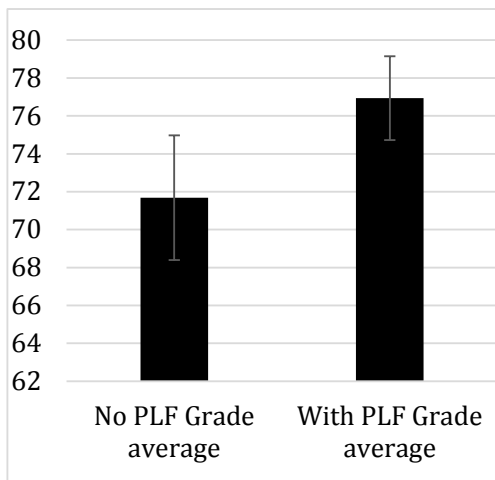


Figure 1. Mean BIOL 106 grades with and without PLF participation from 2014-2016.

What follows is a series of graphs that highlight student performance on specific assessment questions. Academic years 2015-16 and 2016-17 are compared. In several of our core classes, performance on certain questions are much lower than anticipated and topics covered by these questions warrant more coverage in PLF sessions. CCG will need to revisit material covered by these questions and decide if more revision of assessment questions is needed.

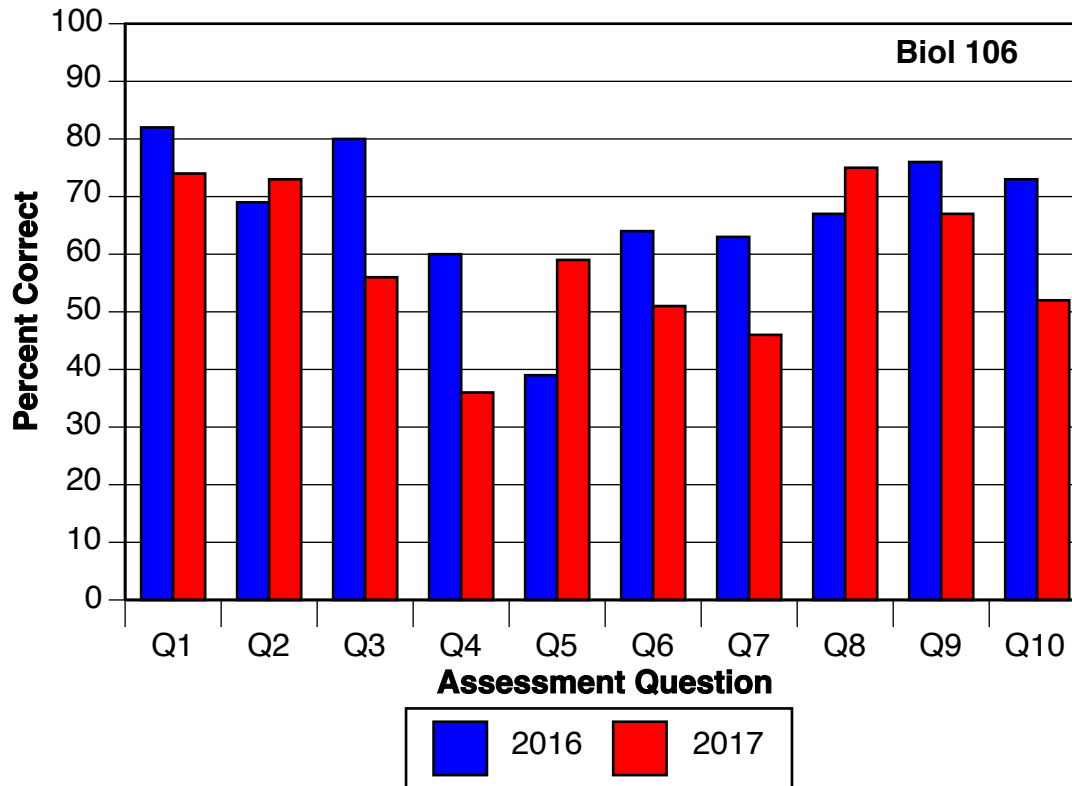


Figure 2. Comparison of SLO 1 in BIOL 106 for two academic years (AY): 2015-2016 (n=446) and 2016-2017 (n=487). The percentage of students that answered each assessment question correctly is shown. Student performance on over half of the assessment questions fell below 60% (i.e., questions 3, 4, 5, 6, 7, & 10) in 2016-17. Previously, question 5 had the lowest number of students choosing the correct answer. Response on this question improved in 2016-17 but Question number 4 had the lowest number of students choosing the correct answer.

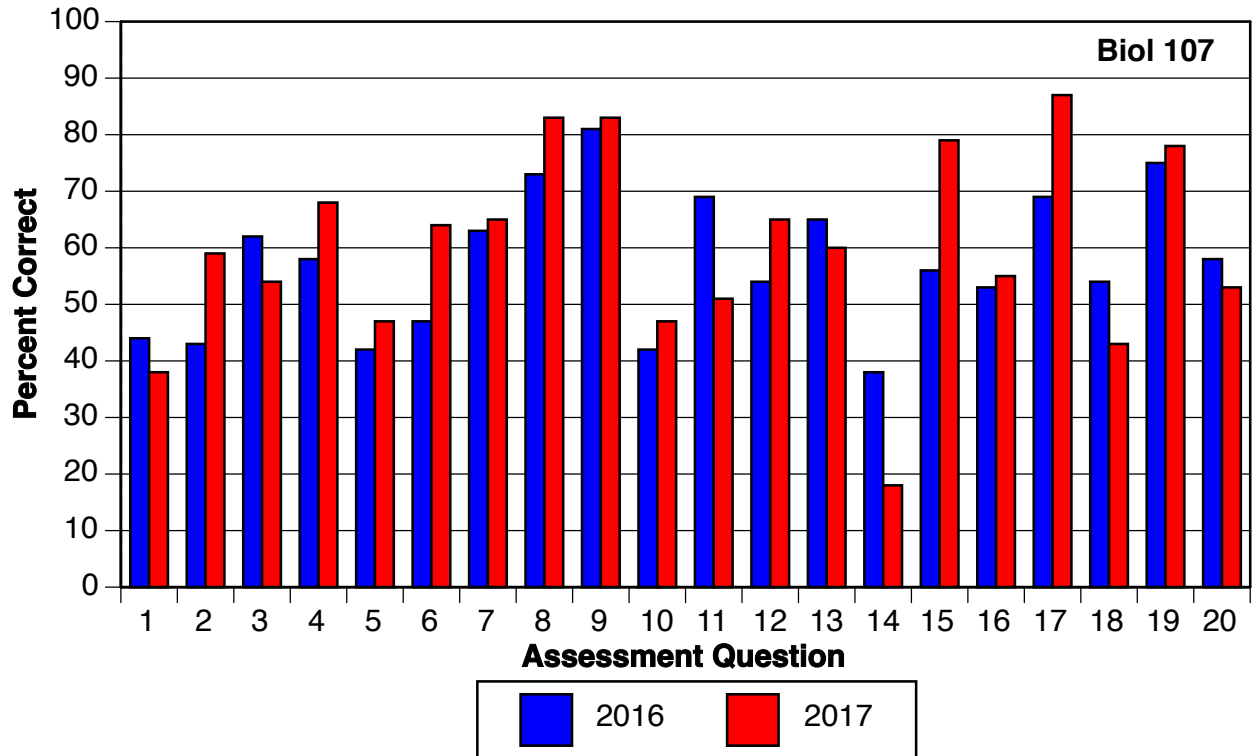


Figure 3. Assessment of SLO 1 in BIOL 107 for two academic years (AY): 2015-2016 (n= 410) and 2016-2017 (n= 386). The percentage of students that answered each question correctly is shown. Overall, student performance on assessment questions improved in 2016-2017. Question 14 is of high concern in that only 18% of the students assessed chose the correct answer.

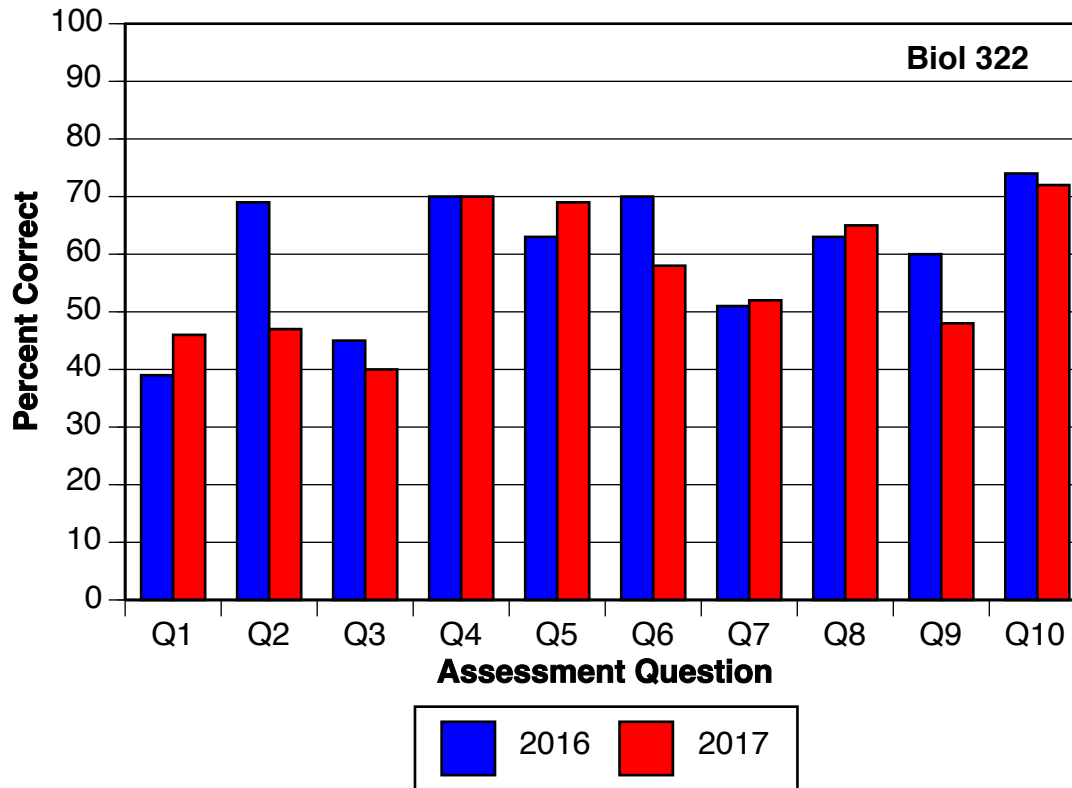


Figure 4. Assessment of SLOs 1 and 2 in BIOL 322 for two academic years (AY): 2015-2016 (n=322) and 2016-2017 (n=315). The percentage of students that answered each question correctly is shown. Assessment questions 1, 3, & 7 have been below the 60% level for the last two academic years.

As students transitioned from lower division courses, BIOL 106 & 107 to upper division courses, BIOL 360 & 380, their performance on assessment questions increased. Overall, performance on the BIOL 360 and 380 assessment questions has typically been over 70% for several years now. This past academic year overall mean performance was 64% for BIOL 360 and 75% for BIOL 380.

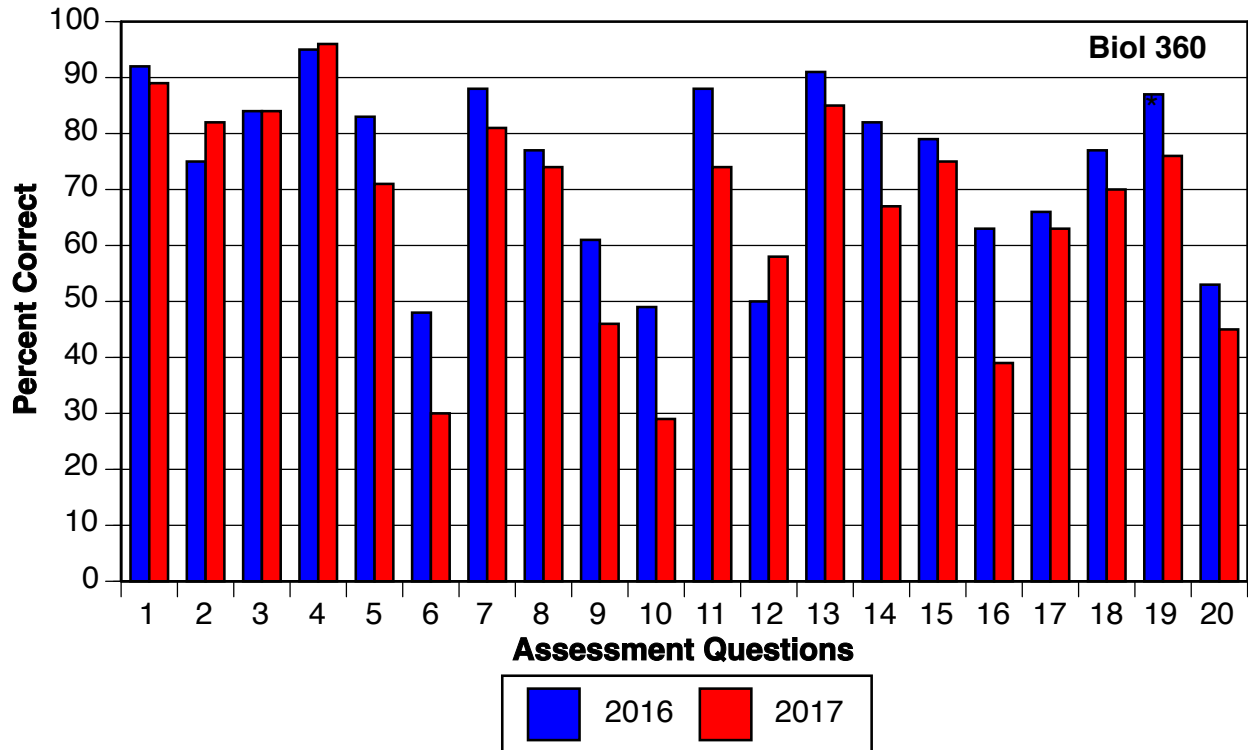


Figure 5. Assessment of SLOs 1, 2, and 3 in BIOL 360 for two academic years (AY): 2015-2016 (n=391) and 2016-2017 (n=403). The percentage of students that answered each question correctly is shown. Questions 6, 10, 12, & 20 have been below the 60% level for the past two academic years. The most current assessment of this course revealed low scores for assessment questions 9 & 16.

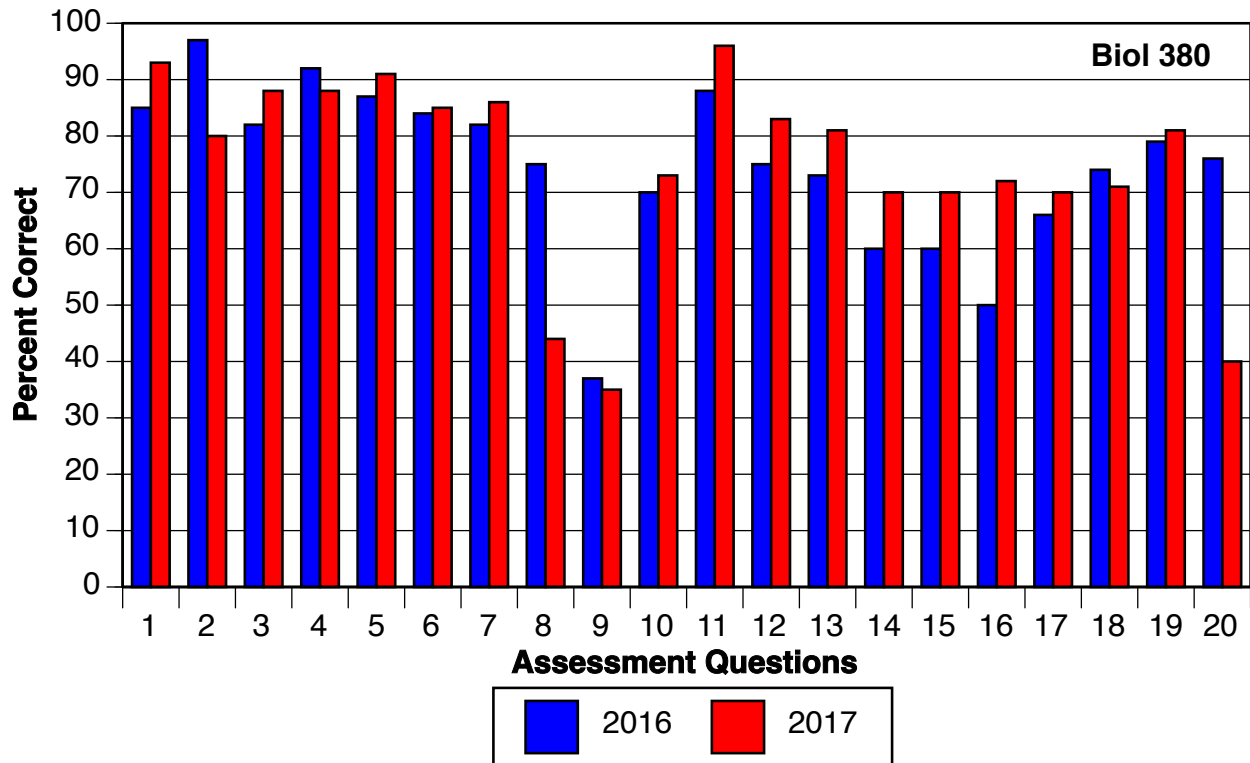


Figure 6. Assessment of SLOs 1, 3, and 4 in BIOL 380 for two academic years (AY): 2015-2016 (n=252) and 2016-2017 (n=266). The percentage of students that answered each question correctly is shown. Only assessment question 9 has been consistently below the 60% level for the last two academic years. Questions 8 and 20 in 2016-17 are also well below our target performance level.

Assessment of other Biology Courses

This year we assessed student performance in BIOL 315 (Principles of Microbiology) using Pre-test and Post-test scores on 11 assessment questions (Figure 7). The mean percent correct answers for the Pre-test was 38.4% compared to 63.4% for the Post-test. The use of pre- and post-tests is an excellent way of gauging learning in a course and informs the instructor as to which topics need greater coverage. Pre- and Post-testing was also done in one section of BIOL 107 with similar results. SLO 2 was assessed in BIOL 421 (Marine Biology) where average performance on assessment questions administered was 79% (n=22). SLO 4 was measured in BIOL 415 (Mammalogy) with a mean score on the assessment question of 71% (n=19). SLO 5 was assessed in BIOL 442 (Developmental Biology) with a mean score on the rubric used to evaluate reading comprehension of scientific literature and presentation of a journal article of 81% (n=18).

SLO5 assessment is improving. Table 2 contains mean scores for 3 courses where SLO5 was measured during the 2016-17 academic year. Note that the course with the highest mean rating, BIOL 475, is also available for graduate credit. We will continue to add to our database for SLO 5 in the coming years.

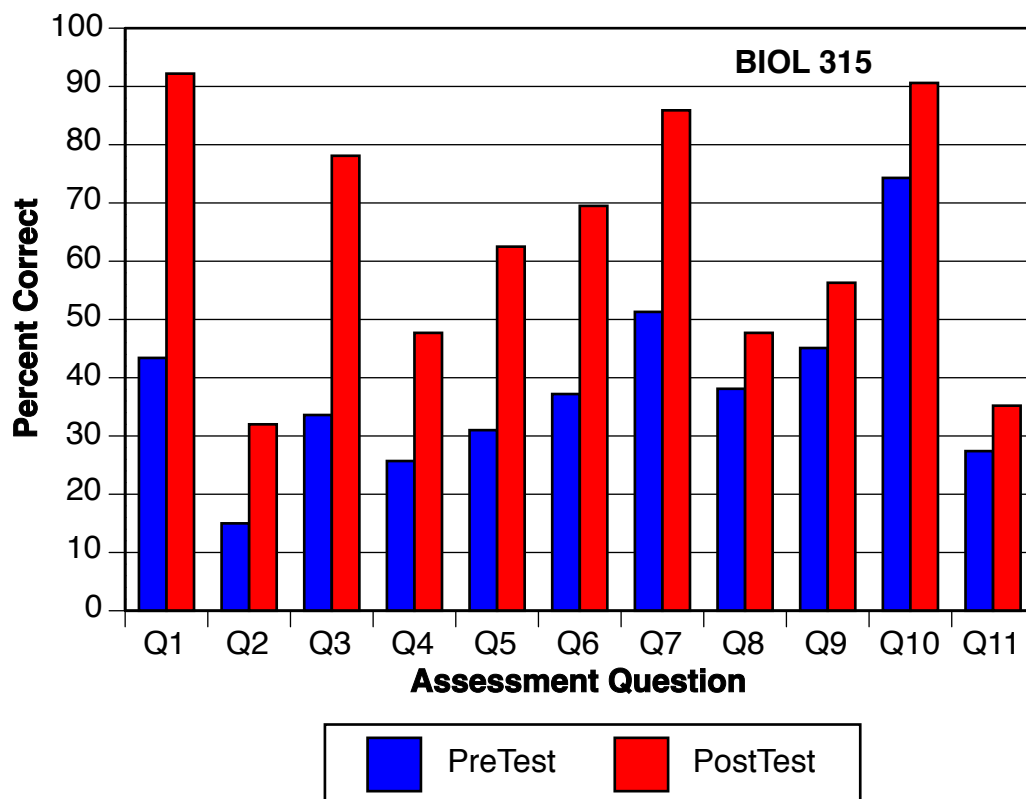


Figure 7. Assessment of SLO 2 in BIOL 315 using Pre- and Post-Test scores during spring semester 2017, n=128. Post-Test scores are higher than Pre-Test scores for each assessment question.

Table 2. Mean rating score on rubric used to assess SLO 5 in three Biology Courses during the 2016-17 school year. “1” is the lowest rating and “5” is the highest. These ratings correspond to the following: “1”- communication mostly flawed, “2” – communication below college-level, “3”- communication just at college-level, “4” – communication good but not great, and “5” – communication excellent.

Course Number and Name	Mean Rating on Presentation	Sample Size
BIOL 419 (Microbial Ecology)	3.13	16
BIOL 447 (FIRE)	3.09	10
BIOL 475 (Biological Imaging)	3.79	24

M.S. Graduate Program

We have four SLOs for the graduate program in Biology:

SLO 1: Students can demonstrate specialized knowledge in one or more disciplines of Biology.

SLO 2: Students are aware of and/or capable of using new and existing methods and technologies.

SLO 3: Students can demonstrate facility in applying the methods of scientific inquiry, including observation, hypothesis testing, data collection, and analysis.

SLO 4: Students can demonstrate professional level oral and written communication skills within a discipline of Biology.

We use the thesis research project to assess the success of graduate students in our M.S. program (Figure 8). Specifically, the graduate student is evaluated at the thesis proposal stage, and when the thesis work is completed and the thesis is defended. External review of the thesis is also done at the thesis defense stage where a faculty member that is not on the student’s graduate committee evaluates the student’s performance in different areas. The rubric used to measure student performance at each stage of the master’s thesis is included in the appendix. Performance in different areas of the rubric are ranked on a scale of 1 to 5 with “1” being poor and “5” being excellent. Average rating for time for completion of the thesis proposal is still 3. The ratings ranged from 3.5 to 4.28 in all other areas of the rubric used for the evaluation of the final thesis by the members of the student’s graduate committee and external reviewer. Overall, graduate students score higher on the thesis defense evaluation. Our M.S. students conduct research that

has scientific merit, display knowledge of the subject area and current methodology in their field, show improvement in their writing and presentation skills between the thesis proposal and thesis defense stage, and produce high quality theses.

BIOL 502 (Biometry) was also used to assess SLO 3 using a combination of multiple choice and essay questions. Students in the course achieved a mean score of 81.6 on the assessment questions. Biometry is one of three courses graduate students may choose to fulfill graduate course requirements. Additionally, we are evaluating SLO 4 using graduate level seminar courses.

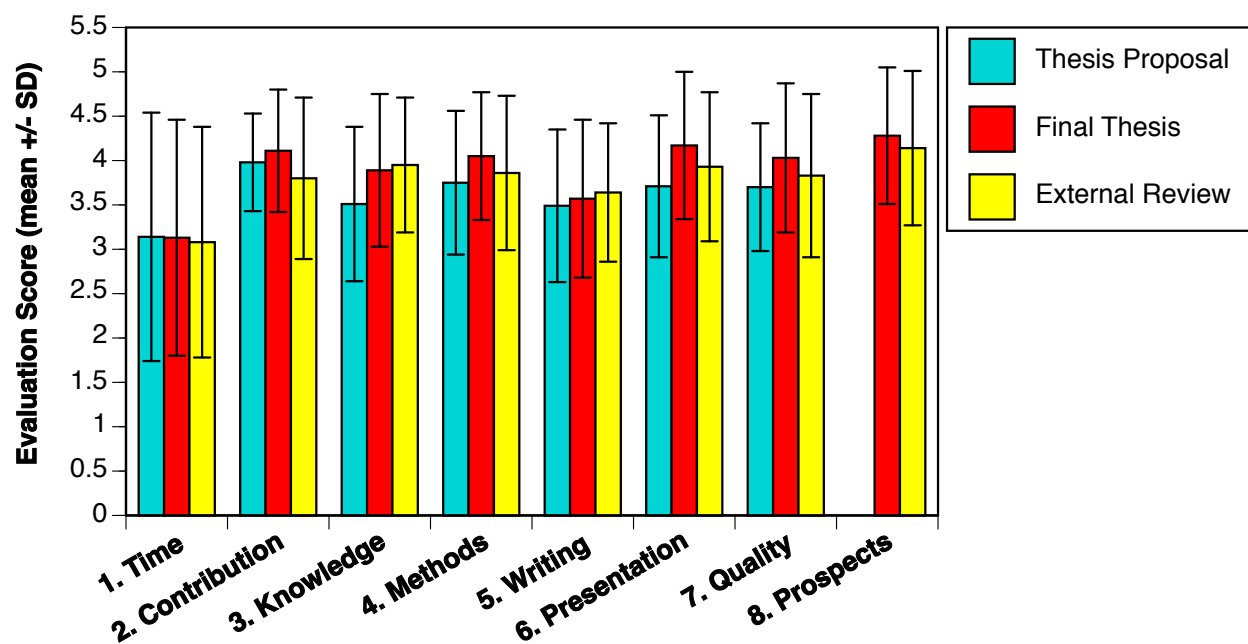


Figure 8. Assessment of the Biology Graduate Program SLOs 1, 2, 3, and 4. Graduate students were evaluated in several areas on a scale of 1 to 5 with “1” being the lowest rating and “5” being the highest. The thesis proposal and completed thesis were evaluated by the graduate committee. The final thesis was also evaluated by an external reviewer (a faculty member not on the student’s graduate committee). Sample sizes are n=105 for the Thesis Proposal, n=95 for the Final Thesis, and n=81 for External Review of the Thesis.

3. Preview of planned assessment activities for next year.

We appreciate the many ways in which our students learn. Assessment of our programs in Biology help us to provide the best learning environment for the diverse population of students that we train. We will continue to assess many of our SLOs for the undergraduate programs using our core classes: BIOL 106, 107, 322, 360, and 380. Collection of longitudinal data

continues and will be used to follow a given student's performance as they transition from lower-division to upper-division courses. More faculty are assessing SLOs 4 and 5 in our upper-division courses and we will continue to build our assessment data for these student learning outcomes.

The Biology M.S. graduate program will continue to use the thesis research project as the primary means to measure how well our students are doing in the program. In addition, we will use other graduate courses to assist us in our assessment.

Assessment of our Biology courses that fulfill the Natural Sciences section of the GE program will be done during the 2017-2018 school year.