**2019-2020 Annual Program Assessment Report Guide**

Please submit your report to your department chair or program coordinator, the Associate Dean and Dean of your College, and to james.solomon@csun.edu, Director of the Office of Academic Assessment and Program Review, by **September 30, 2020**. 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 include this form with your report in the same file and identify your department/program in the file name. Please do not change the date on the form, and be sure to check that your report is ADA accessible.**

**College: Science and Mathematics**

**Department: Biology**

**Program: B.A., B.S., and M.S. programs**

**Assessment liaison: Cheryl Hogue**

1. **Please check off whichever is applicable:**

**A. \_\_\_\_x\_\_\_\_ Measured student work within program major/options.**

**B. \_\_\_\_\_x\_\_\_ Analyzed results of measurement within program major/options.**

**C. \_\_\_\_\_\_\_\_ Applied results of analysis to program review/curriculum/review/revision major/options.**

**D. \_\_\_\_\_\_\_\_\_ Participated in the 2019-20 assessment of General Education Section D: Social Sciences and U.S. History and Government student learning outcomes**

1. **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 GE 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: e.g. SLO revision (especially to ensure continuing alignment between program course offerings and both program and university student learning outcomes) and the creation or modification of new assessment instruments

**3. Preview of planned assessment activities for 2020-21.** Include a brief description as reflective of a continuous program of ongoing assessment.

**1.** **Background for Assessment Activities for Undergraduate and Graduate Programs in**

 **Biology**

The Department of Biology is committed to improving the success of all students and values the role assessment plays in facilitating this. Our Core Curriculum Action Groups (CCAG) are composed of faculty that teach our core classes in the B. A. and B. S. programs. CCAG developed multiple choice questions that are used in assessment of our Student Learning Outcomes (SLOs). Our core classes in the undergraduate program are Biology 106 (Biological Principles I), Biology 107 (Biological Principles II), Biology 322 (Evolutionary Biology), Biology 360 (Genetics), and Biology 380 (Cell Biology). The SLO assessments conducted in core classes in 2019-20 measured student work and analyzed the results. We increased the benchmark for performance on assessment questions from 60% to 70% as recommended after the 2018-19 assessment report. During spring 2020 the University transitioned to virtual instruction and assessment questions were administered off campus via Canvas. Student performance on the spring 2020 assessment was much higher and not representative of assessment trends observed in past years. Other courses that were used in assessment of our undergraduate program SLOs were Biology 315 (Principles of Microbiology), Biology 442L (Developmental Biology Lab), and Biology 452 (Molecular Markers in Evolutionary Studies).

We offer several general education courses in the Biology Department. One of the courses that we have used in the past for assessment of the natural sciences is Biology 101 (General Biology). Many of the students that enroll in this course are in the health sciences. In fall 2019 the DFW rate in this course was 23% (CSU Student Success Dashboard). In this report we present assessment data collected in Biology 101 since the 2017-18 assessment report.

The Department of Biology offers one graduate program, Masters of Science degree. This degree program allows students to engage in advanced study in a specialized area of biology and develop the skills necessary to complete an independent research project. Assessment is ongoing in our M. S. program and we continue to use the thesis research project to assess the graduate SLOs. This assessment incorporates how students perform early in their graduate program and in the final stages of the thesis.

**2.** **Assessment activities for 2019-20**

2-1. *Option A: Measured student work.*

We assessed student knowledge of cell biology, genetics, and evolution (SLO 1) in both lower- and upper division core courses in our B. A. and B. S. programs.

We assessed the ability of students to demonstrate specialized knowledge in at least one discipline of Biology (SLO 2) in Biology 315, 322, and 360.

We assessed student awareness and ability to use new and existing methods and technologies in a discipline in biology (SLO 3) in Biology 360 and 380.

We assessed ability of students to use critical thinking in scientific inquiry (SLO 4) in Biology 442L.

We assessed the ability of students to communicate science effectively (SLO 5) in Biology 452.

Graduate students were assessed in their knowledge of their discipline (Grad SLO 1), their ability to use methods and technologies in their discipline (Grad SLO 2), their ability to apply the methods of scientific inquiry (Grad SLO 3), and their ability to communicate scientific findings of their thesis research project (Grad SLO 4).

Student understanding of basic knowledge in the natural sciences in Biology 101 was assessed using data collected fall 2018 through fall 2019.

2-2.  *Option B: Analyzed results of measurements.*

Student performance on multiple choice assessment questions as a measure of program SLOs was done in all core classes and Biology 315.

Student performance on multiple choice questions as a measure of select natural science SLOs was done in Biology 101.

Elements of the thesis research project were used to assess the SLOs of the M. S. Program.

2-3. *Why the department chose the assessment activities outlined above.*

 These assessment activities are a continuation of the yearly assessment we have been conducting in our core classes and other courses that are prerequisites for upper division courses. Information gathered from these assessments is another tool we can use to gauge how well our students are doing and helps us to identify areas where improvement is needed. The elements of the graduate thesis research project have been used for several years now to assess the graduate SLOs. The thesis is a culminating experience for the graduate student. We are also concerned about the high DFW rate in Biology 101, a course that services non-majors (especially those in the health sciences). The last time we conducted assessment in this course was academic year 2017-18 and the DFW rate was also high at this time.

**3.** **Student work measured and analyzed in five core courses, Biology 315, Biology 442L and Biology 452.**

3-1. *Assessment of SLO 1 in lower division core courses.*

**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.**

Biology 106/L and 107/L are prerequisites for many upper division courses that our majors take. Students must pass these courses with a grade of “C” or better to progress to 300 and 400 level courses in the major. A total of 559 students in Biology 106 and 258 students in Biology 107 participated in the assessment. Ten multiple choice assessment questions were used in 106 and 20 questions in 107.

**Results:**

Student performance on the assessment was examined each semester. In fall 2019, assessment questions were administered on campus. In spring 2020, due to COVID-19, students were given the questions off campus. In fall 2019 the average score on the assessment in Biology 106 was 63% (89% spring 2020) and in Biology 107 it was 57% (75% spring 2020). Fall assessment results in Biology 106 were slightly improved over the average score of 61% in 2018-2019. One of the 106 assessment questions was revised and this may have contributed to the increase in student performance. In Biology 107 twenty assessment questions were given to the students and only on 4 of the 20 questions did performance exceed 70% in fall 2019. The average score on assessment in 107 in 2018-19 was 60%. Question 14 on the 107 assessment continues to be the most challenging for students. In spring 2020 average score on this question was 28% compared to 10% fall 2019.

3-2. *Assessment of SLOs 1, 2, & 3 in upper division core courses.*

**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.**

A total of 178 students in Biology 322, 183 students in Biology 360, and 154 students in Biology 380 participated in the assessment. Ten multiple choice questions were used for the assessment of SLOs 1 & 2 in Biology 322; 20 questions were used for assessment of SLOs 1, 2, & 3 in Biology 360; and 20 questions were also used for assessment of SLOs 1 & 3 in Biology 380.

**Results:**

Pre- and post-assessment were done in one section of Biology 322 fall 2019. Overall, student performance on the assessment increased on the post-test compared to the pre-test, and for each of the ten assessment questions. The mean pre-test score was 3.53 (compared to 3.87 spring 2020) and the mean post-test score was 6.92 (compared to 8.0 spring 2020). This same trend was seen in 2018-19 when the mean pre-test score was 3.81 and the mean post-test score was 7.32.

Additionally, student participation in PLF (Peer Learning Facilitator) sessions was tracked fall 2019. Approximately 70% (45 out of 65 students) attended PLF sessions on a regular basis. In some cases percent improvement on questions was 50%. In fall 2019 we also had a section of Biology 322 in which no pre-test was given and mean performance on the assessment was 6.0. Scores on assessment in Biology 322 have varied over the years but are increasing. With the incorporation of pre- and post-testing in the assessment we are seeing enhanced student learning of concepts even though overall score on the assessment is not yet at 70%.

In past academic years students have performed well on the assessment done in Biology 360 and 380. In some cases students achieved an average score of almost 80% on assessment in Biology 360 (occurred fall 2018) and over 80% in Biology 380 (seen 2017-2019). In fall 2019 the average score on the assessment in Biology 360 was 58% (82% spring 2020) and in Biology 380 the average assessment score was 75% (94% spring 2020). We did note that the most challenging questions on the 360 assessment for students are still questions 9 and 10. Student performance on assessment in Biology 380 typically exceeds the benchmark. Questions 9 and 20 were the most challenging ones for students fall 2019.

3-3. *Assessment of SLOs 2 & 3 in Biology 315.*

**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.**

A total of 105 students participated in assessment in Biology 315 fall 2019.

**Results:**

Although overall student performance on assessment in Biology 315 fall 2019 (mean post- test score of 61% ) was below the benchmark, pre- and post-testing again showed that students improved on the post-test assessment. In fall 2017 the average performance score on the Biology 315 assessment was almost 75% on the post-test, and in spring 2019 it was 63%.

3-4. *Assessment of SLO 4 & SLO 5 in 400 level biology courses.*

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

**SLO 5: Ability to engage the biological literature and to communicate scientific information verbally and/or in writing.**

A total of 17 students in biology 442L fall 2019 and 21 students in Biology 452 spring 2020 participated in assessment.

**Results:**

The Developmental Biology Lab course, Biology 442L, was used to measure how well our students can use critical thinking in applying the methods of scientific inquiry. Students were rated on a scale of 1 to 5 with **“1”** being the poorest performance and **“5”** being the best performance. The average score was 3.76 out of 5 and was based on lab experiments, reports, and presentations.

SLO 5 was measured in Molecular Markers in Evolutionary Studies, Biology 452, using a rating scale of 0 to 5, with “0” being the worst and “5” being the best performance. The average score was 3.08 out of 4. Students were ranked in seven areas: quality of speaking, presentation conceptually fluid, presentation was clear, presentation was structured as assigned, literature was integrated into presentation, presentation provided creativity and logical insight, and presentation provided evidence of critical thinking in science.

We will continue to encourage our faculty to do more assessment of SLOs 4 & 5 in upper division courses that they teach.

**4.** **Student work measured and analyzed in Biology 101.**

A total of 339 students were assessed in Biology 101 from fall 2018 through fall 2019 using 20 multiple choice questions.

**Results:**

Average scores on the assessment were 65.2% in fall 2018, 70.5% in spring 2019, and 68.3% in fall 2019. In 2017-18 when assessment of some of the natural science SLOs were done in Biology 101 the average score achieved by students on the assessment was 65%. It is encouraging to see student performance increasing from past years. We will continue to do assessment in this course and include more sections.

**5.** **Student work measured and analyzed in the M. S. Program.**

**SLO 1: Students can demonstrate specialized knowledge in one of 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.**

Completion of the thesis research project is a culminating experience for our graduate students. We use the graduate student’s thesis project to assess all four of the SLOs for the masters program. The rubric used to measure the student performance at each stage of the thesis includes: time to completion of the thesis proposal or thesis defense, scientific merit of the research project, methodology, writing skills, presentation skills, the quality of the research, and the student’s prospects or likelihood to have a career in the biological sciences. These areas of the rubric are ranked on a scale of 1 to 5. The specific rankings are as follows: **1**, very deficient; **2**, somewhat deficient; **3**, acceptable; **4**, very good; and **5**, outstanding. The sample size for the thesis proposal evaluation was 58, and for both the evaluation of the thesis defense and external review sample size was 21.

**Results:**

The mean score for the thesis evaluation was 3.54 (ranging from 3.24 for knowledge to 3.77 for scientific merit), for the thesis defense evaluation by the graduate committee it was 3.86 (ranging from.3.33 for time to completion of the thesis to 4.29 for likelihood to have a career in the biological sciences), and for the external reviewer’s evaluation it was 3.86 (ranging from 3.19 for time to completion of the thesis to 4.33 for likelihood to have a career in the biological sciences). These current results are similar to what we have seen in past years. In the 2019 assessment report we reported a mean score on the thesis proposal of 3.67 and 3.97 on the thesis defense. Student scores on the assessment increased from the proposal stage to the thesis defense stage which indicates that our students are acquiring the skills necessary to become independent researchers.

# **6.** **Future Assessment Activities**

Assessment will continue to be done in all of the core courses for the B.A. and B.S. programs and in Biology 315 (an important prerequisite for several 400-level courses offered in the microbiology option of the B. S. program). We will continue to identify upper division Biology courses that can be used to assess SLO 4 and SLO 5 and encourage faculty to participate. The thesis research project will continue to be used for assessment of all of the SLOs in the M. S. program. We plan on assessing more sections of Biology 101 this academic year.