



2021 Academic Program Assessment Report	Program current assessment plan here:	<a href="https://www.csupueblo.edu/assessment-and-student-learning/_doc/2019/report/biology-bs-assessment-plan-2019.pdf">https://www.csupueblo.edu/assessment-and-student-learning/_doc/2019/report/biology-bs-assessment-plan-2019.pdf</a>
Biology BS	Program prior assessment report here:	<a href="https://www.csupueblo.edu/assessment-and-student-learning/_doc/2020/report/biology-bs-assessment-report-2020.pdf">https://www.csupueblo.edu/assessment-and-student-learning/_doc/2020/report/biology-bs-assessment-report-2020.pdf</a>

Report Completed By:	Jeff Smith
Date Report Completed:	
Faculty members involved in this Assessment:	

Please describe this year's assessment activities and follow-up for your program below. (Separate sheet for each undergraduate major, stand-alone minor, certificate, and graduate program in your department.) Please also submit any addenda such as rubrics which are not available in your assessment plan. The reports will be available to the Dean of your college/school and to the Executive Director for Assessment as well as faculty peer reviewers.

**Brief Statement of Program Mission and Goals:**

**I. Assessment of Student Learning Outcomes (SLOs) in this cycle. Including processes, results, and recommendations for improved student learning. Use Column H to describe improvements planned for the year based on the assessment process.**

A. Your program SLOs are pasted here verbatim from your assessment plan. Please enter info in columns B-H only for those assessed during this annual cycle.	B. When was this SLO last reported on prior to this cycle? (semester and year)	C. What method was used for assessing the SLO? Please include a copy of any rubrics used in the assessment process.	D. Who was assessed? Please fully describe the student group(s) and the number of students or artifacts involved (N).	E. What is the expected proficiency level and how many or what proportion of students should be at that level?	F. What were the results of the assessment? (Include the proportion of students meeting proficiency.)	G. What were the department's conclusions about student performance?	H. What changes/improvements to the program are planned based on this assessment?
1. Students will develop a broad-based knowledge and application of concepts, techniques and terminology in molecular, cellular, organismal, evolutionary and ecological biology.	3 June 2020	SLO 1. Administer the GRE to each class of First Year Seminar (BIOL 171) for baseline assessment. Administer the GRE and MFAT exam to each class of Senior Seminar (BIOL 493).	Fourty graduating seniors (2020) received the MFAT exam at the end of spring semester BIO171 GRE, n = 17, 1 section. 493 section n = 14.	Our goal is to have 75% of our senior students score at 70% or higher on the GRE in the BIOL 493 class, and to have 75% of our senior students score at or above 50% of National percentile on the MFAT exam.	For the MFAT exam, 51% of students scored at or above 50th percentile.	We failed to meet our goal when using the the MFAT exam, using the GRE results.	The department discussed the result and determined that an improvement would be to increase our delivery of cell biology materials. A process to develop a curriculum map was initiated to more finely evaluate where the gaps in instruction are.
2. Students will develop applied scientific skills through field and laboratory experience and data analysis					The first year BIO 171 students scored 28.5% (50 questions) on the GRE exam. Graduating seniors scored 42+/- 2.5%. None scored above the 70% level.		
3. Students will develop skills in reading and interpreting the scientific literature and in presenting a synthesis of it accurately in oral and written form.							
4. Students will demonstrate critical thinking and problem solving skills using experimental design and the scientific method.	This was the first time	Written artifacts from each class of College Biology I (BIOL 181 Lab) were collected and compared to the same skills during the junior or senior year in Microbiology (BIOL 301 Lab), Cell Biology (BIOL 412Lab), Plant Physiology (413 Lab), and/or Vertebrate Physiology (BIOL 414 Lab). In addition, faculty completed a rubric for each student in Senior Seminar (BIOL 493) that assessed critical thinking based on their operation of the scientific method within their Senior Capstone Oral Presentation and their written Senior Capstone Research Proposal.		Our goal was to have our students show increased proficiency across the course of the 4-year curriculum. For the capstone course, our goal was to have at least 80% of our senior students be at Proficient level.	Students showed clear improvement over the course of the 4 year curriculum. Students failed to meet the goal in the capstone course.	It was determined that a revision of the rubric for the capstone course, or a revision of the artifact parameters to better match the rubric would be needed.	The department met and discussed the outcome, initiating a revision of the assessment process for this SLO, and a curriculum mapping process to better evaluate potential gaps in departmental curriculum.

**Comments on part I:**

**II. Closing the Loop. Describe at least one data-informed change to your curriculum during the year cycle. These are those that were based on, or implemented to address, the results of assessment from previous cycles.**

A. What SLO(s) or other issues did you address in this cycle? Please include SLOs verbatim from the assessment plan, as above.	B. When was this SLO last assessed to generate the data which informed the change? Please indicate the semester and year.	C. What were the recommendations for change from the previous assessment column H and/or feedback?	D. How were the recommendations for change acted upon?	E. What were the results of the changes? If the changes were not effective, what are the next steps or the new recommendations?			
SLO1	Spring 2020	The department planned to discuss the result in the fall of 2020 determine whether the goals are too high, or whether there is a deficiency that needs to be addressed.	With the covid distruption, no action was taken.	none			
SLO4	This was the first time	N/A					
<b>Comments on part II:</b>							

**Summary of CSU-Pueblo Biology Department's Bachelor's Degree SLO4 Assessment: Completed 2021**

**SLO4**

*SLO 4. Assess the critical thinking and problem skills of each class of College Biology I (BIOL 181 Lab) and compare to the same skills during their junior or senior year in Microbiology (BIOL 301 Lab), Cell Biology (BIOL 412/Lab), Plant Physiology (413 Lab), and/or Vertebrate Physiology (BIOL 414Lab). Our goal is to have our students show increased proficiency during all these evaluations. In addition, faculty will complete a rubric for each student in Senior Seminar (BIOL 493) that will assess their critical thinking based on their operation of the scientific method within their Senior Capstone Oral Presentation and their written Senior Capstone Research Proposal. Our goal is to have at least 80% of our senior students be at Proficient level.*

**Summary**

The department goal was to assess teaching and learning of critical thinking and problem skills with the following specific aims:  
 Students will increase in proficiency over the course of the 4-year curriculum.  
 Critical thinking, based on student operation of the scientific method, will be proficient for 80% of graduating seniors.  
 The method used a rubric (p.3) to assess attributes of critical thinking and problem-solving skills among 6 courses taken over the 4-year span of the curriculum.  
 Roughly 100 written artifacts, distributed across the 6 courses, were assessed by 11 instructors in the department.  
 A score sheet was used to evaluate performance in each category defined in the rubric.  
 Faculty met to discuss the outcomes and made recommendations.  
 Main results.  
 An increase in student proficiency over the 6 courses was clearly apparent.  
 The 80% benchmark was not reached.  
 Areas for improving the assessment methodology.  
 The SLO has an error that should be corrected in the wording of the first line, which should read "critical thinking and problem-solving skills".  
 Artifacts from BIOL 493 did not match the rubric well in the last two categories about data interpretation. Either the artifact or the rubric should be changed to match.  
 The last two categories in the rubric were not clearly differentiated. The rubric will be edited (pp. 4-5).

**Detailed results**

The 5 benchmarks used in the rubric to evaluate critical thinking and problem-solving skills head each of the following graphs. The percentage of student-artifacts which demonstrated proficiency is plotted for each course. The courses are presented on the ordinate in chronological order to match the progression of the 4-year biology curriculum. Clear upward trends for each benchmark are apparent over the progression of the curriculum. This is the evidence that the goal to have increased proficiency over the course of the 4-year curriculum was met.

With the exception of the "Statement of problem/hypothesis" benchmark, the 80%-proficiency threshold in BIOL 493 was not met for any benchmark, with worst performance in the "evaluate potential strategies" category. In the rubric, this category was identified by faculty as poorly differentiated from the category "evaluate results". It was also identified that the artifact, being a research proposal, did not include actual research "results", and so would not appropriately match the rubric. Therefore, it was unclear whether the rubric-artifact interface, or student achievement, was the cause of the failure to meet "the department goal to have 80% of our senior students be at Proficient level". It was decided that the rubric would be edited. It was not decided whether the artifact would be altered. The complete data set is included as an addendum.

**Below is the rubric that was used.**

Scoring was 4,3,2,1 for each column with 5 benchmarks.

**Below is a proposed edited rubric.**

BENCHMARK	Excellent = 4	Proficient = 3	Developmental = 2	Ineffective = 1
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