



## Annual Assessment Report 2019-2020

### BS Physics Physics & Astronomy College of Science

#### DOCUMENTATION OF STUDENT LEARNING OUTCOMES

Other than the CPP Catalog and the Office of Assessment and Program Review website, where else are your SLOs published? Select all that apply.

Department Website - provide URL: <https://www.cpp.edu/sci/physics-astronomy/about/progam-assessment.shtml>

#### ASSESSMENT ACTIVITIES IN 2019-2020

This section provides the opportunity for programs to share and discuss assessment activities conducted in AY 2019-2020. This includes data collection, rubric development, data analysis, discussion of findings, development or implementation of closing the loop improvement strategies, update of your assessment plan and/or curriculum matrix, etc.

Please select one of the following:

My program engaged in assessment activities in AY 2019-2020.

Please list the SLOs examined (i.e., data collection, analysis, and/or closing the loop) during AY 2019-2020 (e.g., Students will conduct research following disciplinary standards.)

- SLO #1: Students will develop laboratory techniques (set-up troubleshooting, perform experiments) \_ (Department SLO 4)
- SLO #2: Students will be able to interpret experimentally obtained results) \_ (Department SLO 5)
- SLO #3: Spoken Communication: Students will be able to give verbal presentations on physical principles, applications of physical investigations, at a level understandable by an audience of novices. These presentations may include visual aids.) (Department SLO 4b)

Student Learning Outcome (SLO)	Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence	Findings			
				N of Artifacts	Criterion Used	Goal Met	Eye-opening Result
SLO #1: Students will develop laboratory techniques (set-up troubleshooting, perform experiments)_ (Department SLO 4)	<ul style="list-style-type: none"> <li>Collected/scored direct evidence of student learning (e.g., student work scored with rubrics, exam items, etc.)</li> </ul>	Direct: <ul style="list-style-type: none"> <li>Other, please explain: Formal laboratory reports</li> </ul>	<ul style="list-style-type: none"> <li>Used a rubric or scoring guide</li> </ul>	Eight different lab reports were analyzed describing student work on 5 different lab experiments	Adequate descriptions of these in written lab reports show that students are able to communicate developed laboratory techniques and were thus able to set up an perform the experiment in the actual laboratory course	From looking over student labs, students generally gave a more than adequate description of the purpose and importance of the laboratory experiment. The written experimental backgrounds were clear and concise. Lower scores were associated when the detail or background was not as clear, but this only happened in a few cases. Student's description of the setup were also generally very clear and easy to follow. These descriptions listed all the necessary equipment, settings, and relevant connections. Only a few lower scores were given when students	Use of student lab reports may not be adequate for assessment. Just because a student doesn't describe something in their lab report, does not mean that they cannot do said thing. However, having the student structure lab reports in this way will contribute to the development of their written communication of scientific work
	<ul style="list-style-type: none"> <li>Discussed assessment results to make program decisions to improve SLO achievement (e.g., design new course, modify assignments, etc.)</li> </ul>						

						<p>provided no detail about the experimental set up and only what measurements were being taken. Students collection of data met expectations but did not exceed them. In the collected data students would often make many measurements but only complete one run of the experiment rather than completing multiple runs and averaging the data. This is considered exceeding expectations since it is better scientific practice and shows that the student understands the level uncertainty when making physical measurements. Additionally, some students did not present raw data</p>	
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						for other measurements used in calculation (e.g., length of solenoid, diameter of wire, etc.)	
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Student Learning Outcome (SLO)	Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence	Findings			
				N of Artifacts	Criterion Used	Goal Met	Eye-opening Result
SLO #2: Students will be able to interpret experimentally obtained results) _ (Department SLO 5)	<ul style="list-style-type: none"> <li>Collected/scored direct evidence of student learning (e.g., student work scored with rubrics, exam items, etc.)</li> </ul>	Direct: <ul style="list-style-type: none"> <li>Other, please explain: Formal laboratory reports</li> </ul>	<ul style="list-style-type: none"> <li>Used a rubric or scoring guide</li> </ul>	Eight different lab reports were analyzed describing student work on 5 different lab experiments	Average score based on the rubric developed	Students analysis of data was satisfactory on average. Students receiving a high score explicitly showed calculation and provided the underlying reasoning associated with using the equation. Students' that failed to meet expectation either would provide graphs and tables but give no description of the variables or calculation or context for choices made during analysis. All students compared the data to predicted values or to literature. This generally involved a calculation of percent difference. Showing the calculation and citing the source for the known value was marked as meeting expectations. Failing to meet expectations meant that students did not cite the appropriate source, show the calculation, or made a comparison to the wrong quantity. The	The use of uncertainty in measurement often doesn't show up in upper division labs. Yet, if it is something that we deem as an important skill, enough to be a learning outcome, we need to either discuss where force the use of it in the upper division labs
	<ul style="list-style-type: none"> <li>Discussed assessment results to make program decisions to improve SLO achievement (e.g., design new course, modify assignments, etc.)</li> </ul>						

						<p>average score for uncertainty or discussion of limitations was less than the score for the failing to meet expectation. This is because half of the analyzed students did not use uncertainty in their calculation or discuss experimental limitations. There were a number of cases where there was a large margin of error (&gt;50%) and students failed to discuss possible errors in the experiment or attempted to find their mistakes in calculation. Students scoring 1 gave only small suggestions for error.</p>	
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Student Learning Outcome (SLO)	Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence	Findings			
				N of Artifacts	Criterion Used	Goal Met	Eye-opening Result
SLO #3: Spoken Communication: Students will be able to give verbal presentations on physical principles, applications of physical investigations, at a level understandable by an audience of novices. These presentations may include visual aids.) _ (Department SLO 4b)	<ul style="list-style-type: none"> <li>Collected/scored direct evidence of student learning (e.g., student work scored with rubrics, exam items, etc.)</li> </ul>	Direct: <ul style="list-style-type: none"> <li>Oral performance (e.g., presentation, defense, conference presentation, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Used a rubric or scoring guide</li> </ul>	We collected data from PHY4630 Senior seminar class in spring 2020. Students gave oral scientific presentations as part of their course assignments. Rating was given using the rub	the data collected were for virtual online presentations through zoom. Therefore, we were not able to assess all categories. When rater feels like they could not judge the category, they gave the "na."	Students perform well on the "Etiquette and Presentation Delivery" category. The form especially well on the time management and making the slides easy to follow. They speak with a clear voice and speakers smoothly. The category that needs the most improvement is "appropriate styles for the slides", it seems like students could improve more make sure, appropriate font sizes, colors, texts, size of images	Given the fact that this is a course for graduating seniors, the category that needs the most improvement is "appropriate styles for the slides", it seems like students could improve more make sure, appropriate font sizes, colors, texts, size of images

						<p>“structure and organization” category, but relatively less well compared with their performance on the previous category. They perform best on making the introduction part to make the purpose and goals clear. The category that needs the most improvement is “summary or conclusions and brings the closure effectively”. Some student did not include a summary and that is why it brings down the average. In the future, students might perform better if given explicitly reminders to include a summary section for their presentation. They could also use some extra practice on how to bring their presentation to an</p>	
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						<p>effective closure. For scientific presentations, an effective closure includes some bullet points of the main conclusions as well as some insights on how their work impact future directions. Students perform best on this “content” category compared with previous two categories. They perform with highest score on “knowledge of the topic”, “properly citing the references” and “clearly explain the methodology” items. The category that needs the most improvement is “keeping the audience interested in the scientific content and the listener feel they can follow the talk and genuinely learned”. Keeping audiences motivated has</p>	
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						<p>always been a challenging aspect even for experienced presenters like professors themselves. In the future, students could use more practices on how to make their talk more engaged and intriguing. Techniques including asking audiences more questions, using more visual aid and a variety of representations (animation, sound, visual aid, etc.) could help. Students should also be encouraged to attend professional workshops regarding presentation skills.</p>	
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## IMPROVING THROUGH ASSESSMENT

**Overall, what best describes how the program used the results in 2019-2020? Select all that apply.**

- Assessment procedure changes (SLOs, curriculum matrix, rubrics, evidence collected, sampling, communications with faculty, etc.)

**With whom did the program discuss assessment planning and/or share results during AY 2019-2020? Select all that apply.**

- Program/department faculty as whole
- Program/department assessment committee

**With the changes associated with remote teaching in Spring 2020, please share additional discoveries (e.g., insights about assessment procedures, teaching and learning, challenges, great achievements etc.) regarding program assessment in AY 2019-2020. (open-ended)**

The 2019-2020 academic year introduced tremendous disruptions to the operation of laboratory courses in our department, as well as profound transformation in the instruction of our lecture courses. Our Assessment plan was designed with course modalities in both of these types of courses that no longer use face-to-face operations, and all hands-on laboratories have remained empty since mid-March 2020. The operations thereafter can only be described as interim replacements, some of which had to be created entirely from new and are still being recreated. Our planned operations, and the careful assessment plans we made on the basis of those operations, can only continue in earnest when the current crisis.

**Please upload/provide the program's most updated Assessment Plan. Please don't forget to add "last updated <date>" in one of the cells in the Excel file.**

Submission – yes

**Q19. Please upload/provide the program's most updated Curriculum Matrix . Please don't forget to add "last updated <date>" in one of the cells in the Excel file.**

Submission – yes

**Q20. If you would like us to review other assessment documents such as your evidence (e.g., assignment, survey, interview questions etc.) or scoring rubric, please upload/provide them. (Select all that apply)**

Submission – yes

- Rubric