

2015-2016 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 assessment and program review, by September 30, 2015. 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 Math.

Department: Physics and Astronomy

Program: Physics and Astronomy

Assessment liaison: Radha Ranganathan

1. Please check off whichever is applicable:

A. Measured student work.

B. Analyzed results of measurement.

C. Applied results of analysis to program review/curriculum/review/revision.

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, and/or application) 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

- 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 next year. Include a brief description and explanation of how next year's assessment will contribute to a continuous program of ongoing assessment.

2. Overview of Annual Assessment Project(s).

A. SLOs were revised after discussions between department assessment committee, Chair, and a few interested faculty members. The new SLOs are:

1. **Physics:** Students will be able to describe natural phenomena in general and in their chosen program option using principles of physics

2. **Scientific methods:** Students will be able to

a. Set up laboratory experiments and collect data from observations and experiments

b. Combine insights and techniques from the various courses in the program (integrate knowledge)

c. Derive quantitative predictions from a model through mathematical analysis

d. Analyze data, provide error analysis, and test a model or hypothesis by comparing with data

e. Competently use computer tools, including: software programs for data analysis and presentation, numerical analysis, and computer simulations.

3. **Communication:** Students will be able to

a. Convey physical concepts with mathematical expressions (quantitative literacy)

b. Clearly communicate physical concepts, findings, and interpretations through oral presentations (oral communication)

c. Write clear, organized and illustrated technical reports with proper references to previous work in the area (written communication)

d. Search for and read scientific literature (information literacy)

4. **Responsibility & Ethics:** Students will be able to

- a. Make unbiased and objective judgments of theories and experiments
- b. Maintain integrity in their research and adhere to ethical principles regarding plagiarism, data collection and selective data sampling
- c. Give proper attribution
- d. Practice lab safety

B. Gateway and Exit Tests. ETS (Exit) tests that our students take at the end of their senior year were analyzed. 15 students took this test in Spring 2016. Results and comparison with those for the nation are summarized in the two Tables below.

Data that included 1,907 seniors from domestic institutions who tested between September 2012 and June 2016 is presented below:

Number of Seniors	Mean	Median	Standard Deviation
2,781	150.4	149.0	15.4

Data for CSUN seniors who tested in Spring 2016

Number of Seniors	Mean	Median	Standard Deviation
15	151.5	149	13.3

The average score of our students 151.5/200 with a standard deviation of 13.3 is above the national average and is in the 53 percentile with a percentile range of 15 to 99 %. This is an improvement over the previous year in which the percentile was 39.

Thirteen of the 15 students who took the ETS test in Spring 2016 took the gateway test administered at their junior level. The average score of the cohort of 13 students was 44.7 %..

We continue to study the effect of being Peer Learning Facilitators (PLF) on ETS results; whether tutoring responsibilities help in learning as well. In the present year, of the 15 that took the ETS, 5 were PLFs. The average of their score was 163.6 and percentile was

79 % which is in contrast to the average of 145.5 and percentile of 39 % of the other 10 students. Performance of each of the 5 PLFs was above the national average. Only 2 of the 10 non-PLFs scored above the national average.

In 2014, two students that performed above average in the introductory part of the test were Peer Learning Facilitators (PLF). In 2015 the student who performed best was also a PLF for two semesters and also conducted a senior thesis project.

C. The ETS test addresses the following SLO (1 and 2.b of the revised SLO)

Students will be able to:

1. Describe natural phenomena in general.
2. Combine insights and techniques from the various courses in the program (integrate knowledge)

Exams and home works in the individual courses continue to be the best methods for these SLOs. In this context individual faculty members continue efforts to better engage students. Some faculty have reported that requiring pre-class preparation that counts for grade and in-class assignments have improved student alertness and engagement in the class room.

D. New course proposed. The ETS alone are not adequate for assessment of all SLOs. Last year the department agreed to create a research projects course. Proposal for a new course PHYS 497 was developed and was approved. This was a planned activity proposed in the previous report. PHYS 497 is a Senior Research project course and will serve as a capstone course. All program SLOs will be assessed in this course. Student involvement in research contributes to deeper learning. The purpose of the course is to foster undergraduate research and encourage in-depth continued thinking through a problem toward a logical conclusion.

E. PHYS 465. This is a senior level course in experimental physics. Assessment in PHYS 465 with the rubric prepared in the previous year was implemented. There were 13 students in the class. The course requirement was to perform experiments with each experiment lasting six 3-hour long sessions. The students were required to submit a report and present the results to the entire class using power-point slides. We used the speech and presentation grading rubric included below.

PHYS 465 Assessment Rubric

	Emerging (0-12 points)	Developing (13-16 points)	Advanced (17-20 points)	Score
1. Organization (20 points)	Ideas may not be focused or developed; the main purpose is not clear. The introduction is undeveloped. Main points are difficult to identify. Transitions may be needed. There is no conclusion or may not be clear the presentation has concluded. Conclusion does not tie back to the introduction. Audience cannot understand presentation because there is no sequence of information.	Main idea is evident, but the organizational structure many need to be strengthened; ideas may not clearly developed or always flow smoothly and the purpose is not clearly stated. The introduction may not be well developed. Main points are not clear. Transitions may be awkward. Supporting material may lack in development. The conclusion may need additional development. Audience has difficulty understanding the presentation because the sequence of information is unclear.	Ideas are clearly organized, developed, and supported to achieve a purpose; the purpose is clear. The introduction gets the attention of the audience and clearly states the specific purpose of the speech. Main points are clear and organized effectively. The conclusion is satisfying and relates back to introduction. (If the purpose of the presentation is to persuade, there is a clear action step identified and an overt call to action.)	
2. Topic Knowledge (20 points)	Student does not have grasp of information; student cannot answer questions about the subject. Few, if any, sources are cited. Citations are attributed incorrectly. Inaccurate, generalized, or inappropriate supporting material may be used. Over dependence on notes may be observed.	Student has a partial grasp of the information. Supporting material may lack in originality. Citations are generally introduced and attributed appropriately. Student is at ease with expected answers to all questions but fails to elaborate. Over dependence on notes may be observed.	Student has a clear grasp of information. Citations are introduced and attributed appropriately and accurately. Supporting material is original, logical and relevant. Student demonstrates full knowledge (more than required) by answering all class questions with explanations and elaboration. Speaking outline or note cards are used for reference only.	
3. Audience Adaptation (20 points)	The presenter is not able to keep the audience engaged. The verbal or nonverbal feedback from the audience may suggest a lack of interest or confusion. Topic selection does not relate to audience needs and interests.	The presenter is able to keep the audience engaged most of the time. When feedback indicates a need for idea clarification, the speaker makes an attempt to clarify or restate ideas. Generally, the speaker demonstrates audience awareness through nonverbal and verbal behaviors. Topic selection and examples are somewhat appropriate for the audience, occasion, or setting. Some effort to make the material relevant to audience needs and interests.	The presenter is able to effectively keep the audience engaged. Material is modified or clarified as needed given audience verbal and nonverbal feedback. Nonverbal behaviors are used to keep the audience engaged. Delivery style is modified as needed. Topic selection and examples are interesting and relevant for the audience and occasion.	
4. Language Use (Verbal)	Language choices may be limited, peppered with slang or jargon, too	Language used is mostly respectful or inoffensive. Language is appropriate, but	Language is familiar to the audience, appropriate for the setting, and free of	

Effectiveness) (20 points)	complex, or too dull. Language is questionable or inappropriate for a particular audience, occasion, or setting. Some biased or unclear language may be used.	word choices are not particularly vivid or precise.	bias; the presenter may “code-switch” (use a different language form) when appropriate. Language choices are vivid and precise.	
5. Delivery (Nonverbal Effectiveness) (20 points)	The delivery detracts from the message; eye contact may be very limited; the presenter may tend to look at the floor, mumble, speak inaudibly, fidget, or read most of the speech; gestures and movements may be jerky or excessive. The delivery may appear inconsistent with the message. Nonfluencies (“ums”) are used excessively. Articulation and pronunciation tend to be sloppy. Poise of composure is lost during any distractions. Audience members have difficulty hearing the presentation.	The delivery generally seems effective – however, effective use of volume, eye contact, vocal control, etc. may not be consistent; some hesitancy may be observed. Vocal tone, facial expressions, clothing and other nonverbal expressions do not detract significantly from the message. The delivery style, tone of voice, and clothing choices do not seem out-of-place or disrespectful to the audience or occasion. Some use of nonfluencies are observed. Generally, articulation and pronunciation are clear. Most audience members can hear the presentation.	The delivery is extemporaneous -- natural, confident, and enhances the message – posture, eye contact, smooth gestures, facial expressions, volume, pace, etc. indicate confidence, a commitment to the topic, and a willingness to communicate. The vocal tone, delivery style, and clothing are consistent with the message. Delivery style and clothing choices suggest an awareness of expectations and norms. Limited use of nonfluencies is observed. Articulation and pronunciation are clear. All audience members can hear the presentation.	

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Items 1. Organization, 2. Topic Knowledge and 4. Language Use (Verbal Effectiveness) were used to assess the following SLOs:

Scientific methods: Students will be able to

- 2b. Combine insights and techniques from the various courses in the program (integrate knowledge) (Organization)
- 2c. Derive quantitative predictions from a model through mathematical analysis (Topic Knowledge)
- 2d. Analyze data, provide error analysis, and test a model or hypothesis by comparing with data (Topic Knowledge)
- 3a. Convey physical concepts with mathematical expressions (quantitative literacy) (Topic Knowledge and Language use)
- 3b. Clearly communicate physical concepts, findings, and interpretations through oral presentations (oral communication) (Organization and Language use)

Results are:

1. Topic knowledge: 2 students 75%, 11 students below 60%
2. Language use: 4 students 100 %, 2 students 75%, 7 students below 60%
- 3: Organization skill: 2 students 100%, three students 80%, 9 students below 60%

The results are not satisfactory.

3. Preview of planned assessment activities for next year.

Presentations are time consuming. More time is spent on cosmetic organization than content. In the present year we plan to replace assessment through evaluations of presentations in PHYS 465 with evaluations of specific questions on each lab. Questions that will speak to the SLOs will be formulated. A rubric to evaluate the answers will be developed.

The logistics of offering PHYS 497 and assessment of SLOs will be discussed.

At present ETS test does not count toward student's grade. We will plan to include it as part of the PHYS 497 course and grade.

Continue to observe trends in the ETS field test performance

Targets and a plan for analyzing the ETS test and Junior level gateway test need to be formulated.