2013-2014 ANNUAL ASSESSMENT REPORT

Part 1: Background Information

B1. Program name: Physics and Astronomy, Physics Majors

B2. Report author(s): William DeGraffenreid, Department Chair

B3. Fall 2012 enrollment: 74
*Us*e the *Department Fact Book 2013* by OIR (Office of Institutional Research) to get the fall 2012 enrollment: (http://www.csus.edu/oir/Data%20Center/Department%20Fact%20Book/Departmental%20Fact%20Book.html).

B4. Program type: [SELECT ONLY ONE]

X	1. Undergraduate baccalaureate major
	2. Credential
	3. Master's degree
	4. Doctorate: Ph.D./E.D.D.
	5. Other, specify:

Part 2: Six Questions for the 2013-2014 Annual Assessment

Question 1 (Q1): Program Learning Outcomes (PLO) Assessed in 2013-2014.

Q1.1. Which of the following program learning outcomes (PLOs) or Sac State Baccalaureate Learning Goals did you assess **in 2013-2014**? (See 2013-2014 Annual Assessment Report Guidelines for more details). [**CHECK ALL THAT APPLY]**

	1. Critical thinking (WASC 1) *
	2. Information literacy (WASC 2)
	3. Written communication (WASC 3)
	4. Oral communication (WASC 4)
	5. Quantitative literacy (WASC 5)
	6. Inquiry and analysis
	7. Creative thinking
	8. Reading
	9. Team work
	10. Problem solving
	11. Civic knowledge and engagement – local and global
	12. Intercultural knowledge and competency
	13. Ethical reasoning
	14. Foundations and skills for lifelong learning
	15. Global learning
	16. Integrative and applied learning
	17. Overall competencies for GE Knowledge
	18. Overall competencies in the major/discipline
	19. Others. Specify any PLOs that were **assessed in 2013-2014 but not included above:** a. b. c.

* One of the WASC's new requirements is that colleges and universities report on the level of student performance **at graduation** in five core areas: **critical thinking, information literacy, written communication, oral communication, and quantitative literacy.**

Q1.1.1. Please provide more detailed information about the PLO(s) you checked above:

Note: Although no boxes above were checked due to the fact that we are in the midst of updating our plan, we can still answer many of the questions below.

Q1.2. Are your PLOs closely aligned with the mission of the university?

X	1. Yes
	2. No
	3. Don't know

Q1.3. Is your program externally accredited (except for WASC)?

	1. Yes
X	2. No **(If no, go to Q1.4)**
	3. Don't know (**Go to Q1.4)**

Q1.3.1. If yes, are your PLOs closely aligned with the mission/goals/outcomes of the accreditation agency?

	1. Yes
	2. No
	3. Don't know

Q1.4. Have you used the *Degree Qualification Profile* (DQP)* to develop your PLO(s)?

	1. Yes
	2. No, but I know what DQP is.
X	3. No. I don't know what DQP is.
	4. Don't know

* **Degree Qualifications Profile (DQP**) – a framework funded by the Lumina Foundation that describes the kinds of learning and levels of performance that may be expected of students who have earned an associate, baccalaureate, or master's degree. Please see the links for more details: http://www.luminafoundation.org/publications/The_Degree_Qualifications_Profile.pdf and http://www.learningoutcomeassessment.org/DQPNew.html.

Question 2 (Q2): Standards of Performance/Expectations for EACH PLO.

Q2.1. Has the program developed/adopted **EXPLICIT** standards of performance/expectations for the PLO(s) you assessed **in 2013-2014 Academic Year**? (For example: We expect 70% of our students to achieve at least a score of 3 on the Written Communication VALUE rubric.)

	1. Yes, we have developed standards/expectations for **ALL** PLOs assessed in 2013-14.
	2. Yes, we have developed standards/expectations for **SOME** PLOs assessed in 2013-14.
X	3. No (**If no, go to Q2.2)**
	4. Don't know (**Go to Q2.2)**
	5. Not Applicable (**Go to Q2.2)**

Q2.1.1. If yes, what are the desired levels of learning, including the criteria and standards of performance/expectations, especially at or near graduation, for **EACH PLO** assessed in 2013-2014 Academic Year? (For example: what will tell you if students have achieved your expected level of performance for the learning outcome.) **Please provide the rubric and/or the expectations that you have developed for EACH PLO one at a time below.** [WORD LIMIT: 300 WORDS FOR EACH PLO]

Q2.2. Have you published the **PLO(s)/expectations/rubric(s) you assessed in 2013-2014**?

	1. Yes
X	2. No **(If no, go to Q3.1)**

Q2.2.1. If yes, where were the **PLOs/expectations/rubrics** published? **[CHECK ALL THAT APPLY]**

	1. In **SOME course syllabi/assignments** in the program that claim to introduce/develop/master the PLO(s)
	2. In **ALL course syllabi/assignments** in the program that claim to introduce /develop/master the PLO(s)
	3. In the student handbook/advising handbook
	4. In the university catalogue
	5. On the academic unit website or in the newsletters
	6. In the assessment or program review reports/plans/resources/activities
	7. In the new course proposal forms in the department/college/university
	8. In the department/college/university's strategic plans and other planning documents
	9. In the department/college/university's budget plans and other resource allocation documents
	10. In other places, specify:

Question 3 (Q3): Data, Results, and Conclusions for EACH PLO

Q3.1. Was assessment data/evidence **collected** for 2013-2014?

X	1. Yes
	2. No **(If no, go to Part 3: Additional Information)**
	3. Don't know **(Go to Part 3)**
	4. Not Applicable **(Go to Part 3)**

Q3.2. If yes, was the data **scored/evaluated** for 2013-2014?

	1. Yes
X	2. No **(If no, go to Part 3: Additional Information)**
	3. Don't know **(Go to Part 3)**
	4. Not Applicable **(Go to Part 3)**

Q3.3. If yes, what **DATA** have you collected? What are the **results, findings, and CONCLUSION(s)** for EACH PLO assessed in 2013-2014? In what areas are students doing well and achieving the expectations? In what areas do students need improvement? Please provide a simple and clear summary of the key data and findings, including **tables and graphs** if applicable for EACH PLO one at a time. [WORD LIMIT: 600 WORDS FOR EACH PLO]

We have collected copies of final reports for PHYS 175 and PHYS 116, two upper-division laboratory courses. We will use several years' worth of data to develop a statistical set of data to use with our as of yet undeveloped rubrics for our PLOs.

Q3.4. Do students meet the expectations/standards of performance as determined by the program and achieved the learning outcomes? [PLEASE MAKE SURE THE PLO YOU SPECIFY HERE IS THE SAME ONE YOU CHECKED/SPECIFIED IN Q1.1].

Q3.4.1. First PLO: [_____Critical Thinking_____]

	1. Exceed expectation/standard
	2. Meet expectation/standard
	3. Do not meet expectation/standard

	4. No expectation/standard set
	5. Don't know

[NOTE: IF YOU HAVE MORE THAN ONE PLO, YOU NEED TO REPEAT THE TABLE IN Q3.4.1 UNTIL YOU INCLUDE ALL THE PLO(S) YOU ASSESSED IN 2013-2014.]

Q3.4.2. Second PLO: [_____]

	1. Exceed expectation/standard
	2. Meet expectation/standard
	3. Do not meet expectation/standard
	4. No expectation/standard set
	5. Don't know

Question 4 (Q4): Evaluation of Data Quality: Reliability and Validity.

Q4.1. How many PLOs **in total** did your program **assess in the 2013-2014 academic year**? [_ 0 _]

Q4.2. Please choose **ONE ASSESSED PLO** as an example to illustrate how you use direct, indirect, and/or other methods/measures to collect data. If you only assessed one PLO **in 2013-14**, YOU CAN SKIP this question. If you assessed MORE THAN ONE PLO, please check **ONLY ONE PLO BELOW EVEN IF YOU ASSESSED MORE THAN ONE PLO IN 2013-2014.**

	1. Critical thinking (WASC 1) [1]
	2. Information literacy (WASC 2)
	3. Written communication (WASC 3)
	4. Oral communication (WASC 4)
	5. Quantitative literacy (WASC 5)
	6. Inquiry and analysis
	7. Creative thinking
	8. Reading
	9. Team work
	10. Problem solving
	11. Civic knowledge and engagement – local and global
	12. Intercultural knowledge and competency
	13. Ethical reasoning
	14. Foundations and skills for lifelong learning
	15. Global learning
	16. Integrative and applied learning
	17. Overall competencies for GE Knowledge
	18. Overall competencies in the major/discipline
	19. Other PLO. Specify:

Direct Measures

Q4.3. Were direct measures used to assess this PLO?

	1. Yes
	2. No **(If no, go to Q4.4)**
	3. Don't know **(Go to Q4.4)**

Q4.3.1. Which of the following DIRECT measures were used? **[Check all that apply]**

	1. Capstone projects (including theses, senior theses), courses, or experiences
	2. Key assignments from other CORE classes
	3. Key assignments from other classes
	4. Classroom based performance assessments such as simulations, comprehensive exams, critiques
	5. External performance assessments such as internships or other community based projects
	6. E-Portfolios
	7. Other portfolios
	8. Other measure. Specify:

Q4.3.2. Please provide the direct measure(s) **[key assignment(s)/project(s)/portfolio(s)]** that you used to collect the data. [WORD LIMIT: 300 WORDS]

Q4.3.2.1. Was the direct measure(s) [**key assignment(s)/project(s)/portfolio(s**)] aligned directly with the rubric/criterion**?**

	1. Yes
	2. No
	3. Don't know

Q4.3.3. Was the direct measure (s) [key assignment(s)/project(s)/portfolio(s)] aligned directly with the PLO?

	1. Yes
	2. No
	3. Don't know

Q4.3.4. How was the evidence scored/evaluated? **[Select one only**]

	1. No rubric is used to interpret the evidence (If checked, go to Q4.3.7)
	2. Use rubric developed/modified by the faculty who teaches the class
	3. Use rubric developed/modified by a group of faculty
	4. Use rubric pilot-tested and refined by a group of faculty
	5. Use other means. Specify:

Q4.3.5. What rubric/criterion was adopted to score/evaluate the above key assignments/projects/portfolio? **[Select one only**]

	1. The VALUE rubric(s)
	2. Modified VALUE rubric(s)
	3. A rubric that is totally developed by local faculty
	4. Use other means. Specify:

Q4.3.6. Was the rubric/criterion aligned directly with the PLO?

	1. Yes

	2. No
	3. Don't know

Q4.3.7. Were the evaluators (e.g., faculty or advising board members) who reviewed student work calibrated to apply assessment criteria in the same way?

	1. Yes
	2. No
	3. Don't know

Q4.3.8. Were there checks for inter-rater reliability?

	1. Yes
	2. No
	3. Don't know

Q4.3.9. Were the sample sizes for the direct measure adequate?

	1. Yes
	2. No
	3. Don't know

Q4.3.10. How did you select the sample of student work (papers, projects, portfolios, etc)? Please briefly specify here:

We randomly selected 5 papers from each of the two core classes: Soc. 215 and Soc. 240. In Soc. 215, we had 14 students, and we had 15 students in Soc. 240.

Indirect Measures

Q4.4. Were indirect measures used to assess the PLO?

	1. Yes
	2. No **(If no, go to Q4.5)**

Q4.4.1. Which of the following indirect measures were used?

	1. National student surveys (e.g., NSSE, etc.)
	2. University conducted student surveys (OIR surveys)
	3. College/Department/program conducted student surveys
	4. Alumni surveys, focus groups, or interviews
	5. Employer surveys, focus groups, or interviews
	6. Advisory board surveys, focus groups, or interviews
	7. Others, specify:

Q4.4.2. If surveys were used, were the sample sizes adequate?

	1. Yes
	2. No
	3. Don't know

Q4.4.3. If surveys were used, please briefly specify how you select your sample? What is the response rate?

Other Measures

Q4.5. Were external benchmarking data used to assess the PLO?

	1. Yes
	2. No **(If no, go to Q4.6)**

Q4.5.1. Which of the following measures was used?

	1. National disciplinary exams or state/professional licensure exams
	2. General knowledge and skills measures (e.g., CLA, CAAP, ETS PP, etc)
	3. Other standardized knowledge and skill exams (e.g., ETS, GRE, etc)
	4. Others, specify:

Q4.6. Were other measures used to assess the PLO?

	1. Yes
	2. No **(Go to Q4.7)**
	3. Don't know **(Go to Q4.7)**

Q4.6.1. If yes, please specify: [_____]

Alignment and Quality

Q4.7. Please describe how you collected the data? For example, in what course(s) (or by what means) were data collected? How reliable and valid is the data? [WORD LIMIT: 300 WORDS]

The VALUE critical thinking rubric has been used to collect data in order to directly assess 10 student papers selected from two required core courses offered in spring 2013: Statistics (Soc. 215) and Theory (Soc. 240). The graduate assessment committee is made up of four faculty members, each of whom read two papers. To determine the final scores, the group came together to discuss the similarities and differences of our scores until a consensus was reached. The group met again a week later, after reading 8 more papers. All papers were agreed upon with one exception. This one paper was re-read and the average score was used as our final data.

This is the first time that our graduate program has used a rubric (The VALUE rubric) to EXPLICITLY AND DIRECTLY assess our students' critical thinking skills. We have discovered excellent insight into students' critical thinking skill even though our sample size is small. We plan to include more papers in our program's future assessment studies.

Q4.8. How many assessment tools/methods/measures **in total** did you use to assess this PLO? [_____]
NOTE: IF IT IS ONLY ONE, GO TO Q5.1.

Q4.8.1. Did the data (including all the assignments/projects/portfolios) from all the different assessment tools/measures/methods directly align with the PLO?

	1. Yes
	2. No
	3. Don't know

Q4.8.2. Were **ALL** the assessment tools/measures/methods that were used good measures for the PLO?

	1. Yes
	2. No
	3. Don't know

Question 5 (Q5): Use of Assessment Data.

Q5.1. To what extent have the assessment results **from 2012-2013** been used for? **[CHECK ALL THAT APPLY]**

	Very Much (1)	**Quite a Bit (2)**	**Some (3)**	**Not at all (4)**	**Not Applicable (9)**
1. Improving specific courses					
2. Modifying curriculum					
3. Improving advising and mentoring					
4. Revising learning outcomes/goals					
5. Revising rubrics and/or expectations					
6. Developing/updating assessment plan					
7. Annual assessment reports					
8. Program review					
9. Prospective student and family information					
10. Alumni communication					
11. WASC accreditation (regional accreditation)					
12. Program accreditation					
13. External accountability reporting requirement					
14. Trustee/Governing Board deliberations					
15. Strategic planning					
16. Institutional benchmarking					
17. Academic policy development or modification					
18. Institutional Improvement					
19. Resource allocation and budgeting					
20. New faculty hiring					
21. Professional development for faculty and staff					
22. Other Specify:					

Q5.1.1. Please provide one or two best examples to show how you have used the assessment data above.

Q5.2. As a result of the **assessment effort in 2013-2014** and based on the prior feedbacks from OAPA, do you anticipate making any changes for your program (e.g., course structure, course content, or modification of program learning outcomes)?

	1. Yes
	2. No **(If no, go to Q5.3)**
	3. Don't know **(Go to Q5.3)**

Q5.2.1. What changes are anticipated? By what mechanism will the changes be implemented? How and when will you assess the impact of proposed modifications? [WORD LIMIT: 300 WORDS]

Q5.2.2. Is there a follow-up assessment on these areas that need improvement?

	1. Yes
	2. No
	3. Don't know

Q5.3. Many academic units have collected assessment data on aspects of a program that are not related to program learning outcomes (i.e., impacts of an advising center, etc.). If your program/academic unit has collected assessment data in this way, please briefly report your results here. [WORD LIMIT: 300 WORDS]

Question 6 (Q6). Which program learning outcome(s) do you plan to assess next year?

	1. Critical thinking (WASC 1) [1]
	2. Information literacy (WASC 2)
	3. Written communication (WASC 3)
	4. Oral communication (WASC 4)
	5. Quantitative literacy (WASC 5)
	6. Inquiry and analysis
	7. Creative thinking
	8. Reading
	9. Team work
	10. Problem solving
	11. Civic knowledge and engagement – local and global
	12. Intercultural knowledge and competency
	13. Ethical reasoning
	14. Foundations and skills for lifelong learning
	15. Global learning
	16. Integrative and applied learning
	17. Overall competencies for GE Knowledge
	18. Overall competencies in the major/discipline
	19. Others. Specify any PLOs that the program is going to **assess but not included above:** a. b. c.

Part 3: Additional Information

A1. In which academic year did you **develop** the current assessment plan?

X	1. Before 2007-2008
	2. 2007-2008
	3. 2008-2009
	4. 2009-2010
	5. 2010-2011
	6. 2011-2012
	7. 2012-2013
	8. 2013-2014
	9. Have not yet **developed** a formal assessment plan

A2. In which academic year did you last **update** your assessment plan?

	1. Before 2007-2008
X	2. 2007-2008
	3. 2008-2009
	4. 2009-2010
	5. 2010-2011
	6. 2011-2012
	7. 2012-2013
	8. 2013-2014
	9. Have not yet **updated** the assessment plan

A3. Have you developed a curriculum map for this program?

X	1. Yes
	2. No
	3. Don't know

A4. Has the program indicated explicitly where the assessment **of student learning** occurs in the curriculum?

X	1. Yes
	2. No
	3. Don't know

A5. Does the program have any capstone class?

X	1. Yes
	2. No
	3. Don't know

A5.1. If yes, please list the course number for each capstone class: PHYS 175, PHYS 191

A6. Does the program have **ANY** capstone project?

X	1. Yes
	2. No
	3. Don't know

A7. Name of the academic unit: Physics and Astronomy

A8. Department in which the academic unit is located: Physics and Astronomy

A9. Department Chair's Name: William DeGraffenreid

A10. Total number of annual assessment reports submitted by your academic unit for 2013-2014: 1

A11. College in which the academic unit is located:

	1. Arts and Letters
	2. Business Administration
	3. Education
	4. Engineering and Computer Science
	5. Health and Human Services
X	6. Natural Science and Mathematics
	7. Social Sciences and Interdisciplinary Studies
	8. Continuing Education (CCE)
	9. Other, specify:

Undergraduate Degree Program(s):
A12. Number of undergraduate degree programs the academic unit has: 3
A12.1. List all the name(s): Physics BS, Physics BA, Physics BA Teacher Preparation Concentration
A12.2. How many concentrations appear on the diploma for this undergraduate program? 1

Master Degree Program(s):
A13. Number of Master's degree programs the academic unit has: 0
A13.1. List all the name(s): -NA-
A13.2. How many concentrations appear on the diploma for this master program? -NA-

Credential Program(s):
A14. Number of credential degree programs the academic unit has: -NA-
A14.1. List all the names: -NA-

Doctorate Program(s)
A15. Number of doctorate degree programs the academic unit has: -NA-
A15.1. List the name(s): -NA-

A16. Would this assessment report apply to other program(s) and/or diploma concentration(s) in your academic unit*?

X	1. Yes
	2. No

*If the assessment conducted for this program (including the PLO(s), the criteria and standards of performance/expectations you established, the data you collected and analyzed, the conclusions of the assessment) is the same as the assessment conducted for other programs within the academic unit, you only need to submit one assessment report.

16.1. If yes, please specify the name of each program: Physics BA, Physics BA Teacher Prep Concen.
16.2. If yes, please specify the name of each diploma concentration: _____

Department of Physics and Astronomy

Assessment Plan

January 2014

Assessment is a long-term process that allows departments and faculty members to ensure that our students are leaving our program with useful and marketable skills to become successful members of the scientific and general community. This document is provided as an outline for process to ensure this process is done in a meaningful and efficient manner.

Mission, Background, and Goals

Mission Statement

The mission of the major programs of the Department of Physics and Astronomy is to help our baccalaureate graduates attain the knowledge, skills and attitudes that are the foundation for success in Physics and related careers. More specifically, we support three broad groups of students: those who plan to attend graduate school in either Physics or technical disciplines such as Engineering, Computational Science or Astronomy, those who seek technical industrial or laboratory employment, and those who intend to pursue a career in K-12 teaching.

Department Background

We have approximately 90 majors in three degree programs. Our BS in physics provides a rigorous physics background that is designed for students interested in pursuing graduate studies in physics. The BA is a rather traditional "liberal arts" degree that provides a solid background in physics, yet provides flexibility in the degree for students looking for a well-rounded education. The BA-Teacher Preparation Concentration is designed for those interested in a career in secondary education. About half of our graduates move on to graduate studies in physics or a related field (most notably electrical engineering).

Student Learning Outcomes

The mission of the Department is highly aligned with the Sacramento State Baccalaureate Learning Outcomes. These are described in more detail in Appendix A. Specific to the nature of our programs, there are four learning outcomes that we desire our students to be highly proficient in upon graduation. While the "relative importance" of these areas may vary between our degree programs, they are in fact common to all programs. For this reason, at this point, we do not see any reason to develop different outcomes for our three degree programs.

- Physics Knowledge – Students will develop a broad understanding of the basic principles of physics and have a firm foundation for acquiring new knowledge and applying it in a variety of situations. We desire our students to be well schooled in the theories and laws of physics. In

addition to classroom and laboratory experiences, all students in this program are required to attend a minimum of twenty physics colloquium where they are exposed to current research subjects in physics and occasional talks on the history of physics. We wish the future evolution of our curriculum to keep course content and laboratories as modern as feasible with available resources.

- Analytic Reasoning – Students should develop problem solving, critical thinking, and analytical skills and be able to learn new skills as needed. This is an especially important area since quantitative "critical thinking" is badly needed in all technical pursuits and a good Physics background is extremely effective in providing this. It is no accident that people with Physics training are found in every field in which the connection between mathematics and reality is important. Here, it is important to make the students explicitly aware that the development of general analytical skills is at least as high a priority as the course material itself.
- Technical Skills – Students must be exposed to a broad range of technical skills and should become proficient in most. Not too many years ago there was a fairly large distinction between theorists (working with pencil and paper) and experimentalists (in the lab with equipment and instruments). This is not as true today. A theorist may be heavily involved in developing real-world simulations and an experimentalist will likely need to have to build their work on very complex models. We strive to expose students to and develop proficiency in using a wide variety of instruments, tools, and software programs. Many students will demonstrate advanced technical skills by participating in one of our Certificate Programs.
- Communication Skills – Scientists must be able to share their ideas and work with others in their field. The demands of such technical writing (and speech) are generally beyond the scope of the writing requirements as defined in the University General Education program. Very complex theories and experiments must be described in unambiguous terms often peppered with large amounts of mathematics and technical jargon. Large data sets, measured or theoretically generated, must be presented clearly and succinctly in tables and graphs. Scientists must also be able to effectively share their results in other forms, such as conference presentations and poster sessions. Our students learn about all of these modes of communication and gain experiences in them through their work in classes and Senior Projects.