Instructions

1. Complete the attached form and submit it as an email attachment to Graduate and Undergraduate Programs (academicassessment@sjsu.edu) on or before June 1, 2016.

2. Please copy your college’s Associate Dean and Assessment Facilitator on the email submission. Assessment Facilitators are also available to provide support - please feel free to contact them with any questions or concerns.

3. Completed forms will be posted on your Program Records webpage.

Please note that this form has been updated since last year. We have made several minor changes that we believe will streamline the reporting process and increase focus on the implementation of changes based on assessment results (“Closing the Loop”). The program data elements (graduation rates, headcounts, SFR, etc.) have been dropped from this annual assessment report. This data is still available through the Institutional Effectiveness and Analytics (IEA) website and we encourage programs to examine this data on a regular basis. However, this information will only be required to be reported as part of the Program Planning process. This report is organized into three sections designed to organize your annual assessment efforts and to inform your department’s Program Planning. Here is the rationale behind each section.

Part A – The Big Picture
- This section will likely only need to be prepared once at the beginning of your assessment cycle, although it should be reviewed each year and updated as necessary. This information should be included in each annual report, even if it has not changed.
- This section lists your Program Learning Outcomes (PLOs) and, more importantly, how they connect with your curriculum within the program and the University Learning Goals (ULGs).
- Finally, this section presents your assessment plan for the current planning cycle in the form of a multi-year schedule (usually 5 years, updated as part of Program Planning). This schedule should indicate which PLO(s) will be assessed each year, as well as your plans for implementing changes based on assessment results, and re-assessment after changes have been given time to take effect.

Part B – What We Did This Year
- This section details your assessment efforts over the last year (AY 2015-16).
- Which PLO(s) were assessed, how was the data collected, and what do the data tell you with regard to student achievement on this PLO? What do you plan to do, if anything, to improve future achievement levels (i.e., “close the loop”)?

Part C – Keeping Track of the Changes (“Closing the loop”)
- This section is meant to keep a running record of your efforts to improve your students’ outcomes. This table should grow throughout your assessment cycle and will be an important part of your next Program Plan.
- Create a new row in the table each time you propose a change as a result of your assessment efforts. Then be sure to keep track of your change efforts in subsequent years.
Department: Physics and Astronomy

Program: BA and BS

College: Science

Program Website: http://physics.sjsu.edu

Link to Program Learning Outcomes (PLOs) on program website: http://www.sjsu.edu/science/assessment/physics/

Program Accreditation (if any):

Contact Person and Email: Peter Beyersdorf

Date of Report: 6/1/2016

### Part A

#### 1. List of Program Learning Outcomes (PLOs)

(PLOs should be appropriate to the degree and consider national disciplinary standards, if they exist. Each outcome should describe how students can demonstrate learning.)

- 1.1 Students can demonstrate an understanding of Newton’s laws
- 1.2 Students can demonstrate an understanding of Maxwell’s equations
- 1.3 Students can demonstrate an understanding of the Schrödinger equation
- 1.4 Students can answer qualitative and quantitative problems in classical mechanics
- 1.5 Students can answer qualitative and quantitative problems in electricity and magnetism
- 1.6 Students can answer qualitative and quantitative problems in quantum mechanics
- 1.7 Students can demonstrate an understanding of the thermodynamics and statistical mechanics
- 1.8 Students can represent physical systems using mathematics and manipulate mathematical expressions relating to physical systems

- 3.1 Students can locate research results by searching electronic and traditional databases
- 3.2 Students can present research in a form consistent with the AIP style manual

- 4.1 Students can identify and use standard laboratory equipment and instrumentation
- 4.2 Students have developed critical thinking skills (and can apply these skills to solving problems in physics)
- 4.3 Students are proficient using standard software tools (such as Mathematica, Excel and Word) for modeling, data analysis and report writing

#### 2. Map of PLOs to University Learning Goals (ULGs)

(Please indicate how your PLOs map to the University Learning Goals below by listing the PLO under each relevant ULG, or including this map in table form (see examples [here](#)). Use the link above for a full description of each ULG.)

| ULG 1 – Specialized Knowledge |
1.1 Students can demonstrate an understanding of Newton’s laws
1.2 Students can demonstrate an understanding of Maxwell’s equations
1.3 Students can demonstrate an understanding of the Schrödinger equation
1.7 Students can demonstrate an understanding of the thermodynamics and statistical mechanics

ULG 2 – Broad Integrative Knowledge
1.8 Students can represent physical systems using mathematics and manipulate mathematical expressions relating to physical systems

ULG 3 – Intellectual Skills
1.4 Students can answer qualitative and quantitative problems in classical mechanics
1.5 Students can answer qualitative and quantitative problems in electricity and magnetism
1.6 Students can answer qualitative and quantitative problems in quantum mechanics

ULG 4 – Applied Knowledge
3.1 Students can locate research results by searching electronic and traditional databases
3.2 Students can present research in a form consistent with the AIP style manual
4.1 Students can identify and use standard laboratory equipment and instrumentation
4.2 Students have developed critical thinking skills (and can apply these skills to solving problems in physics)
4.3 Students are proficient using standard software tools (such as Mathematica, Excel and Word) for modeling, data analysis and report writing

ULG 5 – Social and Global Responsibilities
N/A

3. Alignment – Matrix of PLOs to Courses
(Please show in which courses the PLOs are addressed and assessed. The curriculum map should show increasing levels of proficiency and alignment of curriculum and PLOs. See examples [here](#))

Key: I-Introduced, R-Reinforced, A-Advanced

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4. **Planning – Assessment Schedule**  
(Please provide a reasonable, multi-year assessment plan that specifies when a PLO will be assessed (A), when you might plan to implement changes as a result of your assessment (I), and, if applicable, when you might reassess a given PLO (R) to gauge the impact of the change. All PLOs should be assessed at least once during each program planning cycle (usually 5 years). Add rows and columns as necessary.)

We just completed our program planning report in Spring of 2016. We are using this summer as an opportunity to streamline our program learning outcomes. Once the new program learning outcomes are determined we will create schedule going forward for these new learning outcomes.

5. **Student Experience**
   a. How are your PLOs and the ULGs communicated to students, e.g. websites, syllabi, promotional material, etc.?

   The PLOs are available on the website listed at the beginning of this report.

   b. Do students have an opportunity to provide feedback regarding your PLOs and/or the assessment process? If so, please briefly elaborate.

   Students will be consulted regarding the redevelopment of our PLOs this summer.

**Part B**

6. **Assessment Data and Results**  
(Please briefly describe the data collected for this report (e.g., student papers, posters, presentations, portfolios, assignments, exams). The instruments used to evaluate student achievement (e.g., rubrics or other criteria) and actual data (e.g., assignment description or instructions) should be attached as appendices.)

Students in Physics 268 prepared an abstract for a scientific talk they gave. The written abstract was collected to assess LO 3.1 and 3.2, and 4.3. The work of all 8 students demonstrated proficiency at locating research results (LO 3.1), producing content in a format consistent with the AIP Style manual (LO 3.2), and using MS word and/or LaTeX (LO 4.3).

Surveys were given to faculty who participated in oral exams as the culminating experience for our masters students to assess LO 1.1-1.7. The survey and the data follow:

Key for student results:
1: Clueless about the relevant principle
2: Vague recollection of the relevant principle
3: Recognition of the relevant principle
4: Working Knowledge of the relevant principle
5: Mastery of the relevant principle

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Student Results</th>
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<tbody>
<tr>
<td>1.1 Students can demonstrate an understanding of Newton’s laws</td>
<td>4,4,5</td>
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</table>
1.4 Students can answer qualitative and quantitative problems in classical mechanics

1.2 Students can demonstrate an understanding of Maxwell’s equations 5, N/A, 4

1.5 Students can answer qualitative and quantitative problems in electricity 3, 4, 4 and magnetism

1.3 Students can demonstrate an understanding of the Schrödinger equation N/A

1.6 Students can answer qualitative and quantitative problems in quantum Mechanics 3, 4, 3

1.7 Students can demonstrate an understanding of thermodynamics and statistical mechanics N/A

7. **Analysis**
(Please discuss the findings and evaluate the achievement of PLOs and/or progress on recommended actions.)

We find that students are meeting our expectations for all learning outcomes assessed.

8. **Proposed changes and goals (if any)**
(Given your findings, please list the proposed changes and goals for the next academic year and beyond – that is, how will you “close the loop”?)

We will be streamlining our PLOs so that data can be collected on a more regular basis. Currently the PLOs are very specific to certain courses and since those courses are not taught every term or even every year it takes many years to generate data

**Part C**
(This table should be reviewed and updated each year, ultimately providing a cycle-long record of your efforts to improve student outcome as a result of your assessment efforts. Each row should represent a single proposed change or goal. Each proposed change should be reviewed and updated yearly so as to create a record of your department’s efforts. Please add rows to the table as needed.)

<table>
<thead>
<tr>
<th>Proposed Changes and Goals</th>
<th>Status Update</th>
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<tbody>
<tr>
<td>Update PLOs</td>
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