PALO VERDE COLLEGE

Program Review

Astronomy/Physics

Presented by Alejandro Garcia

2011-2012

EXECUTIVE SUMMARY

Astronomy/Physics

1. **Program Strengths:**

    a. Faculty involvement in the Colorado River Astronomy Club and other community events related to astronomy.

    b. Commitment by faculty to implement student learning outcomes assessment methods. In both astronomy and physics.

2. **Program Weaknesses:**

    The enrollments in physics sections are low, and PHY 101 is offered only sporadically

3. **Recommendations for Program Improvement:**

    a. Research the feasibility of an online physics course and lab.

    b. Continue efforts to evaluate student learning outcomes to improve student learning and success.

4. **Committee Determination:**

    Report is accepted and may proceed to the next step in the process.

Program Review Committee Approval Date: April 17, 2012

PROGRAM REVIEW

ASTRONOMY/PHYSICS

1. Support of the College Mission

   A. Purpose of the Program

      1. AST 101, AST 105, and AST 110 offer instruction in college-level astronomy, with emphasis on the observational, mathematical, and historical development of the science.

      2. PHY 101, PHY 110, and PHY 220 offer instruction in college-level physics, with emphasis on the experimental, mathematical, and historical development of the science. Astronomy is naturally an excellent source for physics applications.

   B. Support of the College Mission

      1. Course offerings in astronomy and physics are well-suited to fulfilling the College's mission of addressing the natural desire to understand the world and the heavens.

   C. Unique Institutional Goal

      1. The six courses are applicable to the associate degrees offered by Palo Verde College. They are transferable and applicable to IGETC.

      2. All of the offerings in astronomy and physics are transferable to California State University and the University of California. In this way, these courses assist students seeking to pursue four-year degrees in Science. The program also provides access to astronomical events.

2. Accomplishments in Achieving Previous Goals

   A. Progress

      1. <u>Projected Goal</u>: At present, there are not sufficient funds to fulfill the project of building an observatory north of the College. The number of physics courses offered should be increased. The physics laboratory should be equipped, at least to a minimum.

   B. Accomplishment of Goals

      2. <u>Accomplishment of Goal</u>: In 2004, the College offered only one astronomy course, AST 101. Now three courses are offered: AST 101, AST 105, and AST 110.

      3. <u>Accomplishment of Goal</u>: Following the recommendation of the administration of the College, Dr. Garcia in 2004 contacted the Astronomy Club to reinitiate its activities. The club had been inactive for many years. The club now is called PVC's Colorado River Astronomy Club.

3. Population Served

   A. Describe Populations

1. Students seeking transferable courses, associate degrees, or both.

B. Other Populations

2. Students enrolling in astronomy or physics courses for personal enrichment.

4. Curriculum History

A. Courses in the Program

1. AST 101 Introductory Astronomy
2. AST 105 The Solar System
3. AST 110 Beyond the Solar System
4. PHY 101 Introduction to Physics
5. PHY 110 General Physics 1
6. PHY 220 General Physics 2

B. History

The three Astronomy courses have been repeatedly and successfully offered for more than three years. It is believed that the courses will continue to be successfully offered since there has been a strong demand for them. As for Physics, only Physics 101 has been offered three times in the same period of time.

5. Course Scheduling and Availability

A. How scheduling Optimizes Availability: For Astronomy, the courses have been offered face to face during the evening, and/or distance learning to accommodate the demand. For Physics, the courses have been offered sporadically.

B. How Scheduling Optimizes Student Learning: It is convenient to offer astronomy courses in the late afternoon or in the evening so that part of the time could be used to observe the stars in the dark.

6. Student Learning Outcomes

A. Process: The course outlines of record for all astronomy courses have been regularly updated by Division faculty members. Course outlines incorporate student learning outcomes. The following plan is being implemented.

The course syllabus is updated continuously with revisions and improvements to make learning more effective. Before introducing a topic, a pre-test is administered to determine prior knowledge. The pre-test can be written or verbal. After analyzing the needs of the students from the pre-test, direct instructions are provided along with frequent checking for understanding as the instruction proceeds. Checking for understanding may be oral, written, or a demonstration. To accomplish this, the following teaching strategies are implemented: students summarize for the class the salient points of the direct instruction; students come to the board to teach a problem to the class; or students work in cooperative groups to solve problems. As errors are

detected that are common to the group, Help Guides are developed. One of the most effective methods of developing Help Guides is to have the students participate in the development of the guides, which increases class participation and ownership of the strategies in the Help Guides. After direct instruction and checking for understanding, the students then will do practical exercises in implementing what they have learned, often working in groups to solve problems or do experiments. Assignments are provided in which students research different topics and report out on them. Students participate in science experiments on the topic of discussion. For the astronomy and physics classes, students are invited to all of the events of the Colorado River Astronomy Club. Post-tests are conducted following instruction, results are reviewed with the students, and then these results are evaluated to determine if the areas where students needed help have been addressed.

B. Improvements: Many of the strategies are already being implemented. Other elements of learning assessment will be implemented in the future, as data is compiled and documentation is modified. The use of technology will be increased to provide even more simulations and observations. Based on outcomes from future assessments, improvements will be made in student learning outcomes.

7. Program and Course Coverage

A. Course Coverage by Full- and Part-time Faculty: For Astronomy, the astronomy program has had an instructor for the past ten years. There is adequate coverage based on enrollment of the program. Therefore, one or two astronomy courses have been offered each semester. For Physics, only Physics 101 has been offered sporadically.

B. Plans to improve coverage: So far, the astronomy courses offered by the Division have successfully covered the increasing demand.

C. Physics should be offered consistent with demand.

8. Professional Development

A. The instructor teaching the College's astronomy and physics courses is a full-time mathematics, physics, and astronomy instructor, and maintains current best practices of teaching theory and observational astronomy. Whenever possible, the instructor travels to different observatories, museums and astronomical places of interest in California and nearby states. As an adviser of the PVC's Colorado River Astronomy Club, he helps organize at least two major astronomical observational public events and several informal events in Blythe yearly.

9. Student Performance and Completion

A. The Registrar Office provided the following information:

COURSE COMPLETIONS FOR AST 101			
TERM	Number of Students Enrolled	Number of Students with Final Grade C or Better	Percentage of Success
Fall 2010	47	31	66
Fall 2011	33	19	58

COURSE COMPLETIONS FOR AST 105			
TERM	Number of Students Enrolled	Number of Students with Final Grade C or Better	Percentage of Success
Fall 2008	42	34	81
Spring 2009	48	40	83
Fall 2009	24	22	92
Spring 2010	32	23	72
Spring 2011	29	23	79
Spring 2012	35	Pending	Pending

COURSE COMPLETIONS FOR AST 110			
TERM	Number of Students Enrolled	Number of Students with Final Grade C or Better	Percentage of Success
Spring 2012	15	Pending	Pending

COURSE COMPLETIONS FOR PHY 101			
TERM	Number of Students Enrolled	Number of Students with Final Grade C or Better	Percentage of Success
Fall 2008	8	5	63
Fall			

2009	11	8	73
Fall 2010	14	11	79

B. Degree Completions: Currently there is no associate degree with major or emphasis in astronomy or physics. However, many students apply AST 101, AST 105, and AST 110, PHY 101, PHY 110, PHY 220 toward the associate degree in science offered by the College.

10. Enrollment and Financial Trends

A. Enrollment: The total numbers in the past four years are

TERM	TOTAL ENROLLMENTS IN AST/PHY
Fall 2008	50
Spring 2009	48
Fall 2009	35
Spring 2010	32
Fall 2010	61
Spring 2011	29
Fall 2011	33
Spring 2012	50

This means that the average number of astronomy and physics students for those eight semesters has been 42. However, the enrollment in the fall of 2011 was 33, and in the spring of 2012 it increased to 50, a real improvement.

B. Expenditures: In the past three years, the College has not incurred any expenditure for physics classes, astronomy classes or astronomy events. The Astronomy Club has supplied capital and equipment for the astronomy events.

11. Facilities

A. Adequacy of Current Facilities: For the present, the facilities are adequate.

B. Adequacy of Dedicated Space: Adequate for the present.

C. Adequacy of equipment: Adequate for the present.

D. Plans for future changes: The past administration has commented about the possibility of constructing an observatory; however, the fiscal situation prohibits this plan. Exhibits can be set up in the Library and projections can be shown in the Auditorium. The Colorado River Astronomy Club may do presentations.

12. Strengths and Weaknesses

A. Strengths: The faculty and the administration of PVC and the community of Blythe have shown interest in astronomy courses and astronomy events. The enrollment in astronomy courses and the attendance for astronomy events has increased in the past three years. The Colorado River Astronomy Club has promoted the name of the college and attracted new students. The Club presents a three-day Star Stare event in the fall, which attracts astronomers from many other areas and provides a community night which is always well attended. It also hosts an event for International Astronomy Day in the spring, which takes place at the local Palo Verde Valley Public Library. Art contests are held to promote participation in the International Astronomy Day by students in the elementary and secondary schools. Observations are also held informally throughout the year to view different astronomical events, such as the Messier Marathon.

B. Weaknesses: The lack of a dedicated facility. There is only one astronomy and physics instructor at PVC. This limits the possibilities to offer new courses.

13. Plans to Remedy Weaknesses

Plans for addressing weaknesses of the astronomy program will be the construction of a dedicated facility and perhaps events will be held at the Performing Arts Theater. More displays promoting astronomy and physics will be presented in the library.

14. Plans to Advance the Program

More astronomy and physics courses will be implemented in the near future. The astronomy courses and the astronomy events will be coordinated. The existing buildings and facilities will be used to promote interest in astronomy and physics.