Math and Science

Palo Verde Community College

Program Review

2014-2015

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PROGRAM REVIEW 2011 - 2014
ASTRONOMY/PHYSICS
By Alejandro Garcia

EXECUTIVE SUMMARY

AST 101, AST 105, and AST 110 are the three courses in astronomy available to Palo Verde College students. Each is transferable to both the University of California and the California State University systems. They are applicable to IGETC and can be used as major requirements for the associate in science degree. During the past six years, one or two of these courses have been successfully offered every semester. The science division has plans to implement more astronomy courses, such as 'Life in the Universe', for which there are excellent new texts.

PHY 101, PHY 110, and PHY 220 are the three courses in physics available to Palo Verde College students. Each is transferable to both the University of California and the California State University systems. They are applicable to IGETC and can be used as major requirements for the associate in science degree.

Historically, astronomy and physics have been developed simultaneously, often by the same great scientists. For instance Newton, Kepler, and Huygens were great scientists who made important contributions to both physics and astronomy. Moreover, the separation of physics and astronomy as different sciences was introduced only recently. This becomes obvious when students take courses in these two sciences which have been artificially separated.

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 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, mathematical, and historical development of the science. Astronomy is naturally an excellent source for physics applications.

3. Courses fulfill GE requirements for the AA degree with emphasis in math and science.

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

5. 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.

6. The program provides students access to events in astronomy.

B. Support of the College Mission

Course offerings in astronomy and physics are well-suited to fulfilling the College's mission by addressing the natural desire to understand the universe. These programs offer students the opportunity to study in an exemplary learning environment and the opportunity to acquire a curiosity and interest about science that will stay with them all their lives. As such, physics and astronomy are consistent with the college's mission, to wit:

Palo Verde College is a California community college that supports an exemplary learning environment with high quality educational programs and services. The College promotes student success and lifelong learning for a diverse community of learners.

C. Unique Institutional Goal

Physics and astronomy are rigorous programs in science, requiring considerable application of study and skills to master them. As such, physics and astronomy fulfill Initiative I of the Integrated Strategic Plan, Instructional Programs and Student Success, which states:

Deliver and continuously improve upon quality educational programs, emphasizing student learning leading to certification, conferral of associate degrees, transfer to four-year institutions, and personal growth and career enhancement.

2. Accomplishments in Achieving Previous Goals

A. Progress

1. Accomplishment of Goal: 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 classroom should be equipped, at least to a minimum, for experiments and demonstrations. The astronomy program should also provide access to astronomical events.

2. Accomplishment of Goal: In the past the College offered only one astronomy course, AST 101. Now three courses are offered every year, and the number of students enrolled in these courses remains high. In the case of AST 105, the enrollments have tripled over the past three years (see table in Section 9, below):

AST 105, SP 2012, 1 section, 36 enrollments
AST 105, SP 2013, 1 section, 20 enrollments
AST 105, SP 2014, 4 sections, 109 enrollments

3. Accomplishment of Goal: The goal of providing access to astronomical events has been met and exceeded. Dr. Garcia has continued as Advisor for the PVC Colorado River Astronomy Club, which provides many events throughout the year for the club members as well as the community.

4. Accomplishment of Goal: There will be no funding in the near future for the construction of an observatory.

B. Other than the fact there is no funding for an observatory, there is no modification of previous goals.

3. Population Served

A. Describe Populations
1. Students seeking transferable courses, associate degrees, or both.
2. Students enrolling in astronomy or physics courses for personal enrichment.

B. There are no other populations served by these courses.

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

PHY 220 has never offered in the past six terms due to lack of demand. Faculty has initiated the process of making PHY 220 inactive.

5. Course Scheduling and Availability

A. How scheduling Optimizes Availability:

For astronomy, courses have been offered face-to-face, during the day and evenings, and in correspondence mode to accommodate demand.

For physics, courses have been offered in correspondence mode to accommodate demand.

B. How Scheduling Optimizes Student Learning:

It is beneficial to student learning to offer astronomy courses in the late afternoon or evening so that part of the time could be used to observe the stars in the night sky.

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 syllabi for physics and astronomy are 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, faculty provide direct instruction, 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, Study Guides are developed. One of the most effective methods of developing Study Guides is to have the students participate in the development of the guides, which increases class participation and ownership of the strategies in the Study Guides. After direct instruction and checking for understanding, the students then are invited to 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 are invited to 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. The following are SLOs and assessments for AST 101, AST 105, AST 110 and PHY 101, as reported on the Instructor CLO Data Collection Worksheet, Fall Semester 2014-2015:

AST 101 SLOs

1. Follow, with the naked eye, binoculars, or a (small) telescope the motion of the planet Mars for several weeks and explain its retrograde motion.

   To assess SLO #1, a first test and a Midterm test are provided.
   Success means more than 70% in both the first test and the Midterm test.
   Number of students that met or exceeded the baseline: 13
   Number of students assessed: 18
   % of students that met or exceeded the baseline: 72

2. Attend the several stargazing events organized by the local PVC Astronomy Club and turn in a Term Paper describing your observations.

To assess SLO#2, a third test and a Final test are provided.
Success means more than 70% in both the third test and the Final test.
Number of students that met or exceeded the baseline: 13
Number of students assessed: 18
% of students that met or exceeded the baseline: 72

Conclusion:

This is a face to face course that has proved to be successful. One important aspect of the success is that students were provided with study guides based on direct observations at the stargazing events, so their results were notable.

Improvements:

I conclude from the results that the level of difficulty of the course is adequate because approximately 28% found it challenging, but the majority of the students were successful. Since the level of difficulty is adequate, I will administer two additional quizzes emphasizing direct observations to increase depth of knowledge of the material. Part of the 28% includes students who dropped the course. For the remaining students who did not pass, the additional checking for understanding may increase the success rate of those students who found it too challenging.

AST 105 SLOs

1. State Kepler's laws of motion and universal gravitation and explain how they account for Newton's laws.

To assess SLO #1, a first test and a Midterm test are provided.
Success means more than 70% in both the first test and the Midterm test.
Number of students that met or exceeded the baseline: 22
Number of students assessed: 29
% of students that met or exceeded the baseline: 76

2. Describe the key orbital and physical properties of Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Pluto.

To assess SLO#2, a third test and a Final test are provided.
Success means more than 70% in both the third test and the Final test.
Number of students that met or exceeded the baseline: 22
Number of students assessed: 29
% of students that met or exceeded the baseline: 76

Conclusion:

This is a correspondence course that has proved to be successful. One important aspect of the success is that students from the prison have time to dedicate to their studies, so their results are notable.

Improvements:

I conclude from the results that the level of difficulty of the course is adequate because approximately 24% found it challenging, but the majority of the students were successful. Since the level of difficulty is adequate, I will administer two additional quizzes to increase depth of knowledge of the material. Part of the 24% includes students who dropped the course. For the remaining students who did not pass, the additional checking for understanding may increase the success rate of those students who found it too challenging.

AST 110 SLOs

1. Describe the overall structure of the Milky Way and enumerate the differences between the various regions.

   To assess SLO #1, a first test and a Midterm test are provided.
   Success means more than 70% in both the first test and the Midterm test.
   Number of students that met or exceeded the baseline: 17
   Number of students assessed: 29
   % of students that met or exceeded the baseline: 59

2. Evaluate the chances of finding life elsewhere in the solar system.

   To assess SLO #2, a third test and a Final test are provided.
   Success means more than 70% in both the third test and the Final test.
   Number of students that met or exceeded the baseline: 17
   Number of students assessed: 29
   % of students that met or exceeded the baseline: 59

   Conclusions:
   This is a correspondence course that has proved to be successful. One important aspect of the success is that students from the prison have time to dedicate to their studies, so their results are notable

Improvements:

I conclude from the results that the level of difficulty of the course is adequate because approximately 40% found it challenging, but the majority of the students were successful. Since the level of difficulty is adequate, I will administer two additional quizzes to increase depth of knowledge of the material. Part of the 40% includes students who dropped the course. For the remaining students who did not pass, the additional checking for understanding may increase the success rate of those students who found it too challenging.

PHY 101 SLOs

1. Apply the concepts of velocity, inertia, acceleration, force, Newton's laws, rotational inertia and energy to the motion of macroscopic objects.

   To assess SLO #1, a first test and a Midterm test are provided.
   Success means more than 70% in both the first test and the Midterm test.
   Number of students that met or exceeded the baseline: 10
   Number of students assessed: 15
   % of students that met or exceeded the baseline: 75

2. Apply the concepts of temperature, heat expansion, heat transfer, thermodynamics, and changes of state to practical problems.

   To assess SLO#2, a third test and a Final test are provided.
   Success means more than 70% in both the third test and the Final test.
   Number of students that met or exceeded the baseline: 10
   Number of students assessed: 15
   % of students that met or exceeded the baseline: 75

   Conclusions:

   This is a correspondence course that has proved to be successful. One important aspect of the success is that students from the prison have time to dedicate to their studies, so their results are notable.

   Improvements:

   I conclude from the results that the level of difficulty of the course is adequate because approximately 25% found it challenging, but the majority of the students were successful. Since the level of difficulty is adequate, I will administer two additional

quizzes to increase depth of knowledge of the material. Part of the 25% includes students who dropped the course. For the remaining students who did not pass, the additional checking for understanding may increase the success rate of those students who found it too challenging.

B. Improvements (summary):

Many of the strategies for improving learning are already being implemented. These improvements include:

AST 101, AST 105, AST 110, and PHY 101: To increase depth of knowledge of the material, add two additional quizzes in each course, emphasizing direct observations

Other Improvements:

For correspondence physics sections, increase the number of experiments to enhance student learning.

Increase the amount of time observing stars and planets in the night sky in astronomy classes.

Provide study guides to students to assist in learning and preparing for exams.

In upcoming years, faculty will conduct additional assessments to evaluate the effectiveness of these learning improvements.

7. Program and Course Coverage

A. Course Coverage by Full- and Part-time Faculty:

Courses in astronomy and physics are currently taught by one full-time instructor. The instructor also teaches courses in statistics and mathematics. In view of demonstrated trends in enrollment growth in astronomy, there is a need for an additional full-time instructor in astronomy.

B. Ongoing or Projected Deficiencies

There is need for an additional full-time instructor in astronomy in view of the fact that only one full-time instructor has responsibilities for teaching sections in astronomy, physics, mathematics and statistics.

C. Plans to improve coverage:

The program review recommends the hiring of a full-time astronomy instructor.

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. He is participating in the training offered through the Research and Education Collaborative Occultation Network (RECON) project, as part of the Cal Poly San Luis Obispo research program through the National Science Foundation.

B. There is a need for additional professional development in astronomy, specifically, continuing participation in the RECON project.

9. Student Performance and Completion

A. Display and comment on semester by semester course completions in the program over the preceding six semesters. (Course completion rate = A, B, C or CR divided by A, B, C, D, F, CR, NC, W, MW, IP).

Term	Prefix	Sec	Course Name	Mode	Total Enroll	C or P or Better	% C, P or Better
2011FA	AST-101	01	Intro Astronomy	LEC	19	12	63.2%
2011FA	AST-101	02	Intro Astronomy	TXLEC	24	7	29.2%
2012FA	AST-101	02	Intro Astronomy	TXLEC	28	18	64.3%
2012FA	AST-101	03	Intro Astronomy	TXLEC	17	11	64.7%
2012SP	AST-105	01	Solar System	TXLEC	36	25	69.4%
2012SP	AST-110	01	Beyond Solar System	TXLEC	17	14	82.4%
2013FA	AST-101	01	Intro Astronomy	LEC	19	15	78.9%
2013FA	AST-101	02	Intro Astronomy	TXLEC	31	24	77.4%
2013SP	AST-105	01	Solar System	TXLAB / TXLEC	30	19	63.3%
2013SP	AST-110	01	Beyond Solar System	TXLAB / TXLEC	26	22	84.6%
2014SP	AST-105	01	Solar System	TXLAB / TXLEC	30	22	73.3%
2014SP	AST-105	02	Solar System	TXLAB / TXLEC	28	20	71.4%
2014SP	AST-105	03	Solar System	TXLAB / TXLEC	28	21	75.0%
2014SP	AST-105	04	Solar System	TXLAB / TXLEC	23	13	56.5%
2014SP	AST-110	01	Beyond Solar System	TXLAB / TXLEC	28	20	71.4%
Average Completion Rate With C or P or Better					384	263	68.5%

2013SP	PHY-101	01	Intro to Physic	TXLAB / TXLEC	25	19	76.0%
2014SP	PHY-101	01	Intro to Physic	TXLAB / TXLEC	21	13	61.9%
Average Completion Rate With C or P or Better					46	32	69.6%

The average number of astronomy and physics students for the six semesters was 25. The successful completion rate for all astronomy sections was 68.5%, while the successful completion rate for physics section was 69.6%.

B. Degree Completions:

Courses in astronomy and physics are certified as IGETC and CSU-GE and are electives for the college's general education requirements for Options A, B and C, as well as for the AA degree with emphasis in mathematics and science.

The number of AA degrees with emphasis in mathematics and science that have been awarded over the past three years are as follows:

2013: 23 AA degrees
2014: 20 AA degrees
2015: 39 AA degrees

10. Enrollment and Financial Trends

A. Please refer to the enrollment data table in Section 9.A., above.

B. Expenditures for astronomy and physics: There have been no expenditures for AST or PHY during the preceding three years. The Astronomy Club raises funds through donations and dues. The club's fund balance as of November 24, 2015 is $1,385.00

11. Facilities

A. Adequacy of Current Facilities: For the present, the facilities are adequate; however, as programs in astronomy and physics continue to grow, there will be increasing need for lab facilities.

B. Adequacy of Dedicated Space: There is need for more storage space for equipment, including telescopes. (Currently, astronomy program telescopes are stored in the chemistry lab area.)

C. Adequacy of Equipment: There is need for reusable astronomy and physics kits for students.

D. Plans for future changes: The past administration has commented about the possibility of constructing an observatory; however, the college's 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 enrollment in astronomy courses and the attendance for astronomy events has increased significantly in recent years, suggesting growing interest among students in astronomy (see table, Section 9A).

B. Weaknesses: There is a continuing difficulty in enrolling face-to-face students for physics courses; enrollment in correspondence sections in physics have remained stable (see table, Section 9A).

13. Plans to Remedy Weaknesses

Plans for addressing weaknesses of the face-to-face sections of the astronomy and physics classes would be to increase public events and displays promoting astronomy and physics. At present, there are displays in the PVC Library and the Blythe Public Library, and these presentations could be expanded.

14. Plans to Advance the Program

A. Although the cost of classroom experiments and demonstrations is fairly inexpensive, faculty will continue to include budget request items in annual budget proposals for physics and astronomy.

B. Consider the purchase of reflecting or refracting telescope to supplement classroom learning.

C. Continue to coordinate astronomy courses and the astronomy events.

D. Hire an additional full-time instructor in astronomy.

E. The math and science division should consider diversifying the offerings in the physical sciences, including courses such as geography and geology.

Program Review 2011 - 2015
Biology
By Dr. Solomon Toyin Osayande

EXECUTIVE SUMMARY

The Biology Program focuses on fulfilling the mission of the Palo Verde College in terms of the context of the curricula of varied courses of the discipline. The mission of Palo Verde College states:

Palo Verde College provides an exemplary learning environment that promotes student success, lifelong learning and community development, respectively.

The mission of the college embodies these core values:

Excellence

Palo Verde College is committed to excellence. The college expects quality instructions and services, and applauds the achievement of its students, faculty and staff.

Learning

Palo Verde College facilitates lifelong learning and encourages scholastic achievement. The College believes that knowledge, understanding, and their fair application are keys to a better future.

Integrity and Ethics

Palo Verde College maintains the highest standards of ethics and integrity. The College consistently demands respect, honesty and fairness in its educational programs, professional interactions, and community relations.

Diversity

Palo Verde College celebrates diversity in its students, in its faculty, staff, and in its community.

Creativity

Palo Verde College supports and encourages creativity and innovation.

Civil Responsibility

Palo Verde College supports the continuous development of its civic responsibility.

The Biology Program serves several roles encompassing: Preparing students in Biology- based majors to be successful following their transfer to university programs; Preparing students in Biology related occupational degrees such as Nursing and Allied Health for career success; Assisting General Education students in developing an understanding of the modes of inquiry and basic contents of the discipline; Assisting all students in developing the ability to utilize the scientific method of inquiry to find and comprehend information relating to biological issues, and to apply that knowledge to their "real lives," including recognition of ethical aspects of knowledge; Assisting students in moving toward becoming self-reliant learners, and willing to engage in intellectual inquiry.

The Biology Program course offerings are student centered. The Biology Program schedules an effective mix of day, evening and night courses across the Biology curricula. The varied courses include, but are not limited to: Introduction to Biology, Introduction to Biology Laboratory, Basics

of Biology, Basic Microbiology, Evolution, Animal Biology (Zoology), Introductory Botany, Human Anatomy and Human Physiology.

Part 1: Support of the College Mission

State the purpose of the program.

The Biology Program is designed to provide varied science courses that help address the educational needs of the community. Biology courses are currently used as core and elective requirements for an Associate in Science Degree and General Education respectively. A large number of our courses meet the course requirements transferable to a Bachelor Degree at a 4 year institution.

Describe how the program supports the overall mission of the college as adopted by the Board of Trustees.

The Biology Program provided an exemplary learning environment through teaching, use of the scientific methods to solve problems, proficient use of laboratory techniques, analysis and critical thinking skills and hands-on experiences. Additionally, the goal of the Biology Program supports the college mission by providing courses that include the general education requirements needed for transfer purposes and meet the requirements for the Licensed Vocational Nursing, the Registered Nursing Programs and the Bachelor of Science in nursing respectively.

Describe the unique institutional goal the program achieves.

The Biology Program is consistent with Strategic Plan Initiative 1, as follows: the Biology Program provides general education transferable courses designed toward the completion of the Licensed Vocational Nurse (LVN), the Registered Nurse (RN) and the Bachelor of Science in Nursing (BSN) Programs. Based on the aforementioned, the Biology Program provides opportunity for students to fulfill community need for well-trained professional healthcare workers. Additionally, all biology courses are transferable to four years institutions of higher learning. Upon completion of biology coursework, students should be able to use scientific methodologies to understand, describe, explain and even predict human behavior and natural phenomenon.

Part 2: Accomplishments in Achieving Goals Outlined in the Previous Program Review

Describe progress in achieving goals outlined in the previous program review, providing evidence documenting such achievements.

The Biology Program successfully accomplished the prior goal outlined in the previous program review of preparing the prospective students for employment. Case in point, 20 former Palo Verde College students upon successful completion of the LVN, RN, BSN and Dental Hygiene Programs are gainfully employed at Palo Verde Hospital, La Paz Regional Hospital in Parker, Arizona, and

Eisenhower Medical Center, in Rancho Mirage, Ironwood State Prison and Chuckawalla Valley State Prison in Blythe, California.

Explain modifications of goals outlined in the previous program review, providing evidence documenting such modifications.

By working collaboratively with the curriculum committee, the biology department has strengthened the prerequisites for entry to biology courses in terms of English, and Mathematic courses. This has strengthened the fundamental basis of reading, writing and arithmetic that is required to succeed in the class.

Part 3: Populations Served

Describe the populations served by the program, including special populations.

The populations served by Biology Program include:

- Persons interested in the Licensed Vocational Nursing program
- Persons interested in a Registered Nursing program
- Persons interested in a Bachelor of Science in nursing program
- Individuals needing continuing educational courses to maintain licenses and certificates
- Students who are pursuing the Associate of Science Degree
- Prospective students who are interested in transferring to institutions of higher learning
- Biology Program makes every effort to appeal to a diverse population of students through scheduling arrangements that meet the needs of students including: graduating high school seniors, single parents, disabled, minority, and economically disadvantaged.

Describe other populations that should be served by the program, and describe plans to serve them in the future.

It is our position that courses will continue to be developed to meet the needs and aspirations of our community.

Part 4: Curriculum History

List the courses constituting the program.

The courses constituting the Biology Program encompass:

- BIO 100 Introduction to Biology
- BIO 101 Introduction to Biology Laboratory
- BIO 110 Basics of Biology
- BIO 111 Basic Microbiology
- BIO 140 Animal Biology (Zoology)
- BIO 141 Introductory Botany (formerly BOT 140)
- BIO 142 Marine Biology
- BIO 210 Human Anatomy

- BIO 211 Human Physiology

List those courses that have not been successfully offered at least once during the preceding 6 semesters.

- BIO 140 Animal Biology (Zoology)
- BIO 141 Introductory Botany (formerly BOT 140)

Explain why such courses were not successfully offered.

The aforementioned courses were not successfully offered because of student preference for other courses that constitute the Biology Program. Additionally, when offered, courses with low enrollment are usually cancelled by the Office of Instruction.

Provide a strategy for improving their success, or explain why they should not be removed from the program.

The Biology Program will continue the broad offering of courses and schedules to serve all students. We will schedule and effective mix of day, evening and night courses across the Biology curricula.

Part 5: Course Scheduling and Availability

Describe how effectively the scheduling process of classes in the program:

Optimize class availability for day students, evening students and distance education students.

The Biology Program courses offering are student centered. We offer a wide range of courses to our prospective students. We schedule a mix of day and evening courses and many sections across the Biology curricula in order to optimize classes each semester and summer session for day students, evening students and distance education students. The great success in number of students enrolling in Biological courses is an attestation to the aforementioned.

Optimizes Student Learning

Many factors help contribute to student optimize learning in the Biology Program. The quality of instruction is highly important. The quality of student learning are reflected by student grades, student retention and student satisfaction. In the Biological science courses, student is evaluated using retention rates (percentage of students that remain in class until the end of the semester), and successful completion rates (percentage of students that receive A, B or C grades in the class). Many factors can contribute to a student's ability to successfully complete a biology course. These

include quality of instruction, course content, student preparedness, support services for specific courses and student workload are some factors that affect student success.

We continue to schedule a mix of day, evening and night courses and many sections across the Biology curricula in order to optimize diversity in class offerings each semester and summer session for day students, evening students, and distance learning students.

Part 6: Student Learning Outcomes

Describe the process by which the program identifies measures and evaluates student learning outcomes at the course, program and degree levels and provide evidence that this process is being followed.

The Division of Mathematics and Sciences at Palo Verde College attest that understanding of mathematics and sciences is imperative and an integral part of well-rounded education. Towards this clear-cut goal, the Division recently instituted the Student Learning Outcomes (SLO) for all courses that demonstrate research, analytical reasoning, applied science and technological skills for real life expectations.

The Biology discipline strive to maintain the currency of course content and laboratory exercise (when applicable). All course outlines have been revised and updated within the last two years. The Biology Program utilizes the pre-and-post test in addition to the traditional examinations testing procedures in our assessment of Program's relationship to outcome. Commencing spring 2007 semester, the pre-tests and post-tests were given to face to face in-class students. Similarly, a rubric has been developed for scoring each question. The pre - test and post - tests are duly administered at the beginning of the semester and end of the semesters. These tests are designed to ascertain the present level of student learning.

Beginning fall 2014, Math/Science Division faculty members mapped all CLOs to PLOs and all CLOs to ILOs for each course and program offered in Biology department. The biology department was one of the programs implementing, assessing and utilizing SLO data. We have been posting syllabi online for the biology courses. All biology syllabi list student learning outcomes which match the Current Outline of Record.

Describe the process by which program improvements are made, and provide evidence that this process is being followed.

Through SLO analysis and data collection, SLO have been revised fall 2014 for three biology courses: BIO 110 – Basics of Biology, BIO 111- Basic Microbiology & BIO 211- Human Physiology. These changes are a result of SLO data collection.

Part 7: Program and Course Coverage

Describe how effectively courses in the program are covered by Full-Time and Part-Time Faculty.

The Biology Program has a full-time professor and an adjunct professor at the Palo Verde College Main Campus and one adjunct professor at the Needles Center. The aforementioned currently cover all courses by a mix of day, evening, and night classes while using face-to -face, correspondence and online modes of instruction.

Describe ongoing projected deficiencies in faculty coverage of courses in the Program

There is need for additional full-time faculty member for Biology department.

Describe plans to improve program and course coverage, if applicable

For adequate course coverage, there is need for additional full time faculty.

Part 8: Professional Development

Describe specific professional development activities in which faculty members in the program participate, and explain how such activities benefit or enhance the program and support and facilitate student learning outcomes.

The Biology Program faculty members are involved in professional development activities by attending conferences such as the Hispanic Association for Colleges and Universities, The National Science Foundation and the American Association for the Advancement of Science respectively. Additionally, the faculty members of the Biology Program duly participate in Palo Verde College Flex Day, College seminars, and career Day activities. Faculty members participate in webinars and webinar based sponsored training. The knowledge gained in the aforementioned are duly transmitted to prospective students in the Biology Program, thereby enhancing their know-how. These professional development activities were not funded by Palo Verde College.

Describe areas of unmet professional development needs among faculty in the program, if applicable, and outline plans to address those needs.

Areas of unmet professional development needs results from lack of funding from Palo Verde College to sponsor faculty memberships, travel and conference attendance for the past five years.

Part 9: Student Performance and Completion

Display and comment on semester-by-semester course completions in the program over the preceding 6 semesters.

Academic Year	Total Student Enrollment	Successful Completion	Number Withdrawing	Retention Rate

Fall 2011	165	115	50	70%
Spring 2012	147	83	64	56%
Fall 2012	170	102	68	60%
Spring 2013	149	99	50	66%
Fall 2013	200	126	74	63%
Spring 2014	195	108	87	55%
Average		**62%**		**61.6%**

Based on extrapolation of the above table, the Biology Program continues to contribute to the overall Palo Verde College mission of exemplary learning environment that promotes student success. The retention rate for biology discipline courses over the last six semesters is 61.6% and is an indication of student's belief that they can successfully complete the course. This is remarkable given the nature of the discipline's courses and their diversity. Successful completion rate for the discipline are respectable. Over the last six semesters, 62% of our students have completed biology courses successfully.

Display and comment on annual degree or certificate completions, if applicable, over the preceding three (3) academic years

In the preceding three years, former Palo Verde College students in the Biological sciences programs have successfully completed their degrees: (5) LVN, (2) RN & (1) BSN.

Part 10: Enrollment and Financial Trends

Display and comment on semester-by-semester enrollments in the program courses over the preceding 6 semesters.

Academic Year	Enrollment
Fall 2011	165
Spring 2012	147
Fall 2012	170
Spring 2013	149
Fall 2013	200
Spring 2014	195

Enrollment in the past six semesters shows two distinct trends. From fall 2011 to fall 2013, there is modest enrollment growth. There is growth spurt from spring 2013 to spring 2014. It is the concern of the Biology department and Palo Verde College in particular that a large percentage of students

begin a course but withdraw prior to completing it. Biology faculty members regularly call students and emails students that are absent from class.

Display and comment on semester-by-semester expenses incurred by the program over the preceding 6 semesters, as to: supplies, contracts, capital outlay and other non-salary expenses.

2011-2012	Supplies	Contracts	Total
Biology	$520	$ -	$520

2012-2013	Supplies	Contracts	Total
Biology	$ -	$ -	$0

2013-2014	Supplies	Contracts	Total
Biology	$115	$ -	$115

Expenses incurred by the Biology Program over the preceding 6 semesters are appropriate for current enrollment.

Part 11: Facilities and Equipment

Are current facilities, such as classrooms, offices and equipment, adequate to support the program? Explain.

There is one dedicated lecture/laboratory classroom for the Biology Program. Adjoining the lecture/laboratory classroom is the faculty office. The proximity of the aforementioned allows for great access between the lecture/laboratory and the faculty office. Additionally, there are extensive specimen storage areas adjacent to the classroom.

The Needles Center has one lecture classroom and no laboratory at this time. The adjunct professor currently utilizes the Needles High School laboratory.

Is available dedicated space adequate to support the program? Explain.

The available dedicated space is adequate to support the Biology Program at the main campus. There is need for a dedicated laboratory at Needles Center.

Is available equipment adequate to support the program? Explain.

Yes, the available equipment is adequate to support the program in the main campus.
The Needles Center needs a laboratory and adequate equipment.

Describe plans for future changes in support facilities or equipment.

The administration will address the need for a major capital outlay in support facilities or equipment at Needles Center.

Part 12: Strengths and Weaknesses

List and comment on the major strengths of the program.

The Biology Program strengths encompass:

- Broad appeal of all our courses to prospective students in terms of high number of courses offered every semester and number of sections
- The Biology program is financially viable based on strong and steady enrollment
- The Biology Program continues to maintain very steady student enrollment
- The Biology faculty bring years of education, practical work experience and training to diverse biology classes.
- Faculty academic preparedness (academic qualifications).

List and comment on the major weaknesses of the program.

- Lack of qualified tutors for biology students.
- Need for additional full time faculty.

Part 13: Plans to Remedy Weaknesses

Identify specific steps to correct identified weaknesses and provide the timeline by which they are to be corrected.

To ensure availability of qualified tutors to teach students in the Biology Program, the Student Success Center are duly informed to hire students who have successfully completed higher core courses within the discipline.

Part 14: Plans to Advance the Program.

Describe Other Plans That Will Advance the Program.

The Biology Program is dedicated to providing an exemplary learning environment that promotes students success. Toward this clear cut objective, we will continue to monitor students in Biology courses success rate through assessment of student's skills that include: term papers, laboratory reports, student centered discussions, data analysis, problem solving ability and critical thinking skills. Biological Sciences continue to be the basic building blocks, cornerstones and integral part of the Palo Verde College Curricula. We will continue to monitor all biology courses retention and success rates and develop plans to address any problem areas that are identified. Course load would indicate there is need for another full time instructor.

PROGRAM REVIEW 2012 - 2015
CHEMISTRY
By Biju Raman

PART I: SUPPORT OF THE COLLEGE MISSION

A. STATE THE PURPOSE OF THIS PROGRAM.

The Chemistry discipline is comprehensive in that it provides a science course that addresses the diverse educational needs of the community. The course offered by the Discipline satisfy general education requirements for associate degrees and transfer to four-year institutions.

B. DESCRIBE HOW THE PROGRAM SUPPORTS THE OVERALL MISSION OF THE COLLEGE AS ADOPTED BY THE BOARD OF TRUSTEES.

The Chemistry discipline provides an excellent learning environment through both face- face and online experiences, all designed to give students the tools for success through on the job, practical, hands-on experiences. This discipline promotes scientific inquiry, environmental awareness, synthesis of interrelated disciplines, and lifelong learning through lecture and laboratory courses for those pursuing degrees within and outside of the physical sciences.

C. DESCRIBE THE UNIQUE INSTITUTIONAL GOAL THE PROGRAM SERVES.

The Chemistry discipline provides unique lower division general education including both transferable and nontransferable courses, as well as preparation for occupational certificate programs.

PART II: ACCOMPLISHMENTS IN ACHIEVING GOALS OUTLINED IN THE PREVIOUS PROGRAM REVIEW

A. DESCRIBE PROGRESS IN ACHIEVING GOALS OUTLINED IN THE PREVIOUS PROGRAM REVIEW, PROVIDING EVIDENCE DOCUMENTING SUCH ACHIEVEMENTS.

In order to satisfy the requirement by the CSU and UC system's needing face-to-face laboratory work for their physical science courses, we have maintained the transferability of the CHE 101 – Introduction to General Chemistry by reinstating appropriate lab work.

B. EXPLAIN MODIFICATIONS OF GOALS OUTLINED IN THE PREVIOUS PROGRAM REVIEW, PROVIDING EVIDENCE DOCUMENTING SUCH MODIFICATIONS.

Since the chemistry department received notice from the articulation officer about a year ago, regarding the reinstatement of the wet labs, the department has worked to create the C-ID system identification for the CHE 101 – Introduction to General Chemistry and buy the necessary stock to offer the face-to-face lab work again by ordering essential chemical supplies, glassware and

equipment.

PART III: POPULATIONS SERVED

A. **DESCRIBE THE POPULATION SERVED BY THE PROGRAM, INCLUDING SPECIAL POPULATIONS.**

The Chemistry program is open to all Palo Verde College Students and the general public interested in physical sciences via online access who satisfied the English and Math prerequisites.

The Chemistry discipline serves approximately 16 students per semester. The course offering in the Discipline are currently meeting the needs of transfer students. Initial surveys indicate that almost all of the students enrolled in Chemistry courses indicated transfer as an educational goal.

B. DESCRIBE OTHER POPULATIONS THAT SHOULD BE SERVED BY THE PROGRAM, AND DESCRIBE PLANS TO SERVE THEM IN THE FUTURE.

PVC has decided not to offer online lab work for any of its classes, but options are being kept open for hybrid programs whereby the theory can be done online and then completing the lab work face-to-face.

PART IV: CURRICULUM HISTORY

A. LIST THE COURSES OFFERED SUPPORTING THE PROGRAM OR CERTIFICATE. GIVE THE DATE OF FIRST OFFERING FOR EACH, AND INDICATE HOW MANY SECTIONS WERE SUCCESSFULLY OFFERED DURING EACH OF THE LAST FOUR REGULAR SEMESTERS (TWO YEARS).

Term	COURSE	SUCCESSFULLY OFFERED
Fall 2011	CHE 101: Introduction to General Chemistry	1 Section
Spring 2012	CHE 101: Introduction to General Chemistry	1 Section
Fall 2012	CHE 101: Introduction to General Chemistry	1 Section
Spring 2013	CHE 101: Introduction to General Chemistry	2 Sections
Fall 2013	CHE 101: Introduction to General Chemistry	1 Section
Spring 2014	CHE 101: Introduction to General Chemistry	1 Section

Fall 2014	CHE 101: Introduction to General Chemistry	1 Section
Spring 2015	CHE 101: Introduction to General Chemistry	1 Section

B. LIST THOSE COURSES THAT HAVE NOT BEEN SUCCESSFULLY OFFERED AT LEAST ONCE DURING THE PRECEDING SIX (6) SEMESTERS.

- CHE 108: Organic Chemistry
- CHE 109: General, Organic and Bio-Chemistry
- CHE 210: General Chemistry I
- CHE 211: General Chemistry II

C. EXPLAIN WHY SUCH COURSES WERE NOT SUCCESSFULLY OFFERED.

These courses have been placed on the "inactive" status because PVC is unable to get together a cohort of 10 students to offer the class face-face.

D. PROVIDE A STRATEGY FOR IMPROVING THEIR SUCCESS, OR EXPLAIN WHY THEY SHOULD NOT BE REMOVED FROM THE PROGRAM.

By, initiating face-to-face labs after almost 8 years, we should have a sufficient cohort to offer these classes face-to-face upon their successful completion.

PART V: COURSE SCHEDULING AND AVAILABILITY

A. OPTIMIZES CLASS AVAILABILITY FOR DAY STUDENTS, EVENING STUDENTS AND DISTANCE EDUCATION STUDENTS.

The chemistry classes are offered during a time segment where it does not interfere with other courses that the student needs towards their graduation.

B. OPTIMIZES STUDENT LEARNING.

Since the class was completely online the students were able to schedule the learning at their discretion. The class is currently offered on Mondays and Wednesdays noon to 3:00 p.m. It does not interfere with the lower level of English and math classes which are offered in the morning and evenings.

PART VI: STUDENT LEARNING OUTCOMES

A. **DESCRIBE THE PROCESS BY WHICH THE PROGRAM IDENTIFIES, MEASURES AND EVALUATES STUDENT LEARNING OUTCOMES AT THE COURSE, PROGRAM AND DEGREE LEVELS, AND PROVIDE EVIDENCE THAT THIS PROCESS IS BEING FOLLOWED.**

The Division of Mathematics and Sciences at Palo Verde College believes that an understanding of mathematics and the sciences is an indispensable part of a sound education. Our goal is to provide all students with access to supportive, excellent education, where all students learn by direct experience with the methods and processes of inquiry. Our faculty are highly trained, committed to student development, and dedicated to helping students achieve their maximum potential. Our curriculum is structured to encourage students to engage in critical thinking and to help students realize that learning is a life-long endeavor.

The Chemistry discipline strives to maintain the currency of course content and laboratory exercises (where applicable). All course outlines have been reviewed and updated within the last two years. Each course outline defines course-specific learning outcomes. However, on a program-wide basis, the Math and Science Division has recently developed Student Learning Outcomes (SLO) applicable for all courses taught with the spectrum of Math and Science and has implemented assessment procedures and analysis of the SLOs.

- ***Demonstrate research, analytical reasoning, applied science and technological skills for real life expectations.***

Pre and Post tests are continually being administered in face-to-face classes as stated in the most recent program review. Traditional tests, quizzes, and homework are being assigned and graded with appropriate corrections and comments.

The quality of lab reports that were being submitted by the CHE 101 – Introduction to General Chemistry students after viewing the video labs online was inadequate. To help them better model the report, a sample of a good report is being provided in the course syllabus along with suggested topic headings to help structure the written presentation.

The Chemistry Faculty have utilized pre- and post-tests, progressive quizzes, and rubrics since Spring 2007 term as an instrument for assessing learning outcomes. With the recent addition of our online learning system, this task has been simplified, both in terms of delivery and analysis. The tests/quizzes are designed to involve students solving specific problems using several sets of particular data relevant to the Discipline.

B. DESCRIBE THE PROCESS BY WHICH THE PROGRAM IMPROVEMENTS ARE MADE, AND PROVIDE EVIDENCE THAT THIS PROCESS IS BEING FOLLOWED.

All assessment findings for the division will be compiled and cataloged giving each faculty the ability to evaluate outcomes at the course and division level. Following the time necessary for

sufficient data collection, the Math and Science Division will compile the assessment findings and make the necessary recommendations for remediation, if necessary.

PART VII: PROGRAM AND COURSE COVERAGE

A. DESCRIBE HOW EFFECTIVELY COURSES IN THE PROGRAM ARE COVERED BY FULL-TIME AND PART-TIME FACULTY.

The Chemistry faculty meets the minimum qualifications to be an instructor at Palo Verde College and is adequate to support the program at the Main Campus, as well as all distance education courses. The Needles campus is adequately supported by an adjunct faculty who meets the equivalency guidelines as per the Chancellor's office.

B. DESCRIBE ONGOING OR PROJECTED DEFICIENCIES IN FACULTY COVERAGE OF COURSES IN THE PROGRAM.

There is no need for additional support staff for the Chemistry program at this time. However, due to the nature and expertise necessary, it will be likely that an adjunct faculty member will continue to be utilized to cover the course taught at Needles Campus.

PART VIII: PROFESSIONAL DEVELOPMENT

A. DESCRIBE SPECIFIC PROFESSIONAL DEVELOPMENT ACTIVITIES IN WHICH FACULTY MEMBERS IN THE PROGRAM PARTICIPATE, AND EXPLAIN HOW SUCH ACTIVITIES BENEFIT OR ENHANCE THE PROGRAM AND SUPPORT AND FACILITATE STUDENT LEARNING.

The Chemistry faculty is involved in campus activities and is active in the community and professional organizations, continuing their education and participating in activities that utilize or increase their expertise. Instructors routinely participate in professional development in terms of continuing professional education and seminars. Instructors attend professional workshops available through the various discipline-related organizations and federal, state and regional organizations. Faculty also enrolls in university courses to keep current in their field. Faculty of the Chemistry program regularly participate in in-service activities, including College Flex Day trainings, college seminars, and other professional growth opportunities offered on campus.

B. DESCRIBE AREAS OF UNMET PROFESSIONAL DEVELOPMENT NEEDS AMONG FACULTY IN THE PROGRAM.

At this time, all professional development needs are currently being met.

PART IX: STUDENT PERFORMANCE AND COMPLETION

A. **DISPLAY AND COMMENT ON SEMESTER-BY-SEMESTER COURSE COMPLETIONS IN THE PROGRAM OVER THE PRECEDING SIX (6) SEMESTERS.**

Academic Year	Success Rate
Fall 2011	78.9%
Spring 2012	59.1%
Fall 2012	57.1%
Spring 2013	63.7%
Fall 2013	81%
Spring 2014	50%
Average	64.9%

B. The retention rate for chemistry discipline courses over the last six semesters is 65% and is an indication of our student's belief they can complete the course.

PART X: ENROLLMENT AND FINANCIAL TRENDS

A. DISPLAY AND COMMENT ON SEMESTER-BY-SEMESTER ENROLLMENT IN THE PROGRAM OVER THE PRECEDING SIX (6) SEMESTERS.

Semester	Student Enrollment
Fall 2011	19
Spring 2012	22
Fall 2012	21
Spring 2013	32
Fall 2013	21
Spring 2014	20

Enrollment over the past six semesters has shown a familiar trend when a campus is in the development phase of a discipline program. Historically, enrollment numbers are varied during the phase in period of a program. Recent enrollment has decreased and is constant with the overall college unduplicated headcounts for the last six semesters

B. DISPLAY AND COMMENT ON SEMESTER-BY-SEMESTER EXPENSES INCURRE BY THE PROGRAM OVER THE PRECEDING SIX (6) SEMESTERS.

Academic Year	Supplies	Operating Exp.	Capital	Total
2011-2012	9	0	0	9
2012-2013	0	0	0	0
2013-2014	30	0	0	30
Average	13	0	0	13

The expenses incurred by the Chemistry discipline are appropriate for current enrollment and program activities.

PART XI: FACILITIES AND EQUIPMENT

A. ARE CURRENT FACILITIES, SUCH AS CLASSROOMS, OFFICES AND EQUIPMENT, ADEQUATE TO SUPPORT THE PROGRAM?

The Chemistry discipline is housed within the Classroom Building and has a dedicated lecture/laboratory classroom. The facilities utilized by the Discipline were constructed within the last eleven years and are in excellent condition. Adjoining the dedicated classroom is the faculty office, allowing for ease of and simultaneous access to the teaching forum and faculty office.

B. IS AVAILABLE DEDICATED SPACE ADEQUATE TO SUPPORT THE PROGRAM?

All of the facilities are adequate for the support of this program.

C. IS AVAILABLE EQUIPMENT ADEQUATE TO SUPPORT THE PROGRAM?

Both the classroom and faculty office have a dedicated computer station each. In addition, the classroom has media playing devices and a digital projection and sound system. Laboratory equipment is limited, but adequate to support the program.

D. DESCRIBE PLANS FOR FUTURE CHANGES IN SUPPORT FACILITIES OR EQUIPMENT.

If we make CHE 109 an online hybrid class by making the theory online and labs face-to-face, we will need to replenish our stock of the chemistry experiments that make up that class. Apart from the restocking of the chemicals needed for specific courses, there is no major need for capital outlay in the support facilities or equipment.

PART XII: STRENGTHS AND WEAKNESSES

A. LIST AND COMMENT ON THE MAJOR STRENGTHS OF THE PROGRAM.

- The Chemistry Discipline provides our students with one course designed to meet their varied needs and requirements.
- Our primary goal is to facilitate student growth and success and at the same time maintain academic standards appropriate to our course.
- Continue to coordinate course offerings with changes in requirements of the various CSU and UC campuses, as well as, the changing vocational needs of students.
- Chemistry faculty brings years of education, practical work experience, and training to every class.

- Chemistry maintains a steady student enrollment in classes.

B. LIST AND COMMENT ON THE MAJOR WEAKNESSES OF THE PROGRAM.

- Lack of qualified tutoring staff that have the knowledge base to tutor students in Chemistry. A consistent question received from students is: where they can obtain help outside of the classroom. Currently there are no tutors in the Student Success Center qualified to tutor chemistry students. As a result, the faculty assumes the role of tutor, allowing students in need to receive extra learning opportunities.

PART XIII: PLANS TO REMEDY WEAKNESSES.

IDENTIFY SPECIFIC STEPS TO CORRECT IDENTIFIED WEAKNESSES AND PROVIDE THE TIMELINE BY WHICH THEY ARE TO BE CORRECTED.

In order to have a qualified tutor that is able to tutor students in Chemistry, that student must have already successfully completed core courses within the Chemistry discipline. An incentive of monetary compensation (employment) might improve the chances that a former Chemistry student would consider occupying such a position. Currently there are STEM tutoring grants dedicated that would allow this to occur.

PART XIV: PLANS TO ADVANCE THE PROGRAM.

DESCRIBE OTHER PLANS THAT WILL ADVANCE THE PROGRAM.

The Chemistry Discipline is committed to providing out students with the best possible education. To that end we need to continue to establish procedures for evaluating our successes and failures and employ them on a regular basis. We need to monitor all of our courses' retention and success rates and develop plans to address any problem areas that are identified. We need to develop the use of different teaching methods that reach across a broad spectrum of student intellectualism. We need to continue to develop evaluation methods that monitor the effectiveness of our teaching techniques.

PROGRAM REVIEW 2011 2014
MATH
Prepared by Sandra Sher, Paul Shibalovich and Biju Raman

To support the students in their attempts to learn analytical skills, perseverance, and detail so that they might be better prepared for the job market.

I: SUPPORT OF THE COLLEGE MISSION

A. STATE THE PURPOSE OF THE PROGRAM.

The mathematics program helps students to acquire fundamental grounding in communication, critical thinking, scientific inquiry, and quantitative reasoning. In addition, our program provides courses for Associate degrees for four-year transfer.

B. DESCRIBE HOW THE PROGRAM SUPPORTS THE OVERALL MISSION OF THE COLLEGE AS ADOPTED BY THE BOARD OF TRUSTEES.

Math skills help the students develop their abilities to think and work together with others as they develop their thought processes. This tends to promote student success, lifelong learning, and community development.

C. DESCRIBE THE UNIQUE INSTITUTIONAL GOAL THE PROGRAM ACHIEVES.

The mathematics department helps students who are at risk educationally to prepare for college level courses. The majority of our students enter the program with only basic skills and are not well-prepared for the college environment, with parents who haven't experienced higher education as a way to economic success. The unique aspects of our program are meeting the needs of basic skills students, providing resources for DSPS students, and providing educational growth for college level students.

Years ago, the mathematics program adopted Hawkes Learning System (HLS), which helps basic skills students to master the subject and advance educationally. The system allows instructors to monitor progress of students and provide feedback to them on an individual level.

HLS also provides better services to DSPS students by providing audio assistance, video assistance, and closed caption that can be viewed at a later time.

Our program provides educational growth to college level students by offering courses transferrable to four-year universities. These include College Algebra, Statistics, Precalculus, and Calculus.

II: ACCOMPLISHMENTS IN ACHIEVING GOALS OUTLINED IN THE PREVIOUS PROGRAM REVIEW.

A. DESCRIBE PROGRESS IN ACHIEVING GOALS OUTLINED IN THE PREVIOUS PROGRAM REVIEW, PROVIDING EVIDENCE DOCUMENTING SUCH ACHIEVEMENTS.

In the last program review, the mathematics department set following plans:

- Improve online program and potentially incorporate open educational resources (OER).
- Offer Basic Arithmetic (MAT080) and Arithmetic Fundamentals (MAT082) courses in small time segments meeting four times a week.
- Improve math tutoring service.
- Work with counselors to make higher math classes more successful.

The math program improved the online segment of its program by expanding online course offerings. We developed College Algebra (MAT110) for online. In addition, we developed Introductory Algebra (MAT083) for our incarcerated students using Inmate Education Network. We explored the OERs, and found out that they provide cheaper textbooks but are lacking testing capabilities. The math department decided to work with HLS Company, for it provides good textbooks, excellent testing capabilities, and one of the best feedback options. In addition, HLS expanded its business by supporting iPads and Android tablets, which tends to encourage students to take math classes.

In the past several years, we have been offering two lower math courses in small time segments meeting four times a week. This has improved student learning outcomes.

The math department is still facing challenges with tutoring services. Due to financial issues here at PVC, we had challenges providing math tutoring service to our local and Needles students. Lately, the library has been providing tutoring services including math tutoring. However, we are still facing challenges with providing tutoring for our incarcerated and online students as well as offering tutoring services for our Needles students taking higher math classes. There are technologies available that offer online tutoring, but they require IT involvement and support. We hope to find a feasible solution that can help our students have access to online tutoring when they need it.

In the past three years, we worked with our counselors and tried to offer Precalculus course (MAT 210) advertising the course to local and incarcerated students as well as online students via Virtual Campus. Unfortunately, the course didn't make.

B. EXPLAIN MODIFICATIONS OF GOALS OUTLINED IN THE PREVIOUS PROGRAM REVIEW, PROVIDING EVIDENCE DOCUMENTING SUCH MODIFICATIONS.

In the past three years, we identified several courses that had low demand. These include: MAT085, MAT087, MAT089, MAT090, and MAT108. We inactivated these course and are not offering them at this time.

III: POPULATIONS SERVED.

A. DESCRIBE POPULATIONS SERVED BY THE PROGRAM, INCLUDING SPECIAL POPULATIONS.

We currently serve the student population using the following modalities: Face-face, online, correspondence, Hybrid and modified online for the incarcerated population.

B. DESCRIBE OTHER POPULATIONS THAT SHOULD BE SERVED BY THE PROGRAM, AND DESCRIBE PLANS TO SERVE THEM IN THE FUTURE.

More online courses will bring more students. The Polycom (ITV) will bring in more Needles students without having to hire more math instructors. Hybrid courses will bring in students who need combinations of the various modes of instruction.

IV: CURRICULUM HISTORY

LIST THE COURSES CONSTITUTING THE PROGRAM. OF THE COURSES CONSTITUTING THE PROGRAM, LIST THOSE COURSES THAT HAVE NOT BEEN SUCCESSFULLY OFFERED AT LEAST ONCE DURING THE PRECEDING SIX (6) SEMESTERS. EXPLAIN WHY SUCH COURSES WERE NOT SUCCESSFULLY OFFERED.

COURSES:

Mat 80 Basic Arithmetic Skills
Mat 81 Fundamentals of Arithmetic (Pre-Algebra)-Correspondence Education
Mat 82 Fundamentals of Arithmetic with Lab (Pre-Algebra)
Mat 83 Elementary Algebra –Correspondence Education
Mat 84 Elementary Algebra with Lab (also online)
Mat 86 Intermediate Algebra – Correspondence Education
Mat 88 Intermediate Algebra with Lab (also online)
*Mat 100 Math for Prospective Elementary School Teachers
*Mat 103 Math for Elementary Teachers I
*Mat 104 Math for Elementary Teachers II
*Mat 105 Statistics (Face to face)
Mat 106 Statistics
*Mat 108 Liberal Arts Math
Mat 110 College Algebra Mat 210 Pre-Calculus Mat 220 Calculus I
*Mat 224 Calculus II
*Mat 226 Calculus III
*Mat 280 and Mat 290 Selected topics in Mathematics
(*means has not been offered in preceding six semesters)

PROVIDE STRATEGY FOR IMPROVING THEIR SUCCESS, OR EXPLAIN WHY THEY SHOULD NOT BE REMOVED FROM THE PROGRAM.

Counselors could have sign-up sheets for the non-offered courses in advance in order to determine if these courses can be offered. Online versions of these courses should be constructed. Mat 84 and

Mat 88 are presently online along with Mat 110. The math department plans to start offering courses online and then evaluate the courses which have good enrollments. The upper level courses should not be put on "inactive" status since they are needed for careers such as medicine, engineering, computer science, and science.

V: COURSE SCHEDULING AND AVAILABILITY

A. DESCRIBE HOW EFFECTIVE THE SCHEDULING PROCESS OF CLASSES IS IN THE PROGRAM: OPTIMIZES CLASS AVAILABILITY FOR DAY STUDENTS, EVENING STUDENTS, AND CORRESPONDENCE EDUCATION STUDENTS.

We offer classes Monday through Thursday –day and evening. Most classes meet in the same time slots thus offering ease of transferring a student from one course to another, if needed. The math department also works with the learning communities in order to help students enroll in more classes by not conflicting courses from Basic Skills Math, English, and Reading.

B. OPTIMIZES STUDENT LEARNING

ITV courses allow Needles students to join classes in Blythe, thus increasing enrollment without hiring more instructors. Mat 84, Mat 88 and MAT 110 are also offered online as well as face-to-face. A greater volume of students can learn at once.

VI. STUDENT LEARNING OUTCOMES

A. DESCRIBE THE PROCESS BY WHICH THE PROGRAM IDENTIFIEDS, MEASURES, AND EVALUATES STUDENT LEARNING OUTOCMES AT THE COURSE, PROGRAM, AND DEGREE LEVELS, AND PROVIDED EVEDENCE THAT THIS PROCESS IS BEING FOLLOWED.

The SLO's are assessed through homework, quizzes, and exams. This process has been followed as evidenced by the Flex days in January 2015. The math department (along with all divisions/departments) took CLOs and related them to PLOs.

B. DESCRIBE THE PROCESS BY WHICH PROGRAM IMPROVEMENTS ARE MADE, AND PROVIDE EVIDENCE THAT THIS PROCESS IS BEING FOLLOWED.

1. In addition to Hawkes improvements, the math department is continually exploring possible better options than Hawkes. If a better program emerges, then a change will be made for the betterment of the students.
2. Through the SLO process during the Flex days in January 2015, faculty did share "best practices" with other faculty members. Our department discovered that emphasizing application problems is most needed. In addition, assigning some extra credit for attendance helps increase attendance.

2. Due to Hawkes computer updates, evidence to check student success can be tracked more efficiently.

VII. Program and Course Coverage

A. Describe how effectively courses in the program are covered by:
1) Full time faculty; 2) Part time (adjunct) faculty;

Presently, the math department has 2 full time math instructors and 2 full time instructors who additionally teach in other areas of the math/science division. There were 5 part time faculty members over the past 3 years. Collectively, they taught 23 out of the 112 (21%) of the math courses offered. Since 79% of the math courses were covered by full time faculty, the number of part timers is sufficient.

B. DESCRIBE ONGOING OR PROJECTED DEFICIENCIES IN FACULTY COVERAGE OF COURSE IN THE PROGRAM.

The math department presently does not have a deficiency in faculty coverage.

VIII. PROFESSIONAL DEVELOPMENT

A. DESCRIBE SPECIFIC PROFESSIONAL DEVLEOPMENT ACTIVITIES IN WHICH FACULTY MEMBERS IN THE PROGRAM PARTICIPATE, AND EXPLAIN HOW SUCH ACTIVITES BENEFIT OR ENHANCE THE PROGRAM AND SUPPORT AND FACILITATE STUDENT LEARNING OUTCOMES.

1. Hawkes Learning Systems (HLS) representatives meet with the math faculty about 2 times per year. Online help from the representatives is continually available. This provides math faculty additional tools to enhance teaching methodology as well as to improve student learning outcomes. With the implementation of HLS, full time faculty has more tools to evaluate student performance and to provide more options to DSPS students. In particular, HLS is capable to either narrate lectures to students or allow students to watch lectures in video format with closed captions. This ensures that DSPS students are not missing anything from lectures.

2. Faculty members from the math department are active in professional development by attending conferences, workshops, Flex days, and by sharing their expertise with each other. Math faculty members share information with each other in order to facilitate student learning outcomes.

3. During the past 3 years math faculty have attended several workshops on student learning and teaching methodologies.

These include:

CONFERENCE/WORKSHOPS:

1. BSI (Basic Skills Initiative)
   Topic: Learning communities, Tutorials, Technologies, Methodologies, etc.
   Date: 9 Conferences

2. HLS (Hawkes Learning Systems)
   Topic: Gathering information towards SLOs, updates in technology, tests/quizzes through Hawkes, etc.
   Date: 4 Meetings

3. CMC^3 (California Mathematics Council of Community Colleges -South)
   Topic: Basic Skills Completion: The Key to Student Success in California Community Colleges.
   Date: February 28, 2014

4. Institutional Internal Quality Assurance and SLO Assessment
   Topic: SLOs
   Date: October 4, 2013

5. Webinar "Speaking about Mathematics and Statistics
   Topic: Statistics
   Date: February 15, 2013

B. DESCRIBE AREAS OF UNMET PROFESSIONAL DEVELOPMENT NEEDS AMONG FACULTY IN THE PROGRAM, IF APPLICABLE, AND OUTLINE PLANS TO ADDRESS THOSE NEEDS.

1. Smartboards, HLS, ITV, and tablets need technical support in order for them to work to the maximum. The math department plans to continually request needed updates and technical support from the IT department.

C. DESCRIBE PLANS TO IMPROVE PROGRAM AND COURSE COVRAGE, IF APPLICABLE.

The main plan to improve coverage is online courses. Since the last program review College Algebra has now been offered online. This is in addition to Elementary Algebra and Intermediate Algebra which have already been offered online.

IX: STUDENT PERFORMANCE AND COMPLETION

A. DISPLAY AND COMMENT ON SEMESTER-BY-SEMESTER COURSE COMPLETION IN THE PROGRAM OVER THE PRECEDING SIX (6) SEMESTERS.

(COURSE COMPLETION RATE = A, B, C, OR CR DIVIDED BY A, B, C, D, F, CR, NC, W, MW, IP).

The table below shows data for student completion rates in math courses over the past six semesters. The first column states the semester. The second column shows the headcount of students who successfully completed math courses with a grade of A, B, C, or CR. The third column shows the total headcount of students in math courses at the end of term. The last column states the completion rate computed in percent: $\frac{Completion\ Count}{Total\ Count} \times 100$. The last row in the table shows the average completion rate. The average evens out semester-to-semester fluctuations, providing a metric to compare completion rates of individual semesters.

Completion Rate Table I

Academic Year	Completion Count	Total Count	Percent Completion
Fall 2011	178	301	59.1%
Spring 2012	153	396	38.6%
Fall 2012	187	501	37.3%
Spring 2013	162	359	45.1%
Fall 2013	143	357	40.1%
Spring 2014	141	305	46.2%
Average	---	---	**43.5%**

The overall completion rate for Fall 2011 through Spring 2014 semesters came to 43.5%, which is a low rate. One of the reasons for the lower completion rate is the change in definition of thereof. In the previous program review, the completion rate was defined as "**A, B, C, D, OR CR DIVIDED BY A, B, C, D, F, CR, NC, W, MW, IP."** The current definition of the completion rate excludes all students who earned a grade of D. Completion Rate Table II shows the completion rate using the former definition. Calculations were done in the same way as calculations in the Completion Rate Table I.

Completion Rate Table II

Academic Year	Completion Count	Total Count	Percent Completion
Fall 2011	217	301	72.11%
Spring 2012	185	396	46.7%
Fall 2012	214	501	42.7%
Spring 2013	185	359	51.5%
Fall 2013	160	357	44.8%
Spring 2014	158	305	51.8%
Average	---	---	**50.4%**

The adjusted completion rate for all math courses came to 50.4%. To measure success of our program, we compared the math completion rate to completion rate in English. Students who start education at Palo Verde College in the same cohort are required to take math and English courses. The completion rate in the English Program for both remedial courses as well as college level and transferable courses was 50.8% during Fall 2011 through Spring 2014 semesters. The math program completion rate for the same period was 50.4%, which is very close to the English program completion rate.

Although the mathematics program completion rate is in line with English program completion rate, we believe it can be improved. The first thing that can increase our completion rate is providing tutoring service for local students, Needles students, online students, and incarcerated students. The second improvement is aimed at lowering the attrition rate in our courses. The table below highlights this possibility. The percent change shown below in the last column was computed as follows: $\frac{"W"\ Count}{Total\ Count} \times 100$.

Attrition Rate Table III

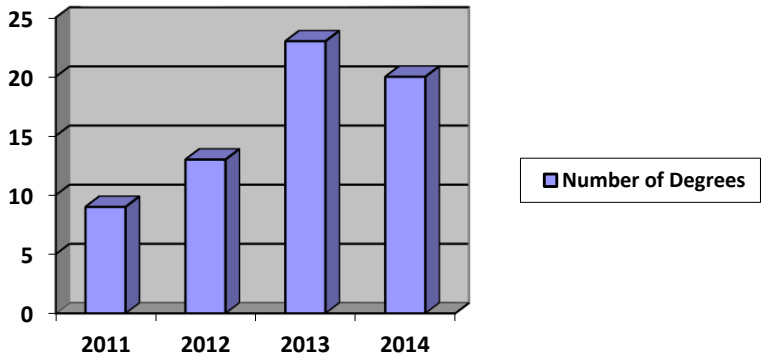
Academic Year	"W" Count	Total Count	Percent
Fall 2011	127	301	42.2%
Spring 2012	99	396	25.0%
Fall 2012	161	501	32.1%
Spring 2013	94	359	26.2%
Fall 2013	93	357	26.1%
Spring 2014	71	305	23.3%
Average	---	---	**29.2%**

From our analysis in the above, we notice two things. First, the attrition rate is quite high. Second, the rate dropped from high of 42.2% to 23.3%. We believe it is due to instruction enhanced with Hawkes Learning System we adopted in out department about four years ago.

B. DISPLAY AND COMMENT ON ANNUAL DEGREE OR CERTIFICATE COMPLETION, IF APPLICABLE, OVER THE PRECEEDING THREE (3) ACADEMIC YEARS.

The mathematics Department offers Associate of Arts degree in Math & Science. The table below shows the number of degrees awarded during previous four academic years.

AA Degree Award Summary



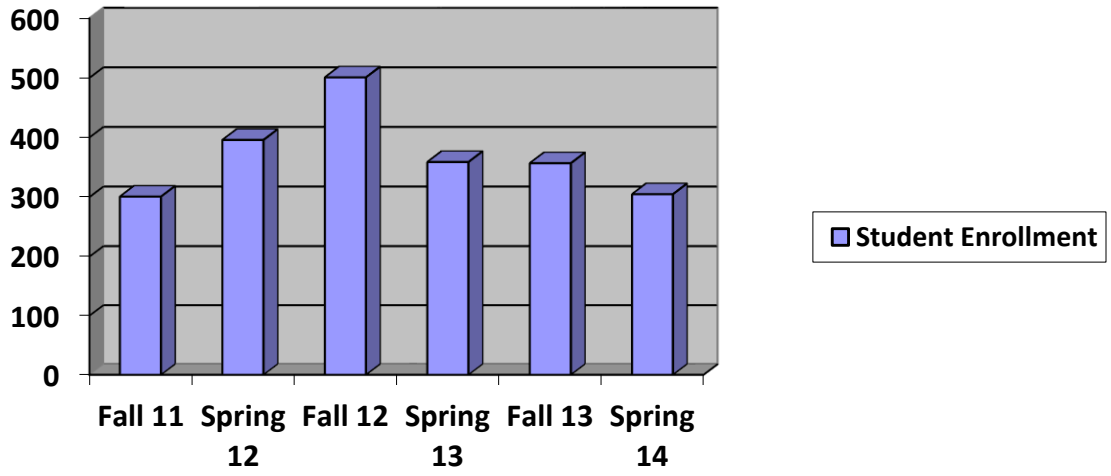
During the period of 2011 through 2014, the mathematics department had consistent growth in our program as shown by the number of degrees awarded to the students.

X: ENROLLMENT AND FINANCIAL TRENDS

A. DISPLAY AND COMMENT ON ANNUAL ENROLLMENT IN THE PROGRAM OVER THE PRECEDING SIX (6) SEMESTERS.

The table below summarizes enrollment data for the past three academic years. The Percent Change column was computed using $\frac{Current\ Enrollment}{Previous\ Enrollment}$ ratio comparing Fall-to-Fall and Spring-to-Spring semesters.

Enrollment Data



The enrollment data during Fall 2011 through Spring 2014 semester was volatile. We believe it fluctuated so much due to massive section cuts imposed by financial issues Palo Verde College experienced during 2010-11 academic year. The student enrollment for 2013-2014 academic year stabilized to the level of 2011-2012 academic year. Please note that even though student enrollment in our program dropped, the demand of the math program is high as shown by the number of degrees awarded to the students (See AA Degree Award Summary table above).

B. DISPLAY AND COMMENT ON ANNUAL EXPENSES INCURRED BY THE PROGRAM OVER THE PRECEDING SIX (6) SEMESTERS, AS TO: SUPPLIES, CONTRACTS, CAPITAL OUTLAY, AND OTHER NON-SALARY EXPENSES.

The table below shows expense data for the mathematics department in the past three years stated by category in dollar amounts. The table does not show the salaries and benefits expenses.

Expense Data Table

Academic Year	Supplies	Operating Exp.	Capital Exp.	Total
2011-12	$1,585	0	0	$1,585
2012-13	0	0	0	0
2013-14	$18	0	0	$18

In the past three years, expenses in the Mathematics department at PVC had declined to the point that faculty didn't spend any money for supplies, operating expense, or capital expense. Yet during the same period, the math department was able to maintain steady enrollment of students. We were able to do this for past two academic year. However, we observed the increase of complaints from students about two issues: tutoring and technical support.

Currently, the library provides tutoring during business hours. We highly recommend providing tutoring service to Needles students as well as those taking online classes via Lync or other means online. We would like to see better technical support with ITV equipment and technical support for online tutoring.

XI. FACILITIES AND EQUIPMENT

A. ARE CURRENT FACILITES SUCH AS CLASSROOMS, OFFICES, AND EQUIPMENT, ADEQUATE TO SUPPORT THE PROGRAM? EXPLAIN?

Not all facilities are adequate.

1. CL 129 has too many wires. This could be a hazard (tripping). When a problem arises, this could hinder its solution. Lack of labeling wires creates confusion.
2. Tutoring for Needles students need to be improved. Lync should be used for tutoring Needles students. Tablets, and online tutoring is the library needs to be maintained.
3. The computers in CL 127 need to be updated.

4. ITV equipment needs to be maintained. Evening classes need more technical support especially concerning the Starboard, the ITV equipment, and the Polycom.

B. IS AVAILABLE DEDICATED SPACE ADEQUIATE TO SUPPORT THE PROGRAM? EXPLAIN.

Space is adequate.

C. IS AVAILABLE EQUIMPENT ADEQUATE TO SUPPROT THE PROGRAM? EXPLAIN.

As explained in part A., technical support, wires, tables, tutoring (especially for online students and Needles students), and ITV equipment must be maintained and updated for best student learning outcomes.

D. DESCRIBE PLANS FOR FUTURE CHANGES IN SUPPORT FACILITIES OR EQUIPMENT.

HLS (Hawkes Learning Systems) is presently being evaluated and checked to see if there is better computer software. The information mentioned in parts A and C will be a top priority.

XII. STRENGTHS AND WEAKNESSES

A. LIST AND COMMENT ON THE MAJOR STRENGTHS OF THE PROGRAM.

1. Small face to face classes
2. Labs within face to face classes.
3. Modalities available – online, face to face, and hybrid.
4. Compassionate math faculty toward student needs.
5. Course outlines contain SLOs
6. Syllabi contain SLOs.
7. Online tutoring (Brainfuse) is available.
8. HLS training is on a regular basis.

B. LIST AND COMMENT ON THE MAJOR WEAKNESSES OF THE PROGRAM.

1. Tutors and Lync are needed.
2. For correspondence courses -Tests from students sometimes arrive late.
3. A few more face to face options need to be available, especially during the Spring.
4. We may need to use more OER (open educational resources) for reducing the cost to the students.
5. Lack of technical support.

XIII. PLANS TO REMEDY WEAKNESSES

IDENTIFY SPECIFIC STEPS TO CORRECT IDENTIFIED WEAKNESSES AND PROVIDE THE TIMELINE BY WHICH THEY ARE TO BE CORRECTED.

1. Online tutoring is being piloted to assist with tutoring issues.
2. Another weakness is technical support in classrooms, in Needles, on tablets, with ITV, and in the evenings. We will continually request these services.

XIV. PLANS TO ADVANCE THE PROGRAM

DESCRIBE OTHER PLANS THAT WILL ADVANCE THE PROGRAM.

1. In-class tutors, face to face tutoring, and "Brainfuse". Brainfuse is a 24/7 virtual online tutorial. It started at PVC in 2015.
2. Returning to smaller classes would help with one-on-one help.
3. In MAT 80 and MAT 82 the math department is again scheduling (for 2015-2016) each of these in two 9-week back-to-back sessions that meet Monday through Thursday for a longer time period each meeting . Other colleges in California are also offering this type of format. Information gathered by B. Raman shows this to be a successful format.
4. Sign-up sheets for math courses of interest to students will be kept by the counselors.
5. HLS (Hawkes Learning Systems) continually sends updates to its program by emails. In addition, a Hawkes representative has been meeting personally with the math department since its beginning with PVC about twice per year.
6. A Hawkes training video for new instructors using Hawkes was posted on the Bridge.