PALO VERDE COLLEGE

Program Review

Math

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2007 - 2012

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

EXECUTIVE SUMMARY

Math

1. **Program Strengths:**

    a. Faculty willingness to attempt innovative teaching methodologies and techniques, such as online instruction and implementation of the Hawkes Learning System.

    b. Faculty willingness to implement new technologies in teaching including the Starboard and ITV transmission to the Needles Center.

    c. Faculty demonstrated commitment to professional development through conferences and seminars.

    d. Courses in basic skills courses offered in small time segments on a daily basis to enhance student participation and learning.

2. **Program Weaknesses:**

    Faculty states the need for more usage of open resource materials to reduce the burden of costs to the students.

3. **Recommendations for Program Improvement:**

    a. Research the availability of open resource textbooks and materials in math, particularly basic skills math, and evaluate the feasibility of implanting such materials.

    b. Continue efforts in program and course learning assessment.

    c. Using research-based approaches continue investigating innovations in scheduling and technology.

4. **Committee Determination:**

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

Program Review Committee Approval Date: April 17, 2012

PART I: SUPPORT OF THE COLLEGE MISSION

A. STATE THE PURPOSE OF THE PROGRAM.

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. Mat 106 and higher level math courses transfer to most (all) 4 year institutions. ASSIST.org has articulated these math courses for certain majors. Some TMCs and parts of our Associate of Arts require certain math courses above number 100.

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 the thought process. This tends to promote student success, lifelong learning, and community development.

C. DESCRIBE THE UNIQUE INSTITUTIONAL GOAL THE PROGRAM ACHIEVES.

We teach mathematics to many students who are at risk educationally. Many are not well prepared for the college environment, with parents who haven't experienced higher education as a way to economic success. Two unique aspects of our program are the Hawkes Learning and the Bridge. These have helped the math department to reach more of these students. Hawkes is a computerized math learning system in which students do homework, quizzes, practice problems online. The computer software will let you pass a section provided a certain percentage is obtained. Without the appropriate minimum percentage, it will give you more problems and help until you do reach the appropriate minimum percentage.

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.

Course outlines are presently being updated - especially to reflect online courses, hybrid courses, ITV courses, and Correspondence Education courses. Most of these changes started in Fall 2010. Technology (ITV, internet, Starboard, polycomm, etc.) and Hawkes learning software is causing changes in mathematics instruction. This is being done in order to have better educated math students.

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

When the Hawkes Learning Program is set to a high level, the program forces students to increase their level of competency and comprehension. This then relates to higher homework grades. Since Hawkes can be done at any computer then, if attendance is low, the students can work off campus at their own PC. The Hawkes tutorial is on our website. The Bridge and online courses also enable students to work off campus. Pre/Post tests are still being administered. The "attendance" hurdle is thus weakened.

PART III: POPULATIONS SERVED.

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

Online service is being extended to anyone who has internet and to Needles students through the Polycom and the Starboard. This is in addition to on-campus students.

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.

PART IV: CURRICULUM HISTORY.

A. **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 106 Statistics
*Mat 108 Liberal Arts Math - inactive as of November 2011 due to low enrollment. (It was offered during spring 2011 as an independent study but had only 2 students.)
Mat 110 College Algebra
Mat 210 Pre-Calculus
Mat 220 Calculus I
Mat 224 Calculus II (not offered because of low enrollment)
Mat 226 Calculus III (not offered because of low enrollment)
*Mat 280 and Mat 290 Selected topics in Mathematics (not offered during the past 6 semesters due to no enrollment)
(*means inactive as of Nov. 2011)

B. PROVIDE A 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 with Mat 110 forthcoming. 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.

PART 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 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 and Mat 88 are also offered online as well as face-to-face.. A greater volume of students can learn at once.

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.

Pre and Post tests are still 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.

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

When post tests are given at the end of each semester the results are compared to those of the pre-tests. Adjustments to the course are then studied and altered in order to help students succeed. The Hawkes Learning System aides in this process automatically through the computer. Our small math department continually converses about better ideas for our classes.

PART VII: PROGRAM AND COURSE COVERAGE

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

At present, Mathematics Department has two full-time math instructors (Sandra Sher and Paul Shibalovich), two full-time instructors who teach mathematics and another subject (Alejandro Garcia and Biju Raman), and four part-time instructors. Math faculties are capable to cover all math courses offered to the students. We seem to have enough part-time instructors at this time. Mathematics department offers courses in face-to-face, ITV, online, and correspondence formats. All full-time instructors have been trained to use ITV equipment and are capable to offer courses in face-to-face, ITV, and correspondence formats. Some full-time teach online courses. Part-time faculty teaches correspondence or face-to-face courses.

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

With current full-time and part-time faculty, the Mathematics department does not have deficiency in course coverage at this time.

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

The Mathematics department is still going through the adoption phase of Hawkes Learning System (HLS). The full-time math faculty completed their training. However, part-time faculty still needs to complete HLS training to be able to utilize the capabilities of the platform.

Currently, Mathematics department offers two math courses online: MAT084 (Introductory Algebra) and MAT088 (Intermediate Algebra). We have plans to expand our online course offerings in the future. Fall semester 2012, we plan to introduce new MAT110 (College Algebra) course online. According to other community colleges in California, MAT084 (Introductory Algebra) is the lowest math course that can be offered to college students, because it is difficult to build crucial math foundation using online format. Mathematics department has a potential to offer math courses beyond MAT110 (College Algebra). However, it needs to be worked out with counselors to ensure sufficient enrollment.

PART VIII: FACULTY 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 OUTCOMES.

Faculty members of the Mathematics Department are active in professional development by attending conferences, workshops, and by sharing their own expertise with one another. Math faculty members who attended conferences/workshops share information with the rest of the faculty members to facilitate student learning outcomes.

During the past few years, Biju Raman, Sandra Sher, and Paul Shibalovich attended several

conferences & workshops on student learning and teaching methodology. These include the following:

Conference/Workshop Data

Conference/Workshop	Topic	When
PVC Services Workshop	Colleague Interface	August 2008
HLS Workshop	Basics of HLS	May 2010
IT Workshop	How To Use the Bridge	September 2010
Aleks Webinar	Developmental Math	October 2010
HLS Workshop	Quizzes & Exams with HLS	December 2010
AMATYC	Math Study Skills	Fall 2011
Basic Skills Initiative Institute	Compressed Calendar	Fall 2011

In May and December of 2010, full-time math faculty attended HLS workshops to learn how to use Hawkes Learning System platform. This provided 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 provide more options to the DSPS students. In particular, HLS is capable to either narrate lecture to the student or allow the student to watch lecture in video format with closed caption, thus ensuring that DSPS students are not missing anything from the lecture.

The Bridge workshop helped math faculty to better serve local students as well as those that access course materials via the Internet. The Bridge platform allow the faculty to post course syllabi, worksheet, study guides, etc.

PVC Services workshop was another successful milestone in the math department. Starting from the Fall semester 2008, math faculty started to use the Colleague (PVC Services Interface) to enter midterm grades and final grades. Also, the Colleague allows the faculty to find out location of the student, which is very useful for Correspondence courses.

After attending Basic Skills Leadership Institute, math department offered remedial math courses in compressed format during Fall semester 2011. The findings showed that compressed format produces lower success rates. Therefore, the department discontinued offering the math courses in the compressed format.

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

The math faculty members conduct self and peer evaluations in order to help determine weak and strong elements of his/her teaching methodology and then subsequently review them in order to insure providing quality instruction of Mathematics at Palo Verde College. With the adoption of Smartboards and implementation of HLS, faculty needs more training to utilize all capabilities of the technology. In particular, faculty needs to learn how to use HLS quiz module for pre-tests and HLS Report module. This will allow the faculty to identify strengths and weaknesses of the students at the early stage, and subsequently, it will help the instructors to craft best possible

instructional delivery.

PART 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, D, OR CR DIVIDED BY A, B, C, D, F, CR, NC, W, MW, IP).

Math faculty members at Palo Verde College closely watch student performance in Mathematics in order to facilitate in the delivery of math instruction. The average completion rate in math courses over the past five years was 76.3%. Table below breaks down the completion rates of math courses, for face-to-face, correspondence, online, and ITV courses by semesters.

Completion Rate

Academic Year	Completion Rate
Fall 2008	78.3%
Spring 2009	77.0%
Fall 2009	81.6%
Spring 2010	73.9%
Fall 2010	75.6%
Spring 2011	71.2%
Average	76.3%

The average completion rate for Palo Verde College students for 2001-2006 was 80.5%. We noticed that recent completion rate average of our students dropped 4.2% when compared with the same during previous years. We identified two reasons that contributed to the decline of the student completion rare. The first reason was introduction of new technology in our classrooms. During the past five years we adopted the Bridge and HLS. Mathematics Department believes that the lack of student preparation in using technology caused the completion rate to drop. We think that the second factor is associated with reduced hours for tutoring services offered to our students.

B. DISPLAY AND COMMENT ON SEMESTER-BY-SEMESTER DEGREE OR CERTIFICATE COMPLETION, IF APPLICABLE.

Not applicable--there is no Mathematics certificate or a degree.

PART X: ENROLLMENT AND FINANCIAL TRENDS

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

For the past three years, enrollment of math students at PVC has grown the average of 1.5% per year. The Math Department is doing its best to meet the growing demand of enrollment at PVC. Being a small college remotely located in the desert, we are able to attract more students to study mathematics by offering ITV & hybrid courses in addition to face-to-face & correspondence

courses. Table below reflects growth of student enrollment for the past three years (headcount of students at the end of semester).

Enrollment Data

Semester	Student Enrollment	Year/Year Change
Fall 2008	517	
Spring 2009	447	
Fall 2009	479	-7.4%
Spring 2010	429	-4.0%
Fall 2010	521	8.8%
Spring 2011	466	8.6%
Average		1.5%

Even though past several years were difficult for Palo Verde College financially, math department was able to maintain positive student enrollment growth. Statistics stated in the table above suggests that currently, there is no need to hire another full-time math instructor.

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.

Table below shows expenses data of the mathematics department in the past five years stated by category in dollar amounts. The last column shows percent change calculated on year over year basis (current year/prior year). The table does not show the salaries and benefits expenses.

Expenses Data

Academic Year	Supplies	Operating Exp.	Capital	Total	Change
2006-2007	2,891	865	0	3,756	
2007-2008	2,986	396	0	3,382	-10.0%
2008-2009	2,260	0	0	2,260	-33.2%
2009-2010	1,356	0	0	1,356	-40.0%
2010-2011	0	0	0	0	-100%
Average	---	---	---	---	-45.8%

In the past five years, expenses in the mathematics department at PVC have declined at the average rate of 45.8 per year, to the point that faculty didn't spend any money for supplies, operating expense, or capital outlay during 2010-2011 academic year. Yet in the past three years, math faculty were able to maintain average growth of student enrollment at 1.5% per year. We were able to do this for the short run. However, it is difficult to provide services with no money for supplies and operational expenses.

PART XI: FACILITIES AND EQUIPMENT

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

At present we are well supported with the computer labs availability, Hawkes Learning System software on all campus computers, dedicated server for the computer software authentication on campus, polycomm connectivity with the Needles Center classrooms, STAR boards for electronic classroom. While the computer labs in the classroom are adequate for today's needs, in the future we need to provide funds for replacing or upgrading the personal computers.

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

With the projected year on year growth of 1.5%, the classroom/lab availability is adequate to support the program at present.

C. IS AVAILABLE EQUIPMENT ADEQUATE TO SUPPORT THE PROGRAM? EXPLAIN.

As explained in part A., funds need to be provided for the replacement/upgrading of the PC and the maintenance of the Polycomms and other equipment needed for ITV classes in Needles center.

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

While the Math department unanimously adopted the Hawkes Learning System Software for all of our MAT classes, we are continuously revaluating the Student Learning Outcomes against the effectiveness of the computer adaptive math teaching software.

PART XII: STRENGTHS AND WEAKNESSES

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

Math department is constantly evaluating our learning materials against the Student learning Outcomes, we revise our course outlines to keep them current and adapt our teaching techniques to incorporate the latest technology and tools that are available on the market.

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

While we are using a lot of proprietary software, like the Hawkes Learning System, we are not using sufficient OER (open educational resources) like Khan Academy, MIT open courseware and other resources to incorporate into our teaching pedagogy. This will not only reduce the cost burden to the students since these are free and constantly updated, it will enable us to market the program across the country with a unique perspective.

Currently, we have only two remedial/basic skills courses which are online: MAT 084 – Elementary Algebra and MAT 086 – Intermediate Algebra. More courses can be developed to be taught online, and one, MAT 110 – College Algebra, is in the process of being prepared to be presented to the Curriculum Committee.

PART XIII: PLANS TO REMEDY WEAKNESSES

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

Currently we are completing the 3rd year of a 5 year Title III grant that is enabling us to go towards a virtually connected campus. We have to make full use of these opportunities to identify and establish good OER so that a completely online MATH program becomes not only viable but also competitive because of the low cost to the students.

PART XIV: PLANS TO ADVANCE THE PROGRAM

DESCRIBE OTHER PLANS THAT WILL ADVANCE THE PROGRAM.

Currently Math Instructors, especially those teaching the Basic Skills classes, enjoy in-class tutoring and other services which need to be supported by the District on an ongoing basis.

Additionally, smaller classes benefit the students in these remedial classes, and students enjoy a level of support and interaction with the instructor which is critical to the student's success.

The Math department continues to encourage the scheduling of the face –to- face basic skills classes, namely, MAT 080 – Basic Arithmetic and MAT 082 – Arithmetic Fundamentals with lab, on a daily basis throughout the week, so that the students can benefit from the same topic being discussed at the same time of the day and the constant engagement reinforces the student learning outcomes.

Sign-up sheets for classes which do not form part of the two year plan will be placed with the counselors, so that when sufficient numbers are available, these courses can be offered.

Hawkes Learning System training for adjuncts will be scheduled, during the Spring 2012 semester so that there is training available for the uniform implementation of Hawkes among adjunct and full time faculty at Palo Verde College.

The Math Department will continue to offer the lowest levels of Math like MAT 080 – Basic Arithmetic and MAT 082 – Arithmetic Fundamentals with Lab in small time segments meeting on a daily basis to reinforce the Student Learning Outcomes in those classes.