PROGRAM REVIEW

MATH FOR TEACHERS PROGRAM

(Math 110, 115, 116)

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Contents

I. Overview of the Program

Description of the Program

The Math for Teachers Program provides an opportunity for students to have a rich and deep experience in the mathematics they will need to be able to both teach quality mathematics to elementary school students as well as interpret initiatives and directives provided by state and national local educational organizations. Predominantly, the courses within the program serve as the lower division math requirements for students who transfer to a 4-year institution as Liberal Studies majors intending to be elementary school teachers. Our mission statement is as follows: The program offers a comprehensive sequence of mathematics courses in order to build and enhance the procedural and conceptual understandings and competencies of students who plan to be teachers. Our mission aligns with the El Camino College mission to ensure student success.

The Math for Teachers Program at El Camino College consists of three courses: Structures/Concepts in Mathematics (Math 110 – 2 lecture and 2 laboratory units), Probability and Statistics for Prospective Elementary School Teachers (Math 115 – 2 lecture and 2 laboratory units) and Geometry and Measurement for Prospective Elementary School Teachers (Math 116 – 2 Lecture and 2 Laboratory Units). These courses support Strategic Initiative A in which teaching is enhanced by using a variety of instructional methods such as the use of manipulatives and the use and development of group activities designed to promote problem based learning. One additional course remains within the program: Probability, Statistics, and Geometry for Prospective Elementary School Teachers (Math 111 – 3 units, 3 hours lecture), which is offered only at the Compton Education Center. The Math 111 course has not been offered at the El Camino College campus since fall 2008. At the time the Compton Center officially decides not to offer Math 111, we will process the request for discontinuance of Math 111.

On the Torrance campus, there are typically 250 enrollments in Math 110, 115, and 116 during each academic year. Three full-time mathematics faculty teach these courses.

Mathematics content courses for pre-service teachers have been offered at El Camino College since the 1960's. Until the early 2000's, El Camino College offered two content courses for students considering a career in teaching (Math 110 and Math 111). On a national level, evidence suggested that a more rigorous mathematics program for potential classroom teachers in the elementary grades would better prepare them to teach not only how to solve pertinent mathematical problems but understand the underlying concepts. This stance was adopted by the leading national organizations for mathematics teachers, the National Council of Teachers of Mathematics and the American Mathematical Association for Two-Year Colleges. At the same time, the state now requires all potential elementary school teachers to pass the Content Subject Examination for Teachers (CSET) as a condition for admission into the teaching credential program at baccalaureate institutions. For prospective elementary school teachers, they must successfully complete three subtests (mathematics and science, language arts and social studies, and human development and the arts). El Camino College responded to these external factors by restructuring the courses for pre-service elementary school teachers. Greater depth was added to the content of Structures/Concepts in Mathematics (Math 110) and Probability, Statistics, and Geometry for Prospective Elementary School Teachers (Math 111) was discarded in favor of two new courses: Probability and Statistics for Prospective Elementary School Teachers (Math 115) and Geometry and

Measurement for Prospective Elementary School Teachers (Math 116). The three-course program reflects the curriculum at most of the California State University system campuses. In addition, these changes support Initiatives B and D because they serve to strengthen quality education in order to promote student success and they involved partnerships with universities and organizations. The Math for Teachers program serves students preparing for the CSET well. El Camino College mathematics faculty prepared a report which documents the mathematics items on the CSET to the two sequences of mathematics content courses for pre-service teachers (Math 110/111 and Math 110/115/116). The report concludes that the content presented in the three course sequence (Math 110/115/116), address all of the required content for the mathematics portion of the CSET for elementary school teachers.

The Math for Teachers courses attract predominately two types of students: Students who are fairly new to the college environment; are full-time students (or nearly so); and want to become elementary school teachers or students who may be returning after having some previous career or work in the K-12 classrooms in some capacity. A minor number of general education students who do not plan to become teachers also enroll in our courses.

Over the last decade, enrollment has fluctuated in the program's courses. For example, in 2006-2007 academic year, there were 11 sections of Math 110 and Math 111 offered and in the 2013-2014 academic year, that number has fallen to 7 sections of Math 110, 115 and 116. The decline in enrollment may be due in part to the college's decision to discontinue the Teacher Education Program as well as the budget and employment constraints in the K-12 school districts.

Status of Previous Recommendations

RECOMMENDATION 2011A: (Consistent Units And Hours For Core Courses)
We recommend revising the course outlines of record, so that Math 110, 115, and 116 are 3-unit courses with 2 hours of lecture and 2 hours of laboratory each week. For the students, this would mean a decrease in the total number of units for the three courses from 11 to 9 units. The faculty load impact of this change would be a slight increase in the faculty load for Math 110 (from 20.00% to 23.33%) and a decrease in faculty load for Math 115 and Math 116 (from 26.67% to 23.33%). This change would also improve articulation and answer the transfer concerns expressed by our counselors. We plan to propose these revisions in spring 2011. (Curriculum)

Status Of The Recommendation: This recommendation has been MET.

RECOMMENDATION 2011B: (Cooperation Among ECC Deans, Instructional Faculty And Counselors)
We recommend increasing the cooperation among ECC Academic Deans, instructional faculty and counselors for coordination of the classes taken by future teachers to avoid conflicts in offerings. This could be accomplished with the reinstitution of the Teacher Education Program on the El Camino campus. The program administrators could keep all members of the campus community aware of current and often changing requirements for the Liberal Studies majors that intend to become elementary school teachers. As teachers in the Math Department, we are often not aware of changes at the statewide level that impact those seeking a Multiple Subject Teaching Credential. In the past the TEP program administrators were our contact in finding out the latest information. Secondly, program administrators of TEP program could be the leader in assisting all divisions to plan and schedule future teacher courses that

do not have time conflicts to best serve our student population. In the event that the TEP program is not reinstituted, cooperation among ECC Academic Deans, instructional faculty and counselors for coordination of classes must be considered to prevent the time conflicts among the courses that future teachers must complete at El Camino College.

Status Of The Recommendation: This recommendation has NOT BEEN MET.
Over the years, little coordination between the deans and departments which offer courses specifically for prospective teachers has taken place. There is always a concern when departments and divisions create their own class schedules without discussing the days and times courses are offered. This is particularly important when only one section of the course is offered.

RECOMMENDATION 2011C: (SLOs With Compton Educational Center Faculty)
We recommend continuing to assess the SLOs at both the course and program level at ECC. We should continue to work with the CEC faculty in completing an entire assessment cycle for the classes in this program. (SLO)

Status Of The Recommendation: This recommendation has been MET and DISCONTINUED.
Since policy dictates that ECC and CEC tabulate, analyze, and reflect upon data and findings separately, we will only use ECC SLO data for Math 110 in our work.

RECOMMENDATION 2011D: (Dedicated Classroom)
We recommend a classroom dedicated to the Math for Teachers Program in the new building. The classroom should be equipped with tables, a locking storage cabinet, and a computer projection system. This classroom may be used for other math classes during the day but the Math for Teachers courses should be given top priority for this classroom. It is also imperative that our classes do not get moved out of the classroom to accommodate other classes which would have a negative impact on the students in our program. (Facilities)

Status Of The Recommendation: This recommendation has been MET. The Dean of Mathematical Sciences typically schedules Math 110, 115, and 116 classes in MBA 103.

RECOMMENDATION 2011E: (Current Software)
We recommend designing a long-range, sustainable plan to purchase and use the most up-to-date version of the software used in the courses in this program. In anticipation of the workplace our future teachers will enter, we are doing our students a disservice to teach our classes using outdated software. (Technology)

STATUS OF THE RECOMMENDATION: This recommendation has been MET. We recommend that software for the Math for Teachers Program be continually updated.

II. Analysis of Research Data

Analysis of Course Grade Distribution, Success Rates, Retention Rates

From the data in table I which represents the number of students enrolled in Math 110, 115, and 116, we see the Math for Teachers Program annually serves about 200 students in which each student annually enrolls in about 1.25 courses making for about 250 enrollments per year.

	2009-10	2010-11	2011-12	2012-13
Students	210	202	195	172
Enrollments/Student	1.20	1.27	1.24	1.22

Table I

Though students can transfer after successfully completing just Math 110, transfer students wishing to become elementary educators will be in a much better position if they take all three courses before they graduate El Camino College both in terms of getting their credential in a timely manner as well as being better prepared for state testing which is required of them before entering the credential program. Thus, Institutional Research did further data collection to see how many students persisted in our program rather than transfering immediately. See table II.

Cohort Term	Number of Students in Cohort	Took Math-115 or 116 within 2 years	Percent of Cohort which Took Math-115 or 116 within 2 years	Passed Math-115 or 116 within 2 years	Percent of Cohort which Passed Math-115 or 116 within 2 years	Pass rate for cohort in next course
Fa 08	76	29	38.2%	23	30.3%	79.3%
Sp 09	78	17	21.8%	15	19.2%	88.2%
Fa 09	69	22	31.9%	18	26.1%	81.8%
Sp 10	87	30	34.5%	26	29.9%	86.7%
Fa 10	78	23	29.5%	21	26.9%	91.3%
Sp 11	72	18	25.0%	16	22.2%	88.9%
Fa 11	61	20	32.8%	17	27.9%	85.0%

Cohort Term	Number of Students in Cohort	Took Math-115 and 116 within 3 years	Percent of Cohort which Took Math-115 and 116 within 3 years	Passed Math-115 and 116 within 3 years	Percent of Cohort which Passed Math-115 and 116 within 3 years	Pass rate for cohort in next course
Fa 08	76	8	10.5%	7	9.2%	87.5%
Sp 09	78	10	12.8%	10	12.8%	100.0%
Fa 09	69	11	15.9%	11	15.9%	100.0%
Sp 10	87	13	14.9%	13	14.9%	100.0%
Fa 10	78	10	12.8%	10	12.8%	100.0%

Table II

Though we expected the figures to be low and they are, the data collected above does not align with the perceptions of the program committee. We plan to follow up on this initial data. We expect to collect more data both through Institutional Research as well as internally. However, the low numbers do support Recommendation 2014 #1 and Recommendation 2014 #2 (see p. 7). Further coordination as well as a TEP program would assist in ensuring that students receive counseling that illuminates the advantages of taking the entire sequence before transfering.

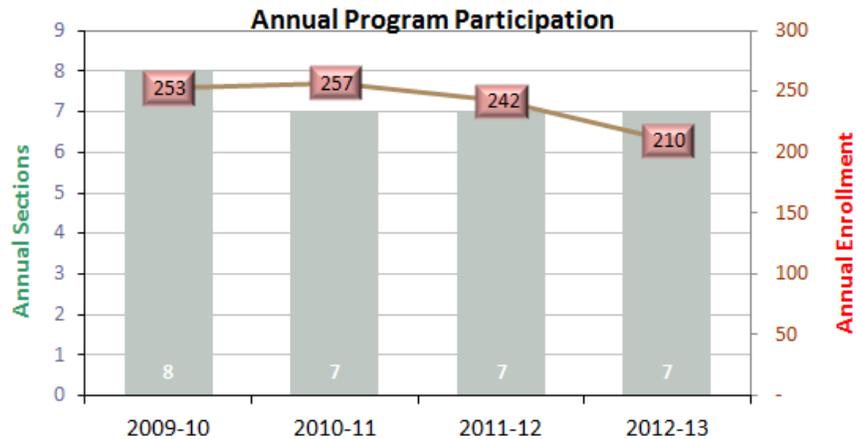**Annual Program Participation**

Table III

Tables I and III have some similar data. In table I, we saw the number of students in the program. In table III, we are looking at the enrollments. There are more enrollments than students because some students will take more than one of our courses in a given academic year. The trend revealed in table III, above, could be cause for concern. However, there are a number of possible reasons for the decline in enrollment: state cutbacks, course offering times that could be in conflict with other courses students need to enroll in, and appropriate counseling. It is our belief that state cutbacks are the largest contributor to this trend. Now that the college has the opportunity to grow once again, it is likely that the program will eventually be part of that growth. However, we shall continue to watch the data to determine if there is need for further concern. It is our belief that our growth will be slower than the colleges due to the likelihood that the need for new elementary school teachers will grow more slowly than the college.

The grade distribution for the fall term of the last five years and for the spring term for the last five years can be found in tables IV and V respectively, on the next page. The data shows that the about 50% of the students consistently earn an A or a B in the program courses and that the students have a 75% success rate and an 87% retention rate. Institutional research suggests that our success standard should be 76.2% as this figure is above the 5 year average but above the 5 year minimum. We agree this is an appropriate goal for our stable program as it is realistic while still encouraging improvement.

The highest success rates were consistently found in Math 116. One contributing factor to this statistic is the fact that the course is only offered once a year. Students are likely to place more value on the course if they know they cannot easily repeat it. Another contributing factor is that this is typically the last math course students will take before they transfer. The students enrolled in this class have already proven to be successful and are highly motivated to succeed.

Upon further inspection of the success rates, one can observe that the course in which students earned the lowest success rates was Math 110. A contributing factor that was considered is the fact that this is the first exposure the majority of the students have had to the methods of teaching elementary school children math as well as learning about the scope of the mathematics they will need to work in this field. Thus, it is likely that these students do not enter the class as motivated or prepared as students in Math 115 or 116, who know better what to expect from our program.

Grade Distribution, Success, and Retention
Math for Teachers
Fall

Program	Math for Teachers																
Term	Fall			Preliminary Success Standard			76.2%										
Do Not select more than one term or Program.				5 year Success Average			77.3%										
				5 year Success Minimum			75.1%										

Year	COURSE	Method	We	Grade I 'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'	Total	Succ.	Reten.
2009	MATH-110	Lecture	16	23	19	11	-	4	2	-	-	-	5	5	69	76.8%	85.5%
	MATH-115	Lecture	16	14	8	1	-	5	1	-	-	-	5	1	35	65.7%	82.9%
2009 Total				37	27	12	-	9	3	-	-	-	10	6	104	73.1%	84.6%
2010	MATH-110	Lecture	16	10	19	21	-	3	10	-	-	-	1	14	78	64.1%	80.8%
	MATH-115	Lecture	16	11	14	13	-	1	-	-	-	-	-	3	42	90.5%	92.9%
2010 Total				21	33	34	-	4	10	-	-	-	1	17	120	73.3%	85.0%
2011	MATH-110	Lecture	16	10	19	15	-	2	5	-	-	-	-	10	61	72.1%	83.6%
	MATH-115	Lecture	16	9	10	9	-	3	1	-	-	-	2	2	36	77.8%	88.9%
2011 Total				19	29	24	-	5	6	-	-	-	2	12	97	74.2%	85.6%
2012	MATH-110	Lecture	16	11	20	15	-	3	4	-	-	-	-	10	63	73.0%	84.1%
	MATH-115	Lecture	16	10	9	8	-	2	-	-	-	-	-	1	30	90.0%	96.7%
2012 Total				21	29	23	-	5	4	-	-	-	-	11	93	78.5%	88.2%

Table IV

Grade Distribution, Success, and Retention
Math for Teachers
Spring

Program	Math for Teachers																
Term	Spring			Preliminary Success Standard			76.2%										
Do Not select more than one term or Program.				5 year Success Average			77.3%										
				5 year Success Minimum			75.1%										

Year	COURSE	Method	We	Grade I 'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'	Total	Succ.	Reten.
2010	MATH-110	Lecture	16	19	23	18	-	7	5	-	-	-	2	13	87	69.0%	82.8%
	MATH-115	Lecture	16	6	11	4	-	3	1	-	-	-	-	7	32	65.6%	78.1%
	MATH-116	Lecture	16	8	10	6	-	1	-	-	-	-	-	5	30	80.0%	83.3%
2010 Total				33	44	28	-	11	6	-	-	-	2	25	149	70.5%	81.9%
2011	MATH-110	Lecture	16	13	21	17	-	6	2	-	-	-	1	12	72	70.8%	81.9%
	MATH-115	Lecture	16	7	11	2	-	-	4	-	-	-	2	4	30	66.7%	80.0%
	MATH-116	Lecture	16	4	13	14	-	3	1	-	-	-	-	-	35	88.6%	100.0%
2011 Total				24	45	33	-	9	7	-	-	-	3	16	137	74.5%	86.1%
2012	MATH-110	Lecture	16	9	22	19	-	11	2	-	-	-	2	12	77	64.9%	81.8%
	MATH-115	Lecture	16	11	4	10	-	2	3	-	-	-	2	2	34	73.5%	88.2%
	MATH-116	Lecture	16	6	15	11	-	-	1	-	-	-	-	1	34	94.1%	97.1%
2012 Total				26	41	40	-	13	6	-	-	-	4	15	145	73.8%	86.9%
2013	MATH-110	Lecture	16	13	19	17	-	3	5	-	-	-	-	3	60	81.7%	95.0%
	MATH-115	Lecture	16	14	7	5	-	-	1	-	-	-	-	3	30	86.7%	90.0%
	MATH-116	Lecture	16	4	11	4	-	3	1	-	-	-	-	4	27	70.4%	85.2%
2013 Total				31	37	26	-	6	7	-	-	-	-	10	117	80.3%	91.5%

Table V

In the past five years, few of our sections have had below 30 students after census. Thus, the classes are nearly always full. This is evidence that the program has room for growth. These numbers also illustrate the careful selection that has been made in determining the time of day that the courses are offered. Every

semester, a faculty member from the program establishes a schedule in consultation with the division dean to ensure that courses are offered at times of the day to best fit student need. In addition, faculty watch the fill rates and the waitlists to determine if we offer an adequate number of sections. At this time, there is no evidence that more sections are needed. The schedule showing the selection of offerings since spring 2011 is in the attachment titled Math for Teachers Schedules.

We currently do not offer summer, Saturday, late night or distance education courses. As mentioned above, the fill rates and waitlists are closely monitored each semester. The student body is being served with no need for summer courses or late night courses. The makeup of the students that enroll in our course is such that they either enroll in morning/early afternoon, or, they take our courses after their assignments in the public school. Offering late afternoon (after 3 pm) classes works well for this class of students. In addition, due to the laboratory nature of these courses, online education might be detrimental to the quality of the program. It is not in the best interest of the students we serve to offer our courses at these times or using distance education.

We collected the data that can be found in the attachment titled ECC Grade Distribution with Success and Retention Rates Fall 2008 - Fall 2013 in order to determine the effect of the curriculum change made from the last program review. One of the major results of Recommendation 2011A was that, through the lab, the students got one more contact hour in the classroom. The curriculum change took effect in fall 2012. The observation we were able to make is that the highest retention rate prior to this semester was 84% while the lowest retention rate since the change has been 84%. This supports the concept behind the change. In addition, though the highs and lows for success rates vary more than the retention rates, we found that the average success rate prior to the curriculum change was 71.4% while the average success rate since the curriculum change is 76%. Again, this gives us great confidence that the change in all courses from lecture to a combination of lecture/lab not only reflects what is truly being done in the classroom and answers the concern of counselors that the students were getting too many units, but also had a very positive effect on students enrolled in Math 110 all of whom received the extra contact hour.

The attachments titles "Demographic and Enrollment Characteristics" provide data regarding demographics. We observe that during both fall and spring, our program served far more females than males in comparison to the El Camino College population. We are not concerned about this discrepancy as this is reflective of the population of elementary school teachers. In observing the ethnicity trends, we see that, though El Camino College is a Latino serving campus, our program serves more Latinos than the norm for ECC and fewer African Americans than is the college norm. Presently, we are not able to compare these percentages to those of Elementary School Teacher in the South Bay or even in Southern California. We did find statewide statistics: 18% all public school instructors in California are Latino and 4% all public school instructors in California are African American. Unlike the comparison to the college, this comparison shows that our percentages in both areas are much lower than the state averages. Though we would like to do further research regarding the discrepancies in the ethnicities our program serves, we have found that much of the data is unattainable or inaccessible. The college is working on a Student Equity Plan in which two of the many goals are to increase enrollment in credit courses and to increase the number of transfers for the underrepresented populations at ECC. We will follow specific guidelines that are a result of the work from that planning team.

Finally, we have included the statistics on demographic trends (see the attachments titled "Demographic Success Characteristics") that were provided by Institutional Research. However, we feel that this data is not very useful for our program because the reference group is white males between 20 and 24.

Related Recommendations

RECOMMENDATION 2014 #1 (Reinstate the Teacher Education Program [TEP]): We recommend that the college reinstate the Teacher Education Program (TEP) to provide a forum for college students who plan to be classroom teachers to gather with their peers, receive accurate information, meet with professionals who can guide them in their chosen career, and counsel them to take the most optimal path to transfer.

RECOMMENDATION 2014 #2 (Coordination Among Deans, Instructional Faculty, and Counselors): We recommend increasing the coordination among deans, faculty and counselors to ensure that students taking courses for pre-service teachers receive accurate and current information about their major, transfer institutions, and state requirements. Courses taken by college students who plan to be teachers span the campus and every effort should be made to schedule these classes on days and times where there are no overlaps. In particular, many of the required courses are only taught once per semester (e.g. Math 115 and Math 116) so to best serve our students, deans, faculty, and counselors should schedule these offerings at times that do not coincide or overlap.

III. Curriculum

We are satisfied with the three core courses: Structures/Concepts in Mathematics (Math 110 – 2 lecture and 2 laboratory units), Probability and Statistics for Prospective Elementary School Teachers (Math 115 – 2 lecture and 2 laboratory units and Geometry and Measurement for Prospective Elementary School Teachers (Math 116 – 2 lecture and 2 laboratory units). We view these courses as mathematically rigorous and intellectually probing. In addition, they prepare future teachers to take the CSET exam and to teach the Common Core Standards when they have a classroom of their own.

At the Torrance campus, Math 110, Math 115, and Math 116 are the three courses offered in the Math for Teachers Program. Math 111 is only offered at the Compton Educational Center campus. At the time that the Compton Educational Center campus becomes an entity and not part of El Camino College, we plan to inactivate the Math 111 course.

We do not need any new courses at this time and all courses have been reviewed in the last five years for compliance with Title 5 regulations, accreditation and local standards.

Our six year curriculum course review timeline can be found below in table VI.

Division: Mathematical Sciences		Department: Mathematics		Faculty: Anna Hockman		Date: 3/5/14		Semester/year of next Program Review: See Table				
Total # of Courses:	31	Courses Requiring CCC Blanket Approval: (Special Topics, CWEE, and Independent Study courses)								Table			
		YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6	
Course	Last Course Review	FA 14	SP 15	FA 15	SP 16	FA 16	SP 17	FA 17	SP 18	FA 18	SP 19	FA19	SP 20
Math - Teachers	May, 2014	P							P	P			
MATH-110	2012-2013											X	
MATH-111-Compton	2012-2013											X	
MATH-115	2012-2013						X						
MATH-116	2011-2012						X						

Table VI

The changes we made in curriculum since our last program review were aligned with Recommendation 2011A. We revised the course outlines of record, so that Math 110, 115, and 116 are 3-unit courses with 2 hours of lecture and 2 hours of laboratory each week.

Institutional Research has supplied us with data reporting the number of students who persist in completing all three courses (Math 110, Math 115, Math 116); the number of students who persist in any two of the courses; and the number of students who complete only one of the courses. The data was presented in table II on p. 4. For the benefit of the reader, this table is repeated here:

Term	Cohort	Took Math-115 or Math-116 within 2 years	% of cohort	Passed Math-115 or Math-116 within 2 years	% of cohort	% of 2 years
Fa 08	76	29	38.2%	23	30.3%	79.3%
Sp 09	78	17	21.8%	15	19.2%	88.2%
Fa 09	69	22	31.9%	18	26.1%	81.8%
Sp 10	87	30	34.5%	26	29.9%	86.7%
Fa 10	78	23	29.5%	21	26.9%	91.3%
Sp 11	72	18	25.0%	16	22.2%	88.9%
Fa 11	61	20	32.8%	17	27.9%	85.0%

Term	Cohort	Took Math-115 and Math-116 within 3 years	% of cohort	Passed Math-115 and Math-116 within 3 years	% of cohort	% of 3 years
Fa 08	76	8	10.5%	7	9.2%	87.5%
Sp 09	78	10	12.8%	10	12.8%	100.0%
Fa 09	69	11	15.9%	11	15.9%	100.0%
Sp 10	87	13	14.9%	13	14.9%	100.0%
Fa 10	78	10	12.8%	10	12.8%	100.0%

Table II

It is our intent in the next four years to increase the number of students who complete all three courses. The strategies we plan to use to increase the number of students completing all three courses include (but are not limited to): (1) encouraging students to persist in the three courses sequence during class time; (2) encouraging counselors, especially those advising pre-service teachers, to counsel students to complete the three course sequence prior to transfer; (3) making connections, when appropriate, between the topics addressed in Math 110, Math 115, and Math 116; and (4) encouraging the faculty and staff to reinstate the Teacher Education Program as part of the college's commitment to preparing K-12 teachers. (5) ensuring that the courses do not meet at the same time as other core courses in the students field of study.

We contend the pre-service teachers who successfully complete Math 110, Math 115, and Math 116 will be well prepared to complete and pass the mathematics component of the CSET (California Subject Examination for Teachers); better prepared to earn their credential in a reasonable time frame; more agile in responding to the Common Core Mathematics Standards; and better prepared to teach the mathematical algorithms and the conceptual underpinnings of the mathematical ideas taught in K-12 classrooms.

Related Recommendations

RECOMMENDATION 2014 #3 (An Increase in the Completion Rate of the Three Course Series): We recommend that there be an increase in the number of students completing the three course series (Math 110, Math 115, Math 116).

IV. Assessment and Student and Program Learning Outcomes (SLOs & PLOs)

MATHEMATICAL SCIENCES
Institutional (ILO), Program (PLO), and Course (SLO) Alignment

Program: **Math (Prospective Elementary School Teachers)**	**Number of Courses:** 4	**Date Updated:** 08.18.2014	**Submitted by:** Susanne Bucher, ext. 3221

ILOs	**1. Critical Thinking** Students apply critical, creative and analytical skills to identify and solve problems, analyze information, synthesize and evaluate ideas, and transform existing ideas into new forms.	**2. Communication** Students effectively communicate with and respond to varied audiences in written, spoken or signed, and artistic forms.	**3. Community and Personal Development** Students are productive and engaged members of society, demonstrating personal responsibility, and community and social awareness through their engagement in campus	**4. Information Literacy** Students determine an information need and use various media and formats to develop a research strategy and locate, evaluate, document, and use information to accomplish a specific purpose. Students demonstrate an understanding of the

SLO-PLO-ILO ALIGNMENT NOTES:

Mark boxes with an 'X' if: SLO/PLO is a major focus or an important part of the course/program; direct instruction or some direct instruction is provided; students are evaluated multiple times (and possibly in various ways) throughout the course or are evaluated on the concepts once or twice within the course.

DO NOT mark with an 'X' if: SLO/PLO is a minor focus of the course/program and some instruction is given in the area but students are not formally evaluated

PLOs	**PLO to ILO Alignment** *(Mark with an X)*			
	1	**2**	**3**	**4**
PLO #1 Solving Application Problems Students will be able to determine an appropriate strategy to solve an application problem, complete the solution of the problem, describe the procedures used to solve the problem, and explain the underlying mathematical concepts using written and oral means.	X	X		
PLO #2 Explaining Mathematical Concepts Students will be able to demonstrate and explain mathematical concepts using a variety of methods.		X		
PLO #3 Analyzing Mathematical Problems and their Solutions Students will be able to analyze a solution to a mathematics problem, determine the appropriateness of the solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written and oral means.	X	X		

SLOs	**SLO to PLO Alignment** *(Mark with an X)*			**COURSE to ILO Alignment** *"FOR OFFICE USE ONLY"*			
	P1	**P2**	**P3**	**1**	**2**	**3**	**4**
MATH 110 Structures and Concepts in Mathematics: SLO #1 Perform and Interpret Basic Operations Students will be able to demonstrate/perform the four basic operations with real numbers and interpret the results.	X		X				
MATH 110 Structures and Concepts in Mathematics: SLO #2 Explain Mathematical Concepts Students will be able to explain the underlying mathematical concepts of the binary operations using written and oral means.		X		X	X		
MATH 110 Structures and Concepts in Mathematics: SLO #3 Solve Application Problems Students will be able to solve an application problem and design an application when parameters are given.	X						
MATH 111 Mathematics for Elementary School Teachers - Geometry, Probability and Statistics: SLO #1 Compute Probability Students will be able to compute the probability of an event.	X		X				
MATH 111 Mathematics for Elementary School Teachers - Geometry, Probability and Statistics: SLO #2 Analyze Statistical Graphs Students will be able to draw and interpret statistical graphs.			X				
MATH 111 Mathematics for Elementary School Teachers - Geometry, Probability and Statistics: SLO #3 Central Tendency and Dispersion Students will be able to compute and interpret measures of central tendency and dispersion.	X		X	X			
MATH 111 Mathematics for Elementary School Teachers - Geometry, Probability and Statistics: SLO #4 Solving Congruence Problems Students will be able to solve problems involving congruence and similarity of geometric figures.	X		X				
MATH 111 Mathematics for Elementary School Teachers - Geometry, Probability and Statistics: SLO #5 Converting Measurements Students will be able to convert between American and metric units of measurement.	X		X				

SLOs	SLO to PLO Alignment (Mark with an X)			COURSE to ILO Alignment "FOR OFFICE USE ONLY"			
	P1	**P2**	**P3**	**1**	**2**	**3**	**4**
MATH 115 Probability and Statistics for Prospective Elementary School Teachers: SLO #1 Research Study Students will be able to design a research study, develop an appropriate assessment instrument, collect and analyze data using appropriate methods, and draw statistical inferences from the data in written form.	X	X	X				
MATH 115 Probability and Statistics for Prospective Elementary School Teachers: SLO #2 Analyze Statistical Procedure Given a particular set of data, students will be able to determine the appropriate statistical procedures to analyze and display the data, complete the statistical methods, and explain the mathematical concepts in written and oral forms.		X	X				
MATH 115 Probability and Statistics for Prospective Elementary School Teachers: SLO #3 Explain Statistics and Probability Concepts Given a particular set of data, students will be able to explain statistics and probability concepts and use appropriate methodologies for elementary or middle school teachers.	X	X		X	X		
MATH 115 Probability and Statistics for Prospective Elementary School Teachers: SLO #4 Solve and Interpret Experimental and Mathematical Probability Students will be able to solve, explain, and interpret informal, experimental, and mathematical probability concepts and application problems both in written and oral forms.	X	X	X				
MATH 116 Geometry and Measurement for Prospective Elementary School Teachers: SLO #1 Identify Geometric Shapes Students will identify two- and three-dimensional geometric shapes, explain their attributes and discuss the relationships among the geometric shapes.		X	X				
MATH 116 Geometry and Measurement for Prospective Elementary School Teachers: SLO #2 Use Geometric Tools Students will use geometric tools (compass, protractor, straightedge, and dynamic geometry software) to construct geometric figures.	X		X				
MATH 116 Geometry and Measurement for Prospective Elementary School Teachers: SLO #3 Solve and Interpret Geometric Application Problems Students will use the concepts of measurement to solve geometric application problems, determine the appropriateness of a solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written or oral means.	X	X	X	X	X		
MATH 116 Geometry and Measurement for Prospective Elementary School Teachers: SLO #4 Explain Geometric Formulas Students will use words and diagrams to explain the derivation of geometric formulas.		X	X				

SLO and PLO Assessment Timeline		
Division: Math **Program: Math for Prospective Elementary School Teachers** **Program Review Date: SP14/FA14**		
Semester and Year	**SLO to be Assessed** Include the SLO# and Short Title	**PLO to be Assessed** Include the PLO# and Short Title
Spring 2014	Math 115 SLO #1- *Research Study* Math 115 SLO #2- *Analyze Statistical Procedure* Math 115 SLO #3- Explain Statistical and Probability Concepts Math 115 SLO #4- *Solve and Interpret Experimental and Mathematical Probability* Math 116 SLO #1- *Identify Geometric Shapes* Math 116 SLO #2- *Use Geometric Tools* Math 116 SLO #3- *Solve and Interpret Geometric Application Problems* Math 116 SLO #4- *Explain Geometric Formulas*	PLO #1: Students will be able to determine an appropriate strategy to solve an application problem, complete the solution of the problem, describe the procedures used to solve the problem, and explain the underlying mathematical concepts using written and oral means. PLO #2: Students will be able to demonstrate and explain mathematical concepts using a variety of methods. PLO #3: Students will be able to analyze a solution to a mathematics problem, determine the appropriateness of the solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written and oral means.

Summer 2014 (If applicable)		
Fall 2014	Math 110 SLO #1- *Perform and Interpret Basic Operations* Math 110 SLO #2- *Explain Mathematical Concepts* *Math 110 SLO #3- Solve Application Problems*	
Spring 2015	Math 111 SLO #2 - *Analyze Statistical Graphs* Math 115 SLO #1- *Research Study* Math 115 SLO #2- *Analyze Statistical Procedure* *Math 115 SLO #3*- Explain Statistical and Probability Concepts *Math 115 SLO #4- Solve and Interpret Experimental and Mathematical Probability* Math 116 SLO #1- *Identify Geometric Shapes* Math 116 SLO #2- *Use Geometric Tools* *Math 116 SLO #3- Solve and Interpret Geometric Application Problems* *Math 116 SLO #4- Explain Geometric Formulas*	PLO #1: Students will be able to determine an appropriate strategy to solve an application problem, complete the solution of the problem, describe the procedures used to solve the problem, and explain the underlying mathematical concepts using written and oral means. PLO #2: Students will be able to demonstrate and explain mathematical concepts using a variety of methods. PLO #3: Students will be able to analyze a solution to a mathematics problem, determine the appropriateness of the solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written and oral means.
Summer 2015 (if applicable)		
Fall 2015	Math 110 SLO #1- *Perform and Interpret Basic Operations* Math 110 SLO #2- *Explain Mathematical Concepts* *Math 110 SLO #3- Solve Application Problems*	
Spring 2016	Math 111 SLO #1 - *Compute Probability* Math 111 SLO #3 - *Central Tendency and Dispersion* Math 115 SLO #1- *Research Study* Math 115 SLO #2- *Analyze Statistical Procedure* *Math 115 SLO #3*- Explain Statistical and Probability Concepts *Math 115 SLO #4- Solve and Interpret Experimental and Mathematical Probability* Math 116 SLO #1- *Identify Geometric Shapes* Math 116 SLO #2- *Use Geometric Tools* *Math 116 SLO #3- Solve and Interpret Geometric Application Problems* *Math 116 SLO #4- Explain Geometric Formulas*	PLO #1: Students will be able to determine an appropriate strategy to solve an application problem, complete the solution of the problem, describe the procedures used to solve the problem, and explain the underlying mathematical concepts using written and oral means. PLO #2: Students will be able to demonstrate and explain mathematical concepts using a variety of methods. PLO #3: Students will be able to analyze a solution to a mathematics problem, determine the appropriateness of the solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written and oral means.

Summer 2016 (If applicable)		
Fall 2016	Math 110 SLO #1- *Perform and Interpret Basic Operations* Math 110 SLO #2- *Explain Mathematical Concepts* *Math 110 SLO #3- Solve Application Problems*	
Spring 2017	Math 111 SLO #4 – Congruence and Similarity Math 111 SLO #5 – Units of Measurement Math 115 SLO #1- *Research Study* Math 115 SLO #2- Analyze Statistical Procedure Math 115 SLO #3- Explain Statistical and Probability Concepts Math 115 SLO #4- Solve and Interpret Experimental and Mathematical Probability Math 116 SLO #1- *Identify Geometric Shapes* Math 116 SLO #2- *Use Geometric Tools* Math 116 SLO #3- Solve and Interpret Geometric Application Problems Math 116 SLO #4- Explain Geometric Formulas	PLO #1: Students will be able to determine an appropriate strategy to solve an application problem, complete the solution of the problem, describe the procedures used to solve the problem, and explain the underlying mathematical concepts using written and oral means. PLO #2: Students will be able to demonstrate and explain mathematical concepts using a variety of methods. PLO #3: Students will be able to analyze a solution to a mathematics problem, determine the appropriateness of the solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written and oral means.
Summer 2017 (If applicable)		
Fall 2017	Math 110 SLO #1- *Perform and Interpret Basic Operations* Math 110 SLO #2- *Explain Mathematical Concepts* Math 110 SLO #3- Solve Application Problems	

All SLO's for Math 110, 115 and 116 have been assessed. Math 110 assesses all SLO's every fall semester and Math 115 and Math 116 assess all SLO's every spring semester. Each spring semester all PLO's are assessed. We have 100% assessment for all SLO's and PLO's in the Math for Teachers Program.

SLO's Summary per Course in Math for Teacher Program
Math 110
In the fall semester of 2012, Math 110 was changed from a three unit lecture course to a two unit lecture and two unit lab course. This decision was made to increase the student contact hours for the course and also respond to the request by counselors to decrease the total number of units required for Liberal Studies majors. The Math 110 data will include data from 2011 for comparison purposes. Math 110 SLO's are assessed from a diverse set of course requirements, which includes activities, homework, class discussions, writing assignments, quizzes and exams. Using a rubric to assess student understanding of each SLO, a student may score within a range of 1 to 4. Using a Likert scale, a score of 1 indicates little or no understanding of the topic and a score of 4 indicates significant understanding of the topic. We consider students with scores of 3 and 4 as attaining sufficient mastery of the topic assessed. The rubric for each Math 110 SLO is stated below.

Student Learning Outcome #1

Students will be able to demonstrate/perform the four basic operations with real numbers and interpret the results.

ASSESSMENT RUBRIC

Score of 4:
- Students are able to demonstrate and explain a variety of strategies to perform the basic operations with real numbers in an exemplary fashion.
- Students are able to perform the four basic operations with real numbers and interpret the results in an exemplary fashion.

Score of 3:
- Students are able to demonstrate and explain a variety of strategies to perform the basic operations with real numbers in a competent fashion.
- Students are able to perform the four basic operations with real numbers and interpret the results in a competent fashion.

Score of 2:
- Students are able to demonstrate and explain a variety of strategies to perform the basic operations with real numbers in an adequate fashion.
- Students are able to perform the four basic operations with real numbers and interpret the results in an adequate fashion.

Score of 1:
- Students are unable to demonstrate and explain a variety of strategies to perform the basic operations with real numbers.
- Students are unable to perform the four basic operations with real numbers and interpret the results.

Student Learning Outcome #2

Students will be able to explain the underlying mathematical concepts of the binary operations using written and oral means.

ASSESSMENT RUBRIC

Score of 4:
- Students demonstrate a keen understanding of the foundational concepts of the binary operations as demonstrated through exams, quizzes, and discussions.
- Students are able to provide an exemplary explanation of the foundational concepts of the binary operations in written and oral means.

Score of 3:
- Students demonstrate a good understanding of the foundational concepts of the binary operations as demonstrated through exams, quizzes, and discussions.
- Students are able to provide a good explanation of the foundational concepts of the binary operations in written and oral means.

Score of 2:
- Students demonstrate a fair understanding of the foundational concepts of the binary operations as demonstrated through exams, quizzes, and discussions
- Students are able to provide fair explanation of the foundational concepts of the binary operations in written and oral means.

Score of 1:
- Students are unable to demonstrate any understanding of the foundational concepts of the binary operations as demonstrated through exams, quizzes, and discussions.
- Students are unable to provide an explanation of the foundational concepts of the binary operations in written and oral means.

Students will be able to solve an application problem and design an application when parameters are given.

ASSESSMENT RUBRIC

Score of 4:
- Students are able to demonstrate a keen understanding about how to set up and solve an application program as demonstrated by exams, quizzes, activities, and class discussions.
- Students are able design an application problem and explain the application problem in an exemplary fashion in both written and oral means.

Score of 3:
- Students demonstrate a good understanding about how to set up and solve an application program as demonstrated by exams, quizzes, activities, and class discussions.
- Students are able design an application problem and explain the application problem in a competent fashion in both written and oral means.

Score of 2:
- Students demonstrate a fair understanding about how to set up and solve an application program as demonstrated by exams, quizzes, activities, and class discussions.

- Students are able design an application problem and explain the application problem in an adequate fashion in both written and oral means.

Score of 1:
- Students are unable to set up and solve an application program as demonstrated by exams, quizzes, activities, and class discussions.
- Students are unable to design an application problem and explain the application problem in both written and oral means.

Math 110 SLO Assessment Results and Analysis

SLO #1 Perform and Interpret Basic Operations: **Students will be able to demonstrate/perform the four basic operations with real numbers and interpret the results**.

Results for SLO #1

	Fall 2011	Fall 2012	Fall 2013
Number of Students	24	59	57
Mean	2.92	3.15	3.02
Standard Deviation	0.83	0.66	0.71

As we review the data for SLO#1, we are particularly interested in how the change in units and increase of student contact hours has impacted the results of the SLOs. The Fall 2011 data represents the Math 110 course consisting of 3 lecture units. The Fall 2012 and Fall 2013 data represents the Math 110 course consisting of 2 lecture and 2 laboratory units. We are cautiously optimistic that the increases in the mean (computed average) and the standard deviation (indicating variance among student scores) reveal an increase in the mean and a decrease in the standard deviation. Although the data is preliminary, we are encouraged that the decision to increase student contact hours, which was made with the hopes of providing students the opportunity to work with their peers, explore mathematical ideas conceptually, and discuss strategies, questions, and solutions, was a decision that leads to increased student success.

SLO #2 Explain Mathematical Concepts: *Students will be able to explain the underlying mathematical concepts of the binary operations using written and oral means.*

Results for SLO #2

	Fall 2011	Fall 2012	Fall 2013
Number of Students	24	59	57
Mean	2.52	3.04	2.55
Standard Deviation	0.78	0.78	0.92

One of the most difficult ideas in Math 110 is the notion of exploring, understanding, and explaining mathematical concepts. Between 2011 and 2012 (and the change to more student contact hours), we were pleased to see that the mean increased significantly. We were hopeful that devoting more time to exploration of concepts would improve the mean scores for this SLO. In 2013, the mean decreased and was only slightly higher than the data reported in 2011. It is unclear if the data for 2012 or 2013 was idiosyncratic for that group of students or if there is a trend forming. Instructors noticed that the students in 2013 had a lower overall attendance than what we typically find in Math 110. Additional activities to explore and gain a deeper understanding of conceptual underpinnings of the binary operations were designed and implemented during the academic year 2013-2014. We will continue to examine the data each fall semester to see what the scores reveal over time.

SLO #3 Solve Application Problems: *Students will be able to solve an application problem and design an application when parameters are given.*

Results for SLO #3

	Fall 2011	Fall 2012	Fall 2013
Number of Students	24	59	57
Mean	2.82	2.92	2.79
Standard Deviation	0.83	0.83	0.91

The mean score for this SLO improved from 2011 to 2012 with the increase in student contact hours; however the mean score decreased in 2013.   Again, the faculty hypothesizes that this may be due to the lower attendance rates for the fall 2013 semester and the difficulty that students may have with application problems and the challenges that students face as they attempt to understand the problem, determine viable strategies to solve the problem, and then determine the reasonableness of their answers. We contend that the increased student contact hours will ultimately provide students with the time essential to carefully explore and solve application problems. We plan to watch this data closely over time to determine how the mean and standard deviations for the data reveal about our success with this SLO. One of the major implications of the change in units is the ability for students to spend more in class time working cooperatively on activities and discussing the mathematics with their peers. This has improved the ability for these students to work with each other during activity times in the future math for teachers courses.

Math 115

In 2012, the number of units for Math 115 changed from 4 lecture hours to 2 lecture and 2 laboratory hours. This decision was in response to the request by counselors to decrease the total number of units required for Liberal Studies majors. This change in units did not have any impact on student contact hours. The four SLOs for Math 115 are assessed each spring semester. To determine student performance and success, students are evaluated on the research project, tests, activities, class discussions, writing assignments, and homework. Using a rubric to assess student understanding of each SLO, a student may score from a range of 1 to 4. Using a Likert scale, a score of 1 indicates little or no understanding of the topic and a score of 4 indicates significant understanding of the topic. We consider students with scores of 3 and 4 as attaining sufficient mastery of the topic assessed. The rubric for each Math 115 SLO is stated below.

Rubric for SLO #1

Part One: The Design of the Research Study (3 points possible)

Design presented with no errors, well-written, and complete. (3 points)
Design presented with a few errors, errors in the writing, and/or missing a few components. (2 points)
Design presented with several errors, errors in the writing, and/or missing some important components. (1 point)
Design presented is substantially flawed. (0 points)

Part Two: Data Analysis (3 points possible)

Raw data and data analysis is presented with no errors, well-written, and complete. (3 points)
Raw data and data analysis presented with a few errors, errors in the writing, and/or missing a few components. (2 points)
Raw data and data analysis presented with several errors, errors in the writing, and/or missing some important components. (1 point)
Raw data is missing. (0 points)
Data analysis is substantially flawed. (0 points)

Part Three: Statistical Inferences (3 points possible)

Statistical inferences, observations, and recommendations are stated clearly with no errors, well-written, and complete. (3 points)
Statistical inferences, observations, and recommendations are stated with a few errors, errors in the writing, and/or missing at least one component. (2 points)
Statistical inferences, observations, and recommendations are presented with several errors, errors in the writing, and/or missing some important components. (1 pt)
Statistical inferences, observations, and recommendations presented are substantially flawed. (0 points)

Part Four: Overall Appearance of the Research Study (2 points)

Research Study is nicely presented, in a folder, typed, and visually pleasing. (2 points)
Research Study is either not in a folder, typed, or visually pleasing. (1 points)
Research Study does not meet the specifications for the assignment as presented in the syllabus. (0 points)

Rubric for SLO #2

VISUAL AND MATHEMATICAL STATISTICS TEST (50 points possible)

Scores of 45- 50: A

Scores of 40-44: B

Scores of 33-39: C

Scores of 28-32: D

Scores of 27 and below: F

PART II – STATISTICS RESEARCH STUDY

Raw data and data analysis is presented with no errors, well-written, and complete. (3 points)

Raw data and data analysis presented with a few errors, errors in the writing, and/or missing a few components. (2 points)

Raw data and data analysis presented with several errors, errors in the writing, and/or missing some important components. (1 point)

Raw data is missing. (0 points)

Data analysis is substantially flawed. (0 points)

Rubric for SLO #3

Score of 4: Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an exemplary fashion.

Score of 3: Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in a competent fashion.

Score of 2: Students are able to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an adequate fashion.

Score of 1: Students are unable to explain statistical and probability concepts and use appropriate methodologies for K-8 students in an exemplary fashion.

Rubric for SLO #4

PROBABILITY EXAM (50 points possible)

Scores of 45- 50: A

Scores of 40-44: B

Scores of 34-39: C

Scores of 30-33: D

Scores of 29 and below: F

Math 115 SLO Assessment Results and Analysis

SLO #1 Research Study: *Students will be able to design a research study, develop an appropriate assessment instrument, collect and analyze data using appropriate methods, and draw statistical inferences from the data in written form.*

In 2012, 84% of the students scored at mastery (score of 3 or 4) and in 2013, 96% of the students scored at mastery (score of 3 or 4) on this SLO. The instructor had provided some exemplary examples of research projects on the first day of the course and this helped to peak student interest which resulted in well-designed projects for the semester. The caliber of research questions, in 2013, were more interesting and compelling than in previous semesters. The instructor will continue to collect exemplary projects to share with future students.

In 2014, the data indicates that 95% of the students scored a grade of A, B, or C. On this project, only 50% of the students received an A grade. This is a semester long project and this percent is much lower than in semesters past. Typically about 80% of the students receive an A grade. This is due, in part, to the numerous absences that students in this class accrued. The frequent absences results in gaps in their success in various projects and exams during the semester. More students have frequent absences than in other semesters in the past. It is unclear if this is a trend or idiosyncratic of this group of students. Regardless, the Math for Teachers Program Committee has determined that investigation into the impact of frequent absences into the success of these students is a worthy effort.

SLO #2 Analyze Statistical Procedure: *Given a particular set of data, students will be able to determine the appropriate statistical procedures to analyze and display the data, complete the statistical methods, and explain the mathematical concepts in written and oral forms.*

The percentage of mastery (score of 3 or 4) improved from 49% in 2012 to 56% mastery in 2013. Students who continually worked on their research project throughout the semester and asked questions so they could move forward with the project generally scored at mastery. A factor to the lower mastery percentage compared to the other SLO's is students do not do well on exams.   The instructor will incorporate more practice problems before the exam for students to examine appropriate strategies (both visual and mathematical) when a set of data is given.
In 2014, the data indicates that the students did not reach the benchmark of 70% of the students earning a grade of A, B, or C on the Visual and Mathematical Statistics Test. The students, did, however, exceed the 70% benchmark of scoring a 2 or 3 on Part II of the Statistics Research Study. The low scores on the test are particularly troubling because this is an important component of the course and it is essential that this group of pre-service teachers have a good understanding of statistics that they may encounter in the classroom. The issue of some students having frequent absences may be a key factor in the lower scores for this SLO than in semesters past. The issue of frequent absences is a topic that the Math for Teachers Program Committee plans to examine in the 2014-2015 academic year.

SLO #3. *Given a particular set of data, students will be able to explain statistics and probability concepts and use appropriate methodologies for elementary or middle school teachers.*

In 2012 the mean score on SLO #3 was 2.55 with a standard deviation of 0.78. Class attendance is an important component of this SLO. Students will not have sufficient time to practice explaining concepts if they are not attending class regularly. The instructor will continue to recommend and encourage students to attend class consistently. In 2013 the mean score improved to 3.19 with a standard deviation of 0.68. In 2014, only 49% of the students scored a 3 or a 4. Explaining mathematical ideas in ways that are clear to the listener or reader is an essential skill in becoming a teacher.   This skill develops over time with a significant amount of practice explaining ideas in both written and oral forms. In subsequent semesters, the instructor will use pair sharing more often so students have more practice explaining things orally.

SLO #4. Solve and Interpret Experimental and Mathematical Probability: *Students will be able to solve, explain, and interpret informal, experimental, and mathematical probability concepts and application problems both in written and oral forms.*

The SLO #4 results remained the same from 2012 to 2013 with 78.6% of the students scoring at mastery level (score of 3 or 4). In 2014, 86% of the students scored at mastery level. Students who attended class regularly were more likely to reach mastery level. The instructor will continue to emphasize the importance of regular class attendance to the students.

During the past few years, the faculty has noticed that when regular attendance is an issue the mean scores for the rubric and class grades are lower. In the 2014-2015, faculty will collecte and analyze data regarding class attendance and examine if there is a correlation between attendance and class grades/SLO rubric scores.

Math 116

In 2012, the number of units for Math 116 changed from 4 lecture hours to 2 lecture and 2 laboratory hours**.** This decision was in response to the request by counselors to decrease the total number of units required for Liberal Studies majors. This change in units did not have any impact on student contact hours. The four SLOs for Math 116 are assessed each spring semester**.** To determine student performance and success, students are evaluated on tests, activities, class discussions, writing assignments, and homework. Using a rubric to assess student understanding of each SLO, a student may score from a range of 1 to 4. Using a Likert scale, a score of 1 indicates little or no understanding of the topic and a score of 4 indicates significant understanding of the topic. We consider students with scores of 3 and 4 as attaining sufficient mastery of the topic assessed. The rubric for each Math 116 SLO is stated below.

Rubric for SLO #1

Score of 4:
•Students demonstrate a proficient understanding of two- and three-dimensional shapes.
•Students are able to explain attributes of the shapes with no errors.
•Students compare shapes and can discuss relationships among the shapes using exemplary explanations.

Score of 3:
•Students demonstrate a good understanding of two- and three-dimensional shapes.
•Students are able to explain attributes of the shapes with minor errors.
•Students compare shapes and can discuss relationships among the shapes using good explanations.

Score of 2:
•Students demonstrate a fair understanding of two- and three-dimensional shapes.
•Students are able to explain attributes of the shapes with several errors.
•Students compare shapes and can discuss relationships among the shapes using some explanations.

Score of 1:
•Students are unable to demonstrate an understanding of two- and three-dimensional shapes.
•Students are unable to explain attributes of the shapes or do so with significant errors.

•Students are not able to compare shapes and cannot discuss relationships among the shapes.

Rubric for SLO #2

Score of 4:
•Students use geometric tools proficiently to create exemplary constructions.
•Students are able to explain steps in their constructions with no errors.

Score of 3:
•Students use geometric tools but may have a few problems in their constructions.
•Students are able to explain steps in their constructions with minor errors.

Score of 2:
•Students use geometric tools fairly and have problems with their constructions.
•Students are able to explain steps in their constructions but have several errors.

Score of 1:
•Students use geometric tools poorly and are unable to complete their constructions.
•Students are not able to explain steps in their constructions or have significant errors.

Rubric for SLO #3

Score of 4:
•Students demonstrate a proficient understanding of the concepts of measurement.
•Students are able to solve geometric application problems with no errors.
•Students are able to provide an exemplary explanation of their work in solving the application problem using written or oral means.

Score of 3:
•Students demonstrate a good understanding of the concepts of measurement.
•Students are able to solve geometric application problems with minor errors.
•Students are able to provide a good explanation of their work in solving the application problem using written or oral means.

Score of 2:
•Students demonstrate a fair understanding of the concepts of measurement.
•Students are able to solve geometric application problems with several errors.
•Students are able to provide a fair explanation of their work in solving the application problem using written or oral means.

Score of 1:
•Students are unable to demonstrate an understanding of the concepts of measurement.
•Students are not able to solve geometric application problems.
•Students are unable to provide an explanation of their work in solving the application problem using written or oral means.

Rubric for SLO #4

Score of 4:

•Students demonstrate a proficient understanding of explaining the derivation of geometric formulas using both words and diagrams.

•Students are able to explain the derivation with no errors.

Score of 3:

•Students demonstrate a good understanding of explaining the derivation of geometric formulas using both words and diagrams.

•Students are able to explain the derivation with few errors.

Score of 2:

•Students demonstrate a fair understanding of explaining the derivation of geometric formulas using both words and diagrams.

•Students are able to explain the derivation with several errors.

Score of 1:

•Students are unable to demonstrate any understanding of explaining the derivation of geometric formulas using both words or diagrams.

•Students are unable to explain the derivation.

Math 116 SLO Assessment Results and Analysis

SLO #1 Identify Geometric Shapes: *Students will identify two- and three-dimensional geometric shapes, explain their attributes and discuss the relationships among the geometric shapes.*

In 2012, the mean score was 3.18 and in 2013, the mean score increased to 3.35. The goal after the assessment in 2012 was to increase the percentage of students who score a 4 to at least 25% of the class. We are delighted to report that this goal was met: in 2013 47% of the class scored a 4. In 2013 91% of the class scored at mastery level (score of 3 or 4). In 2013 the class size was smaller (23 in 2013 and 33 in 2012) which allowed the instructor to attend to the needs of each student by tailoring the explanation to individual students as they worked in small groups. In 2014, the average for the class was 3.24, which is lower than in 2013 but the class size was larger at 34 students. Eighty-eight percent of the class performed at mastery.

SLO #2 Use Geometric Tools: *Students will use geometric tools (compass, protractor, straightedge, and dynamic geometry software) to construct geometric figures.*

The mean score of this SLO in 2012 was 2.45 and the mean score in 2013 increased to 3.78. In 2013, 96% of the class scored at mastery level (score of 3 or 4). This significant increase may be due, in part, to the smaller class size, aptitude of the students, and more focused activities on using a compass and straightedge.

 In 2014 the mean score was 3.38, which is lower than in 2013 (mean = 3.78). The instructor plans to span out the constructions over the entire course of the class and create a specific activity for students to complete prior to the construction project.

SLO #3 Solve and Interpret Geometric Application Problems: *Students will use the concepts of measurement to solve geometric application problems, determine the appropriateness of a solution, and if errors are made, explain the misconceptions or errors made and how to solve the problem correctly using written or oral means.*

In 2012, the mean score on this SLO was a 3.30 and the goal was to maintain this high average for 2013. In 2013 the average score was 3.35 which was even slightly higher, with 91% of the class scoring at mastery level (score of 3 or 4). In 2014 the average score is 3.26 with 88% of the students scoring at mastery. Given the initial attainability of the goal for students to attain a deeper understanding of measurement were actualized, we will continue to work diligently to ensure that student success in this area will continue. Data collected over time will reveal if success in this SLO remains consistent.

SLO #4 Explain Geometric Formulas: *Students will use words and diagrams to explain the derivation of geometric formulas.*

In 2012, the mean score was 2.94 and in 2013, the average increased to 3.35, with 91% of the class scoring at mastery level (score of 3 or 4). In 2012, the goal was to increase the average to 3.2, and we are delighted to report that this goal was met. Again, this can be attributed to a smaller class size in 2013, which allowed the instructor to give more personal attention to each student. We are cautiously optimistic that we will have continued success in maintaining high standards for this SLO because we know that being able to explain geometric formulas is a crucial skill which these students need in order to become excellent elementary school teachers.

In 2014 the class average is 2.97 and the standard for success was not met. Seventy-four percent of the students scored at mastery. As we continue to assess this SLO over time, we will be able to determine if the mean score in 2014 was idiosyncratic of the student population or reveals a trend that causes concern. The instructor realizes that this is a difficult skill for students because it requires them to have a deep understanding of the geometric formulas that they will be teaching. The instructor will encourage students to turn in a rough draft of their area project as a way to ensure that student explanations of the area formulas are in enough detail. This feedback will allow students to make adjustments prior to the project due date.

PLO's Summary in Math for Teacher Program

PLO #1 Solving Application Problems: *Students will be able to determine an appropriate strategy to solve an application problem, complete the solution of the problem, describe the procedures used to solve the problem, and explain the underlying mathematical concepts using written and oral means.*

PLO #2 Explaining Mathematical Concepts: *Students will be able to demonstrate and explain mathematical concepts using a variety of methods.*

PLO #3 Analyze Mathematical Problems and Their Solutions: *Students will be able to analyze a solution to a mathematics problem, determine the appropriateness of the solution, and if errors are made,*

explain the misconceptions or errors made and how to solve the problem correctly using written and oral means.

We continue to assess the Program Learning Outcomes each spring semester. To determine student performance and success, students are evaluated on all of the course requirements for Math 110, Math 115, and Math 116. Using a rubric to assess student competency, a student may score from a range of 1 to 4. Using a Likert scale, a score of 1 indicates little or no understanding of the PLO and a score of 4 indicates significant understanding of the PLO. We consider students with scores of 3 and 4 as attaining mastery of the PLO. The rubric for the PLO's is stated below.

Rubric for PLO #1

Score of 4:

Students demonstrate a keen understanding of setting up and solving application problems.

Students are able to solve the application problems with no errors.

Students are able to provide an exemplary explanation of the mathematical concepts for the application problems.

Score of 3:

Students demonstrate a good understanding of setting up and solving application problems.

Students are able to solve the application with minor errors.

Students are able to provide a good explanation of the mathematical concepts for the application problems.

Score of 2:

Students demonstrate a fair understanding of setting up and solving application problems.

Students are able to solve the application problems with several errors.

Students are able to provide some information about the mathematical concepts for the application problems.

Score of 1:

Students are unable to demonstrate set up and solve application problems.

Students are not able to solve the application problems or they are able to solve the application problems with significant errors.

Students are not able to provide an explanation of the mathematical concepts for the application problems.

Rubric for PLO #2

Score of 4:

Students demonstrate a keen understanding of a variety of mathematical concepts.

Students are able to provide an exemplary explanation of a variety of mathematical concepts in written and oral means.

Score of 3:

Students demonstrate a good understanding of a variety of mathematical concepts.

Students are able to provide a good explanation of a variety of mathematical concepts in written and oral means.

Score of 2:

Students demonstrate a fair understanding of a variety of mathematical concepts.

Students are able to provide fair explanation about a variety of mathematical concepts in written and oral means.

Score of 1:
Students are unable to demonstrate any understanding of a variety of mathematical concepts.
Students are not able to provide an explanation of a variety of mathematical concepts in written and oral means.

Rubric for PLO #3

Score of 4:
Students demonstrate a keen understanding of the representation of the answers to a variety of problems in written and oral means.
Students are able to provide a clear and complete explanation of the appropriateness of answers to problems in written and oral means.
Students are able to provide a clear and complete explanation of the misconceptions or errors made in problems using written and oral means.

Score of 3:
Students demonstrate a good understanding of the representation of the answers to a variety of problems in written and oral means.
Students are able to provide a good explanation of the appropriateness of answers to problems in written and oral means.
Students are able to provide a good explanation of the misconceptions or errors made in problems using written and oral means.

Score of 2:
Students demonstrate a limited understanding of the representation of the answers to a variety of problems in written and oral means.
Students are able to provide a limited explanation of the appropriateness of answers to problems in written and oral means.
Students are able to provide a limited explanation of the misconceptions or errors made in problems using written and oral means.

Score of 1:
Students are unable to demonstrate the representation of the answers to a variety of problems in written and oral means.
Students are not able to provide an explanation of the appropriateness of answers to problems in written and oral means.
Students are not able to explain the misconceptions or errors made in problems using written and oral means.

PLO Assessment Results and Analysis
We have chosen to report the PLO data for all courses (Math 110, Math 115, and Math 116) and also report the data for Math 110 only and for Math 115 and Math 116 combined. We have chosen to do so in order to determine how the increased student contact hours in Math 110 has impacted each of the PLOs.

Data for Math 110 Only

	PLO #1 2012	PLO #1 2013	PLO #1 2014	PLO #2 2012	PLO #2 2013	PLO #2 2014	PLO #3 2012	PLO #3 2013	PLO#3 2014
Number of Students	59	57	43	59	57	43	59	57	43
Mean Score	2.99	3.10	3.14	2.86	2.96	2.77	3.155	2.89	2.88
Standard deviation	.76	.69	.51	.74	.68	.71	.64	.72	.69

Data for Math 115 & Math 116 Only

	PLO #1 2012	PLO #1 2013	PLO #1 2014	PLO #2 2012	PLO #2 2013	PLO #2 2014	PLO #3 2012	PLO #3 2013	PLO#3 2014
Number of Students	62	52	56	62	52	56	62	52	56
Mean Score	2.98	3.10	3.08	2.86	3.19	2.89	3.15	3.11	3.07
Standard deviation	.76	.69	.74	.74	.71	.90	.64	.71	.78

Data for Math 110, Math 115 & Math 116

	PLO #1 2012	PLO #1 2013	PLO #1 2014	PLO #2 2012	PLO #2 2013	PLO #2 2014	PLO #3 2012	PLO #3 2013	PLO#3 2014
Number of Students	121	109	99	121	109	99	121	109	99
Mean Score	3.025	3.10	3.11	2.909	3.07	2.84	3.116	3.00	2.99
Standard deviation	.689	.69	.65	.707	.70	.82	.622	.73	.75

The data for all four sections of the Math for Teachers Program courses (Math 110, 115, and 116) appear consistent and are a reflection of the data we have collected over the years. As a collective group, the students have a slightly easier time completing problems, determining if the answers are reasonable, diagnosing errors and the underlying misconceptions, and explaining the solutions and answers in oral and written means. The students have a slightly more difficult time explaining mathematical concepts, making connections between mathematical ideas, and explaining their reasoning in a clear and concise fashion. This improves with time throughout the semester in these courses. We find that the Math 115 and 116 students do slightly better with explaining mathematical concepts which may be due to more exposure to this type of problem as they progress through the three-course sequence.

We plan to examine how attendance impacts student performance on each of the three PLOs. We contend that if students are not in class, they not only miss mathematics content, but more importantly miss the

opportunity to explore and investigate the underpinnings of a mathematical idea, discuss how to think and reason mathematically, discover the connections within mathematics and between mathematics and other disciplines, and explain the concepts in their own words. We plan to examine the correlation between student attendance and their rubric score for each of the PLOs. We will collect this data at the end of the semester and report the findings on the next cycle of PLO assessment.

Data was separated into two groups, Math 110 only and Math 115 and 116 to determine if there were any observable differences in the results for the three program SLOs. Over the years, we have found that Math 115 and 116 students typically do better on the SLOs than Math 110 students.
The Math for Teachers Program has reached the sustainable continuous quality improvement level according to the ACCJC SLO rubric. Every student learning outcome is assessed each year, all Math 110 SLO's are assessed each fall semester and all Math 115 and 116 SLO's are assessed each spring. Every PLO is also assessed each spring semester.

Faculty members on the committee meet after each assessment is completed and discuss the results. Based on the results we determine and discuss ways to improve student learning. We are currently collecting data to compare class attendance and SLO results. We realized after looking at the SLO data over the last year that we had some students who are not attending class on a regular basis. This happened in both the Math 110 courses in the fall and the Math 115 course in the spring. These students are having difficulties explaining the mathematical concepts because they are not able to practice their explanations when they are missing class. This has resulted in lower SLO scores for Math 110 in the Fall 2013 semester and in Math 115 for the Spring 2014 semester.

The Math for Teachers Program is continuously discussing results of SLO assessments and working to improve student learning based on the results. We see consistency between student grades, retention rates in all courses and the SLO results. We will continue to monitor student progress based on SLO results and make adjustments to our courses as needed.

<center>**Related Recommendations**</center>

RECOMMENDATION 2014 #6 (SLO Data Collection): We recommend that instructors of Math 110, Math 115, and Math 116 collect attendance data with the SLO data and analyze this to establish a connection between good attendance and good SLO results.
Fiscal Impact of this Recommendation: There is no cost to the College or Division for this recommendation.

V. Facilities and Equipment

The courses for the Math for Teachers Program are typically offered in MBA 103. This classroom has tables, a cabinet in the front of the classroom, and a computer projection system that allows for teacher demonstrations when necessary. The tables provide ample space for the students in this program to use manipulatives in class and the cabinet allows for storage of these materials. The computer projection system allows the teacher to use the computer, a document camera and a projection system for class demonstrations.

Related Recommendations

RECOMMENDATION 2014 #4 (Dedicated Classroom): We recommend that Math 110, Math 115, and Math 116 are offered in MBA 103. (Facilities)

VI. Technology and Software

All teachers in the program use their computers (email) as the dominant way to communicate with students in their classes. In some cases, assignments are given and turned in via email. Often, teachers will also prepare some portion of a lesson on their computer, and, in some cases, this preparation will include a computer enhanced demonstration which is used within the classroom.

Currently in the Math 115 course, students use the Excel program, to design visual statistics and to tabulate and analyze data for the research project that students are required to complete. Students may also use calculators as a way to tabulate data.

Currently, in the Math 116 course, there are approximately 3 – 5 labs that are completed using the program called Geometer's Sketchpad (per the course outline). This program is installed on the computers in the lab in the MBA Building and in the Basic Skills Lab located in the Learning Resource Center (LRC) within the library. When students complete labs during class-time, they go as a class to the lab and if there are labs that are not completed or are to be done as homework assignments, students will use the lab in the MBA building or the LRC to complete the assignment.

The computer programs used in all of our courses (Excel and Geometer's Sketchpad) will require updates when the computer companies create them (see Recommendation 2014 #5).

Related Recommendations

RECOMMENDATION 2014 #5 (Updated Software): We recommend designing a long-range, sustainable plan to purchase and use current versions of the required software for the Math for Teachers courses. (Technology)

VII. Staffing

Current Staffing

Currently, there are three full-time instructors (Susanne Bucher, Judy Kasabian, and Susie Tummers Stocum) who consistently teach our core courses, although other full-time instructors have taught the curriculum in the past and are prepared to step up and teach again, if the program experiences growth. Should the need arise for other full-time or adjunct faculty to teach any of the Math for Teachers Program courses, one of the full-time faculty listed above will mentor the new instructor to assure that the courses meet the needs of our students. Sharing materials (assessments, projects, and activities) and regular communication is the current practice among our faculty and will be part of the mentoring process.

The Dean of Mathematical Sciences plays a key part in our program by assisting with the scheduling of the classes; she ensures that the classes can meet at the times recommended by our program, schedules the recommended faculty to teach the classes, and attempts to schedule all the classes in the room designated for this program. Classified staff work with the dean in creating the schedule.

Program's Current and Future Needs

Our current staffing is adequate for our program at its present level of offerings. Should the growth of our college result in a return to more robust enrollments, we would need to attract two additional full time math instructors to teach in the program regularly, and there may be a need to formalize the support structures we currently offer adjunct instructors.

Related Recommendations

There are no recommendations at this time.

VIII. Future Direction and Vision

The Math for Teachers Program continues to provide high quality mathematics courses so that pre-service teachers will obtain the conceptual and procedural understandings of the mathematics that they will eventually teach. In addition, they learn the sophisticated language of mathematics that is necessary for them to understand state and national standards and directives for the classroom. We firmly contend that just understanding how to solve mathematical problems will not prepare future teachers well. Instead, we know that future teachers should have a keen understanding of the conceptual underpinnings of the mathematical ideas in these courses. There are a variety of ways that engage students to explore the conceptual understanding of mathematical ideas. We use individual and small group activities, in class and out of class projects, small group and class discussions, and traditional assessments such as tests and quizzes. This not only assists the students in their learning, but, in addition, it models what they will need to do in their own classrooms in order to understand and reach children having multiple learning styles.

We strive to provide the best pre-service mathematics program available at a community college. We understand that there are several salient components for students to explore and understand mathematical ideas both procedurally and conceptually. In order for us to meet our goal, we must understand these components and provide for them to the best of our ability.

1. Students need sufficient time, both in class and outside class, to examine mathematical ideas carefully. The additional student contact hours in Math 110 resulting in the change from 3 lecture units to 2 lecture – 2 laboratory units has provided these students with more class time to explore mathematical ideas, discuss their reasoning with peers and the instructor, and examine the variety of strategies that can be used to solve problems. The change in units for Math 115 and Math 116 from 4 lecture units to 2 lecture – 2 laboratory units has not changed the student contact hours. It does, however, reflect more accurately what is happening in the classroom. The class time is sufficient to explore the mathematical ideas deeply.

2. Students need to be motivated, focused, and willing to take the time needed to explore mathematical ideas beyond just completing the steps of a problem and finding the answer. Many of our students who plan to be teachers possess the motivation to delve into mathematics beyond the superficial level. Each semester, we have students enrolled in Math 110, Math 115, and Math 116 who do not plan to be classroom teachers yet have enrolled in these classes to meet the mathematics transfer requirements. We ensure that the purpose of the courses and the required components do not change even when students do not plan to be teachers. We continue to see that these students explore and discover mathematics in ways that they would not do in other transfer level mathematics courses and some have reported that they may consider a teaching career in the future.

3. Students should complete the three course series (Math 110, Math 115, Math 116) in order to gain the essential mathematical content and reasoning so that they will be able to teach both the "how" and "why" of mathematics. When students complete the three courses, they have received all of the mathematical topics on the CSET (California Subject Examination for Teachers), which must be completed prior to enrolling in a teacher credentialing program. More importantly, the topics covered in these courses will better prepare students to present mathematical ideas, design lessons, ask probing questions, and use authentic assessment strategies essential to successfully adhere to the Common Core Standards for Mathematics that are now implemented in all of California's public K-12 schools.

4. Students who plan to be teachers need a place to belong, a place where students with like minds and career goals can meet, and a place where students can participate in value-added experiences which enhance their academic preparation to become teachers. Until 2012, El Camino College had such a place – the Teacher Education Program. We contend that preparing the next generation of K-12 teachers is an important part of the college's work and we strongly encourage the college to reinstate the Teacher Education Program.

We believe that our program is assisting students to accomplish points one and two. We do not believe that enough of our students are accomplishing point three. In the future, we would like to study students who have taken all three courses at El Camino College. We would like to find out if, by our third course, they are better at attaining a deeper understanding than they were capable of their first semester in our program. We would also like to find out if they are better prepared for their transfer institutions and state testing. Though students in our courses get an opportunity to converse and work closely with their classmates, this is too limited for them to gain the benefits of meeting students in a program such as TEP. Thus, we strongly recommend the program be re-established.

We continue to be optimistic that the students who complete the courses in the Math for Teachers Program have gained a deeper understanding of mathematical ideas, have explored mathematical ideas in such a way that they know the "whys" that ground the mathematics we do, and are better able to communicate (in writing and orally) their reasoning and problem solving skills.

Related Recommendations

RECOMMENDATION 2014 #1 (Reinstate the Teacher Education Program [TEP]): We recommend that the college reinstate the Teacher Education Program (TEP) to provide a forum for college students who plan to be classroom teachers to gather with their peers, receive accurate information, meet with professionals who can guide them in their chosen career, and counsel them to take the most optimal path to transfer.

IX. Prioritized Recommendations

RECOMMENDATION 2014 #1 (Reinstate the Teacher Education Program [TEP]): We recommend that the college reinstate the Teacher Education Program (TEP) to provide a forum for college students who plan to be classroom teachers to gather with their peers, receive accurate information, meet with professionals who can guide them in their chosen career, and counsel them to take the most optimal path to transfer.
Fiscal Impact of this Recommendation: *We anticipate that the cost to the College is $50,000 per calendar year.*

RECOMMENDATION 2014 #2 (Coordination Among Deans, Instructional Faculty, and Counselors): We recommend increasing the coordination among deans, faculty and counselors to ensure that students taking courses for pre-service teachers receive accurate and current information about their major, transfer institutions, and state requirements. Courses taken by college students who plan to be teachers span the campus and every effort should be made to schedule these classes on days and times where there are no overlaps. In particular, many of the required courses are only taught once per semester (e.g. Math 115 and Math 116) so to best serve our students, deans, faculty, and counselors should schedule these offerings at times that do not coincide or overlap.
Fiscal Impact of this Recommendation: *There is no cost to the College or Division for this recommendation.*

RECOMMENDATION 2014 #3 (An Increase in the Completion Rate of the Three Course Series): We recommend that there be an increase in the number of students completing the three course series (Math 110, Math 115, Math 116).
Fiscal Impact of this Recommendation: *There is no cost to the College or Division for this recommendation.*

RECOMMENDATION 2014 #4 (Dedicated Classroom): We recommend that Math 110, Math 115, and Math 116 are offered in MBA 103. (Facilities)
Fiscal Impact of this Recommendation: *There is no cost to the College or Division for this recommendation.*

RECOMMENDATION 2014 #5 (Updated Software): We recommend designing a long-range, sustainable plan to purchase and use current versions of the required software for the Math for Teachers courses. (Technology)
Fiscal Impact of this Recommendation: *We anticipate updating software used in the Math for Teachers courses will cost $5000 every three to four years.*

RECOMMENDATION 2014 #6 (SLO Data Collection): We recommend that instructors of Math 110, Math 115, and Math 116 collect attendance data with the SLO data and analyze this to establish a connection between good attendance and good SLO results.
Fiscal Impact of this Recommendation: *There is no cost to the College or Division for this recommendation.*

Demographic and Enrollment Characteristics
Math for Teachers
Fall

Will show 0.0% if you did not select Program *AND* Term on the Academics Tab

		Fall				ECC Student Population	District Boundary Population
			Term				
		2009	**2010**	**2011**	**2012**	**Fall 2012**	**2010 Census**
	Term Headcount	101	113	89	89	*23,409*	*556,400*
Gender	F	78.2%	79.6%	78.7%	77.5%	*52.5%*	*51.0%*
	M	21.8%	20.4%	21.3%	22.5%	*47.5%*	*49.0%*
Ethnicity	African-American	11.9%	8.8%	13.5%	9.0%	*17.0%*	*15.1%*
	Amer. Ind. or Alask. Native	0.0%	0.9%	0.0%	0.0%	*0.2%*	*0.2%*
	Asian	5.9%	12.4%	19.1%	11.2%	*16.1%*	*13.6%*
	Latino	45.5%	46.9%	40.4%	58.4%	*44.7%*	*34.5%*
	Pacific Islander	2.0%	0.9%	0.0%	0.0%	*0.5%*	*0.5%*
	White	22.8%	24.8%	20.2%	13.5%	*15.6%*	*32.8%*
	Two or More	0.0%	0.9%	2.2%	4.5%	*3.8%*	*2.9%*
	Unknown or Decline	11.9%	4.4%	4.5%	3.4%	*2.0%*	*0.4%*
Age/ Age Group	<17	0.0%	0.0%	0.0%	0.0%	*0.8%*	*24.2%*
	17	0.0%	0.0%	0.0%	0.0%	*2.0%*	
	18	3.0%	5.3%	2.2%	3.4%	*11.6%*	*2.5%*
	19	16.8%	22.1%	21.3%	6.7%	*14.7%*	
	20	18.8%	23.9%	23.6%	16.9%	*13.1%*	*1.2%*
	21	13.9%	12.4%	15.7%	14.6%	*9.5%*	*1.2%*
	22	7.9%	3.5%	10.1%	11.2%	*7.3%*	*3.9%*
	23	5.9%	6.2%	2.2%	7.9%	*5.6%*	
	24	2.0%	2.7%	7.9%	6.7%	*4.6%*	
	25-29	18.8%	14.2%	10.1%	21.3%	*12.7%*	*7.4%*
	30-39	9.9%	6.2%	5.6%	5.6%	*9.0%*	*14.9%*
	40-49	3.0%	3.5%	1.1%	4.5%	*4.7%*	*15.9%*
	50-64	0.0%	0.0%	0.0%	1.1%	*3.5%*	*18.1%*
	65+	0.0%	0.0%	0.0%	0.0%	*0.8%*	*10.6%*
Class Load	Full-time	50.5%	43.4%	44.9%	34.8%	*29.8%*	
	Part-time	49.5%	56.6%	55.1%	65.2%	*69.2%*	
Academic Level	College degree	8.9%	9.7%	14.6%	18.0%	*12.3%*	
	HS Grad	89.1%	88.5%	85.4%	82.0%	*83.2%*	
	Not a HS Grad	1.0%	1.8%	0.0%	0.0%	*1.4%*	
	K-12 Special Admit	0.0%	0.0%	0.0%	0.0%	*1.1%*	
	Unknown	1.0%	0.0%	0.0%	0.0%	*1.9%*	
Educational Goal	Intend to Transfer	39.6%	44.2%	32.6%	42.7%	*31.4%*	
	Degree/Certificate Only	2.0%	1.8%	2.2%	0.0%	*3.9%*	
	Retrain/recertif.	0.0%	2.7%	2.2%	0.0%	*3.8%*	
	Basic Skills/GED	3.0%	2.7%	3.4%	5.6%	*5.3%*	
	Enrichment	2.0%	4.4%	4.5%	0.0%	*4.1%*	
	Undecided	23.8%	11.5%	19.1%	16.9%	*16.7%*	
	Unstated	29.7%	32.7%	36.0%	34.8%	*35.0%*	

Demographic and Enrollment Characteristics
Math for Teachers
Spring

Will show 0.0% if you did not select Program _AND_ Term on the Academics Tab

	Spring					ECC Student Population	District Boundary Population
			Term				
		2010	**2011**	**2012**	**2013**	**Spring 2013**	**2010 Census**
	Term Headcount	142	129	138	111	*22,660*	*556,400*
Gender	F	79.6%	86.0%	81.2%	83.8%	*52.0%*	*51.0%*
	M	20.4%	14.0%	18.8%	16.2%	*48.0%*	*49.0%*
Ethnicity	African-American	6.3%	6.2%	10.1%	9.0%	*16.6%*	*15.1%*
	Amer. Ind. or Alask. Native	1.4%	0.8%	0.0%	0.0%	*0.2%*	*0.2%*
	Asian	10.6%	8.5%	9.4%	12.6%	*16.0%*	*13.6%*
	Latino	57.0%	55.0%	52.9%	56.8%	*45.1%*	*34.5%*
	Pacific Islander	1.4%	0.8%	1.4%	0.0%	*0.5%*	*0.5%*
	White	18.3%	15.5%	17.4%	15.3%	*15.9%*	*32.8%*
	Two or More	2.1%	3.9%	5.8%	3.6%	*4.0%*	*2.9%*
	Unknown or Decline	2.8%	9.3%	2.9%	2.7%	*1.7%*	*0.4%*
Age/ Age Group	<17	0.0%	0.0%	0.0%	0.0%	*0.2%*	*24.2%*
	17	0.0%	0.8%	0.7%	0.9%	*0.6%*	
	18	8.5%	8.5%	5.8%	4.5%	*9.8%*	*2.5%*
	19	21.8%	11.6%	13.8%	19.8%	*14.8%*	
	20	16.9%	24.0%	16.7%	13.5%	*13.6%*	*1.2%*
	21	17.6%	16.3%	18.8%	17.1%	*10.4%*	*1.2%*
	22	9.9%	7.0%	10.1%	10.8%	*8.0%*	*3.9%*
	23	6.3%	5.4%	4.3%	9.0%	*6.0%*	
	24	4.9%	4.7%	10.1%	5.4%	*4.7%*	
	25-29	7.7%	7.0%	7.2%	9.9%	*13.4%*	*7.4%*
	30-39	3.5%	11.6%	3.6%	6.3%	*9.4%*	*14.9%*
	40-49	0.7%	2.3%	6.5%	1.8%	*4.4%*	*15.9%*
	50-64	2.1%	0.8%	2.2%	0.9%	*3.7%*	*18.1%*
	65+	0.0%	0.0%	0.0%	0.0%	*0.9%*	*10.6%*
Class Load	Full-time	52.8%	51.2%	44.2%	40.5%	*26.7%*	
	Part-time	47.2%	48.8%	55.8%	59.5%	*69.0%*	
Academic Level	College degree	6.3%	10.1%	10.9%	10.8%	*12.3%*	
	HS Grad	91.5%	88.4%	87.7%	89.2%	*83.8%*	
	Not a HS Grad	0.7%	0.8%	0.7%	0.0%	*0.5%*	
	K-12 Special Admit	0.0%	0.0%	0.7%	0.0%	*0.6%*	
	Unknown	1.4%	0.8%	0.0%	0.0%	*2.9%*	
Educational Goal	Intend to Transfer	38.0%	38.8%	39.1%	38.7%	*31.0%*	
	Degree/Certificate Only	1.4%	1.6%	2.2%	0.0%	*3.9%*	
	Retrain/recertif.	2.1%	2.3%	0.7%	0.0%	*3.6%*	
	Basic Skills/GED	1.4%	4.7%	3.6%	3.6%	*5.6%*	
	Enrichment	4.2%	4.7%	4.3%	2.7%	*4.2%*	
	Undecided	19.7%	19.4%	16.7%	22.5%	*16.2%*	
	Unstated	33.1%	28.7%	33.3%	32.4%	*35.5%*	

Demographic Success Characteristics
Math for Teachers
Fall: 2009 to 2012

	Fall 2009		Fall 2010		Fall 2011		Fall 2012	
Ethnicity	Success	N	Success	N	Success	N	Success	N
African-American	81.8%	11	45.5%	11	33.3%	12	62.5%	X
Amer. Ind. or Alask. Native	0.0%	X	100.0%	X	0.0%	X	0.0%	X
Asian	100.0%	X	78.6%	14	94.1%	17	80.0%	X
Latino	82.2%	45	74.5%	55	73.0%	37	78.2%	55
Pacific Islander	50.0%	X	0.0%	X	0.0%	X	0.0%	X
Two or More	0.0%	X	100.0%	X	100.0%	X	100.0%	X
Unknown or Decline	72.7%	11	80.0%	X	100.0%	X	100.0%	X
White	78.9%	19	80.6%	31	82.6%	23	75.0%	12
Gender								
M	60.0%	20	62.5%	24	73.7%	19	65.0%	20
F	86.5%	74	76.8%	95	76.3%	76	82.2%	73
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Age Groups								
19 or less	85.7%	21	75.0%	32	77.3%	22	55.6%	X
20 to 24	79.2%	48	69.5%	59	73.7%	57	77.8%	54
25 to 49	80.0%	25	82.1%	28	81.3%	16	86.2%	29
Over 49	0.0%	X	0.0%	X	0.0%	X	100.0%	X

X: Counts are suppressed for groups with less than 10 students.
Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively.
Reference groups are White, male, and 20 to 24 years old.

Demographic Success Characteristics
Math for Teachers
Spring: 2010 to 2013

Ethnicity	Spring 2010 Success	N	Spring 2011 Success	N	Spring 2012 Success	N	Spring 2013 Success	N
African-American	75.0%	X	55.6%	X	61.5%	13	63.6%	11
Amer. Ind. or Alask. Native	100.0%	X	100.0%	X	0.0%	X	0.0%	X
Asian	80.0%	15	91.7%	12	92.3%	13	57.1%	14
Latino	69.8%	86	70.7%	75	72.7%	77	84.8%	66
Pacific Islander	0.0%	X	100.0%	X	66.7%	X	0.0%	X
Two or More	50.0%	X	100.0%	X	50.0%	X	100.0%	X
Unknown or Decline	80.0%	X	75.0%	12	100.0%	X	0.0%	X
White	74.1%	27	89.5%	19	91.3%	23	100.0%	19

Gender								
M	66.7%	30	77.8%	18	76.0%	25	70.0%	20
F	72.6%	117	75.9%	116	75.9%	116	82.5%	97
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X

Age Groups								
19 or less	75.0%	44	78.6%	28	77.8%	27	75.0%	28
20 to 24	66.7%	81	76.6%	77	76.4%	89	78.8%	66
25 to 49	78.9%	19	71.4%	28	72.7%	22	90.9%	22
Over 49	100.0%	X	100.0%	X	66.7%	X	100.0%	X

X: Counts are suppressed for groups with less than 10 students.
Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively.
Reference groups are White, male, and 20 to 24 years old.

ECC Grade Distribution with Success and Retention Rates
By Course: Fall 2013

Mathematical Sciences	A	B	C	P	D	F	I	NP	IF	W	Total Grades	Success Rate	Retention Rate
MATH-110	11	13	17	0	4	2	0	0	0	9	56	73.2%	83.9%
% Of All Course Grades	19.6%	23.2%	30.4%	0.0%	7.1%	3.6%	0.0%	0.0%	0.0%	16.1%			
MATH-115	18	6	1	0	1	3	0	0	0	6	35	71.4%	82.9%
% Of All Course Grades	51.4%	17.1%	2.9%	0.0%	2.9%	8.6%	0.0%	0.0%	0.0%	17.1%			

ECC Grade Distribution with Success and Retention Rates
By Course: Spring 2013

	A	B	C	P	D	F	I	NP	IF	W	Total Grades	Success Rate	Retention Rate
MATH-110	13	19	17	0	3	5	0	0	0	3	60	81.7%	95.0%
% Of All Course Grades	21.7%	31.7%	28.3%	0.0%	5.0%	8.3%	0.0%	0.0%	0.0%	5.0%			
MATH-115	14	7	5	0	0	1	0	0	0	3	30	86.7%	90.0%
% Of All Course Grades	46.7%	23.3%	16.7%	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%	10.0%			
MATH-116	4	11	4	0	3	1	0	0	0	4	27	70.4%	85.2%
% Of All Course Grades	14.8%	40.7%	14.8%	0.0%	11.1%	3.7%	0.0%	0.0%	0.0%	14.8%			

ECC Grade Distribution with Success and Retention Rates
By Course: Fall 2012

	A	B	C	P	D	F	I	NP	IF	W	Total Grades	Success Rate	Retention Rate
MATH-110	11	20	15	0	3	4	0	0	0	10	63	73.0%	84.1%
% Of All Course Grades	17.5%	31.7%	23.8%	0.0%	4.8%	6.3%	0.0%	0.0%	0.0%	15.9%			
MATH-115	10	9	8	0	2	0	0	0	0	1	30	90.0%	96.7%
% Of All Course Grades	33.3%	30.0%	26.7%	0.0%	6.7%	0.0%	0.0%	0.0%	0.0%	3.3%			

ECC Grade Distribution with Success and Retention Rates
By Course: Spring 2012

	A	B	C	P	D	F	I	NP	IF	W	Total Grades	Success Rate	Retention Rate
MATH-110	9	22	19	0	11	2	0	0	2	12	77	64.9%	81.8%
% Of All Course Grades	11.7%	28.6%	24.7%	0.0%	14.3%	2.6%	0.0%	0.0%	2.6%	15.6%			
MATH-115	11	4	10	0	2	3	0	0	2	2	34	73.5%	88.2%
% Of All Course Grades	32.4%	11.8%	29.4%	0.0%	5.9%	8.8%	0.0%	0.0%	5.9%	5.9%			
MATH-116	6	15	11	0	0	1	0	0	0	1	34	94.1%	97.1%
% Of All Course Grades	17.6%	44.1%	32.4%	0.0%	0.0%	2.9%	0.0%	0.0%	0.0%	2.9%			

ECC Grade Distribution with Success and Retention Rates
By Course: Fall 2011

	A	B	C	P	D	F	I	NP	IF	W	Total Grades	Success Rate	Retention Rate
MATH-110	10	19	15	0	2	5	0	0	0	10	61	72.1%	83.6%
% Of All Course Grades	16.4%	31.1%	24.6%	0.0%	3.3%	8.2%	0.0%	0.0%	0.0%	16.4%			
MATH-115	9	10	9	0	3	1	0	0	2	2	36	77.8%	88.9%
% Of All Course Grades	25.0%	27.8%	25.0%	0.0%	8.3%	2.8%	0.0%	0.0%	5.6%	5.6%			

ECC Grade Distribution with Success and Retention Rates
By Course: Spring 2011

	A	B	C	P	D	F	I	NP	IF	W	Total Grades	Success Rate	Retention Rate
MATH-110	13	21	17	0	6	2	0	0	1	12	72	70.8%	81.9%
% Of All Course Grades	18.1%	29.2%	23.6%	0.0%	8.3%	2.8%	0.0%	0.0%	1.4%	16.7%			
MATH-115	7	11	2	0	0	4	0	0	2	4	30	66.7%	80.0%
% Of All Course Grades	23.3%	36.7%	6.7%	0.0%	0.0%	13.3%	0.0%	0.0%	6.7%	13.3%			
MATH-116	4	13	14	0	3	1	0	0	0	0	35	88.6%	100.0%
% Of All Course Grades	11.4%	37.1%	40.0%	0.0%	8.6%	2.9%	0.0%	0.0%	0.0%	0.0%			

ECC Grade Distribution with Success and Retention Rates
By Course: Fall 2010

MATH-110	10	19	21	0	3	10	0	0	1	14	78	64.1%	80.8%
% Of All Course Grades	12.8%	24.4%	26.9%	0.0%	3.8%	12.8%	0.0%	0.0%	1.3%	17.9%			
MATH-115	11	14	13	0	1	0	0	0	0	3	42	90.5%	92.9%
% Of All Course Grades	26.2%	33.3%	31.0%	0.0%	2.4%	0.0%	0.0%	0.0%	0.0%	7.1%			

ECC Grade Distribution with Success and Retention Rates
By Course: Spring 2010

MATH-110	19	23	18	0	7	5	0	0	2	13	87	69.0%	82.8%
% Of All Course Grades	21.8%	26.4%	20.7%	0.0%	8.0%	5.7%	0.0%	0.0%	2.3%	14.9%			
MATH-115	6	11	4	0	3	1	0	0	0	7	32	65.6%	78.1%
% Of All Course Grades	18.8%	34.4%	12.5%	0.0%	9.4%	3.1%	0.0%	0.0%	0.0%	21.9%			
MATH-116	8	10	6	0	1	0	0	0	0	5	30	80.0%	83.3%
% Of All Course Grades	26.7%	33.3%	20.0%	0.0%	3.3%	0.0%	0.0%	0.0%	0.0%	16.7%			

ECC Grade Distribution with Success and Retention Rates
By Course: Fall 2009

MATH-110	23	19	11	0	4	2	0	0	5	5	69	76.8%	85.5%
% Of All Course Grades	33.3%	27.5%	15.9%	0.0%	5.8%	2.9%	0.0%	0.0%	7.2%	7.2%			
MATH-115	14	8	1	0	5	1	0	0	5	1	35	65.7%	82.9%
% Of All Course Grades	40.0%	22.9%	2.9%	0.0%	14.3%	2.9%	0.0%	0.0%	14.3%	2.9%			

ECC Grade Distribution with Success and Retention Rates
By Course: Spring 2009

MATH-110	19	23	15	0	4	6	0	0	5	6	78	73.1%	85.9%
% Of All Course Grades	24.4%	29.5%	19.2%	0.0%	5.1%	7.7%	0.0%	0.0%	6.4%	7.7%			
MATH-115	10	9	4	0	3	1	0	0	0	3	30	76.7%	90.0%
% Of All Course Grades	33.3%	30.0%	13.3%	0.0%	10.0%	3.3%	0.0%	0.0%	0.0%	10.0%			
MATH-116	2	7	4	0	0	1	0	0	1	1	16	81.3%	87.5%
% Of All Course Grades	12.5%	43.8%	25.0%	0.0%	0.0%	6.3%	0.0%	0.0%	6.3%	6.3%			

ECC Grade Distribution with Success and Retention Rates
By Course: Fall 2008

MATH-110	24	23	14	0	1	2	0	0	4	8	76	80.3%	84.2%
% Of All Course Grades	31.6%	30.3%	18.4%	0.0%	1.3%	2.6%	0.0%	0.0%	5.3%	10.5%			
MATH-115	11	6	6	0	0	3	0	0	1	2	29	79.3%	89.7%
% Of All Course Grades	37.9%	20.7%	20.7%	0.0%	0.0%	10.3%	0.0%	0.0%	3.4%	6.9%			
MATH-116	2	4	2	0	0	0	0	0	0	1	9	88.9%	88.9%
% Of All Course Grades	22.2%	44.4%	22.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%			

MATH FOR TEACHERS PROGRAM
Long Term Schedule of Classes
Program Review Data

	MATH 110	MATH 110	MATH 115	MATH 116
SPRING 2011	J. Kasabian M/W 9:30 – 10:55 am	S. Tummers M/W 6:30 – 7:55 pm	J. Kasabian M/W 11:15 – 1:20 pm	S. Tummers M/W 4:15 – 6:20 pm
FALL 2011	S. Tummers T/Th 7:45 – 9:10 am	J. Kasabian M/W 6:00 – 7:25 pm	J. Kasabian M/W 3:30 – 5:35 pm	Not offered
SPRING 2012	S. Tummers T/Th 7:45 – 9:10 am	J. Kasabian M/W 3:30 – 4:55 pm	J. Kasabian M/W 12:30 – 2:35 pm	S. Tummers T/Th 10:30 – 12:35 pm
FALL 2012 *** 110 – unit chg ***	S. Tummers T/Th 7:30 – 9:35 am	J. Kasabian M/W 3:00 – 5:05 pm	J. Kasabian M/W 5:45 – 7:50 pm	Not offered
SPRING 2013	S. Tummers T/Th 7:45 – 9:50 am	S. Bucher T/Th 4:00 – 6:05 pm	J. Kasabian T/Th 10:30 – 12:35 pm	S. Tummers M/W 3:30 – 5:35 pm
FALL 2013	S. Bucher T/Th 8:00 – 10:05 am	S. Bucher M/W 3:30 – 5:35 pm	J. Kasabian M/W 10:15 – 12:20 pm	Not offered
SPRING 2014	S. Bucher T/Th 8:00 – 10:05 am	S. Bucher M/W 4:00 – 6:05 pm	J. Kasabian M/W 3:00 – 5:50 pm	S. Tummers T/Th 10:30 – 12:35 pm
FALL 2014	S. Bucher T/Th 8:00 – 10:05 am	S. Bucher M/W 4:00 – 6:05 pm	J. Kasabian T/Th 10:45 – 12:50 pm	Not offered
SPRING 2015				
FALL 2015				