El Camino Community College

PROGRAM REVIEW 2018

MATHEMATICAL SCIENCES

CM3 – Math for Teachers Program

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SECTION 1
Overview of the Program

A) Provide a brief narrative description of the current program, including the program's mission statement and the students it serves.

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 local, state, and national 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. Pre-service secondary mathematics teachers are welcome to enroll in the three mathematics course sequence to gain a deeper understanding of the mathematics that serves as the foundation for the mathematics that they will eventually teach.

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 because it was replaced by the Math 115 and Math 116 course which represent the content of Math 111 course in a more thorough conceptual and procedural manner. We will inactivate the Math 111 course during the Fall 2018 semester as it is up for Course Review at that time.

Background

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 either pass the Content Subject Examination for Teachers (CSET) as a condition for admission into the teaching credential program at baccalaureate institutions or at some institutions, students may take additional courses to prove content knowledge prior to entering a credential program. For prospective elementary school teachers, they must successfully complete three subtests. Subtest #1 covers reading, language, and literature as well as history and social science. Subtest #2 covers science and mathematics. Subtest #3 covers physical education, human development, and the visual and performing arts. El Camino College responded to these external factors by restructuring the mathematics courses for pre-service elementary school teachers by revising the courses to align with the mathematics required on Subtest #2 and by preparing a report which documents the alignment. 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). We contend that students who successfully complete the three-course sequence will have a deeper understanding of the mathematics they will eventually teach, be adequately prepared to pass the mathematics questions on the CSET Subtest #2, and be able to have an appreciation for the natural beauty of mathematics. We are confident that these courses will readily articulate with the colleges and universities chosen by our students.

On the Torrance campus, for a typical academic year, there are on average, 195 enrollments in Math 110, 115, and 116. The 2013-14 academic year saw the greatest enrollment with 210 while the 2016-17 academic year saw enrollment drop to 166. Two full-time mathematics faculty teach Math 110 and Math 116 and currently, different part-time mathematics faculty teach Math 115. We anticipate that with the creation of the El Camino TEACH Program in 2018, the college will be able to successfully identify and support many more prospective teachers. As a result, we expect that the number of students successfully completing Math 110, 115, and 116 will increase.

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 small 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 had fallen to 7 sections of Math 110, 115 and 116. During the 2017-2018 academic year, there were 6 sections of Math 110, 115, and 116 offered. This was the first academic year that we offered one section of Math 115 in the Fall semester and one section of Math 116 in the Spring semester with the intention that the students in this program take Math 115 and Math 116 in one academic year prior to their transfer to the baccalaureate institution. The decline in enrollment may be due in part to the

college's decision to discontinue the Teacher Education Program, budget and employment constraints in the K-12 school districts, and the typical ebb and flow of career choices by college students.

B) Describe the degrees and/or certificates offered by the program.

There are no degrees and/or certificates offered by this program.

C) Explain how the program fulfills the college's mission and aligns with the strategic initiatives.

The mission of El Camino College is to make a positive difference in people's lives by providing a comprehensive educational programs and services that promote student learning and success in collaboration with our diverse communities.

Educating and preparing the next generation of K-12 teachers continues to be the responsibility of the institutions of higher education which include both two- and four-year colleges and universities. For the college students who know that teaching is their chosen career path as well as those who are considering teaching as their profession, El Camino College must provide the academic and pre-professional experiences as well as suitable role models to ensure that our students are best prepared to meet the challenges of this academic and career pathway. The Math for Teachers courses (Math 110, 115, and 116) are designed so that students experience both procedural and conceptual understandings of the mathematical topics in a learning environment that supports collaboration, exploration, and communication of ideas.

STRATEGIC INITIATIVES

1. **Student Learning:**

   The Math for Teachers Program prides itself on using a variety of instructional methods within our courses to best meet student needs. Future teachers must demonstrate not only procedural knowledge but also conceptual knowledge to be proficient within their own classroom and our program incorporates instructional approaches to assist students in this type of learning.

2. **Student Success and Support:**

   Students in the Math for Teachers Program frequently meet with the counselors designated for Liberal Studies in order to meet the necessary requirements for transfer. We are excited for the El Camino TEACH Program to begin as another means for students to be prepared for transfer to their 4-year institution.

3. **Collaboration:**

   Collaboration within the Math for Teachers Program occurs frequently. The small size of our program, accompanied by the camaraderie of our faculty members, allows for on-going discussion about the direction of our program. Collaboration also happens with counselors and other departments via our Dean. In the past, we have also collaborated with 4-year institutions based upon the requirements necessary for Liberal Studies students to complete their transfer to the university.

4. **Community Responsiveness:**

   Our program directly addresses the need for training future teachers. California is still in great need of teachers and our program allows future teachers to take the beginning steps toward completing a Liberal Studies degree and eventually, earn their California Teaching Credential.

5. **Institutional Effectiveness:**

   By participating in program review, curriculum review and long-term planning, our program sets the groundwork to communicate both our success and our needs with our department and therefore, via our Division Dean, we are able to communicate to the entire campus. Our work with student learning outcomes has been a model for the entire campus as we have continually used this data as a means to collaborate and alter the instructional methods used within the classroom setting.

6. **Modernization:**

   Our program continues to make use of technology in order to facilitate a high-quality learning environment for our students. The use of Geometer's Sketchpad in Math 116 and the use of data analysis software in Math 115 has given our students an opportunity to be at the forefront of the understanding of the use of technology within an elementary school classroom setting.

D) Discuss the status of recommendations from your previous program review.

1. **Recommendation:** 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.

   Status: Complete

   Notes/Comments: We are pleased to report that the college has re-established a program for prospective teachers, entitled El Camino TEACH. As this new version of the former TEP emerges in fall of 2018, we will support all efforts to make this program a success and provide high academic standards in all disciplines as well as

encourage future teachers to engage in pre-professional experiences which will enhance their academic endeavors.

2. **Recommendation:** 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.
   Status: Active
   Notes/Comments: We anticipate that with the El Camino TEACH Program, there will be a stronger coordination between the faculty and deans to ensure that courses and classes are suitably scheduled to meet the needs of the students who plan to become teachers.

3. **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 (Math110, Math 115, Math 116).
   Status: Active
   Notes/Comments: We anticipate that El Camino TEACH program will ultimately result in an increase in the number of students who are declared pre-service elementary school teachers and with the support of our colleagues increase the enrollment, retention, and successful completion rates of students taking Math 110, 115, and 116.

4. **Recommendation:** RECOMMENDATION 2014 #4 (Dedicated Classroom): We recommend that Math 110, Math 115, and Math 116 are offered in MBA 103. (Facilities)
   Status: Partially Active
   Notes/Comments: For ease of handling manipulatives necessary for the Math 110 class, it is highly suggested that the two sections of Math 110 continue to be offered in the same classroom. However, Math 115 and Math 116 do not need to be offered in MBA 103.

5. **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)
   Status: Active
   Notes/Comments: We appreciate that the Mathematical Sciences Division continues to support the need for updated software to effectively teach the courses. Currently, we have the most up-to-date versions of the software and we recommend that the Division continues to update both the software and hardware for the optimal use of technology within this program.

6. **Recommendation:** 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.

Status: Abandoned

Notes/Comments: We have collected data to examine the correlation between class attendance and SLO attainment. Due to the small numbers of students in the program, we continue to be cautious about drawing any inferences from the data. If the numbers of students taking Math 110, 115, and 116 continues to increase, we will once again examine this topic by collecting and analyzing data and determining any reliable conclusions.

SECTION 2
Analysis of Research Data

A) Head count of students in the program

The table below shows the headcount of students in the program.

Academic Year	Total
2013-14	202
2014-15	198
2015-16	196
2016-17	164

The headcount within this program has been decreasing. We attribute this to the consequences of the elimination of the teacher education program here at El Camino several years ago. Given that the new TEACH program has been re-instituted, we believe we will see the headcount increase.

B) Course grade distribution

The course grade distributions are given below. Table II includes Fall semester data. Table III includes Spring semester data. These tables also include the success and retention rates for these courses.

Math for Teachers												Preliminary Success Standard				69.1%	
Fall												5 year Success Average				72.3%	
												5 year Success Minimum				65.8%	
Year	COURSE	Method	Weeks	'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'	Total	Succ.	Reten.
2013	MATH-110	Lecture	16	11	13	17	-	4	2	-	-	-	-	9	56	73.2%	83.9%
	MATH-115	Lecture	16	18	6	1	-	1	3	-	-	-	-	6	35	71.4%	82.9%
2013 Total				29	19	18	-	5	5	-	-	-	-	15	91	72.5%	83.5%
2014	MATH-110	Lecture	16	11	11	24	-	5	4	-	-	-	-	8	63	73.0%	87.3%
	MATH-115	Lecture	16	8	8	4	-	-	2	-	-	-	-	7	29	69.0%	75.9%
2014 Total				19	19	28	-	5	6	-	-	-	-	15	92	71.7%	83.7%
2015	MATH-110	Lecture	16	9	10	28	-	1	9	-	-	-	-	15	72	65.3%	79.2%
	MATH-115	Lecture	16	8	5	2	-	-	1	-	-	-	-	5	21	71.4%	76.2%
2015 Total				17	15	30	-	1	10	-	-	-	-	20	93	66.7%	78.5%
2016	MATH-110	Lecture	16	8	12	15	-	11	4	-	-	-	-	14	64	54.7%	78.1%
	MATH-115	Lecture	16	10	-	2	-	-	-	-	-	-	-	1	13	92.3%	92.3%
2016 Total				18	12	17	-	11	4	-	-	-	-	15	77	61.0%	80.5%

Table II

Math for Teachers												Preliminary Success Standard				69.1%	
Spring												5 year Success Average				72.3%	
												5 year Success Minimum				65.8%	
Year	COURSE	Method	Weeks	'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'	Total	Succ.	Reten.
2014	MATH-110	Lecture	16	5	12	18	-	6	2	-	-	-	-	8	51	68.6%	84.3%
	MATH-115	Lecture	16	6	11	5	-	-	-	-	-	-	-	6	28	78.6%	78.6%
	MATH-116	Lecture	16	12	5	12	-	3	2	-	-	-	-	6	40	72.5%	85.0%
2014 Total				23	28	35	-	9	4	-	-	-	-	20	119	72.3%	83.2%
2015	MATH-110	Lecture	16	15	15	21	-	8	9	-	-	-	-	5	73	69.9%	93.2%
	MATH-115	Lecture	16	8	9	1	-	-	1	-	-	-	-	1	20	90.0%	95.0%
	MATH-116	Lecture	16	4	7	5	-	-	-	-	-	-	-	4	20	80.0%	80.0%
2015 Total				27	31	27	-	8	10	-	-	-	-	10	113	75.2%	91.2%
2016	MATH-110	Lecture	16	3	11	20	-	8	14	-	-	-	-	9	65	52.3%	86.2%
	MATH-115	Lecture	16	6	8	3	-	-	1	-	-	-	-	2	20	85.0%	90.0%
	MATH-116	Lecture	16	9	7	2	-	-	-	-	-	-	-	3	21	85.7%	85.7%
2016 Total				18	26	25	-	8	15	-	-	-	-	14	106	65.1%	86.8%
2017	MATH-110	Lecture	16	12	19	19	-	-	2	-	-	-	-	16	68	73.5%	76.5%
	MATH-115	Lecture	16	2	3	2	-	-	1	-	-	-	-	-	8	87.5%	100.0%
	MATH-116	Lecture	16	4	5	2	-	1	-	-	-	-	-	1	13	84.6%	92.3%
2017 Total				18	27	23	-	1	3	-	-	-	-	17	89	76.4%	80.9%

Table III

We are pleased with the course grade distribution and believe that this is partially due to the style of teaching that occurs within these courses. Students are expected to consider both procedural and conceptual methods of understanding the content and this translates into improved grades.

C) Success rates (Discuss your program's rates, demographic success characteristics and set a success standard for your program.)

Demographic Success Characteristics
Math for Teachers
Fall: 2013-2016

		Fall 2013		Fall 2014		Fall 2015		Fall 2016	
		Success	N	Success	N	Success	N	Success	N
Ethnicity	African-American	80.0%	-	44.4%	-	40.0%	-	0.0%	-
	Amer. Ind. or Alask. Native	0.0%	-	0.0%	-	0.0%	-	0.0%	-
	Asian	72.7%	11	80.0%	-	76.9%	13	69.2%	13
	Latino	68.4%	57	71.2%	52	62.7%	51	58.2%	55
	Pacific Islander	0.0%	-	0.0%	-	0.0%	-	0.0%	-
	Two or More	33.3%	-	66.7%	-	42.9%	-	100.0%	-
	Unknown or Decline	100.0%	-	100.0%	-	100.0%	-	0.0%	-
	White	92.9%	14	81.3%	16	87.5%	16	100.0%	-
Gender	M	56.3%	16	74.1%	27	61.9%	21	57.9%	19
	F	76.0%	75	70.8%	65	68.1%	72	62.1%	58
	X	0.0%	-	0.0%	-	0.0%	-	0.0%	-
Age Group	19 or less	66.7%	21	70.0%	20	56.3%	32	69.2%	13
	20 to 24	78.0%	50	75.0%	52	76.2%	42	62.3%	53
	25 to 49	65.0%	20	63.2%	19	66.7%	15	50.0%	-
	Over 49	0.0%	-	100.0%	-	50.0%	-	0.0%	-

Counts are suppressed for groups with less than 10 students.
Shaded cells 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: 2014-2017

		Spring 2014		Spring 2015		Spring 2016		Spring 2017	
		Success	N	Success	N	Success	N	Success	N
Ethnicity	African-American	83.3%	-	61.5%	13	*18.2%*	11	*66.7%*	-
	Amer. Ind. or Alask. Native	*0.0%*	-	100.0%	-	*0.0%*	-	*0.0%*	-
	Asian	64.3%	14	76.9%	13	*62.5%*	16	*71.4%*	14
	Latino	74.7%	75	78.3%	60	*67.2%*	58	75.5%	53
	Pacific Islander	*0.0%*	-	100.0%	-	*0.0%*	-	100.0%	-
	Two or More	66.7%	-	100.0%	-	*50.0%*	-	80.0%	-
	Unknown or Decline	*0.0%*	-	*0.0%*	-	*0.0%*	-	*0.0%*	-
	White	75.0%	16	72.7%	22	89.5%	19	90.0%	-
Gender	M	75.0%	28	63.2%	19	61.1%	18	40.0%	-
	F	71.4%	91	77.7%	94	65.9%	88	81.0%	79
	X	*0.0%*	-	*0.0%*	-	*0.0%*	-	*0.0%*	-
Age Group	19 or less	90.0%	20	81.5%	27	*50.0%*	24	83.3%	18
	20 to 24	72.9%	70	68.8%	64	68.3%	60	70.0%	50
	25 to 49	60.7%	28	86.4%	22	72.2%	18	84.2%	19
	Over 49	*0.0%*	-	*0.0%*	-	75.0%	-	100.0%	-

Counts are suppressed for groups with less than 10 students.
Shaded cells 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.

When examining the success rates for subgroups completing the three-course mathematics sequence, we notice a significant amount of variability in the data. This is due, in part, to the small number of students completing the courses. We are cautious to draw any conclusions from the information noted in the tables above.

D) Retention rates (if applicable, include retention based on placement method)

Even though Tables II and III above include the retention rates of the courses in our program, none of the retention rates are based on the results of any placement method. We continue to be pleased with the retention of students within these courses and attribute that to the method of teaching that occurs within these classes.

E) A comparison of success and retention rates in face-to-face classes with distance classes

This is not applicable in the Math for Teachers program in that we do not offer any distance education classes. The courses in the Math for Teachers program are not well suited for distance education in that the emphasis on hands-on instruction and practice would be lost in an online version of this class.

F) Enrollment statistics with section and seat counts and fill rates

The table below shows the program participation.

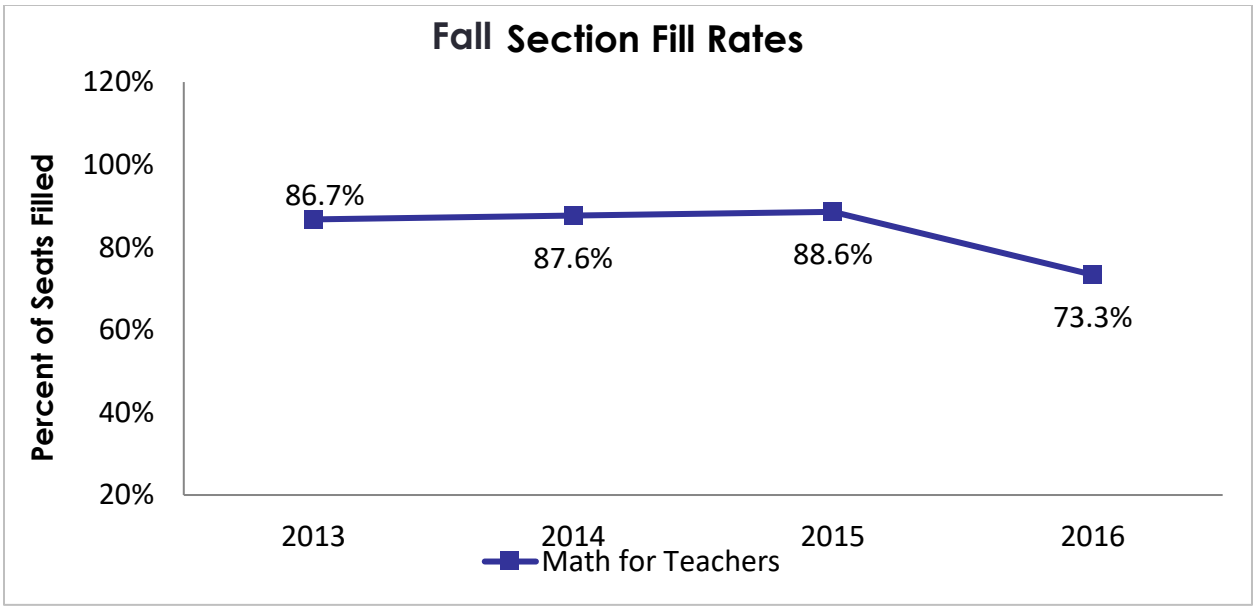
Program Participation (4-year Trend)
Math for Teachers
Years: 2013-14 to 2016-17

	2013-14	2014-15	2015-16	2016-17	4 Yr Average
Annual Enrollment	210	205	199	166	195

The table and chart below show the fill rates for the Fall semesters.

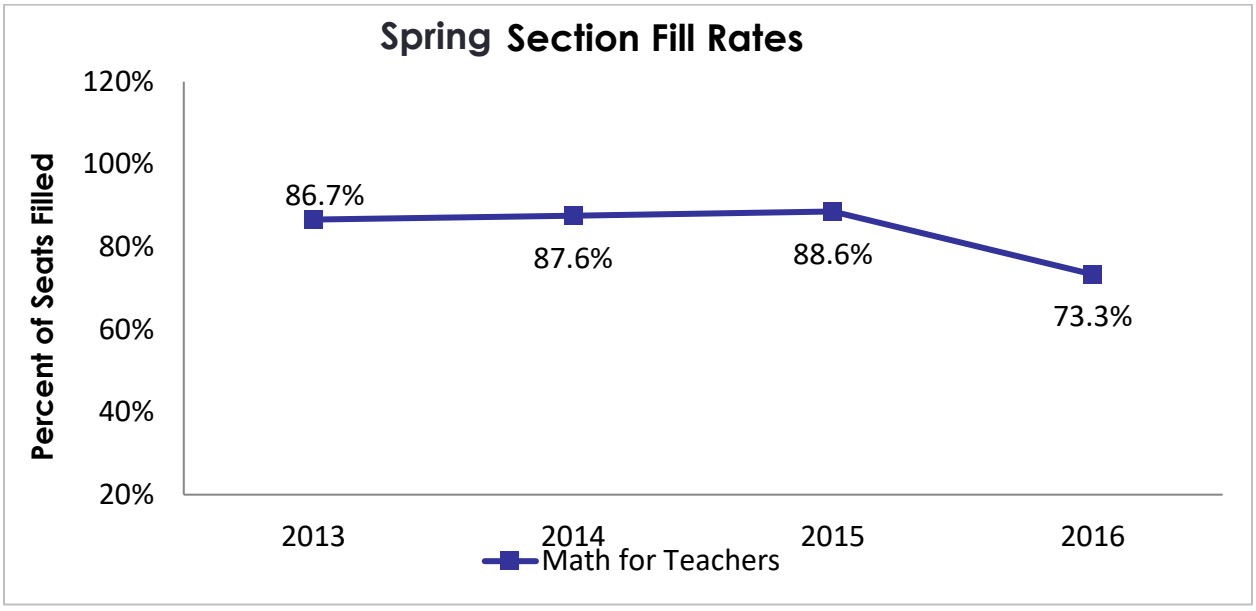
Course Fill Rates	2013	2014	2015	2016
Math for Teachers	86.7%	87.6%	88.6%	73.3%
Daytime	91	92	93	77
Evening	-	-	-	-

	91	92	93	77
Cap	105	105	105	105
Enrollment	91	92	93	77


Fall Section Fill Rates
Percent of Seats Filled
120%
100%
80%
60%
40%
20%
86.7%
87.6%
88.6%
73.3%
2013
2014
2015
2016
Math for Teachers

The table and chart below show the fill rates for the Spring semesters.

Course Fill Rates	2014	2015	2016	2017
Math for Teachers	85.0%	80.7%	75.7%	63.6%
Daytime	119	113	106	89
Evening	-	-	-	-
	119	113	106	89
Cap	140	140	140	140
Enrollment	119	113	106	89



We continue to be concerned about the enrollment and fill counts for the three mathematics content courses for pre-service elementary school teachers. We are hopeful that as the El Camino TEACH Program becomes more robust, these numbers will increase.

G) Scheduling of courses (day vs. night, days offered, and sequence)

The three courses in this program are offered on a tightly monitored scheduling sequence. Math 110 is offered twice every semester, with one section being a morning section and the other section being offered in the mid-afternoon (start time between 3:00 and 5:00 pm). Due to enrollment concerns, Math 115 has moved to being offered only during the Fall semester of every academic year. In most cases, this class changes from a morning class to a mid-afternoon class the next year in an attempt to accommodate all of our students. Math 116 is also offered only during the Spring semester and it also, follows a schedule of morning and then, the subsequent year, it will be offered in the mid-afternoon. In the past few years, we have made some adjustments to this schedule due to courses for prospective teachers in other divisions that conflict with our courses.

In the last five years, whereas we have seen a decrease in the overall enrollment within the program, we do not believe it is due to the scheduling of courses. Data from our student surveys (indicated in Section 5 of this document) indicate that 78.5% of our students are satisfied with the scheduling of these courses and 78.7% found themselves satisfied with their ability to register for these courses.

Careful selection has been made in determining the time of day that our 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.

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 or mid-afternoon (since they take our courses after their assignments in the public school). Offering mid-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.

H) Improvement Rates (Course success by placement method, if applicable)

Since students do not enroll in Math 110, 115, and 116 by any placement method, this does not apply to our program.

I) Additional data compiled by faculty.

Spring 2012 – Fall 2015

2-year Math Course Enrollment

Term	Math 110 Cohort	Enrolled in Math 115 or Math 116	% of Math 110 Cohort
Spring 2012	77	28	36.4%
Fall 2012	63	23	36.5%
Spring 2013	73	16	20.5%
Fall 2013	56	22	39.3%
Spring 2014	51	9	17.6%
Fall 2014	63	16	25.4%
Spring 2015	73	16	21.9%
Fall 2015	72	15	20.8%

2-year Math Course Completion

Term	Math 110 Cohort	Enrolled in Math 115 or Math 116	Passed Math 115 or Math 116	% Passed Math 115 or Math 116	% Passed of Math 110 Cohort
Spring 2012	77	28	26	92.9%	33.8%
Fall 2012	63	23	18	78.2%	28.6%
Spring 2013	73	16	14	87.5%	19.2%
Fall 2013	56	22	18	81.8%	32.1%
Spring 2014	51	9	7	77.8%	13.7%
Fall 2014	63	16	13	81.2%	20.6%
Spring 2015	73	16	14	87.5%	19.2%
Fall 2015	72	15	11	73.3%	15.3%

The data shown above indicates that a large portion of our students are not taking the three-course sequence that we believe is best for the math preparation of our future teachers.

During conversations with students enrolled in Math 110, 115, and 116, we have discovered informally that students have been advised not to complete all three courses at El Camino College but instead transfer to their baccalaureate institution and complete them there. This may be due, in part, to requirements stated in the AA Transfer Degree pattern. This continues to present a problem in that we are frequently on the verge of

cancelling our low-enrolled courses, yet enrollment is low due to students being advised to not take these courses at El Camino.

J) List any related recommendations.

RECOMMENDATION 2018 #1 (Coordination Among Deans, Instructional Faculty, and Counselors): We recommend increasing the coordination among deans, faculty, and counselors to ensure that students taking courses for prospective 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 courses on days and times where there are no overlaps or scheduling conflicts. In particular, many of the required courses are only taught once per year (e.g. Math 115 and Math 116) so to best serve our students, deans, faculty, and counselors should schedule classes for prospective teachers at times that do not coincide or overlap. [Curriculum, Analysis of Research Data]

RECOMMENDATION 2018 #2 (An Increase in the Completion Rates of the Three Course Sequence): We recommend that there be an increase in the number of students completing the three-course sequence (Math 110, Math 115, and Math 116). [Curriculum, Analysis of Research Data, Direction and Vision]

SECTION 3
Curriculum

Review and discuss the curriculum work done in the program during the past four years, including the following:

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.

A) Provide the curriculum course review timeline to ensure all courses are reviewed at least once every 6 years.

	CTE	ACT	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Ma 110	N	Y	x	x						x				
Ma 115	N	Y	x	x				x						x
Ma 116	N	Y	x					x						x

B) Explain any course additions to current course offerings.

There have been no course additions to the current offerings.

C) Explain any course deletions and inactivations from current course offerings.

Math 111 was inactivated during the Fall 2018 semester as it was up for Course Review and therefore the inactivation was completed.

D) Describe the courses and number of sections offered in distance education. (Distance education includes hybrid classes.)

There are no courses offered in distance education.

E) Discuss how well the courses, degrees, or certificates meet students' transfer or career training needs.

1. **Have all courses that are required for your program's degrees and certificates been offered during the last two years? If not, has the program established a course offering cycle?**

   All of the courses in our program have been offered in the last two years.

2. **Are there any concerns regarding program courses and their articulation to courses at other educational institutions?**

   There are no concerns regarding our program courses and their articulation to courses at other institutions.

3. **How many students earn degrees and/or certificates in your program? Set an attainable, measurable goal related to student completion of the program's degrees/certificates.**

   There are no degrees or certificates offered in our program.

4. **Are any licensure/certification exams required for program completion or career entry? If so, what is the pass rate among graduates? Set an attainable, measurable goal for pass rates and identify any applicable performance benchmarks set by regulatory agencies.**

   There are no licensure/certification exams required for program completion.

F) List any related recommendations.

RECOMMENDATION 2018 #1 (Coordination Among Deans, Instructional Faculty, and Counselors): We recommend increasing the coordination among deans, faculty, and counselors to ensure that students taking courses for prospective 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 courses on days and times where there are no overlaps or scheduling conflicts. 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 classes for prospective teachers at times that do not coincide or overlap. [Curriculum, Analysis of Research Data]

RECOMMENDATION 2018 #2 (An Increase in the Completion Rates of the Three Course Sequence): We recommend that there be an increase in the number of students completing the three-course sequence (Math 110, Math 115, and Math 116). [Curriculum, Analysis of Research Data, Direction and Vision]

SECTION 4
Assessment of Student and Program Learning Outcomes (SLOs & PLOs)

A) Provide a copy of your alignment grid, which shows how course, program, and institutional learning outcomes are aligned. (This will be Appendix A.)

See Appendix A

B) Provide a timeline for your course and program level SLO assessments. (This will be Appendix B.)

See Appendix B

C) State the percent of course and program SLO statements that have been assessed.

The Math for Teachers Program has assessed 100% of the SLO's and PLO's since that last program review. Each year until the fall of 2017 all SLO's and all PLO's were assessed. Beginning in fall of 2017 the Math for Teachers Program will assess one SLO and one PLO each year.

D) Summarize the SLO and PLO assessment results over the past four years and describe how those results led to improved student learning. Analyze and describe those changes. Provide specific examples.

The PLO data is reported in three groups with Math 110 data only, Math 115 and 116 data only and the data of all courses Math 110, 115 and 116. Since Math 110 is the first course in the Math for Teachers Program and students are not yet accustomed to explaining the concepts the data for Math 110 is usually a bit lower than the data for Math 115 and Math 116 where students have already had an opportunity to work on explaining mathematical concepts.

The primary focus of this assessment cycle was to examine the correlation between student attendance and their rubric score for each of the PLOs. We contend that if students are not in class, they not only miss mathematical 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.

The rubric that has been used for the PLO's are shown below.

CM3 PLOs Assessment Rubric

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.

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.

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

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.

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.

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.

To determine if there is a positive correlation, negative correlation, or no correlation, the Pearson Correlation Coefficient was used. The Pearson Correlation Coefficient represents the slope of the Best Fit Line representing the data. The following scale is used to determine correlation.

Pearson Correlation Coefficient = 1.0 [Perfect Positive Correlation]

Pearson Correlation Coefficient between 0.7 and 1.0 [Acceptable Positive Correlation]

Pearson Correlation Coefficient between 0.7 and -0.7 [No Correlation]

Pearson Correlation Coefficient between -0.7 and -1.0 [Acceptable Negative Correlation]

Pearson Correlation Coefficient = -1.0 [Perfect Negative Correlation]

The results of the Pearson Correlation Coefficient were that there is no correlation between the number of absences and the student rubric score for each of the PLOs. We have found this trend over the past several years and we observe that even though there is no statistical correlation, student attendance does impact student understanding. We contend that since explanations of conceptual ideas and procedural strategies become stronger with time and practice, student attendance does play a part in the successful completion of all learning outcomes. The Math 110 instructor did an informal evaluation in fall 2017 of attendance and the student's performance on SLO #1 and noted that of the nine students who were unable to meet the target of success six students had four or more absences.

PLO Data for Math 110 only

	Spring 2015	Spring 2016	Spring 2017	Spring 2018
PLO #1				
Sample Size	62	55	52	52
Mean	3.25	3.27	3.36	3.02
Standard deviation	0.63	0.72	0.62	0.61
Pearson Correlation Coefficient		-.20	.04	-0.25
Average Number of absences		2.55	1.80	3.04
PLO #2				
Sample Size	62	55	52	
Mean	3.0	2.39	2.94	
Standard deviation	0.83	1.36	0.75	
Pearson Correlation Coefficient	-0.30	-0.11	-0.51	
Average Number of absences		2.55	1.80	
PLO #3				
Sample Size	62	55	52	
Mean	3.02	2.55	2.94	
Standard deviation	0.78	0.82	0.75	
Pearson Correlation	-0.3	-0.04	-0.042	

Coefficient				
Average Number of absences		2.55	1.80	

PLO Data for Math 115 and Math 116 only

	Spring 2015	Spring 2016	Spring 2017	Spring 2018
PLO #1				
Sample Size	35	37	20	27
Mean	3.31	3.31	3.05	3.00
Standard deviation	0.58	0.70	0.64	0.62
Pearson Correlation Coefficient		-0.35	-0.42	-0.16
Average Number of absences		2.51	1.87	3.56
PLO #2				
Sample Size	35	37	20	
Mean	3.17	3.25	2.99	
Standard deviation	0.65	0.79	0.66	
Pearson Correlation Coefficient	-0.21	-0.50	-0.51	
Average Number of absences		2.51	1.87	
PLO #3				
Sample Size	35	37	20	
Mean	3.21	3.22	2.90	
Standard deviation	0.68	0.75	0.63	
Pearson Correlation Coefficient	-0.21	-0.44	0.10	
Average Number of absences		2.51	1.87	

PLO Data for Math 110, Math 115 and Math 116

	Spring 2015	Spring 2016	Spring 2017	Spring 2018
PLO #1				
Sample Size	97	92	72	79
Mean	3.27	3.28	3.28	3.01
Standard deviation	0.74	0.71	0.65	0.61
Pearson Correlation Coefficient		-0.26	-0.164	-0.22
Average Number of absences		2.57	1.82	3.22
PLO #2				
Sample Size	97	92	72	
Mean	3.08	2.73	2.94	

Standard deviation	0.78	1.24	0.51	
Pearson Correlation Coefficient	-0.23	-0.24	-0.19	
Average Number of absences		2.57	1.82	
PLO #3				
Sample Size	97	92	72	
Mean	3.09	2.82	2.94	
Standard deviation	0.78	0.86	0.51	
Pearson Correlation Coefficient	-0.23	-0.22	-0.05	
Average Number of absences		2.57	1.82	

The mean and standard deviation for PLO #1 has remained consistent over time. Students are able to successfully select an appropriate strategy to solve application problems, determine the reasonableness of their answers, and communicate their strategies and solutions in written and oral means.

The mean and standard deviation for PLO #2 continues to exhibit that asking students to explain concepts in an articulate and complete fashion is still a difficult task for some students. We continue to contend that for future teachers, being able to explain concepts and procedures in a clear fashion is imperative.

For prospective teachers, it is essential that they become competent in looking at a solution of a problem, determining the mistakes made, deciphering the misconceptions, and determining an appropriate way to help someone solve the problem correctly. We have come to know that it takes time and a great deal of practice to make headway on this endeavor. Students in Math 115 and 116 tend to score higher on PLO #3 than students in Math 110 since they have had previous practice on this skill in their prior course. Most other math courses do not focus on this task so our students come to Math 110 with little or no experience finding errors and deciphering misconceptions in work completed by others.

SLO Data Math 110

	Fall 2014	Fall 2015	Fall 2016	Fall 2017
SLO #1				
Number of Students	55	62	50	52
Percent of success	89%	90.3%	86%	82.7%
SLO #2				
Number of Students	55	62	50	
Percent of success	74.5%	87%	64%	
SLO #3				
Number of Students	55	62	50	
Percent of success	78%	85.5%	68%	

The standard for success, which is 80% of the students are expected to score a 3 or above, has been consistently met for SLO #1 but not SLO's #2 and #3 over the past four years. Students are having more difficulties with the concepts of explaining binary operations (SLO #2) and solving and designing application problems (SLO #3) as shown by the results in the above table.

The concept of binary operation is new to the majority of the students and they often struggle with the idea of working with numbers in different bases. The instructor for Math 110 has explored alternative ways of approaching this concept based on the student population in the class. In some semesters, students seem to do well with a visual approach (using objects to show regrouping, drawing a picture of what the regrouping represents) and in other semesters this approach has not worked well. The instructor will continue to explore different methods for teaching this concept based on the learning styles of the student population in the class.

Application problems are also a challenge for most students as many students are looking for a formulaic way to solve these problems. Many times, this will be the first class where students are required to use their critical thinking skills and the knowledge of prior math concepts to problem solve. The instructor often hears from students that an example was not given exactly like the one placed on the assessment or they ask if they can have a review sheet with similar problems prior to the assessment. Students in this course need to learn how to think critically and formulate their own method for problem solving based on Polya's four steps: Understanding the Problem, Devising a Plan, Carrying out the plan and Looking Back. Many students approach application problems by writing and solving an equation (the method used in most prerequisite courses) and they have a difficult time moving away from this method and exploring other ways of problem solving. The instructor for Math 110 continues to model additional problem-solving methods in class and encourages students to explore these alternative approaches. Changing student's mindset to these other approaches is often challenging since many students have not experienced these approaches in prior math classes. The instructor for Math 110 will continue to explore additional ways of expanding students critical thinking skills in order for them to use these skills to problem solve.

SLO Data Math 115

The data for SLO #1 indicates that, as a class, students are competent in designing a research study, collecting and analyzing data, drawing inferences from data analysis, and reflecting on their work.

The mean score for SLO #2 dropped in spring 2016 and rose again in spring 2017. This data indicates as a collective group, students are somewhat competent in determining an appropriate data analysis procedure to use given a research question and data set and correctly interpret the analysis by making appropriate statistical analysis.

The mean and standard deviation for SLO #3 have remained consistent over time. The data indicates that as a collective group, students are competent in explaining concepts and procedures in statistics and probability. We contend that this is a result of students completing some or all of the Math for Teachers course sequence (Math 110, 115, 116) where explanations of conceptual and procedural understanding is discussed and students practice these explanations many times during the semester.

The mean and standard deviation of the data for SLO #4 have remained consistent over time. The data indicates that as a collective group, students are very competent in demonstrating their conceptual and procedural understanding of probability concepts and practices.

In Spring 2017 we found, for the first time, that the Pearson Correlation Coefficient for SLO's #2 and #3 resulted in an acceptable negative correlation indicating that the fewer the absences, the higher the performance on the SLO. As instructors we know this is true and this is the first semester the data offers this conclusion.

	Spring 2015	Spring 2016	Spring 2017	Fall 2017
SLO #1				
Number of Students	19	18	8	13
Mean	3.68	3.39	3.13	3.23
Standard Deviation	0.67	0.95	0.99	0.44
Pearson Correlation Coefficient	-0.33	-0.22	-0.59	-0.25
SLO #2				
Number of Students	19	18	8	
Mean	3.16	2.55	2.81	
Standard Deviation	0.76	1.07	1.17	
Pearson Correlation Coefficient	-0.22	-0.26	-0.84	
SLO #3				
Number of Students	19	18	8	
Mean	3.0	3.22	2.92	
Standard Deviation	0.82	0.85	1.06	
Pearson Correlation Coefficient	-0.23	-0.24	-0.86	
SLO #4				
Number of Students	19	18	8	
Mean	3.47	3.47	3.06	
Standard Deviation	0.84	0.84	0.98	
Pearson Correlation Coefficient	-0.42	-0.42	-0.62	

SLO Data Math 116

	Spring 2015	Spring 2016	Spring 2017	Spring 2018
SLO #1				
Number of Students	16	18	12	14
Mean	3.375	3.28	3.17	3.36
SLO #2				

Number of Students	16	18	12	
Mean	3.5	3.5	3.00	
SLO #3				
Number of Students	16	18	12	
Mean	3.44	3.39	3.083	
SLO #4				
Number of Students	16	18	12	
Mean	3.19	3.44	3.25	

The mean for SLO #1 remains consistent over the years. Students are able to demonstrate a proficient understanding of two and three dimensional figures.

The data for SLO #2 remained the same for spring 2015 and 2016, during this time constructions were taught throughout the course of the semester and reviewed as necessary. The instructor also taught constructions throughout the semester in spring 2017 but the mean score dropped because by the time the students needed to complete their construction project, many of them were overwhelmed with their semester and did not do well on the construction project.

The mean for SLO #3 remains consistent over the years. The instructor has improved in teaching students how to recognize the errors that are made yet students at this level continue to struggle with identifying the misconceptions when an error is made. The teacher will continue to focus on recognizing errors and the underpinning of geometric concepts by working with individual groups on their oral and written explanations.

Student's mean scores for SLO #4 also remain consistent. The concept of explaining the "Why" of a formula continues to be a challenge for students. The instructor will continue having students work on partner teaching about the explanations of geometric formulas.

E) Describe how you have improved your SLO/PLO assessment process and engaged in dialogue about assessment results.

Based upon discussion among our faculty members, we have decided to focus our efforts on one SLO per semester as opposed to all of them, every semester. This allows our faculty members to use multiple instructional methods to assess the progress of our students. This decision was made after consultation with all faculty members in the program.

F) List any related recommendations.

None

SECTION 5
Analysis of Student Feedback

Provide a copy of any feedback reports generated by Institutional Research and Planning or your program. Review and discuss student feedback collected during the past four years including any surveys, focus groups, and/or interviews.

Our student survey contained the questions listed below. Possible answers for all of these questions were: Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree. Three classes were surveyed during the Spring 2018 semester (two Math 110 courses and one Math 116 course). Because we do not currently offer our Math 115 course in the Spring semester, we do not have any student survey data from this course.

A) Describe the results of the student survey in each of the following areas:

The data below presents the information students communicated to us during the spring 2018 semester. These students were enrolled in Math 110 and Math 116. Due to the fact that Math 115 is not offered in the spring semester, we were not able to obtain results from the Math 115 students.

1. Student Support

Student Support Questions

- Instructors in this program have helped me achieve my academic goals.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
48.48%	42.42%	6.06%	3.03%	0.00%

Comments: We are pleased with the data purported here and it conveys our commitment to ensuring that students reach their academic and career goals.

- Instructors in this program have helped me stay on track.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
42.42%	46.97%	7.58%	3.03%	0.00%

Comments: We are pleased with the data purported here and it conveys our commitment to ensuring that students continue on the pathway to becoming a classroom teacher.

- Instructors in this program provide opportunities to actively participate in my classes.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
59.09%	34.85%	6.06%	0.00%	0.00%

Comments: We are pleased with the findings since we continue to be mindful about the strategies and methodologies used in both the lecturer and laboratory components of the courses. We continue to model the pedagogy that our students will eventually replicate once they become classroom teachers.

- I have felt a sense of community in this program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
34.85%	36.36%	27.27%	0.00%	1.52%

Comments: The data reported above conveys that most students felt a sense of community within the program. Since Math 115 has been taught by adjunct faculty for the past few years, we are also cognizant that this may have some impact on the responses from some of the students. We are hopeful that the El Camino TEACH Program will expand the sense of community to a larger audience and we look forward to examining the data from this question as the years unfold.

- Student contributions have been valued by instructors in this program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
48.48%	43.94%	7.58%	0.00%	0.00%

Comments: We are pleased with the data offered here because we continue to be mindful of our audience (pre-service teachers) and the importance of their contributions to the class. We are also modeling the importance of student contributions so that they will replicate this once they have a classroom of their own.

- An El Camino College Teacher Education Program would assist me in attaining my academic and career goals.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
53.03%	30.30%	12.12%	3.03%	1.52%

Comments: We are pleased with the data purported here which conveys our commitment to supporting our students' academic and career goals. We also are hopeful that the El Camino

TEACH Program will become an integral part of supporting our pre-service teachers to complete their education and become classroom teachers.

2. Curriculum

Curriculum Questions

- There is an appropriate range of courses offered in this program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
25.00%	48.44%	17.19%	7.81%	1.56%

Comments: We are concerned about this data and have examined the implications. The results may be due, in part, to the number of students who are encouraged not to complete the three-course sequence but transfer and complete the courses at their baccalaureate institutions. Support from the El Camino TEACH Program by advising students to complete the three-course sequence before transferring should have a positive impact on the data in subsequent years.

- Courses were scheduled on days and times that were convenient to me.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
36.92%	41.54%	10.77%	7.69%	3.08%

Comments: We continue to be mindful about scheduling the courses so that they do not interfere with courses that pre-service teachers must take in other disciplines. Due to the frequent low enrollment of these courses, we cannot schedule multiple sections and therefore, the course offerings may not be convenient for all students. We are hopeful that the El Camino TEACH Program will play an important role in monitoring the scheduling of classes from all the divisions to ensure that times and days are appropriate for students.

- I've been able to register for the classes I need within this program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
36.36%	42.42%	13.64%	6.06%	1.52%

Comments: We are unaware of how registration impacts student enrollment in the courses and we will continue to monitor this issue.

- The courses in this program have helped me meet my academic goals.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
37.88%	40.91%	18.18%	3.03%	0.00%

Comments: We are pleased with the data reported as we are mindful of ensuring that students continue to be enthusiastic about completing their academic degrees.

- There is a variety of extracurricular activities related to this program on campus.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
13.64%	13.64%	59.09%	9.09%	4.55%

Comments: In the years since the demise of the TEP program, there has not been any formal efforts to offer extracurricular activities specifically for pre-service teachers. We are hopeful that the El Camino TEACH Program will bring back some of the successful pre-professional activities and events in the near future.

- The library has the resources to help me succeed in the program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
20.31%	37.50%	37.50%	1.56%	3.13%

Comments: We are unaware of the extent to which the library provides resources to ensure academic success in the three mathematics courses. We will investigate this issue to determine ways in which the library can support our students.

- The projects are helpful to understand more deeply the mathematical ideas of the course.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
50.77%	36.92%	10.77%	0.00%	1.54%

Comments: We continue to work diligently to assign projects that promote the investigation of the conceptual understanding of the mathematics that we teach. Comprehending the concepts that lay the foundation for mathematics is difficult and we know that once it is achieved, the results are gratifying. We will continue to work on designing projects that increase conceptual understanding knowing that the benefits will be rewarding.

- The activities are helpful to understand more deeply the mathematical ideas of the course.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
55.38%	32.31%	12.31%	0.00%	0.00%

Comments: As with the projects discussed in the prior question above, we will continue to provide rich and varied activities during the laboratory portion of the classes so that students will explore and investigate rich mathematics ideas in a supportive environment.

- The small group discussions are helpful to understand more deeply the mathematical ideas of the course.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
48.48%	36.36%	13.64%	1.52%	0.00%

Comments: Talking about mathematics in a supportive environment is one of the components integrated into each of the courses. We contend that when students discuss mathematical ideas with each other, a great deal of insights emerge. We will continue this type of activity in each of the courses.

- The class discussions are helpful to understand more deeply the mathematical ideas of the course.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
59.09%	33.33%	7.58%	0.00%	0.00%

Comments: Talking about mathematics in a supportive environment is one of the components integrated into each of the courses. We know that talking about mathematics can lead nicely to a clearer and deeper understanding of mathematical ideas.

3. Facilities, Equipment, and technology

Facilities, Equipment, & Technology Questions

- The buildings and classrooms used by this program are satisfactory.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
50.77%	41.54%	7.69%	0.00%	0.00%

Comments: We are pleased to find that students are satisfied with the classrooms in the MBA building and serve their needs.

- I am satisfied with the equipment (projectors, machinery, models, etc.) used in this program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
56.06%	31.82%	9.09%	3.03%	0.00%

Comments: We are pleased that students find the equipment satisfactory.

- I am satisfied with the computers and software used in this program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
51.56%	28.13%	18.75%	1.56%	0.00%

Comments: The findings from this question may indicate some students expressing their concern over the use of Geometer's Sketchpad in the Math 116 course. During the semester that the survey was administered, there were some issues with getting access to Geometer's Sketchpad on the computers that students use in the lab classrooms. We must continue to ensure that updated software and functioning computers are available to students.

4. Program Objectives

Program Objectives Questions

- I am aware of the course outcomes – what I should be able to learn and what skills I should possess after completing courses in the program.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
66.67%	27.27%	4.55%	0.00%	1.52%

Comments: We are pleased with the data purported here and we continue to be mindful that course outcomes are important to the success of each student.

- Class attendance is valuable to my success in the course and excessive absences may negatively impact my performance in the course.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
72.31%	23.08%	4.62%	0.00%	0.00%

Comments: We are pleased with the findings from this question as we know that given the nature of these courses, class attendance is imperative to gaining a deeper understanding of both the conceptual and procedural understanding of mathematics. We continue to stress the importance of class attendance and are pleased to see that students are aware of the importance.

B) Discuss the implications of the survey results for the program.

We are generally pleased about the results provided by the students taking Math 110 and 116 who offered their thoughts about the program. We will continue to stress the importance of conceptual understandings of mathematical ideas which ground the procedural algorithms discussed in each of the courses. We will also continue to stress the importance of discussing mathematical topics with peers and instructors and communicating mathematical ideas both verbally and in writing. We are hopeful that the El Camino TEACH Program will be a valuable tool in developing a community of learners, offer pre-professional opportunities to enhance the courses students complete, and support programs just as ours to provide high-quality education to students who plan to be classroom teachers.

C) Discuss the results of other relevant surveys.

There are no other relevant surveys.

D) List any related recommendations.

None

SECTION 6
Facilities and Equipment

A) Describe and assess the existing program facilities and equipment.

The courses in the Math for Teachers program are offered in classrooms in the MBA Building. These classrooms have 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.

B) Explain the immediate (1-2 years) needs related to facilities and equipment. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

The computers, projectors, and other classroom equipment must be maintained and replaced on a regular basis to ensure a high-quality educational experience. We anticipate that this will be part of the maintenance of equipment for the Mathematical Sciences Division as a whole.

C) Explain the long-range (2-4+ years) needs related to facilities and equipment. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

The long-range needs for our program include continuing to offer the sections of Math 110 in the same classroom so as to facilitate access to the manipulatives that are used in this course. There is no cost for this need and it will allow the teacher of the course to focus on teaching the content as opposed to movement of material for the course.

We are also in need of the use of a lab classroom for the Math 116 course. There is no cost associated with this need, however, there is a need for careful planning when scheduling courses to ensure that a lab classroom will be available during the time the Math 116 course is offered.

D) List any related recommendations.

RECOMMENDATION 2018 #3 (Continue to hold Math 110 in the same Classroom): Whereas all courses in this program do not need to be offered in the same classroom, we recommend the multiple sections of Math 110 to be offered in the same classroom for ease of storage and access to the manipulatives that are frequently used in the classroom setting. [Facilities]

RECOMMENDATION 2018 #4 (Lab Classroom available for Math 116 Course): We recommend having a lab classroom available when the Math 116 course is offered to ensure that students can complete the lab requirement portion of this class in an un-interrupted setting. [Facilities]

SECTION 7
Technology and Software

A) Describe and assess the adequacy and currency of the technology and software used by the program.

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 typically installed on the computers in the lab classrooms in the MBA Building and in the shared Mathematics/Business Computer Lab located on the first floor of the MBA Building. When our 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 to complete the assignment. During the last two semesters that Math 116 was offered, there have been some issues associated with completing the labs. There have been cases that no lab is available during the entire time of class and therefore the labs must be split into 2 or 3 portions. This is disruptive to student understanding of the concepts contained within the lab. Secondly, we have encountered situations where the program was not available on all the computers within the lab, thus causing students to have to "test" several computers to find out if the program was installed on the machines.

B) Explain the immediate (1-2 years) needs related to technology and software. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

The immediate needs for the technology and software needed for our program involve keeping the computers up-to-date. There is no need at this time to update the Geometer's Sketchpad program because we have the latest version on our computers.

C) Explain the long-range (2-4+ years) needs related to technology and software. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

There will only be a need for updated technology and software, if there are updates to the computer programs used within our Math for Teachers Program. Currently, the Geometer's Sketchpad program costs $21.27 per license for 50 – 99 computers. Given that we have a

small program, we do not need the computer program on every computer in the Math Building, but rather just those computers that will be used by our program.

D) List any related recommendations.

RECOMMENDATION 2018 #5 (Updated Software): We recommend designing a long-range, sustainable plan to purchase and use current versions of the required software and hardware for the Math for Teachers courses. [Technology]

SECTION 8
Staffing

A) Describe the program's current staffing, including faculty, administration, and classified staff.

Currently, there are two full-time instructors (Susanne Bucher and Susie Tummers Stocum) who consistently teach our Math 110 and Math 116 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. Since the 2015-2016 school year, Math 115 has been taught by an adjunct faculty member for 4 different semesters. To ensure quality and consistency, along with a deep consideration of the conceptual understanding of the topics included in our courses and the Math for Teachers Program, we would like to secure one full-time faculty member (designated from our current full-time faculty members) to take the lead on our Math 115 course. Once that person is secured, 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 in consultation with the members of our committee, schedules the recommended faculty to teach the classes, and attempts to schedule the courses in classrooms and labs that best suit the learning environment of our students. She was also instrumental in helping our committee begin to dialogue with other divisions on campus that play an integral role in educating our future teachers. Classified staff work with the dean in creating the schedule.

B) Explain and justify the program's staffing needs in the immediate (1-2 years) and long-term (2-4+ years). Provide cost estimates and explain how the position/s will help the program better meet its goals.

Currently, the staffing needs are sufficient as we are offering two sections of Math 110 each fall and spring semester; one section of Math 115 offered each fall semester; and one section of Math 116 offered each spring semester. We will continue to work toward securing a full-time teacher to teach the Math 115 course as a way to better meet the goals of our program. With the emergence of the El Camino TEACH Program and the possible changes resulting from passage of AB705, we anticipate a boost in enrollment for these courses in the next few years. We will continue to monitor the enrollment each semester to determine when it is appropriate that new sections of the courses be offered. At this point, we are unable to document the number of sections to be added in the next few years so a cost estimate is not possible. We know that with the support of the El Camino TEACH Program and the administrators and staff in the Mathematical Sciences Division, we will continue to meet the academic needs of students who plan to be classroom teachers.

With the potential increase in the number of sections of Math 110 being offered (due to AB 705), there may be a need to consider SI coaches as a way to assist students in being

successful within these courses. This will become a recommendation that will be monitored as the number of sections increases.

C) List any related recommendations.

RECOMMENDATION 2018 #6 (Full-Time Faculty Member for Math 115(from our current pool of full-time faculty members)): We recommend working toward finding an enthusiastic full-time faculty member (from our current pool) to teach Math 115 to ensure we are meeting the goals of the program. [Staffing]

RECOMMENDATION 2018 #7 (SI coaches for Math 110 courses): We recommend considering SI coaches as a way to improve student success within the Math 110 courses. [Staffing]

SECTION 9
Direction and Vision

A) Describe relevant changes within the academic field/industry. How will these changes impact the program in the next four years?

There continues to be a teacher shortage in California. Enrollment in higher education teacher credential programs continues to decline and therefore there will continue to be a need for teachers in our state. This may increase the number of students in our program, but only if students choose teaching as their profession. It is our hope that the El Camino TEACH Program can assist our program in recruiting future teachers that may be among our student population.

B) Explain the direction and vision of the program and how you plan to achieve it.

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 local, state and national educational organizations. Our 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. In order to provide this experience for our students, we will continue to facilitate active and engaging classroom lessons, accompanied by collaboration among our faculty members and communication with the greater campus community to continue advocating for and providing the high-quality educational experience that we offer our future teachers.

C) List any related recommendations.

RECOMMENDATION 2018 #2 (An Increase in the Completion Rates of the Three Course Sequence): We recommend that there be an increase in the number of students completing the three-course sequence (Math 110, Math 115, and Math 116). [Curriculum, Analysis of Research Data, Direction and Vision]

SECTION 10
Prioritized Recommendations

A) Provide a single, prioritized list of recommendations and needs for your program/ department (drawn from your recommendations in sections 2-8). Include cost estimates and list the college strategic initiative that supports each recommendation. Use the following chart format to organize your recommendations.

	Recommendations	Cost Estimate	Strategic Initiatives
1.	***An Increase in the Completion Rates of the Three Course Sequence***	N/A	A, C, D
2.	***Full-Time Faculty Member to teach Math 115***	N/A	A, B
3.	***Coordination Among Deans, Instructional Faculty, and Counselors for Scheduling Future Teacher Courses***	N/A	B, C, E
4.	***Continue to hold Math 110 in the same Classroom***	N/A	A, B, F
5.	***Updated Software***	$2000	A, F
6.	***Lab Classroom available for Math 116 Course***	N/A	A, B, F
7.	***SI Coaches for Math 110***	$2000 per semester	A, B, E

B) Explain why the list is prioritized in this way.

The Math for Teachers Program is working hard to increase enrollment in our program and therefore chose the recommendations that will help boost enrollment as our top recommendations. Secondary to that goal, we want ensure that we, the faculty within the program, have the needed material to assist our students in obtaining a high-quality education.

Appendix A - ALIGNMENT GRIDS

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**	**2. Communication**	**3. Community and Personal Development**	**4. Information Literacy**
	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.	*Students effectively communicate with and respond to varied audiences in written, spoken or signed, and artistic forms.*	*Students are productive and engaged members of society, demonstrating personal responsibility, and community and social awareness through their engagement in*	*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 legal, social, and ethical aspects related to information use*

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 on the concepts; or if the SLO/PLO is minimally or not at all part of the course/program.

PLOs	**PLO to ILO Alignment**			
	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				

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	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					
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				

Appendix B
SLO/PLO TIMELINES

SLO Timeline *Worksheet*
(2017 - 2020)

Division: Mathematical Sciences **Program: MATH (PROSPECTIVE ELEM. SCHOOL TEACHERS)** **Program Review Year: SP 18/FA 18**

Directions: *Use this worksheet to enter the existing assessment timelines for 2016 and distribute assessments for each SLO/PLO statement over the next four-year timeline (2017-2020). Type an* ***X*** *in the cells below to indicate the semester in which the SLOs/PLOs are being assessed. (Include the 2016 semesters currently listed in TracDat.) This worksheet should be emailed to the division facilitator by* ***JUNE 1, 2017*** *. Facilitators are responsible for making sure the information is complete and e-mailing an electronic copy of this Timeline Worksheet document (in Word or PDF format) to ipena@elcamino.edu by _____. Once received by the SLO Administrative Assistant, this information will be input into TracDat.*

Course and SLO #	Note if offered only in FA/SU/SP	SP 2016	SU 2016	FA 2016	SP 2017	SU 2017	FA 2017	SP 2018	SU 2018	FA 2018	SP 2019	SU 2019	FA 2019	SP 2020	SU 2020	FA 2020
PLO #1		X						X								
PLO #2		X									X					
PLO #3		X												X		
MATH 110 - SLO #1				X			X									
MATH 110 - SLO #2				X						X						
MATH 110 - SLO #3				X									X			
MATH 115 - SLO #1		X			X		X									
MATH 115 - SLO #2		X			X					X						
MATH 115 - SLO #3		X			X								X			
MATH 115 - SLO #4		X			X											
MATH 116 - SLO #1		X			X			X								
MATH 116 - SLO #2		X			X						X					
MATH 116 - SLO #3		X			X									X		
MATH 116 - SLO #4		X			X											

Appendix C
6-YEAR CURRICULUM COURSE REVIEW TIMELINE

	CTE	ACT	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Ma 110	N	Y	x	x						x				
Ma 115	N	Y	x	x				x						x
Ma 116	N	Y	x					x						x

APPENDIX D
CAREER AND TECHNICAL EDUCATION (CTE) SUPPLEMENTAL QUESTIONS

CTE programs must conduct a full program review every 4 years. The comprehensive program review includes responses to the CTE supplemental questions below. Every two years (once between full program reviews) these supplemental questions must be answered and submitted to Academic Affairs for posting on the College website.

Use labor market data, advisory committee input/feedback, and institutional and program-level data to respond to the following questions:

1. **How strong is the occupational demand for the program?** In your response, describe any changes in demand over the past 5 years and discuss the occupational outlook for next 5 years. Provide applicable labor market data (e.g., US Bureau of Labor Statistics, Employment Development Department) that address state and local needs.

2. **How does the program address needs that are not met by similar programs in the region?** In your response, identify any distinctive components of the program (e.g., curriculum, facilities, resources) and/or describe any unique contributions the program or its students/graduates make to the community served.

3. **What are the completion, success, and employment rates for students in the program?** In your response, identify the standards set by the program and discuss any factors that may impact completion, success, and employment rates among students in the program. Describe the status of any action plans for maintaining/improving rates relative to such benchmarks.

4. **List any licensure/certification exam(s) required for entry into the workforce in the field of study and report the most recent pass rate(s) among program graduates.** In your response, identify any applicable performance benchmarks set by regulatory agencies and describe the status of any action plans for maintaining/improving pass rates relative to such benchmarks.

5. **Are the students satisfied with their preparation for employment? Are the employers in the field satisfied with the level of preparation of program graduates?** Use data from student surveys, employer surveys, and other sources of employment feedback to justify your response.

6. **Is the advisory committee satisfied with the level of preparation of program graduates? How has advisory committee input and feedback been used in the past two years to ensure employer needs are met by the program?** Describe the status and impact of any advisory committee recommendations.

California Education Code 78016 requires that the review process for CTE programs includes the review and comments of a program's advisory committee.

Provide the following information:

a. Advisory committee membership list and credentials.
b. Meeting minutes or other documentation to demonstrate that the CTE program review process has met the above Education Code requirement.