PROGRAM REVIEW
GENERAL EDUCATION MATH COURSES
(MATH 120, 130, 140, 150, 160, 161)

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1. Overview

a) Description of Program

The General Education Mathematics Program at El Camino College consists of six courses that serve students on different tracks: Nature of Mathematics (Math 120), College Algebra (Math 130), Finite Mathematics for Business and Social Sciences (Math 140), Elementary Statistics with Probability (Math 150), Calculus I for the Biological, Management, and Social Sciences (Math 160), and Calculus II for the Biological, Management, and Social Sciences (Math 161). Over the past four years, the program has served an average of 3,114 students with 98 sections offered per year. The mission of our program is to teach students the importance and relevance of mathematics in the complex world of today. We strive to provide a variety of course offerings and up-to-date curricula to help our students transfer efficiently and successfully to their desired universities.

All of the courses in our program may be used to satisfy the General Education Mathematics requirement for transfer to a university and to fulfill the Mathematics Competency component of the A.A. or A.S. degree; however, some of the courses also serve as prerequisites and fundamental courses for certain types of majors. Math 130 serves as a prerequisite for Math 160, the first course in Calculus for the Biological, Management and Social Sciences majors. In turn, Math 160 is the prerequisite for Math 161. Math 140 is primarily designed for business majors, while Math 150 is taken by social science and nursing majors. Math 120 is the only course truly designed for general education mathematics and it is a course typically taken by liberal arts majors.

b) Degrees and Certificates

There are no degrees or certificates offered in the General Education Mathematics Program.

c) College Mission and Strategic Initiatives (Appendix A) Explain how the program fulfills the college's mission and aligns with the strategic initiatives.

The goals and objectives of the General Education Mathematics Program are to emulate the goals and objectives of the college as a whole: To offer a quality, comprehensive educational program and services to ensure the educational success of our diverse community of students. Despite the limitations of fewer sections and deferred staffing needs, we intend to offer a quality program that will ensure the success of our students both at their transfer institution and in the workplace (*Strategic Initiative B* and *Strategic Initiative D. Note: This will be shortened to "S.I" from this point on*). In developing new curriculum, we have consulted with the Biology faculty members (including Dr. Jean Shankweiler, Dean of Natural Sciences), the Counseling Office, Lori Suekawa in the Articulation Office, and Dr. Rapp, the Dean of Business and Interim Dean of Mathematical Sciences (*SI-C* and *SI-D*). In addition, we have also aligned our curriculum with neighboring universities such as CSULB, CSUF, CSUDH, USC, UCLA and UCI in order to meet the needs of our students (*SI-C* and *SI-D*). We have and will continue to support student success by using a variety of teaching methodologies within our classes (*SI-A*). We strive to obtain funding to support faculty development and facility and technology improvements (*SI-G*) to meet the needs of students and faculty (*SI-F*). Student learning outcomes will continue to be

assessed and close communication by those within the program will allow for any changes necessary to ensure student success and the vitality of our program (*SI-E*). From our last program review in 2010, 46.2% of the students surveyed have a Bachelor's degree as their end goal and 40.2% desire an advanced degree (Masters or Ph.D.). A strong academic foundation is essential for these students. Given that many of these students will be majoring in fields that use mathematical thinking as part of their jobs, it is essential that they master those concepts in the General Education Mathematics Program which emphasize applications of math in the workplace (*SI-B*).

d) Status of Previous Recommendations

Status of Previous Recommendations from 2010 Program Review:

Recommendation 1: (Possible Increase in number of Faculty) The General Education Mathematics Program requires specialized teaching skills in areas such as probability and statistics that are not part of every instructor's training, expertise, and interest. Demand for statistics has grown, so ensuring that staffing for that course is adequate should be considered in hiring. In addition, some courses such as Math 130 seem to have a disproportionately lower success rate as measured by the SLO when taught by part-time instructors. Therefore, it is recommended that additional full-time math instructors be hired to teach in the program and create a more formal support system for the adjunct instructors that teach General Education Mathematics Program courses. **Status: IN PROCESS** **1.** We have hired ten new full-time faculty since 2010 and seven out of the ten new faculty teach statistics. However, since more senior faculty who teach statistics will retire in the next few years, we will need to continue to hire full-time instructors and part-time instructors who specialize in statistics. **2.** Math 130 (College Algebra) is still mostly taught by part-time instructors. Each semester only one to two full-time faculty teach this course. There is still a need to hire more full-time faculty who are willing to teach this course.

Recommendation 2: (Current Hardware and Software Technology) It is recommended that a long-range, sustainable plan to purchase the most up-to-date version of the software and hardware used in the courses in this program be implemented and that newer technologies are investigated for possible introduction to the General Education Mathematics Program.
Status: IN PROCESS We moved into the new MBA building in January 2013. Each classroom is equipped with a new computer, document camera, and projection system. The current problem that we are facing is that we do not a have a technician maintaining the software and computers on a regular basis. Therefore, if equipment breaks down, no one is there to immediately assist faculty and students. Please refer to Section 6 (*Facility and Equipment*), Section 7 (*Software and Technology*), and Section 8 (*Staffing*) for additional requests and cost estimation in this area.

Recommendation 3: Inactivation or lessened scheduling of Math 140 (Finite Mathematics)
Status: ABANDONED After further research in Fall 2013, the General Education Math Committee has abandoned this recommendation. Instead, the Committee recommends that ECC offers Math 140 in both Fall and Spring semesters. Math 140 is being continued primarily because it satisfies the most current Transfer Model Curriculum for Business Administration

Majors at the CSUs. In addition, it fulfills the General Education Requirement at all CSUs, UCs and other local universities.

Recommendation 4: Design a survey to better capture the background, needs, and future plans of General Education Mathematics students.
Status: ACTIVE Since four out of six courses in the General Education Mathematics Program are either required courses or elective courses for Business Majors, we designed and conducted a short, informative survey in both Fall 2013 and Spring 2014 to understand the needs of those students. This will be further discussed in other sections (**3.** *Curriculum,* **5.** *Analysis of Student Feedback,* **8.** *Direction and Vision,* and **9.** *Prioritized Recommendations*).

Recommendation 5: Increase participation of faculty, both full-time and part-time, in the administration and reporting of SLOs.
Status: ACTIVE We have just completed our 4-year SLO/PLO assessment cycle and have begun a new cycle starting this semester. We have two committee members (Junko Forbes and Susanne Bucher) who were or are currently the SLO Coordinator for the Division of Mathematical Sciences. Our Committee SLO Coordinators (Aban Seyedin – Interim Coordinator and Milan Georgevich – Current Coordinator) have kept us well informed on the up-to-date SLO requirements and timeline. They have also designed an efficient way to get more faculty (both full-time and part-time) to give us feedback on SLO assessments and improvements on our SLO success rates. Most of our full-time committee members have been trained in TracDat and have met all SLO deadlines past and present. Please see our recommendations in Section 4 (*Assessment and Student Learning Outcomes*) on getting more part-time faculty involved with SLO process.

2. Analysis of Institutional Research Data

a) Provide and analyze the following statistics/data.

1. Head count of students in the program

Figure 1 shows that the number of students in the General Education Mathematics Program has been decreasing over the last four years. This decreasing trend may be explained by *Figure 2*, which shows that student participation has decreased most likely because the number of sections has decreased steadily over the past four years. [*Note: This data was downloaded from the website provided by ECC's Institutional Research.]*

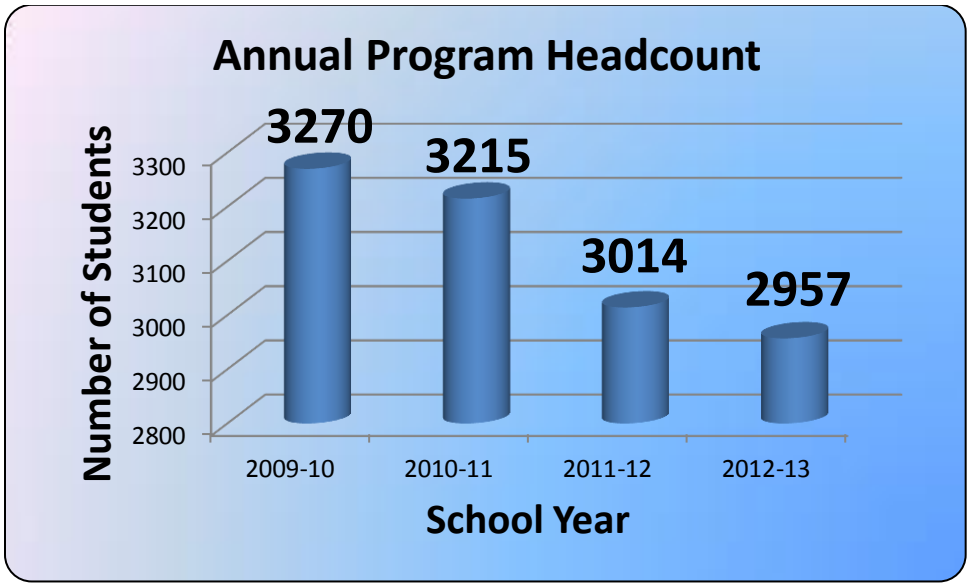


Figure 1: General Education Mathematics Program – Annual Headcount

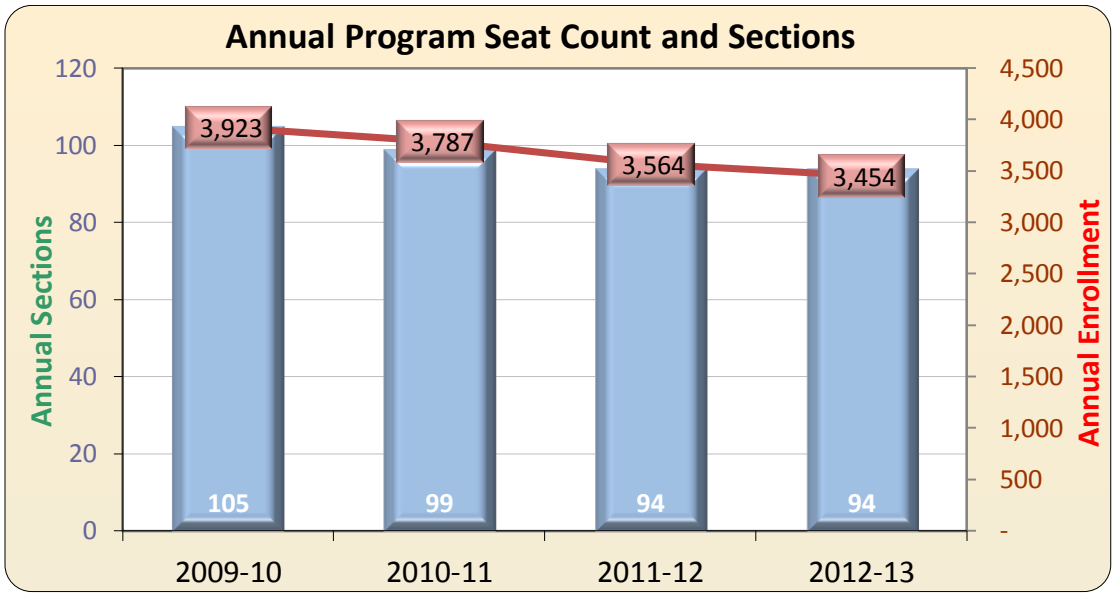


Figure 2: General Education Mathematics Program – Annual Seat Count and Sections

2. Course grade distribution (Are there some courses that stand out in one way or another in terms of grades?)

From *Figures 3-6* (on the next two pages), we can see that the grade distribution for the General Education Math courses have been fairly similar during the last four years.

Notable observations over the past four years include the following:

- Math 150 (Distance Education) had a high percentage of withdrawals in the 2009-10 school year, followed by a higher percentage of A's in the next school year. This occurred during the beginning stage of our Distance Education Program in Mathematics. It is possible that some students were not prepared to take Statistics in Distance Education as students often don't realize that Distance Education courses are every bit as challenging as traditional courses. Once students realized that they needed to learn independently with minimum supervision away from school, they performed better the following school year.
- It is not surprising that Math 120 and Math 161 tend to have a higher percentage of A's, B's, and C's than other courses in our program. Math 120 is the least rigorous transfer-level math course. Since it contains topics that are very contextualized, many non-STEM major students can relate to these concepts. Math 161 is second-semester Calculus for Business and Biology majors. The students, who enroll in this course, are typically the best students in our program. Most students in Math 161 work extremely hard towards earning a final letter grade of either an "A" or a "B".
- Math 130 tends to have a lower percentage of A's, B's, and C's than other courses. In order to be successful in Math 130, students must retain all of the skills from its prerequisite course. During recent years, our students have the choice of taking Math 80 (Intermediate Algebra for STEM) or Math 73 (Intermediate for General Education) to satisfy this prerequisite requirement. Students who opted to take Math 73 have a much weaker preparation in algebra, since Math 73 is missing topics that are crucial to the success in Math 130. The General Education Math Committee recommended to the Math Department to change the prerequisite of Math 130 back to just Math 80. This change will take place starting in Fall 2014.
- There were a higher percentage of withdrawals in Math 130 and Math 160 in the 2012-2013 academic year. This may also result from having Math 73 as a prerequisite course for Math 130. Instructors who teach Math 160 have observed that students entering the course have noticeably weaker preparation in algebra than in the past, since Math 130 is the prerequisite course for Math 160.

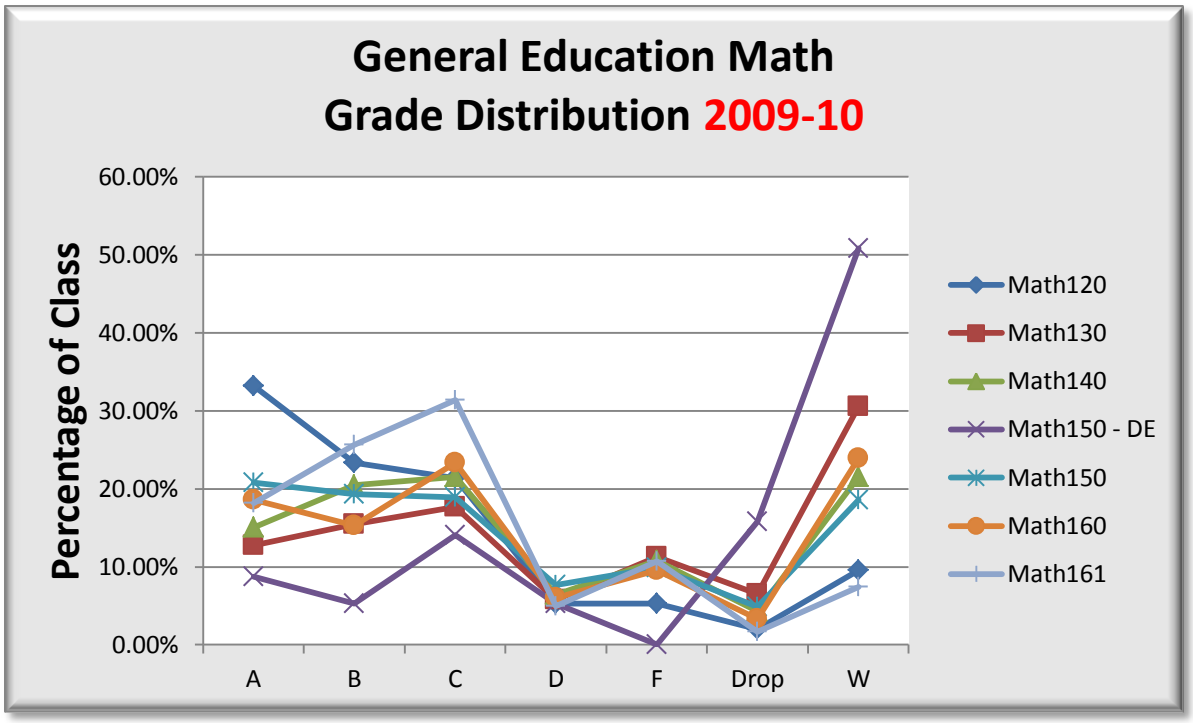


Figure 3: General Education Mathematics Program – Grade Distribution 2009-10

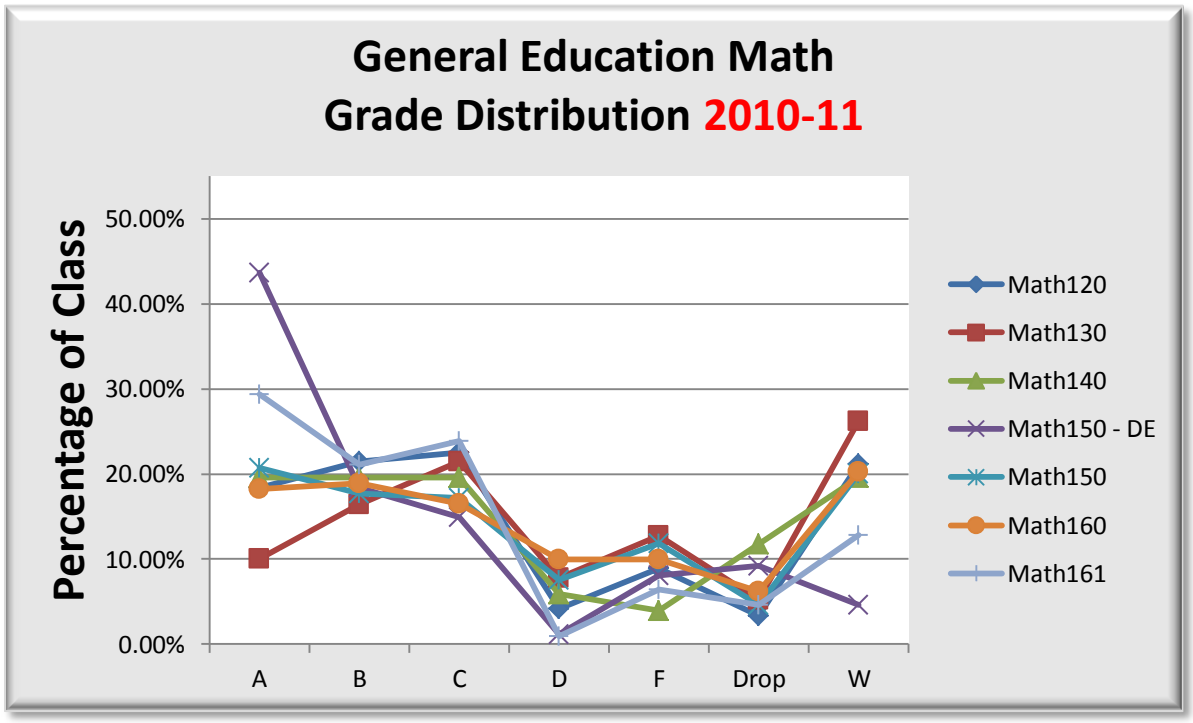


Figure 4: General Education Mathematics Program – Grade Distribution 2010-11

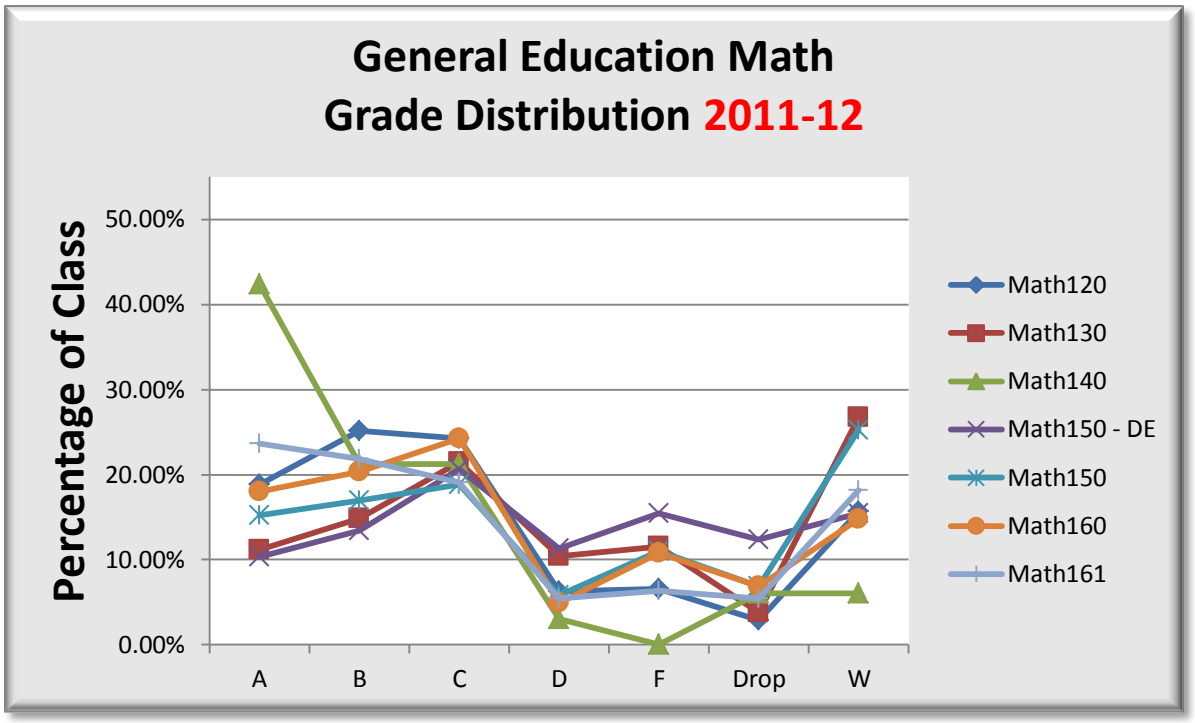


Figure 5: General Education Mathematics Program – Grade Distribution 2011-12

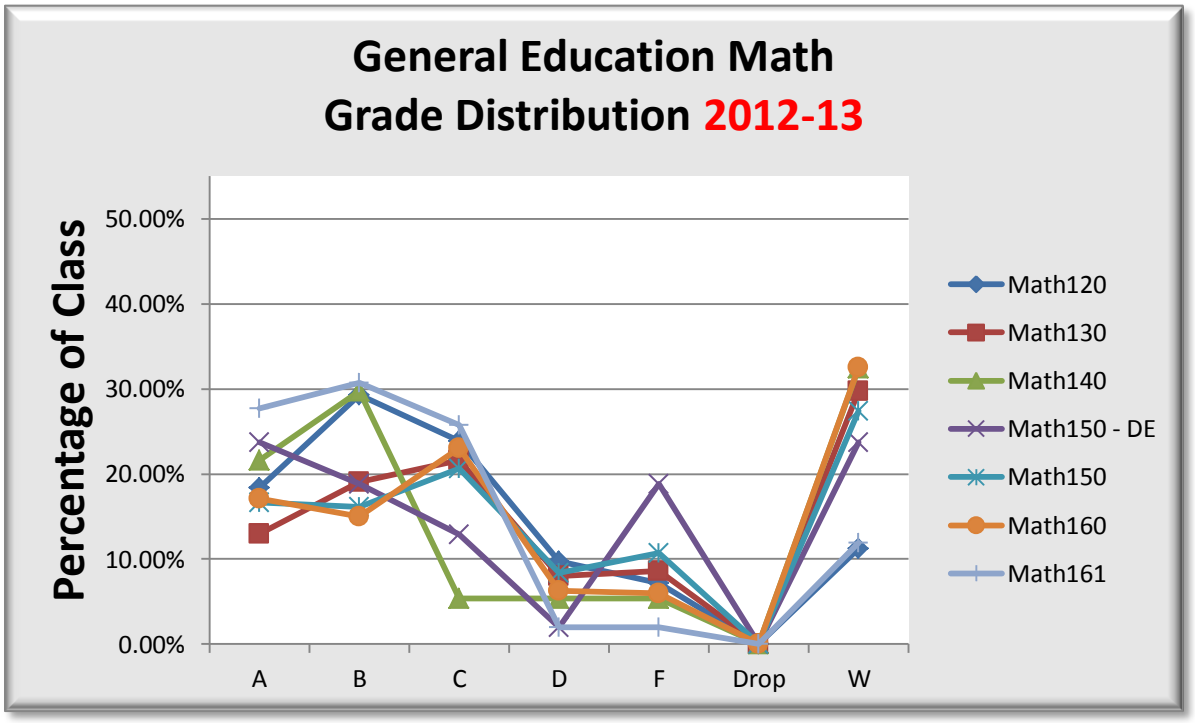


Figure 6: General Education Mathematics Program – Grade Distribution 2012-13

3. Success rates (Discuss your program's rates in light of the college's success rate standard. Set a standard for your program.)

The college's preliminary success standard for General Education Mathematics is 59.7%. According to *Figure 7*, although the program's actual success rate has been slightly lower than the standard set by the college for the past four years, the course and program success rates are within 3% of those in the last program review (for 2006-2009). Requiring Math 80 as a prerequisite for Math 130 will hopefully improve the success rate for this course, and therefore for the program as a whole. Our target goal for our program is 60% success rate overall.

General Education Mathematics Program Success Rates					
Course	2009-10	2010-11	2011-12	2012-13	Course Success Rate
Math120	78%	62%	68%	72%	70%
Math130	46%	48%	48%	54%	49%
Math140	57%	59%	85%	57%	62%
Math150 - DE	28%	77%	44%	55%	53%
Math150	59%	56%	51%	53%	55%
Math160	57%	54%	63%	55%	57%
Math161	75%	74%	65%	84%	74%
Program Success Rate	57%	55%	54%	57%	

Figure 7: General Education Mathematics Program – Success Rates Academic Year 2009-13

The following two tables (*Figure 8 and Figure 9*) compare the success rates by course for each of the fall and spring terms. Course success rates vary considerably between the six General Education Mathematics courses as the student population varies considerably from course to course. The success rate is the percentage of students who receive a C or better as a final course grade compared to all students who were enrolled at the census date.

General Mathematics Education Program Success Rates - FALL TERMS					
Course	2009	2010	2011	2012	Course Success Rate
MATH 120	80.80%	60.00%	69.20%	72.00%	**70.50%**
MATH 130	46.20%	53.50%	48.50%	52.90%	**50.28%**
MATH 140	58.50%	18.80%			**38.65%**
MATH 150	60.50%	57.30%	50.90%	51.50%	**55.05%**
MATH 150 - DISTANCE ED	30.00%	85.70%	28.60%	62.10%	**51.60%**
MATH 160	63.80%	52.80%	69.30%	48.00%	**58.48%**
MATH 161	75.00%	73.20%	64.70%	84.60%	**74.38%**
PROGRAM SUCCESS RATE	58.60%	56.80%	54.90%	55.10%	**56.35%**
DIVISION SUCCESS RATE	53.60%	54.60%	54.20%	54.80%	
COLLEGE SUCCESS RATE	66.20%	67.30%	67.30%	69.80%	

Figure 8: General Mathematics Education Program Success Rates (2009-2012 Fall Terms)

General Mathematics Education Program Success Rates - SPRING TERMS					
Course	**2010**	**2011**	**2012**	**2013**	**Course Success Rate**
MATH 120	75.30%	64.30%	68.10%	71.20%	**69.73%**
MATH 130	45.70%	77.10%	46.60%	54.30%	**55.93%**
MATH 140	55.00%	68.90%	84.80%	56.80%	**66.38%**
MATH 150	57.80%	54.20%	51.10%	54.10%	**54.30%**
MATH 150 - DISTANCE ED	27.00%	68.90%	50.00%	52.80%	**49.68%**
MATH 160	50.00%	55.00%	51.70%	66.10%	**55.70%**
MATH 161	75.40%	75.00%	64.50%	83.90%	**74.70%**
PROGRAM SUCCESS RATE	54.80%	54.00%	53.20%	58.50%	
DIVISION SUCCESS RATE	51.90%	53.70%	53.70%	56.70%	
COLLEGE SUCCESS RATE	67.20%	66.60%	68.10%	69.20%	

Figure 9: General Mathematics Education Program Success Rates (2009-2012 Spring Terms)

Overall, success rates of the General Education Mathematics Program exceeds the overall success rates of the Mathematical Sciences Division as a whole almost every term (See *Figure 10* below and *Figure 11* on the next page). Mathematics courses are generally more difficult in comparison to other courses that the College offers.

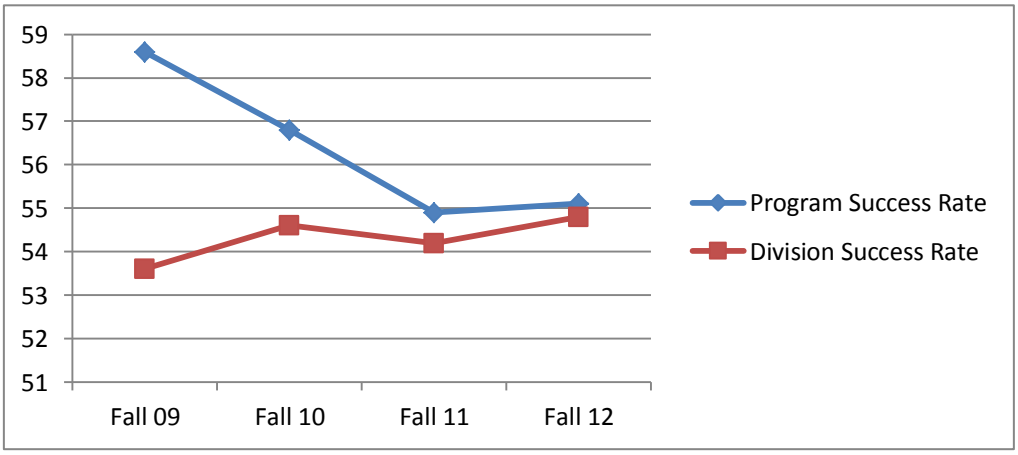


Figure 10: A Comparison of Our Program Success Rates vs Division Success Rates (2009-2012 Fall Terms)

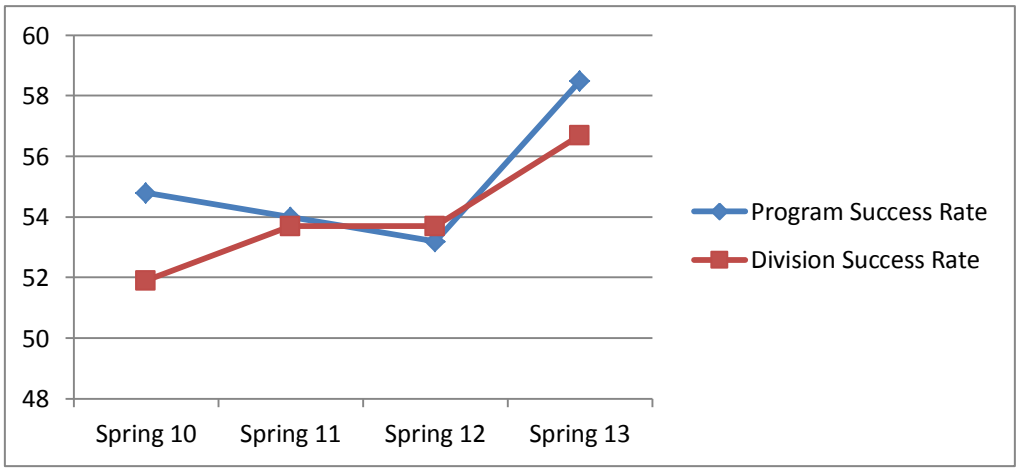


Figure 11: A Comparison of Our Program Success Rates vs Division Success Rates (2010-2013 Spring Terms)

4. Retention rates

Retention rates vary considerably among the six General Education Mathematics courses as student body varies considerably from course to course. The retention rate is the percentage of students who remain enrolled through the end of a course out of all students enrolled at census date. In essence, it is the percentage of students who *did not withdraw or drop the course.*

The following two tables (*Figure 12* and *Figure 13*) compare retention rates by course for each of the fall and spring terms.

General Mathematics Education Program Retention Rates - FALL TERMS					
Course	**2009**	**2010**	**2011**	**2012**	**Course Retention Rate**
MATH 120	91.10%	71.30%	82.40%	88.70%	**83.38%**
MATH 130	63.40%	71.90%	72.60%	68.40%	**69.08%**
MATH 140	71.70%	25.00%			**48.35%**
MATH 150	77.20%	75.60%	66.90%	71.20%	**72.73%**
MATH 150 - DISTANCE ED	35.00%	88.10%	38.10%	86.20%	**61.85%**
MATH 160	80.50%	76.70%	82.50%	60.80%	**75.13%**
MATH 161	94.60%	80.50%	73.50%	89.70%	**84.58%**
PROGRAM RETENTION RATE	74.60%	74.10%	72.40%	71.90%	**73.25%**
DIVISION RETENTION RATE	74.10%	74.70%	75.40%	77.60%	
COLLEGE RETENTION RATE	81.70%	81.80%	81.80%	84.30%	

Figure 12: General Mathematics Education Program Retention Rates (2009-2012 Fall Terms)

General Mathematics Education Program Retention Rates - SPRING TERMS					
Course	2010	2011	2012	2013	Course Retention Rate
MATH 120	86.10%	78.90%	80.60%	88.90%	**83.63%**
MATH 130	62.60%	65.60%	66.60%	72.00%	**66.70%**
MATH 140	77.50%	88.60%	87.90%	67.60%	**80.40%**
MATH 150	76.10%	75.10%	68.70%	73.20%	**73.28%**
MATH 150 - DISTANCE ED	32.40%	84.40%	81.60%	72.20%	**67.65%**
MATH 160	64.40%	68.50%	71.60%	77.40%	**70.48%**
MATH 161	87.70%	83.80%	77.60%	87.10%	**84.05%**
PROGRAM RETENTION RATE	71.10%	73.30%	71.20%	75.60%	
DIVISION RETENTION RATE	73.00%	74.40%	74.80%	76.80%	
COLLEGE RETENTION RATE	81.20%	81.00%	82.00%	82.80%	

Figure 13: General Mathematics Education Program Retention Rates (2009-2012 Spring Terms)

Although retention rates from class to class vary from term to term, our program retention rates have consistently been above 70% from Fall 2009 to Spring 2013. Our program retention rates have also stayed within a 3% margin of error of our division retention rates with the exception of the academic year 2012. It is not surprising that retention rates for transfer-level math classes are slightly below our division retention rates as these students tend to be aware of the drop deadline and will withdraw in preference to receiving failing grades.

5. A comparison of success and retention rates in face-to-face classes with distance education classes

Distance education success rate shows significant fluctuation from term to term perhaps due to the teaching method or instructor in charge. Currently, both full time and part time faculty are teaching distance education classes. We have a small sample of students in these distance education classes, making it harder to notice trends. Due to the high volume of students and demand, the Math 150 Elementary Statistics course has consistently opened sections through Distance Education. Most majors especially in business, economics, nursing, and life sciences require Statistics to transfer to a 4-year college. The different format can definitely affect success and retention rates for students. In particular, students will quickly realize the need for extra self-discipline and motivation to complete the course with far less face-to-face instruction. Looking at success rates (*Figure 14* and *Figure 15* on the next page) in the Math 150 face-to-face vs. distance education sections, we see the trend of slightly higher success rate in the face-to-face instruction format (about 4% higher in the fall terms and 6% higher in the spring terms).

Math 150 Fall Terms – Face-to-Face and Distance Ed Comparison – SUCCESS RATE					
	2009	2010	2011	2012	
MATH 150	60.50%	57.30%	50.90%	51.50%	**55.05%**
MATH 150 - DISTANCE ED	30.00%	85.70%	28.60%	62.10%	**51.60%**

Figure 14: A Comparison of Math 150 Face-to-Face and Distance Ed Success Rate (Fall terms)

Math 150 Spring Terms – Face-to-Face and Distance Ed Comparison – SUCCESS RATE					
	2010	2011	2012	2013	
MATH 150	57.80%	54.20%	51.10%	54.10%	**54.30%**
MATH 150 - DISTANCE ED	27.00%	68.90%	50.00%	52.80%	**49.68%**

Figure 15: A Comparison of Math 150 Face-to-Face and Distance Ed Success Rate (Spring terms)

Below (*Figure 16 and Figure 17*) is a comparison of face-to-face Math 150 retention rates to distance education instruction:

Math 150 Fall Terms – Face-to-Face and Distance Ed Comparison – RETENTION RATE					
	2009	2010	2011	2012	
MATH 150 – Face – to - face	77.20%	75.60%	66.90%	71.20%	**72.73%**
MATH 150 - DISTANCE ED	35.00%	88.10%	38.10%	86.20%	**61.85%**

Figure 16: A Comparison of Math 150 Face-to-Face and Distance Ed Retention Rate (Spring terms)

Math 150 Spring Terms – Face-to-face and Distance Ed Comparison – RETENTION RATE					
	2010	2011	2012	2013	
MATH 150 – Face – to - face	76.10%	75.10%	68.70%	73.20%	**73.28%**
MATH 150 - DISTANCE ED	32.40%	84.40%	81.60%	72.20%	**67.65%**

Figure 17: A Comparison of Math 150 Face-to-Face and Distance Ed Retention Rate (Spring terms)

We definitely see a trend of higher retention rate overall in face-to-face classes. Factors that contribute to this may include a need for more motivation and self-discipline on the students' part to ensure success in the Distance Ed format. We also have much smaller samples of students to analyze in the Distance Ed sections.

6. Enrollment statistics with section and seat counts and fill rates (*Are sections over/under filled?)*

Collecting enrollment data, we combine student participation in the General Education Math courses for the academic terms from 2009-2013 in the table (*Figure 18 on the next page*). We notice a potential need for an increased number of Math 150 sections due to high enrollment.

Note that almost 50% of the program participation originates in the Math 150 face-to-face sections.

Gen Ed Math Program - Total Enrollments					
Course	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**Totals**
MATH 120	304	359	350	348	**1361**
MATH 130	956	884	867	787	**3494**
MATH 140	93	51	33	37	**214**
MATH 150	1158	1261	1184	1288	**4891**
MATH 150 - DISTANCE ED	57	87	97	101	**342**
MATH 160	334	291	305	286	**1216**
MATH 161	121	109	110	101	**441**

Figure 18: General Education Program Total Enrollments 2009-2013

Many students in the CM2 Program are business majors who plan to transfer to CSULB. CSULB has recently made some changes that have severely affected enrollment in CM2 math classes. One of the changes was to require Math 150 instead of Math 140 for business majors. The data shown in the above table shows a surge in enrollment for Math 150 and a large drop in enrollment for Math 140. Although CSULB no longer requires Math 140 for their business majors, Math 140 is still an elective on the CSU Transfer Model Curriculum. The strong retention rates in Math 140 (*Figure 13*) have persuaded us to continue to offer this course for the students who are either required to take the course by some CSUs, or who choose to take it as an elective to satisfy their general education requirement. The enrollment of Math 160 and Math 161 has decreased from 2009 to 2013 largely because CSUs now offer a one-semester business calculus course. Since we still have a two-semester calculus sequence for our business majors, we undoubtedly lost some students to nearby community colleges that offer a one-semester business calculus course. To boost enrollment in business calculus, the General Education Math Committee has created a new course, Math 165, which combines Math 160 and Math 161 into a single 5-unit course. [*Note: Math 165 has just been approved by the CCC.*] Math 160 and 161 will subsequently be inactivated. Until then, there will be enough Math 161 sections offered to cycle off the Math 160 students. See *Section 5* (*Analysis of Student Feedback*) for more details. **The following chart (*Figure 19*) displays our annual program participation.**

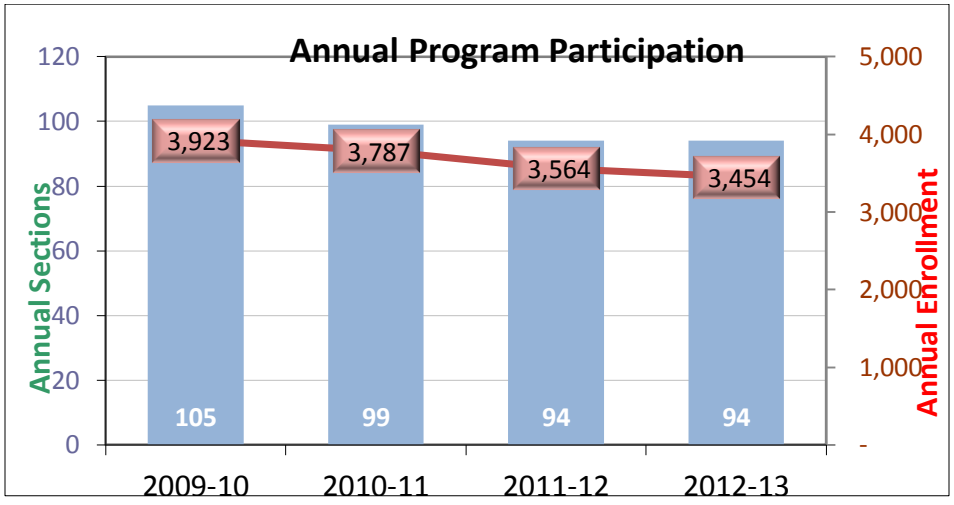


Figure 19: General Education Seat Counts and Sections.

Looking at section fill rates (*Figure 20* and *Figure 21*), we see as a whole that sections in the General Education Math Program are consistently at or over capacity. We strongly recommend an increase in the number of Mathematics 150 sections to accommodate the increasing need for students to complete a transfer-level statistics course for many majors in the STEM and non-STEM fields. We also recommend an increase in the number of sections in our courses overall in Spring Semesters as our fill rates are consistently above 105% and we want to make sure that our students have the opportunity to take their last math course needed to transfer. The number of sections are dependent upon the dean and budgetary restrictions.

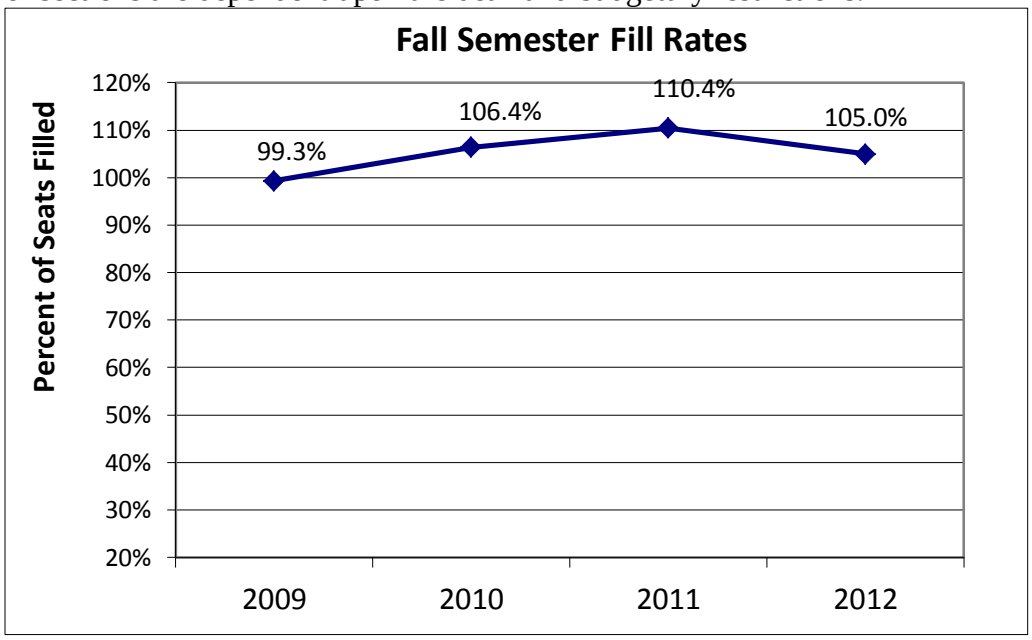


Figure 20: General Education Section Fill Rates (Fall Semesters)

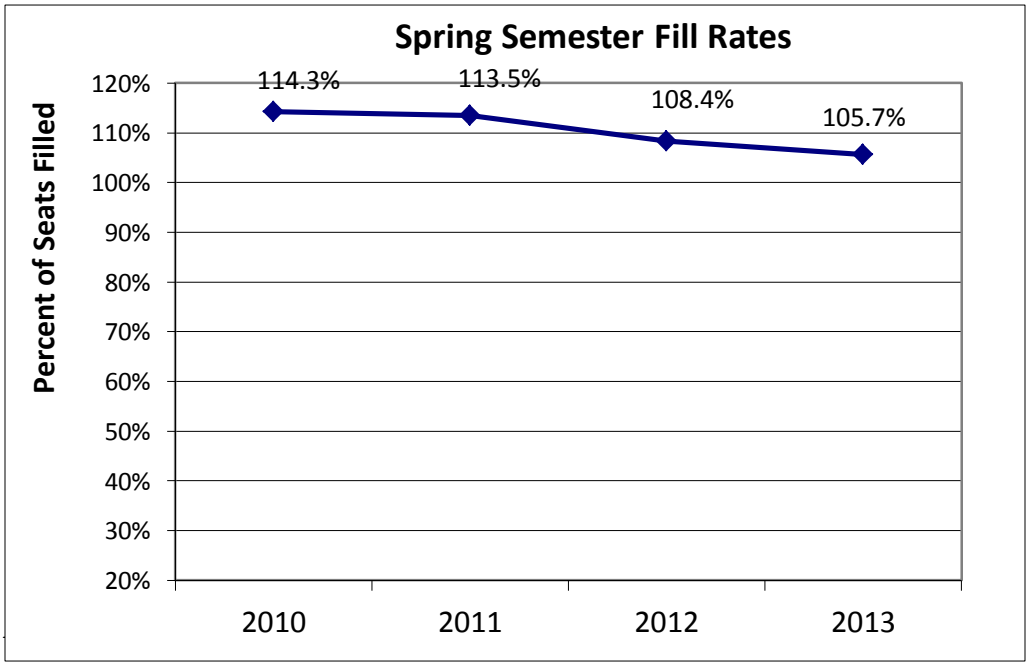


Figure 21: General Education Section Fill Rates (Spring Semesters)

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

All courses in the program have sections offered throughout the day. Roughly half of the sections are offered in the morning, one quarter in the afternoon, and one quarter in the evening. We have very little control over the scheduling of the courses. Almost every classroom available to the Division of Mathematical Sciences is being used all day long, leaving little room to change the current scheduling. Since the program fill rate is consistently over 100%, more sections need to be offered in order to keep up with the demand, but there are no classrooms available, except for evenings and weekends.

Of all of the courses in the program, Math 150 (Statistics) has the largest demand and is in greatest need of increasing the number of sections. When sections of Math 150 are offered, they fill. In Spring 2014, twenty-seven sections of Math 150 were offered and virtually all of them filled. At the time of this writing, the registration for Fall 2014 has been open for less than two weeks. All sections of Math 150 but one are full and most have a full waiting list as well. If registration were stopped now and all the students on the waiting lists were allowed to add, the fill rate would be 110%, however, registration will continue for four more months. The number of sections offered does not satisfy the demand for the course. The students who enroll in this course do so because it is required for their major or course of study. If they cannot get into a section of the course here, it is likely they will take it elsewhere and also take their other courses at that institution. If more sections of Math 150 are offered, they will fill. The number of sections to be added are dependent upon the dean and budgetary restrictions.

For Math 150, in addition to opening additional sections in the evenings or on weekends, there is also the possibility of increasing the number of hybrid sections offered. Additionally, more sections could be offered during the summer session(s) or winter session (if it were to be reinstated). Elsewhere in this document is a recommendation for dedicated classrooms for Math 150. This would help the scheduling of the course. There are times when 3 or 4 sections of Math 150 are being conducted simultaneously. If there were at least three dedicated (and equipped) classrooms for Math 150, they could still be used for other courses as scheduling permits. However, the statistics courses should be scheduled first and other courses can then be scheduled around them. This is not unreasonable. No course other than the Intermediate Algebra courses has as many sections offered each semester as Math 150. An analysis of the times Math 150 was scheduled for the Spring 2013 and Fall 2014 semesters revealed several instances of two sections which overlapped by only a few minutes. Dedicated classrooms could be scheduled more efficiently, alleviating some of the problems caused by a shortage of classroom availability. In summary, more classes can be offered at times when classrooms are available (e.g. evenings, weekends, summer sessions), more hybrid classes can be offered (if instructors can be found), and more sections can be offered during the daytime, if efficient scheduling of dedicated classrooms is adopted.

From Spring 2011 to Fall 2014 the number of sections of Math 150 offered each semester has ranged from a low of 15 to a high of 27, with an average of 18. There are more sections offered in the spring semesters than in the fall, although there is no reason for there to be more demand in the spring semesters. There are one or two hybrid sections offered each semester. The last semester during which a weekend section of Math 150 was offered was Spring 2012. An average of 44 sections of Math 150 have been offered each year (Fall/Winter/Spring/ Summer) for the past few years. It appears reasonable to offer two hybrid sections of Math 150

and one weekend section each semester. It is not clear how many sections of Math 150 are necessary to satisfy the demand, but for a start, at least 20 sections should be offered each semester and 10 during the summer. If they fill consistently, then the number should be raised in subsequent semesters.

Math 140 (Finite Math) is being resurrected, as it were, and we hope to be increasing the number of sections offered each semester. It is important that as we do this, the sections are offered at a variety of times: mornings, afternoons, and evening, if at all possible. Much of the increase in the Math 140 enrollment is expected to come at the expense of Math 130 enrollments, so finding available classrooms may not be a problem. The rest of the courses in the program also need to have the number of sections increased to meet the demand. Since there is no data on how many students are turned away each semester, we should increase the number of sections until the fill rate falls consistently near 100%.

8. Improvement rates (if applicable)

There are two different tracks within the General Mathematics Education Program:

1. Stand-Alone Courses - Courses which are not prerequisites to other courses within the program
    a. Math 120
    b. Math 140
    c. Math 150
    d. Math 150 – DE

2. Sequential Courses - Courses which serve as pre-requisites for other courses in the program
    a. Math 130 (pre-requisite for Math 160)
    b. Math 160 (pre-requisite for Math 161)
    c. Math 161

Since Math 120, Math 140 and Math 150 are stand-alone courses, we will not consider those in these analyses.

General Mathematics Education Program Success Rates - FALL TERMS					
Course	***2009***	***2010***	***2011***	***2012***	***Course Success Rate***
MATH 130	46.20%	53.50%	48.50%	52.90%	50.28%
MATH 160	63.80%	52.80%	69.30%	48.00%	58.48%
MATH 161	75.00%	73.20%	64.70%	84.60%	74.38%

Figure 22: A Comparison of Math 130, 160 and 161 Success Rates (Fall terms)

General Mathematics Education Program Success Rates - SPRING TERMS					
Course	***2010***	***2011***	***2012***	***2013***	***Course Success Rate***
MATH 130	45.70%	77.10%	46.60%	54.30%	55.93%
MATH 160	50.00%	55.00%	51.70%	66.10%	55.70%
MATH 161	75.40%	75.00%	64.50%	83.90%	74.70%

Figure 23: A Comparison of Math 130, 160 and 161 Success Rates (Spring terms)

As shown in *Figures 22* and *23* above, the overall course success rates are virtually the same when comparing Fall and Spring semesters.

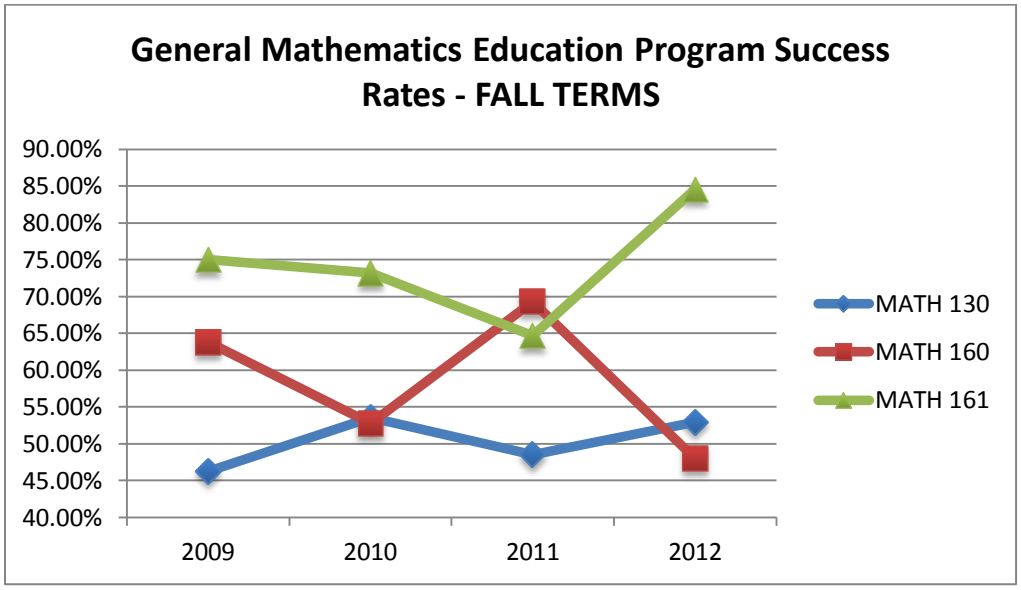


Figure 24: A Comparison of Math 130, 160 and 161 Success Rates (Fall Terms)

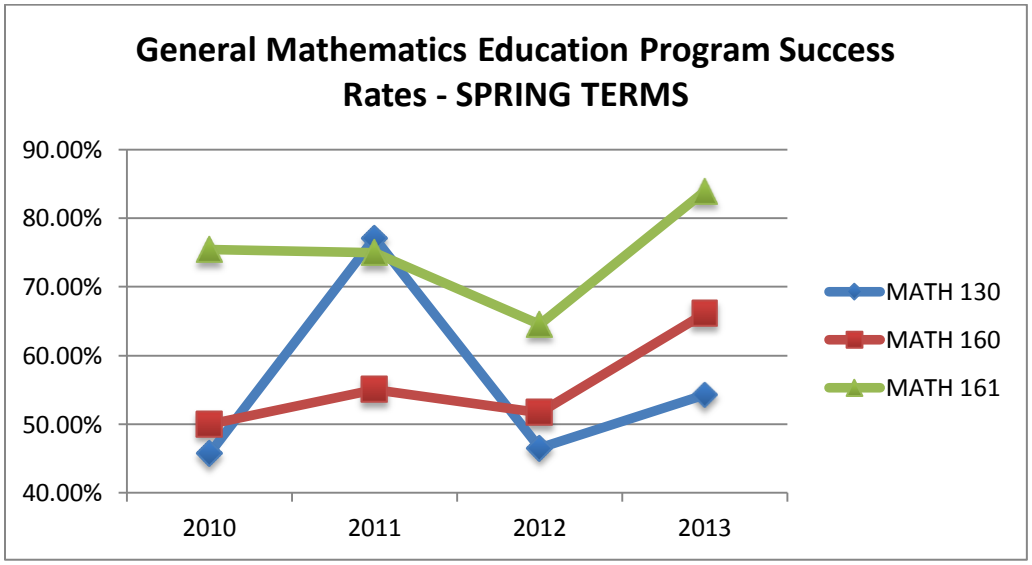


Figure 25: A Comparison of Math 130, 160 and 161 Success Rates (Spring Terms)

Looking at *Figures 24* and *25* above, what is most evident are the vastly different success rates between Math 130 (40-50% range), Math 160 (50-60% range) and Math 161 (70-80% range). As mentioned earlier, we believe that the low success rates for Math 130 can be attributed to the fact that both Math 73 and Math 80 are acceptable pre-requisites. Math 73 does not fully prepare the student for Math 130, and hence is a major factor in the low

success rates for Math 130. See #2 in this section for more discussion on Math 80 vs. Math 73.

With this in mind, we can then understand why Math 160 has similar mediocre success rates (though slightly higher) than Math 130. Our program has a very high set of standards for our students in order to meet the requirements of the 4-year universities. Math 160 students coming in who have taken Math 73 and, most likely, barely passing Math 130 are presented with a tough challenge. Those that do end up passing Math 160 are now very well prepared for the last course in the sequence, Math 161. *Figures 26* and *27* show that those remaining students are now fully prepared for Math 161. This is why the success rates of Math 161 are so high (70-80% range). By the time the students have made it through the rigors of Math 130 and Math 160, they are now considered some of the best students in our program. They are typically the most motivated students and usually make it a goal to get A's and B's. As seen earlier, Math 161 students have a higher percentage of A's, B's and C's than students in other courses in our program.

We feel one way to improve the success of the Math 160/161 sequence is to combine both courses into one rigorous 5-unit course (as discussed in #6 of this section). We would like to inactivate Math 161, and make one course that combines the current Math 160 curriculum with the required CID topics from Math 161. This would not only help increase the enrollment in the program, but it would also allow for the business majors to take one less class during their time at El Camino College. The new course, Math 165, aims to be ready to replace Math 160/161 by Fall of 2015.

9. Additional data compiled by faculty

Please see *Section 5* (*Analysis of Student Feedback*) for more details.

b) List any related recommendations.

1. The statistics instructors would like to explore the possibility of adding a lab component to our current Math 150 course. Since each section of this course requires a common set of manipulatives, technological equipment and statistical software, we recommend that Math 150 have three to four dedicated classrooms and schedule the times for Math 150 before scheduling other courses. **Fiscal Impact:** $0
2. Increase the number of sections of Math 150 by offering additional sections of evening, weekend, and/or hybrid classes, scheduling the dedicated classrooms efficiently, and offering more sections during the summer sessions. We can start by offering fifty sections per year and then increase (or decrease) as necessary. The cost for offering a 4-unit course at ECC is approximately $10,500 per section. [*Note: These numbers were provided by Donald Goldberg, the previous Dean of Mathematical Sciences*.]
   Fiscal Impact: $10,500/section

3. We also recommend continuing to offer at least one section of Finite Mathematics (Math 140) every semester, as it satisfies the Transfer Model Curriculum Model for CSUs and General Education Requirements for UCs and other private colleges. In the past 4 years, we offered only one section per year but it always had robust enrollment with 35 to 36 students enrolled per section. We would like to increase slowly to 2 sections each semester, one in the morning and one during the afternoon or evening.
   Fiscal Impact: $10,500/section

4. Increase the number of sections of the other courses in the program and continue to add sections each semester as long as the fill rates warrant it. The number of sections are dependent upon the dean and budgetary restrictions.
   Fiscal Impact: Approx $8,000/3-unit course, $10,500/ 4-unit course, $13,000/ 5-unit course

3. Curriculum

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

There are six courses in the General Education Mathematics Program and all have been reviewed within the past six years. Below is the timeline for our 6-year review cycle, including the date of the last course review and our plan for the next 6 years.

Course	Last Course Review	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6	
		FA 14	SP 15	FA 15	SP 16	FA 16	SP 17	FA 17	SP 18	FA 18	SP 19	FA 19	SP 20
Math - General Education	May, 2014	P							P	P			
MATH-120	2012-2013			X									
MATH-130	2013-2014												X
MATH-140	2013-2014												X
MATH-150	2013-2014											X	
MATH-160	2011-2012	X											
MATH-161	2011-2012	X											

b) Explain any course additions to current course offerings.

Math 160/161 (Calculus I and II for the Biological, Management and Social Sciences): Compared to Fall 2013, we have increased the number of sections of Math 160 from 5 to 6 in Spring 2014. We are also offering 2 sections of Math 160 in Summer 2014, compared with only 1 section in Summer 2013. As the result of the increased enrollments in Math 160, we are offering 2 sections of Math 161 in both Spring 2014 and Spring 2015.

Numerous local community colleges (including LBCC, LACC, OCC, ELAC) offer one singular Business Calculus course. Therefore, we have decided to combine Math 160 (Calculus I for Biological, Management and Social Sciences) with Math 161 (Calculus II for Biological, Management and Social Sciences) to create a one-semester 5-unit Business Calculus course called Math 165. [Note: This course has just been approved by the CCC, and the Math Department is planning to offer six sections of Math 165 starting Fall 2015.] Please see *Section 5. Student Feedback* for a more detailed analysis of our proposal.

Math 140 (Finite Mathematics): Under Recommendation 2011C in our last program review, the General Education Mathematics Program Committee proposed a inactivation or lessened scheduling of Math 140. After further research in Spring 2013, our committee has reversed the previous recommendation. Instead, we recommended strongly that we continue offering one section of Math 140 every semester for the following reasons:

First, Finite Math is currently one of the courses listed on the latest CSU Transfer Model Curriculum for business administration majors. Students who satisfy the TMC have priority to be considered for admission to CSUs.

Second, despite the fact that Finite Math is no longer a requirement for business majors at CSULB or social science majors at UCLA, it fulfills the GE requirements for all CSUs, UCs and at LMU and other local private universities.

Third, Finite Math is a requirement for criminal justice majors at CSUDH and for social sciences majors at USC. CSUDH currently offers at least 5 sections of Finite Math (Math 105) every semester because it satisfies their GE requirement. USC requires Finite Math (Math 116) for their social science majors. They offer a large section with an enrollment of 60 students every semester.

Last, Finite Math is an excellent choice for those students who need one final course beyond Intermediate Algebra, and who are tired of algebra and are looking for something different and potentially useful. It is also a good preparation for students planning to take Statistics because it contains the topics of combinatorics and probability, as well as an introduction to statistics. Other local community colleges (SMC, LBCC, Cerritos, ELAC, WLAC, Cypress, Orange Coast, etc.) all offer multiple sections of this course every year because their students find it useful and interesting.

Taking everything into consideration, the Mathematics Department supported our recommendation last Spring and voted in favor of continuing to offer this course. If enrollment goes down in the future, we may inactivate it then.

Math 150: Currently there is increasing interest from Statistics instructors to include a laboratory component for Math 150, which would use statistical software packages to analyze data. Statistical data analysis is a part of many diverse majors, from Psychology to Biology, Criminal Justice to Anthropology, and Sociology to Nursing, to name a few. Statistics is now required for many students who plan to transfer to a UC or CSU. Our current statistics class requires students to use some form of statistical software or graphing calculator. However, the level of usage varies from section to section and depends upon the availability of the computer rooms and graphing calculators.

The General Education Mathematics Committee will be considering the option of adding a laboratory aspect to the class, which would require students to do more data analysis, and learn different software programs such as Excel, Minitab, or SPSS to analyze data. With the assistance of computers, students can analyze large data sets, which come as part of the textbook package, but would be unreasonable to analyze using graphing calculators. For example, the new California Edition of Statistics by Mario Triola has data sets containing 100 data samples. It is completely unrealistic to enter all of them into a graphing calculator for analysis, but they can easily be analyzed using a software program. Adding the laboratory part to the class would give students experience analyzing large scale real world data, and prepare them for future classes in their major and in the workplace.

At this point, it is very difficult to schedule lab time for Math 150 classes. We have 3 dedicated computer classrooms for the entire math department. Two developmental courses, Math 37 and Math 67, as well as various computer science courses are scheduled in the computer rooms every day. There are plans to add more sections of these classes, which will make computer rooms less available. If we were to adopt this proposal, it would require additional classrooms dedicated to Statistics, as well as funding for the purchase of additional computers and necessary software.

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

Math 160/161: Since our proposal to combine Math 160 (4 units) with Math 161 (3 units) to create a one-semester Business Calculus course called Math 165 (5 units) has just been approved, we will inactivate Math 160 in Fall 2015 and Math 161 in Fall 2016. Please see *Section 5. Student Feedback* for a more detailed analysis of our proposal.

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

Currently the General Education Mathematics Program has only two sections of Math 150 (Statistics) being offered as a hybrid class every semester. The hybrid classes have the same fill rate as the regular classes and also share similar success rates. The classes only meet once a week to accommodate the students who are unable to attend classes more than once a week. If demand rises, we plan to offer more hybrid sections to meet students' needs.

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?**

   Although there are no degrees or certificates offered in the General Education Mathematics Program, all of our courses have been offered during the last two years.

2. **Are there any concerns regarding program courses and their articulation?**

   There are currently no concerns regarding articulation with any of the courses in the General Education Mathematics Program. However, we have made changes in our courses to better serve the students who are Business Majors, as four out of six courses in our program are either required courses or elective courses for those students.

   In Fall 2013, we modified Math 130 (College Algebra), which is a prerequisite for Math 160 (Calculus for the Biological, Management and Social Sciences), to include the following topics to better prepare students for Math 160:

- Factoring of expressions with rational exponents, rationalizing of numerators, simplifying the difference quotient, solving formulas for a variable, and review of equations of lines have been added to strengthen students' algebraic skills before entering Math 160.

- Useful everyday applications involving the mathematics of finance (compound interest, annuities, loans), exponential growth and decay were added.

- Piecewise functions, the average rate of change of function, increasing/decreasing functions, domain and range of functions, determining maximum and minimum from graphs of functions, and applications of exponential and logarithmic functions were added to strengthen the understanding of functions.

In addition, CSULB and CSUF require both Math 160 and Math 161 to articulate with their one-semester Business Calculus course. In Fall 2014, we decided to combine Math 160 and Math 161 into a single 5-unit Business Calculus course to make it easier for Business Majors to transfer to the CSUs. Math 165 not only articulates with all CSUs and local private transfer schools, but it also completely satisfies the requirement of CI-D. Our goal is to make sure that we keep our courses current to meet the requirements of the 4-year colleges and the demand of our student population.

3. How many students earn degrees and/or certificates in your program? Do students take licensure exams? If so, what is the pass rate? If few students receive degrees or certificates or if few students pass the licensure exam, should the program's criteria or courses be re-examined? Set an attainable, measurable goal for future degrees, certificates, and/or licensure pass rates.

N/A.

f) List any related recommendations.

1. The General Education Mathematics Program highly recommends creating a one-semester Business Calculus Course to make it easier for those students who transfer to CSUs. Since we typically offer 11 sections of Math 160 (4-units ~ $10,500) and 3 to 4 sections of Math 161 (3-units ~ $8,000) per year, our current cost is either $139,500 or $147,500. If we do eliminate Math 161 and increase Math 160 from 4 to 5 units, our projected cost of offering 11 sections of a 5-unit Math 160 is $143,000.
Fiscal Impact: An increase of $3,500 or a decrease of $4,500 per academic year.

2. We also recommend continuing to offer one section of Finite Mathematics every semester, as it satisfies the Transfer Model Curriculum Model for CSUs and General Education Requirements for UCs and other private colleges. In the past 4 years, we offered only one section per year but it always had robust enrollment with 35 to 36 students enrolled per section. **Fiscal Impact:** **$**10,500/section.

3. In addition, our Committee would like to explore the possibility of adding a lab component to our current Math 150 course. We recommend that our program receive additional classrooms dedicated to Math 150, and also the necessary software that benefits student learning. Please see *Section 7 Technology* and *Software* for detailed cost estimate.

4. Assessment and Student Learning Outcomes (SLOs)

a. Provide a copy of your alignment grid, which shows how course, program, and institutional learning outcomes are aligned.

Mathematical Sciences

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

Use the checklists provided to evaluate your SLO statements. Please add or revise PLO and SLO statements directly on this form.
Or, if you prefer to make changes on the electronic version contact your Facilitator Junko Forbes, or Angie Snider in your Division Office, to have the grid emailed to you. When SLO, PLO and ILO alignment changes are made, please make changes in red.
Return the completed grid to your Facilitator by Friday, Nov 8th.

Program: Math for G.E. and Non-Science Majors	Number of Courses: 6	Date Updated	Submitted by Junko Forbes Ext: 7217

ILO Rating Rubric

4 - A major focus of the course. Direct instruction is provided. Students are evaluated multiple times (and possibly in various ways) throughout the course.

3 - An important part of the course. Some direct instruction is provided and students are evaluated on the concepts once or twice within the course.

2- Only a minor focus of the course. Some instruction is given in the area but students are not formally evaluated on the concepts.

1- May be tangentially part of the class, but is not directly taught or evaluated or is not part of the course at all.

Institutional Learning Outcomes (ILOs)	I. Content Knowledge	II. Critical, Creative, and Analytical Thinking	III. Communication and Comprehension	IV. Professional and Personal Growth	V. Community and Collaboration	VI. Information and Technology Literacy
Overall Program Rating Rate each from 1-4 based on above rubric	4	4	3	2	2	3

Program Level SLOs A minimum of 3 and maximum of 6 PLOS. There are, however, exceptions. For example, if department faculty have developed one or two comprehensive PLO statements that reflect the program mission and covers the major components and the overarching goals of the program, they may present them to their Dean and Facilitator for approval as is. In cases where the facilitator or dean or faculty disagree with the rigor of the statements, the PLO statement will be forwarded to the Assessment of Learning Committee (ALC) for review and recommendations. *Include PLO #, Short Title, and PLO statement. Example: PLO #2 Ethics and Professionalism*	**ILOs to PLOs Alignment (Rate 1-4)** I	II	III	IV	V	VI
PLO #1 Graphical Methods Students will be able to analyze and solve application problems involving business, the social sciences, and/or biological sciences using graphical methods.	4	4	3	2	2	1
PLO #2 Analytical and Computational Skills Students will be able to analyze and solve application problems involving business, the social sciences, and/or biological sciences using analytical and computation skills	4	4	3	2	1	3

Course Level SLOs A minimum of 3 and maximum of 6 SLOs. There are, however, exceptions. For example, if department faculty have developed one or two comprehensive SLO statements that cover the major components and the overarching goals of the course, they may present them to their Dean and Facilitator for approval as is. In cases where the facilitator or dean or faculty disagree with the rigor of the statements, the SLO statement will be forwarded to the Assessment of Learning Committee (ALC) for review and recommendations. *Include SLO #, Short Title, and SLO Statement Example: Math 170 SLO #3 Vectors and Complex Numbers.*	**Course to Program SLO Alignment** *Mark with an X if you will use the course when assessing your PLO.*			**ILOs to Course SLOs Alignment** (Rate 1-4)					
	P1	**P2**	**P3**	I	II	III	IV	V	VI
Mathematics 120 Nature of Mathematics: SLO #1 Solve Loan Problems Apply techniques of simple and compound interest to solve loan and annuity problems.		x		4	4	2	2	2	1
Mathematics 120 Nature of Mathematics: SLO #2 Solve Application Problems Using Graphical Methods Solve application problems using graphical methods such as: 3-ring Venn diagrams, truth tables, Euclidean, Riemannian and Lobachevskian geometries.	x			4	4	2	2	2	1
Mathematics 120 Nature of Mathematics: SLO #3 Analyze Voting System Analyze voting systems, methods of apportionment and representation to further the understanding of the political process.		x		4	4	2	2	2	1
Mathematics 120 Nature of Mathematics: SLO #4 Solve Application Problems Solve application problems using basic counting principles, permutations, combinations, probability, expected value and frequency distribution.	x	x		4	4	2	2	2	1
Mathematics 130 College Algebra: SLO #1 Solve Nonlinear Inequalities Solve nonlinear inequalities and a variety of equations such as: polynomial, rational, radical, exponential, and logarithmic.	x	x		4	4	2	2	2	1
Mathematics 130 College Algebra: SLO #2 Solve Problems using Graphical Methods Solve problems using graphical methods involving a variety of functions, such as: polynomial, rational, radical, exponential, and logarithmic.	x			4	4	2	2	2	1
Mathematics 130 College Algebra: SLO #3 Solve Problems Using Sequences and series Solve problems using sequences and series.		x		4	4	2	2	2	1
Mathematics 130 College Algebra: SLO #4 Solve Application Problems Solve college algebra level application problems and use technology.		x		4	4	3	3	3	3

Course Level SLOs Minimum of 3 and maximum of 6 SLOs. *Include SLO #, Short Title, and SLO Statement* *Example: Math 170 SLO #3 Vectors and Complex Numbers*	**Course to Program SLO Alignment** *Mark with an X if you will use the course when assessing your PLO.*			**ILOs to Course SLOs Alignment** (Rate 1-4)					
	P1	**P2**	**P3**	I	II	III	IV	V	VI
Mathematics 140 Finite Mathematics for Business and Social Sciences: SLO # 1 Use of Gauss-Jordan Use the Gauss-Jordan technique to solve systems of linear equations.		x		4	4	2	2	2	1
Mathematics 140 Finite Mathematics for Business and Social Sciences: SLO #2 Use of Matrices Solve problems using matrices.		x		4	4	2	2	2	1
Mathematics 140 Finite Mathematics for Business and Social Sciences: SLO #3 Use of Geometrical Approach Solve linear programming problems using the geometrical approach.	x			4	4	2	2	2	1
Mathematics 140 Finite Mathematics for Business and Social Sciences: SLO #4 Use of Finite Mathematics Techniques Solve application problems using finite mathematics techniques	x	x		4	4	2	2	2	1
Mathematics 150 Elementary Statistics with Probability: SLO # 1 Computing and Interpreting Various Measures From data or bivariate data, compute statistics and develop displays of the data that illustrate the measures of central tendency, variation, relative position, and correlation. Interpret the displays in context.	x			4	4	2	2	2	1
Mathematics 150 Elementary Statistics with Probability: SLO #2 Probability Compute probability of an event by applying the basic assumption in classical probability and using addition rule and multiplication rule for contingency tables.	x	x		4	4	2	2	2	1
Mathematics 150 Elementary Statistics with Probability: SLO #3 Central Limit Theorem Use the Central Limit Theorem to compute probabilities concerning the distribution of the sample means and comparing these to the probabilities of the related random variable.	x	x		4	4	2	2	2	1
Mathematics 150 Elementary Statistics with Probability: SLO #4 Confidence Intervals and Hypothesis Testing Compute the confidence intervals and conduct hypothesis testing for a variety of parameters, and perform non-parametric hypothesis testing.	x	x		4	4	2	2	2	1

Course Level SLOs Minimum of 3 and maximum of 6 SLOs. *Include SLO #, Short Title, and SLO Statement* *Example: Math 170 SLO #3 Vectors and Complex Numbers*	**Course to Program SLO Alignment** *Mark with an X if you will use the course when assessing your PLO.*			**ILOs to Course SLOs Alignment (Rate 1-4)**					
	P1	**P2**	**P3**	**I**	**II**	**III**	**IV**	**V**	**VI**
Mathematics 160 Calculus I for the Biological, Management, and Social Sciences: SLO # 1 Determine and Interpret Limits Determine limits, classify types of continuity of functions, and determine first and second derivatives of functions.	x	x		4	4	2	2	2	1
Mathematics 160 Calculus I for the Biological, Management, and Social Sciences: SLO #2 Sketch graphs of functions Identify the intercepts, relative extrema, inflection points, and concavity, and use this information to sketch graphs of functions.	x	x		4	4	3	2	2	1
Mathematics 160 Calculus I for the Biological, Management, and Social Sciences: SLO #3 Area Problems Solve area problems using integral calculus.	x	x		4	4	2	2	2	1
Mathematics 160 Calculus I for the Biological, Management, and Social Sciences: SLO #4 Application Problems Using Calculus Solve calculus-level application problems and use technology.	x	x		4	4	3	2	2	1
Mathematics 161 Calculus II for the Biological, Management, and Social Sciences SLO # 1 Compute and Interpret Integrals Find integrals using a variety of methods, including: substitution, parts, and partial fractions.		x		4	4	2	2	2	1
Mathematics 161 Calculus II for the Biological, Management, and Social Sciences SLO # 2 Compute and Interpret Derivatives Compute and interpret partial derivatives and apply these skills to application problems	x	x		4	4	3	2	2	1
Mathematics 161 Calculus II for the Biological, Management, and Social Sciences SLO # 3 Convergence and Divergence of Series Determine convergence and divergence of infinite series		x		4	4	2	2	2	1
Mathematics 161 Calculus II for the Biological, Management, and Social Sciences SLO # 4 Solve Application Problems Using Calculus Use single-variable and double-variable integral calculus methods to solve application problems from relevant disciplines, including economics	x	x		4	4	3	2	2	1

b. Provide a timeline for your course and program level SLO assessments.

SLO and PLO Assessment Timeline Division: Math Program: Math for GE and Non-Science Majors 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 120 SLO #3 - *Analyze Voting System* MATH 130 SLO #3 - *Solve Problems Using Sequences and series* MATH 140 SLO #3 - *Use of Geometrical Approach* MATH 150 SLO #3 - *Central Limit Theorem* MATH 160 SLO #3 - *Area Problems* MATH 161 SLO #3 - *Convergence and Divergence of Series*	
Summer 2014 **(If applicable)**		
Fall 2014		
Spring 2015	MATH 120 SLO #4 - *Solve Application Problems* MATH 130 SLO #4 – *Solve Application Problems* MATH 140 SLO #4 - *Use of Finite Mathematics Techniques* MATH 150 SLO #4 - *Confidence Intervals and Hypothesis Testing* MATH 160 SLO #4 - *Solve Application Problems Using Calculus* MATH 161 SLO #4 - *Solve Application Problems Using Calculus*	**PLO #2:** Students will be able to analyze and solve application problems involving business, the social sciences, and/or biological sciences using analytical and computation skills.
Summer 2015 **(if applicable)**		
Fall 2015		
Spring 2016	MATH 120 SLO #1 - *Solve Loan Problems* MATH 130 SLO #1 - *Solve Nonlinear Inequalities* MATH 140 SLO #1 - *Use of Gauss-Jordan* MATH 150 SLO #1 - *Computing and Interpreting Various*	

	Measures MATH 160 SLO #1 – *Determine and Interpret Limits* MATH 161 SLO #1 - *Compute and Interpret Integrals*	
Summer 2016 **(If applicable)**		
Fall 2016		
Spring 2017	MATH 120 SLO #2 - *Solve Application Problems Using Graphical Methods* MATH 130 SLO #2 - *Solve Problems using Graphical Methods* MATH 140 SLO #2 - *Use of Matrices* MATH 150 SLO #2 - *Probability* MATH 160 SLO #2 – *Sketch graphs of functions* MATH 161 SLO #2 - *Compute and Interpret Derivatives*	**PLO #1:** Students will be able to analyze and solve application problems involving business, the social sciences, and/or biological sciences using graphical methods.
Summer 2017 **(If applicable)**		
Fall 2017		

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

EL CAMINO COLLEGE – TORRANCE CAMPUS BY DIVISION

Division	% of Courses With At Least One Assessment *as of 5/24/201*	% of Courses With At Least One Assessment by end of Spring	% of Courses With At Least One Assessment by Summer 2013	% of Courses With At Least One Assessment by Fall 2013	% of Courses With At Least One Assessment by Spring 2014	% of Courses With At Least One Assessment by Fall 201
Mathematics	100%	100%	100%	100%	100%	100%

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.

A summary of SLO and PLO assessment results over the past four years is provided in the following table. Trends for each course are not clearly evident. Since the Spring 2010 semester, the student success rate for Math 120 went down from 86% to 66% by the Spring 2011 semester and then went up to 76% by the Spring 2012 semester, followed by a descent to 58% by the Spring 2013 semester. Finally in Fall 2013, the success rate climbed to 72%. This type of dramatic fluctuation in student success rates from one semester to the next is exhibited in all of the other CM2 courses, as well. One of the contributing factors for this type of behavior is the fact that the SLO being assessed changes from semester to semester. With the change in the SLO statement, comes a change in the problem solved by the students. The problem used for one SLO may be considerably more difficult than the one used for another SLO, based on the nature of the objective. Another reason may be the instructors teaching the course. Many sections of CM2 courses are taught by PT instructors, who have inadequate time to place sufficient emphasis on SLO assessment. Also, instructors of CM2 courses may change, from semester to semester. So, there may be a lack of continuity and consistency in SLO assessment. As an example, with a change in the instructor for the one and only section of Math 161, the student success rate plummeted from 81% in Spring 2013 to 16% in Fall 2013. Yet another reason for the fluctuations in student success rates may be the students themselves. A cluster of very well prepared and motivated students during one semester, may improve the success rate considerably, especially for a CM2 course with few sections. Program Learning Outcomes also exhibit fluctuations, but with a much smaller variation.

In an attempt at improving both SLO and PLO success rates, CM2 instructors have introduced a number of pedagogical changes:

For Math 120, The Nature of Mathematics, instructors will continue to use real-life examples and current events to help students understand logic and truth tables. In addition, instructors will collaborate with each other in the development of practical projects, including Microsoft Excel exercises.

For Math 130, College Algebra, more effort needs to be exerted in reaching out to help PT instructors. Also, the type of problem assessed could be introduced earlier in the semester, more homework problems involving the type of problem could be assigned, as well as a more in-depth discussion on the topic could be presented. Based on discussions among CM2 faculty members, instructors are encouraged to have their students collaborate with their classmates at solving problems both at their desks and at the board. This would give students the opportunity to engage in dialogue, which would promote active learning, while simultaneously giving the instructor time to provide immediate feedback. As active learners, the students could share their ideas with each other and the instructor, and they would have a better conceptual understanding of the math content. Another suggestion was to have students discuss with each other why the logarithm of a negative number is undefined. Students who are able to explain a concept to someone else have a true understanding of that concept. One instructor had students solve the SLO type problem in groups, followed by his solving of the problem on the board. Then he surveyed the students and found that the majority had solved the problem correctly. Another instructor had students solve this type of problem in pairs, followed by an explanation of the solution process with a justification of steps and an error analysis. One instructor is planning on teaching the subject earlier in the course, testing the students via a quiz, followed by an exam later, and then ultimately assessing the SLO on the Final Exam. Yet another instructor, after lecturing on the topic and solving problems in class, posted step-by-step solutions on the Team Site. Here are some recommendations that were collected by the instructors who participated in the assessment of the SLO involving logarithmic functions:

1. Review graphing logarithmic functions several times during the semester. This can be done when covering transformation of functions, inverse functions, exponents & logarithmic functions. Graphs can be discussed through the use of a table, through the use of transformations, and using a graphing calculator.

2. It is important to remind students that the x-axis and y-axis can have different scales and review how to graph the vertical asymptote for log functions. Moreover, students need show more details (intercepts, vertical asymptote, graph several points) when graphing a logarithmic function.

3. Students can be reminded that a log function can be graphed by first graphing the inverse function (exponential function) and then interchanging the roles of the x-values and y-values.
4. The instructor needs to spend more time on the topic of graphing a logarithmic function and not rush through this content.

For Math 140, Finite Mathematics in Spring 2012, the following (SLO #3) was assessed: Solve linear programming problems using the geometrical approach. Results: A total of 29 students were assessed from the only class (#0690) offered. 0% of the students earned a score

of 0, 3% earned a 1, 7% earned a 2, and 90% earned a 3. The overall success rate was approximately 97%. A success rate of 67% is fairly typical for General Education Mathematics students enrolled in Finite Math. With a success rate of 97%, which is significantly greater than 67%, the next time this SLO is assessed we will increase the difficulty of the assessment by creating a linear programming application question where students must set up (identify the objective function and constraints) and then solve the problem. In Spring 2013 SLO #1 was assessed: Use the Gauss-Jordan technique to solve systems of linear equations. Only one section of Math 140 was offered during that semester. Twenty-two students were assessed. Of those 17 scored satisfactory and 5 scored unsatisfactory. Since students tend to do well in matrices, the success rate of 77% was expected. To help the students who scored unsatisfactory, one suggestion is to use practice worksheets in class. This allows the instructor to check for understanding and help any students who are having difficulties prior to leaving class.

For Math 150, Statistics, for SLO #3, instructors who participated put the SLO question on either the mid-term or the final exam. It might be more appropriate to imbed the SLO question on a test that covers this material. This way the subject would be part of a more focused body of material. For SLO #4, instructors observed that students who score 2 or 3 (considered successful) attend class and turn in homework regularly and students who scored 0 or 1 (considered unsuccessful) missed class and did not turn in the homework. After analyzing and discussing the results of the assessment, instructors of the course made a suggestion that they will hold shared office hours in the tutoring center so that students from other sections of the course can join and get help. Also, instructors will form a cohort group to create in-class activities that can be shared with other instructors to support student learning. For SLO #1, the difference in success rates occurred in the student's ability to explain standard deviations of given distributions. Students are very comfortable with working with means, but they have a tough time analyzing standard deviations. That is the nature of the standard deviation. One of the things we did that worked well was to utilize SI coaches to focus on the particular topic to strengthen student's skills. Though we have a fairly good success rate, we will create activities that contain problems that compare different kinds of distributions. Some instructors started the Math 150 cohort last semester to create more activities, handouts, and projects that can be shared with all instructors. There are four natural places where problems like this come up. They come up in the discussion of histograms, box plots, the normal distribution and regression/correlation.

For Math 160, Calculus I for the Biological, Management, and Social Sciences, instructors may want to consider implementing more practice opportunities to provide students a greater range of examples and practice with feedback. It is encouraging that approximately seven-eighths of all of the students assessed completely understood the problem and mastered SLO #3 (Solve area problems using integral calculus). Although improvement is possible with diminishing returns, it is suggested that the current standard of success be maintained and that future efforts be directed toward improving the success rate on other SLOs. For SLO #4 (Solve calculus-level application problems and use technology), the results indicate an average level of success with this particular SLO. However, this level appears to be lower than that of recent SLO assessments. One factor may be the amount of material that is assessed by the SLO assessment problem. Topics that are assessed include differentiating exponential functions, using the Product Rule, analyzing the first and second derivatives, and curve sketching. In the future, the committee may want to consider breaking down this assessment into subunits so that results

addressing specific components can be assessed. For *SLO # 1* (*Determine and Interpret Limits:* Determine limits, classify types of continuity of functions, and determine first and second derivatives of functions), even though the performance of the students on this Course Level SLO is fairly high, the high variability in the scores may be indicative of a general weakness of many calculus students in their algebra skills. Small parts of this specialized formula that leads to the limit definition of the derivative begin appearing in algebra courses as part of exercises using function notation. These exercises are often deemed unnecessary and difficult for algebra students and are not assigned. In another scenario, the student is assigned the problem but is not told the derivation and how it will be used. With this in mind, it is suggested that Intermediate Algebra instructors be strongly urged to assign more of the function notation exercises as well as difference quotient exercises. Further, it is suggested that instructors might want to emphasize the derivation of the formula and its relationship to the slope formula.

For Math 161, Calculus II for the Biological, Management, and Social Sciences, for SLO #1 (Evaluate integrals using a variety of methods, including: substitution, parts, and partial fractions), the student success rate was 81%. This data was very consistent from both sections of Math 161 (a combined 50 out of 62 students passed the assessment). Since 81% percent of Math 161 students understand the method of integration using partial fractions, few changes are needed. Algebraic fractions and factoring should be reviewed before introducing partial fractions to improve student learning. For SLO #2, since the success rate was 75%, there is no evidence suggesting that the topic "Compute and interpret partial derivatives and apply these skills to application problems" should be taught in a different manner. For SLO #3 (Determine convergence and divergence of infinite series), only 54% of the students were successful. Since the student success rate for SLO #3 was not consistent with the success rates of the previous two assessments, we recommend that the concept of testing for convergence/divergence be given more consideration in teaching. For SLO #4 (Use single-variable and double-variable integral calculus methods to solve application problems from relevant disciplines, including economics), the success rate was 94%. This indicates that majority of students understood the concept and were able to complete the problem with ease. This is largely because they were given sufficient practice on their homework. This course SLO is tied in with Program Level SLO #1 (Students will be able to analyze and solve application problems involving business, the social sciences, and/or biological sciences using graphical methods). The SLO results for Math 161 are usually good because this course is a capstone course for business majors who are transfer ready. Since the success rate of this SLO was very high at 94%, any change should be minor.

One suggestion would be to allow more in-class time for homework discussions before the tests to try to reach as many students as possible. It should also be noted that Math 161 contains many high-level topics in a 3-unit course and some topics are not required by 4-year colleges for Business majors. It is often a struggle for instructors to cover all required topics. Moreover, few instructors (both full-time and part-time) are willing to teach it because it requires much preparation for just a 3-unit course. Since students who pass Math 160 do fairly well in Math 161, the CM2 Committee recommends that ECC combines the two courses into a one-semester Business Calculus and hence reduces the total number of units from 7 to 5. In doing so, it will allow the students to transfer faster to a 4-year university, and it will also attract more full-time instructors that have experience teaching Calculus to teach this course. This will benefit student learning in the long run.

Summary of PLO Results

Spring 2011

PLO #2: Students will be able to analyze and solve application problems involving business, the social sciences, and/or biological sciences using analytical and computation skills.

Results: There were 1634 students surveyed, from 47 sections, spanning 6 courses. Of that group 72% earned a score of 2 or 3, which indicates most or complete understanding. The remaining 28% scored a 0 or 1, which corresponds to no or some understanding.

Implications: This data implies that 72% of over 1600 students assessed, have successfully acquired the skill of solving application problems in General Education, Business Management, Biological Sciences, and Social Sciences using algebraic or calculus methods. This 72% success rate for this Program Level SLO for the Spring 2011 semester, represents a 9% increase over the 63% success rate for the same SLO assessed during the Fall 2010 semester.

Fall 2012

PLO #1: Students will be able to analyze and solve application problems involving business, the social sciences, and/or biological sciences using graphical methods.

Results: A total of 839 students were assessed from 36 sections spanning the courses Math 120, Math 130, Math 150, Math 160, and Math 161. Approximately 16% earned a score of 0, 18% earned a 1, 30% earned a 2, and 36% earned a 3. The overall success rate was approximately 66%.

A success rate of 2/3 is fairly typical for General Education Mathematics students at the Community College Level. The following table (*Table 1* on the next page) contains the student success rates in the different GE course that participated in the Fall 2012 assessment:

Score	**0**	**1**	**2**	**3**	**Success Rate**
Math 120	21%	20%	35%	24%	59%
Math 130	15%	21%	27%	37%	64%
Math 150	16%	17%	29%	38%	67%
Math 160	17%	15%	33%	35%	68%
Math 161	0%	6%	42%	52%	94%
CM2 Program	16%	18%	30%	36%	66%

Table 1: Fall 2012 CM2 SLO and PLO Success Rates

As an example of a more detailed description of an SLO assessment, the Fall 2012 Math 130 (College Algebra) problem for SLO #4 (Solve college algebra level application problems and use technology) will be considered. The problem statement was: The population of a small town was 18,000 in the year 2005 and the population grows exponentially with a relative growth rate of 4%.

(a) Construct a function that models the population growth of the town after the year 2005.
(b) Construct a table with three points corresponding to the years 2005, 2010, and 2015, and graph the function using these points.
(c) From the graph, locate and plot the point corresponding to the year 2013. Use the graph (not the equation) to estimate the population of the town in the year 2013. Approximate the population from the graph, rounding to the nearest thousand and state the final answer in a complete sentence.

For the assessment, instructors of Math 130 used this problem or one similar in type and of approximately equal difficulty.

A student leaving the problem blank or writing irrelevant mathematics earned a score of 0. If the student constructed the function, the student earned a score of 1. If, in addition, the student constructed the table and sketched the graph, their score was 2. If, in addition to all of the above, the student determined the approximate population and rounded to the nearest thousand, the student earned the maximum score of 3. As stated earlier, scores of 0 and 1 corresponded to the student being unsuccessful at mastering this SLO, while scores of 2 or 3 corresponded to being successful. The data is summarized in Table I above.

Implications: The success rates for most of the courses are in the 60% range. The extremely high success rate for Math 161 is not surprising, since this is a course in second semester calculus which naturally has more motivated students enrolled. The overall success rate of 66%, though typical for General Education Mathematics students, could be improved upon. Some of the ways in which the success rate could be improved include the following: the type of problem to be assessed could be introduced earlier in the semester; more homework problems involving this type of problem could be assigned; more *in-depth* discussion will be done on the topics. Moreover, based on discussions among CM2 faculty members, in an attempt to improve the student success rate, students will collaborate with their classmates and solve math problems on the board. This provides the students with the opportunity to engage in dialogue which promotes active learning, while simultaneously giving the instructor the time to provide immediate feedback. As active learners, the students will share their ideas with each other and the instructor, and they will have a better conceptual understanding of the math content.

The table below contains the summary of CM2's SLO and PLO student success rates from Spring 2010 to Fall 2013.

MATH	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013
120	86%	81%	66%	73%	76%	59%	58%	72%
130	73%	53%	59%	66%	68%	64%	60%	65%
140	71%	25%	97%	-------	97%	-------	77%	------
150	49%	68%	74%	73%	61%	67%	88%	70%
160	69%	67%	73%	53%	86%	68%	82%	73%
161	61%	71%	75%	75%	54%	94%	81%	16%
CM2 Program	67%	63%	72%	-------	-------	66%	-------	--------

Table 2: CM2 SLO and PLO Success Rates from Spring 2010 to Fall 2013

e. Determine and discuss the level your program has attained in the SLO Rubric in Appendix B. (Awareness, Developmental, Proficiency, or Sustainable Continuous Quality Improvement)

The faculty members of the CM2 Committee are long past the AWARENESS and DEVELOPMENTAL levels of operation on the ACCJC SLO Rubric. In addition to Student Learning Outcomes being in place, all of the SLOs for all of the courses in the CM2 Program have been assessed multiple times, as have the Program Level SLOs. There is only one exception: Math 140 Finite Math. Since this course has until now, only been offered during the Spring semester of each academic year, SLO #2 "Solve problems using matrices", has not been assessed since the last CM2 Program Review. This problem will be eliminated in the future, since one of the recommendations of this CM2 Program Review is to offer one section of Math 140 in each of the Fall and Spring semesters of every academic year, thereby assessing every SLO for every course during a particular cycle. There is widespread dialogue on the results of assessment and problem areas have been identified. For example, the considerably lower student success rate for SLOs in Math 130, College Algebra has been noticed and discussed among CM2 faculty. Recommendations will be discussed in sub-section *g*.

The CM2 Program is well into the PROFICIENCY level, as CM2 faculty members are in the process of aligning practices to improve student learning. Since many of the sections of courses in the CM2 Program are taught by part-time instructors, e-mail discussions have become a regular practice for all faculty members teaching a CM2 course in a particular semester. Effective teaching methods, as well as pedagogical techniques that weren't successful, are presented in these exchanges. CM2 faculty members provide clear goals of courses to their students, both in the form of a list of SLOs on the Course Syllabus and reasons for the usefulness of each objective. Students are presented with real life examples, as well as fields of work, such as economics, biology, and management, that involve the topics being presented in class. However, ECC administration has not allocated sufficient funds and resources, in order for the

CM2 Program to be able to ascend to the SUSTAINABLE CONTINUOUS QUALITY IMPROVEMENT level. As an example, during the Spring 2013 semester, the overall student success rate for SLO #1 was approximately 60%, but the success rate for students in sections taught by full-time instructors was 78%, while the success rate for students taught by part-time instructors was only 47%. One of the reasons for this may be that PT instructors are so poorly compensated and stretched so thin with time, that they do not place sufficient focus and importance on assessing SLOs.

f. Describe how you have improved your SLO process and engaged in dialogue about assessment results.

Since the previous CM2 Program Review, faculty members have become more engaged in the SLO process. Currently, all CM2 instructors, both full-time and part-time, are participating in dialogue via e-mail, regarding effective teaching methodologies. When submitting data for their particular section of a CM2 course that was assessed, instead of just providing numbers, they are analyzing their results and describing both effective teaching methods and pedagogical techniques that were not successful.

In addition, ECC has changed from CurricUNET as the software for entering SLO Reports, to TracDat. With the new system, the SLO Report template has changed, as well. Now instructors are listing target percentages for SLO student success rates, which provide a goal toward which they can strive. In the report, instructors provide information as to whether the target percentage was reached. If it has, they discuss the teaching methods that they used that helped achieve this goal, providing valuable tools to instructors whose students have succeeded at a lower rate. If the target percentage was not met, instructors can discuss the techniques that they tried that were not as effective and suggest what they could change to improve success, the next time that students are assessed for that particular SLO. All of these comments are included in the SLO report. When the report is completed at the end of the semester, in addition to appearing on TracDat, it is sent by the Course Coordinator to all of the instructors who had taught the course that semester.

Moreover, CM2 faculty have attended numerous SLO training sessions, both on CurricUNET earlier, and now on TracDat. At the beginning of the semester, the CM2 committee meets to discuss and analyze results from the previous semester and plan for assessments for the new semester. Since there are four SLOs for each course, the SLO statement for that semester is agreed upon for each course. Volunteers for each of the CM2 courses are assigned as Course Coordinators. Some of the courses, such as Math 150, with many sections, have two Course Coordinators. The Course Coordinators, in discussion with other faculty teaching their course, construct a problem and rubric for the assessment. The problem statement is distributed as a suggested assessment, to all faculty teaching the course that semester, both part-time and full-time, and both at the Torrance campus and Compton. The information is sent early in the semester, so that instructors have ample lead time to plan for the assessment. Instructors are not required to use the exact same problem that was suggested. However, they are encouraged to use a similar problem of approximately equal difficulty, in order that the SLO assessment results are both comparable and meaningful. Throughout the semester, reminder e-mail messages are sent by the CM2 SLO Coordinator to the CM2 Course Coordinators, who in turn, send messages to the instructors teaching their assigned course, regarding the SLO assessment. After the SLO reports are generated in TracDat, the Course Coordinators e-mail them to all participating faculty

for further input and for their own information. As of Fall 2014, the Torrance and Compton campuses will analyze SLO data separately.

g. List any related recommendations.

1) In order for SLO assessment to become more meaningful, there needs to be more robust participation by the poorly compensated CM2 part-time faculty. Many sections of courses in CM2 are taught by PT instructors. In order to survive, these PT faculty need to teach many courses and because of unit limitations, in different community college districts. If they were paid more, they would be stretched less thin and have more time that they could devote to constructing SLO assessment instruments, conducting assessments, analyzing data, and discussing improved teaching methods with their colleagues. The CM2 committee recommends that the pay of Part Time faculty be increased by 5% for each of the next three years or that they become eligible for special assignments or stipends for their work regarding SLOs.
Fiscal Impact: 5% increase in salary for both full-time and part-time faculty.

2) In addition, it is recommended that part-time faculty participate in TracDat training sessions. Though part-timers in CM2 will probably not be called upon to write SLO reports, by attending the sessions, they will become more immersed in the SLO process and be provided opportunities to discuss SLO assessment with their colleagues. Though PT instructors are invited and encouraged to attend all CM2 committee meetings, there are very few who actually do. Based on their teaching commitments at other community colleges and universities, they rarely have time to attend ECC meetings. Since there are so many TracDat training sessions scheduled throughout the semester, it is possible that more PT instructors will have a chance to attend some of them. **Fiscal Impact:** $0

3) Another recommendation is to ask students where their stumbling block is located when they are learning a certain skill or concept. If based on an SLO assessment, the target success rate is far above what students actually learned, the students themselves may be able to provide insight into the problems that they are having. This may be conducted as informally as a classroom discussion following an exam or more formally as a student survey, in which students explain their difficulties when being assessed for an SLO. **Fiscal Impact:** $0

5. Analysis of Student Feedback

In the academic year of Fall 2013-Spring 2014, the General Education Math Program distributed a short survey (*See Appendix A*) to all eleven sections of Math 160 (Calculus I for the Biological, Management and Social Sciences) for the purpose of responding to the following questions:

1. What majors are declared by students enrolling in Math 160?
2. What percentage of students need to take Math 161 (Calculus II for the Biological, Management and Social Sciences)?
3. To which universities (top 3 choices) do these students plan to transfer?
4. How does the current Math 160/161 compare with similar courses offered by local four-year universities and community colleges?

The results of questions 1 and 2 are tabulated in *Table 1* below and *Figure 2* on the next page.

MAJOR	BUSINESS	ECONOMICS	BIOLOGY	PSYCHOLOGY	OTHER NATURAL SCIENCE MAJORS (ENVIRON-MENTAL, GEOLOGY, VETERINA-RIAN)	OTHERS (PE, COMMUNICA-TIONS, ADMIN OF JUSTICE, MUSIC, NURSING, AND UNDECIDED)	TOTAL NUMBER OF STUDENTS SURVEYED FROM 11 SECTIONS OF MATH 160
1. Number of Math 160 students	**206**	33	**28**	9	10	23	**309**
% of total Math 160 students	**66.7%**	10.7%	**9.1%**	2.9%	3.2%	7.4%	**100.0%**
2. Students who need Math 161	**111**	27	**24**	1	7	3	**173**
% of total Math 160 students	**35.9%**	8.7%	**7.8%**	0.3%	2.3%	1.0%	**56.0%**
2. Students who do NOT need Math 161	95	6	4	8	3	20	136
% of total Math 160 students	30.7%	1.9%	1.3%	2.6%	1.0%	6.5%	44.0%

Table 1*: *2013-2014 Math 160 Students (By Major and Needs of Math 161)

a) Describe the results of relevant student feedback.

In past years, Math 160 (a combined Calculus course) served predominately students who majored in business or biology. In recent years, the student populations have changed due to the change of requirements by UCs and CSUs. *Table 1* above clearly indicates that the majority (66.7%) of the 309 students enrolled in Math 160 are business majors, and only 9.1% are biology majors. Moreover, about 56% of the Math 160 students need to take Math 161 (35.9% are

business majors needing to take Math 161), but only 7.8% (24 students) of Math 160 students who need to take Math 161 are biology majors. Please see *Figure 2* below for the percentages of the 173 students who need to take Math 161 by majors.

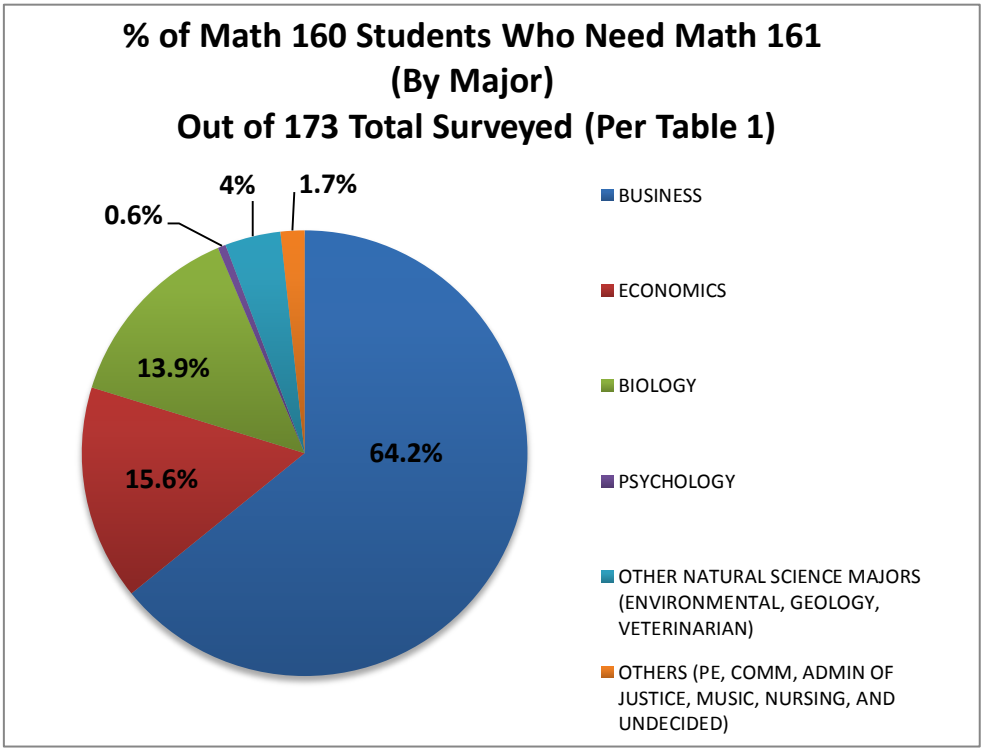


Figure 2 – Percentage of Math 160 Students Who Need Math 161

We also asked Math 160 students to list the top three choices of universities. The results are tabulated in *Table 3* below and in *Figure 4* on the next page.

Top 3 colleges of choice	CSULB	CSUF	UCLA	USC	CSUDH	CSUN	UCI	UCSB	UCR	LMU	UCSD	UC BERKELEY	CSULA	OTHER CSUs	OTHER UCs
Number of students	180	82	70	67	41	37	44	22	28	30	19	29	42	44	29
% of students out of 309 surveyed	58.3%	26.5%	22.7%	21.7%	13.3%	12.0%	14.2%	7.1%	9.1%	9.7%	6.1%	9.4%	13.6%	14.2%	9.4%

Table 3 – Survey Top 3 Universities Preferred by Transferring Students

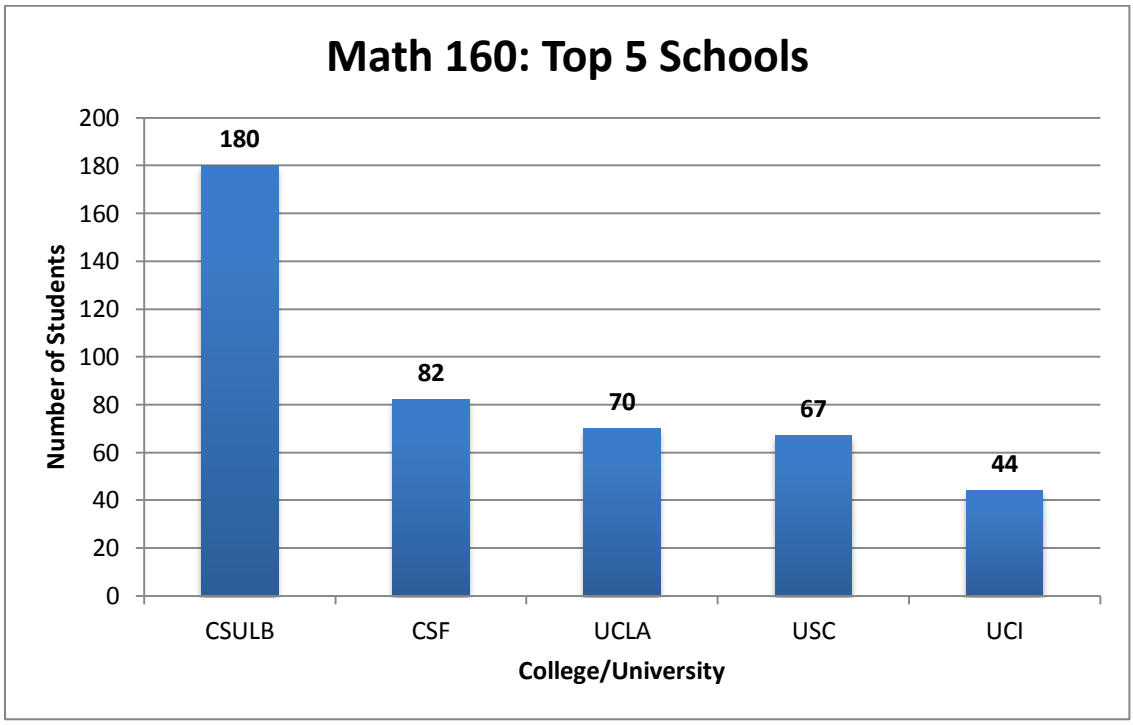


Figure 4 –Math 160 Students' Top Five Transferring Schools (from Table 3)

According to *Figure 4*, the top five schools to which Math 160 students want to transfer are: CSULB, CSUF, UCLA, USC and UCI. Therefore, these are the colleges that we want to align our Math 160/161 curriculum with in order to better serve the needs of our students.

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

With 58.3% of our Math 160 students listing CSULB as one of their top three colleges, the General Education Mathematics Program compared our Math160/161 curriculum with theirs. Currently, CSULB has two separate tracks: Math 115, which is Calculus for Business, and Math 119A/B, which is Calculus for Life Sciences. Unfortunately, our current Math 160 alone does not articulate with CSULB's Math 115 because we are missing some topics that are in our Math 161. Therefore, business majors are required to take both Math 160 and Math 161 to articulate with Math 115.

Since 66.7% of the Math 160 students are business majors, we would like to model after CSULB in creating a 5-unit Business Calculus course by combining all of our Math 160 with selected topics from Math 161. In fact, other top 5 colleges (CSUF, USC) as listed by our students and many neighboring community colleges such as LBCC and Orange Coast Community College, now have just a one-semester specialized Calculus course for business majors. We are one of the few community colleges along with SMC (Math 28/29) that still has a sequence of combined calculus for business and biological sciences. If we do not create a one-semester Business Calculus course, we are doing a disservice to the majority of our business students by delaying them from transferring to a 4-year institution. Furthermore, if a business student who does not

pass Math 160 for the first time and also needs to take Math 161, he/she could be delayed for another year before transferring to CSULB or USC.

As for the biology students, our survey indicates that very few of them are taking either Math 160 or Math 161. As indicated in *Table 1*, only 28 out of 309 Math 160 students are biology majors which is approximately 9.1%, and only 24 out of 309 Math 160 students (7.8%) are biology majors needing to take Math 161. Since our STEM Calculus Math 190/191 sequence also articulates with CSULB's Math 119A/B and with less than 10% of Math 160/161 students majoring in biology, there is no need to create a special life sciences calculus track for these few students. They would instead benefit greatly by taking Math 190/191. Our survey also indicates that our students listed UCLA as #3 and UCI as #5 as their preferred school of choice. Interestingly, UCLA and UCI both required Math 190 and Math 191 for both business/economics majors and biological sciences majors. Therefore, many of our students are apparently not taking the right classes and are also underprepared for their 4-year colleges. It will benefit everyone if we clearly separate the courses so all of our students can be well-prepared for their goals.

c) List any related recommendations

1. The General Education Mathematics Committee is recommending a proposal to replace the current Math 160/161 sequence (Calculus for the Biological, Management and Social Sciences) with a one-semester Business Calculus course, called Math 165. This will reduce the number of units required for most Business majors from 7 units to 5 units. Currently, fewer than 10% of Math 160/161 students are biology majors, and biology majors intending to transfer to a 4-year school would be better served by taking Math 190/191, especially if they intend to do graduate work or attend professional schools. The proposal that the Committee is recommending essentially requires that all biology majors take Math 190/191 (STEM calculus), which articulates well with universities to which biology majors will transfer, whereas Math 160/161 may not. We have already consulted the Biology faculty and there were no objections to this proposal. Dr. Teresa Palos, (STEM Director and Biology Professor), Mr. Arturo Hernandez (Director of MESA), and Dr. Virginia Rapp (Dean of Business Division) all support this proposal. **Fiscal Impact:** An increase of $3,500 or a decrease of $4,500 per academic year.

6. Facilities and Equipment

a. Describe and assess the existing program facilities and equipment.

The General Education Mathematics Program and the Mathematics Department, along with other divisions of the college, are in the process of integrating new technology into their instruction. This requires that all classrooms have computing and display technologies readily available, as well as up-to-date software and maintenance to support this equipment.

The new MBA building is now complete and houses the Division of Mathematical Sciences as well as the Business Division and Allied Health. For example, the new building contains 22 offices designated for full-time instructors, as well as 8 additional offices currently designated for part-time instructors. If needed, these offices can be converted to use by full-time instructors, although students benefit greatly from having access to part-time instructors. Given the demand for new instructors due to increased enrollments, retirements and attrition, the amount of office space will not be adequate for the long-term faculty needs of the growing Math Department. Due to the high seat fill rate and demand for courses in the General Education Mathematics Program, there will be a pressing need for additional classroom space.

Each classroom in the new MBA building has a computer, a projection system and a document reader; however, there will still be a need for up-to-date technology (hardware and software) for instructors and for the classroom. This equipment includes faculty laptops, tablet PCs, SMART boards, classroom clicker sets, classroom and department sets of graphing calculators and other equipment. Please see *Section 7 Technology and Software* for more details.

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.

Classrooms: Every classroom in the MBA building is equipped with a computer, a document reader, and a projector. However, none of the rooms have pencil sharpeners. In the previous MCS building, most of the classrooms, common areas, hallways and tutoring center had pencil sharpeners. Please see *Table A* below for cost analysis:

	Classrooms	**Common Areas**			
	31 Classrooms in MBA	**Common Areas in MBA Floor 1 – 3**	**Hallways**	**Tutoring Center**	**Total Cost Estimate**
Manual Sharpener at $20 each	$620	2 on each floor (total of 6) = $120	2 per hallway (total of 12) = $240	Total of 2 = $40	$620 for classrooms + $400 for common areas = **$1,020**

Table A: Costs of Pencil Sharpeners in MBA

In addition, many of our classrooms have white boards installed on the back walls and side walls but no dry erasers could be found. It is extremely difficult to send a group of students to do board work when there is often just one dry eraser in the front of the classroom. We recommend that there should be a dry eraser per white board to encourage class participation, and that our department provide at least 6 dry erasers per whiteboard classroom. A typical EXPO dry eraser costs approximately $2.50. However, at www.officesupply.com, CLI marker board eraser, a multi-purpose eraser, costs only $0.87 each. This eraser also works well on standard chalk boards. If we ordered 6 CLI multi-purpose erasers for every Math classroom, it would only cost $0.87 x 6 x 31 = $161.82 plus free shipping for bulk purchase.

Furthermore, in light of the recent threats of violence made against El Camino College employees and students, the General Education Mathematics Program recommends that landline phones be installed in the classrooms with emergency buttons connecting directly to the Math Division Office (for reporting minor incidents and urgent classroom/ technology repairs), ECC Campus Police and Torrance Police Department (for imminent threats). Santa Monica College has already installed phones in their classrooms after their recent campus shooting incident. The estimated cost for installing a standard classroom phone ($60/phone) in 31 Math classrooms in MBA is approximately $1,860.

It is also highly recommended that Math 150, Elementary Probability and Statistics, have three to four dedicated classrooms, since each section of this course requires a common set of manipulatives, technological equipment and statistical software. Please refer to *Section 3 Curriculum* for further details.

Faculty Workrooms: The two math faculty workrooms are equipped with three computers each and two printers (DELL and HP) but the DELL printers are often inoperable and are nearing the end of their lifespan. We recommend that a better HP printer be added to each of the faculty workrooms. The estimated cost for an HP printer is $550-$650. In addition, only the second floor faculty workroom has a scanner that is currently connected to one of the three computers. However, if the computer that is connected to the scanner is already being used by a faculty member, no one can access the scanner. We recommend that an additional scanner be added to the second floor faculty workroom and two scanners be installed in the third floor faculty workroom. The estimated cost for a top-of-the-line scanner, which can be used to create class handouts for students, is $1200.

Furthermore, a few oversized (23 inch diameter) wall clocks (approximately $50-$70 each) should be installed in faculty hallways and classroom hallways. Most instructors and students rely on their watches to determine what time to head to their classes. The watches often are not in sync with the clocks in the classrooms. It makes a lot of sense to install a couple of clocks in the faculty hallways and also a couple in the classroom hallways. It will cost approximately $500 to $700 to install a total of ten clocks on floor 1 to floor 3 in the MBA building.

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.

In addition, in order to create a state-of-the-art tutoring center for our students, installation of whiteboard technology such as SMART boards is recommended. This technology is used in many tutoring centers that are more advanced than ours. The cost is estimated to be $2,500 to $5,000 per whiteboard.

Moreover, many of our classrooms in the MBA building are currently shared with other divisions. Additional lecture rooms beyond those currently dedicated to our department and division will need to be dedicated to the entire Division of Mathematical Sciences, especially given the high seat fill rate and demand for courses in the General Education Mathematics Program.

Finally, with our program expanding, we will need to have office space for a faculty library to store references and teaching tools. Since faculty offices do not have adequate storage space, we recommend that a faculty office be converted for this purpose. One possibility is to convert MBA-244 from a storage room to a faculty library.

d. List any related recommendations.

1. The General Education Mathematics Program recommends that the College provide students and faculty the bare necessities such as:

   Classrooms: erasers, pencil sharpeners, landline phones **Fiscal Impact:** $2,645
   Common areas such as tutoring center, hallways, workrooms: printers, scanners, clocks, pencil sharpeners. **Fiscal Impact:** $6,000

2. We recommend that Math 150 have three to four dedicated classrooms, since each section of this course requires a common set of manipulatives, technological equipment, and statistical software. **Fiscal Impact:** $0

3. Funding should be established to maintain all equipment (document readers, laptops, computers), retain currency (license renewals of *Mathematica*, *Scientific Notebook*), and provide for new and innovative technologies (tablet PCs, calculator sets, SMART boards) in the classrooms, computer labs, tutoring center, and faculty offices. We estimate that this will cost between $150,000 and $200,000. **Fiscal Impact:** Estimated between $150,000 and $200,000

4. Dedicate additional lecture rooms in MBA exclusively for the Division of Mathematical Sciences. **Fiscal Impact:** $0

5. Convert an existing office to a faculty library for storing references and teaching tools. **Fiscal Impact:** $0

7. Technology and Software

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

In today's classroom, technology and software are essential tools for teaching and learning mathematics. Not only is technology used for teaching presentations, but is often used to design, implement, and assess curriculum. With the rapid growth of the internet and technology, instructors are able to access various resources that help support mathematics instruction and enhance the students' conceptual understanding of mathematics. Moreover, by combining technology and software with real-world applications, the students will not only gain a deeper understanding of mathematics, but can also build their self-confidence, and hopefully develop an appreciation of the mathematics content that is being introduced in the course.

During the past few years the General Education Mathematics Program and the Mathematics Department have started to integrate more technology and software into their teaching. This includes the use of the document reader (which is installed in each classroom), *Excel*, *Mathematica 9.0, Scientific Notebook 5.5,* Texas Instruments graphing calculators, as well as an online homework and/or an online quiz component (*Webassign*, *MyMathLab*). Consequently, all classrooms must have the appropriate technology equipment and software installed, but there is also a need for all faculty (full-time and part-time faculty) to have such software installed on their computers. It will also be necessary to maintain and update this technology and software regularly. For example, Wolfram's *Mathematica* requires an annual maintenance renewal of approximately $8,000 per year. This provides for the concurrent use of *Mathematica* on 88 computers shared between the two campuses (ECC campus and Compton campus), 27 ECC owned laptop licenses, and 88 home-use licenses

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.

Currently, the MBA building offers three computer labs for instruction with 34 computer stations in each lab, but the expectation of the college is to enroll at least 35 students per class whenever possible. This means that for every class using one of the computer labs with 35 or more students, there will be a few students who will not be able to fully participate with the course activities. Moreover, with only three computer labs available at any given time, a large number of faculty are restricted from using the lab to enhance their teaching. The Math Department currently has class sets of iPads for student use. However, instructors need training to incorporate this technology into their classes. Funding for professional development workshops or conferences that focus on using iPad technology in General Education Math Courses would increase their use. This could cost anywhere from $3,000-$5,000 per semester.

The Developmental Mathematics Program continues to rent Texas Instruments (TI) graphing calculators through the TI-84 Calculator Loan Program, but these are primarily used for students in developmental courses (nearly 3000 students). Purchasing additional graphing calculators for students taking courses in the General Education Mathematics Program would be very beneficial

since the 110 calculators that are used by the students in the developmental courses are not enough to give the other students an opportunity to use the TI calculator. The use of this type of calculator in the classroom allows for many opportunities to gain a richer understanding of the math content, such as the careful analysis of graphs and data points in Statistics. Approximate cost for each TI- 84 graphing calculator is $120 - $150, and we need at least four sets of 40 classroom calculators.

Statistics is a branch of mathematics that is used in almost every discipline outside of mathematics. The students who enroll in statistics (Math 150) would benefit not only from the technological tools mentioned above, but also from having access to a computer lab designed especially for this type of a course where they would freely have access to advanced statistical software like SPSS or Minitab. The cost of Minitab license for use on campus is only approximately $3500 per year.

Last but not least, all of our faculty laptops (including the newly hired faculty) are at least 4 years old and almost all have suffered mechanical failures involving hard drives, power cords, batteries, and keyboards. This is particularly detrimental for faculty members who teach Distance Education courses. It is imperative that we replace these laptops soon so that we can continue to perform our daily commitments at ECC efficiently and effectively. A new PC laptop for faculty is estimated to cost $1,500 each. We recommend that faculty computer laptops be replaced at least every three years in order to keep up with technological upgrades in the classroom.

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.

SMART boards (a system that includes the interactive whiteboard, a computer, a projector and the Smart Notebook collaborative learning software for education) in each classroom (cost: approximately $30,000 - $40,000), additional laptop computer classrooms (cost: approximately $30,000 per room), InterWrite pads (an interactive tablet system that features the patented digitizer and pen-input technology which allows you to teach anywhere in the classroom), and classroom clicker sets are essential technological tools that will enhance the students' learning experience in all of the courses that make up the General Education Mathematics Program (Statistics, Business Calculus, College Algebra, Finite Mathematics and Nature of Mathematics). They can also be used in the other courses offered by the Mathematics Department. By using SMART boards, the students and faculty can work with manipulatives to promote conceptual understanding or write in color on the computer image to emphasize key points during a lesson. The use of InterWrite pads allows the instructor to have greater interaction with the students since the lesson can be delivered from anywhere in the classroom. It is highly recommended that the aforementioned technological tools be purchased by the college as soon as possible to keep up with the latest technological innovations.

d) List any related recommendations.

Today's learners need to be more active and engaged in the classroom. The lack of the proper technological tools and software in the classrooms will impose limitations on the type of teaching and interaction that takes place.

1. The General Education Mathematics Committee recommends that funding for the aforementioned technology and software should be a priority, as well as maintaining all equipment, retaining currency, and providing for new and innovative technological tools in the classroom. This equipment may include faculty laptops, InterWrite pads, SMART boards, classroom clicker sets, classroom graphing calculator sets, and other equipment.
Fiscal Impact: Estimated between $150,000 and $200,000

2. We also recommend that faculty computer laptops be replaced by Spring 2015 to keep up with classroom technology. **Fiscal Impact:** $1,500 per new laptop for FT faculty

3. Funding for professional development workshops or conferences be provided to focus on using iPad technology in General Education Math Courses.
Fiscal Impact: Anywhere from $3,000-$5,000 per semester.

4. Purchase four classroom sets of forty TI-84 graphing calculators for students in the General Education Mathematics Program. **Fiscal Impact:** Estimated at $19,200 to $24,000

5. Renew the campus license of Minitab for Statistics classes. **Fiscal Impact:** $3,500 per year

8. Staffing

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

The Mathematical Sciences Department currently has 41 full-time faculty members and 68 part-time faculty members. Since 2001, there have been 17 full-time hires and the loss of 12 full-time hires due to attrition, retirements and other factors. The chart below shows the full-time and part-time staffing for the General Education Mathematics Program from Fall, 2010 through the most recent semester, Spring, 2014.

General Education Mathematics Program

Current Staffing

Number of Sections Offered

(Full Time/Part Time)

Fall 2010 – Spring 2014

	MATH 120		MATH 130		MATH 140		MATH 150		MATH 160		MATH 161		Total Sections
	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	
Fall-10	1	3	4	7	1	0	5	8	3	2	0	2	**36**
Winter-11	1	0	4	0	0	0	4	0	0	0	0	0	**9**
Spring-11	2	3	4	8	0	1	8	9	1	2	0	2	**40**
Summer-11	0	1	3	1	0	0	5	0	1	0	0	0	**11**
Fall-11	2	2	6	5	0	0	9	6	3	2	1	0	**36**
Winter-12	0	0	2	0	0	0	4	0	0	0	0	0	**6**
Spring-12	3	2	5	7	0	1	11	7	2	1	0	2	**41**
Summer-12	1	0	3	0	0	0	3	2	1	0	0	0	**10**
Fall-12	2	2	4	7	0	0	9	7	5	0	0	1	**37**
Winter-13	0	0	2	0	0	0	4	0	0	0	0	0	**6**
Spring-13	2	4	4	7	1	0	13	7	2	1	1	0	**42**
Summer-13	1	0	3	0	0	0	5	0	1	0	0	0	**10**
Fall-13	2	2	2	9	0	0	8	5	3	2	0	1	**34**
Spring-14	0	6	2	10	1	1	13	14	2	4	1	1	**55**
Full time/Part Time	17	25	48	61	3	3	101	65	24	14	3	9	**373**
Course Totals	**42**		**109**		**6**		**166**		**38**		**12**		**373**
% FT	**40%**		**44%**		**50%**		**61%**		**63%**		**25%**		**53%**

The staffing data above is obtained from published schedules of classes and should be considered approximate since changes to the official schedule are often made after the publication of the schedule.

The total number of sections per year offered by the General Education Mathematics Program has remained essentially constant, although the number of Mathematics 150 sections has increased by 15%. As the school year is from Fall through Summer, there is not a complete set of data for 2014.

The overall fraction of courses taught by full-time instructors for the General Mathematics Education Program is 53%. Mathematics 130 and Mathematics 150 together make up over 74% of all sections offered.

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.

Program/department's current needs

The California Community Colleges require that 67% of all sections be taught by full-time faculty. Within the General Education Mathematics Program, this percentage is currently 53%, so it is clear that additional faculty need to be hired to bring this percentage closer to the required number to avoid financial penalties within the department or campus. These financial penalties have been waived for the last two years due to the fiscal crisis in California.

Although most of our equipment in the MBA building is new, we have already experienced technical problems due to the combination of frequent usage and lack of maintenance. Often when computers or document cameras break down, it takes at least 3 to 7 days to get a technician from ITS or Media Services to repair the equipment. There will be a need to hire a full-time staff member to supervise and maintain all of the technological equipment in the classrooms, labs and faculty workrooms in MBA. Depending on education and experience, the annual salary is $80,000 including benefits.

Currently, we have a large space for our math tutoring center (1600 square feet) but no full-time coordinator in charge of it. The purpose of this position is to plan, develop and coordinate a comprehensive tutoring program to support students and student success in the Mathematical Sciences Division. Most students in the General Education Mathematics Program do not receive adequate help at our tutoring center because our tutors lack knowledge of probability and statistics. With the help of a full-time tutoring coordinator, we can recruit tutors for statistics and also train tutors to have basic knowledge of statistics. Depending on education and experience, the annual salary is $90,000 including benefits.

Program/department's future needs

As noted, the demand for Mathematics 150 has grown significantly. Assuming the trend continues, hiring committees must ensure that staffing for the course is adequate. Also, the University of California and the California State University and College systems have capped enrollment and increased costs and students are increasingly attending community colleges as a

way of saving money for their first two years of college and also as a way to squeeze in extra classes at a lower cost while attending these 4-year colleges. A significant portion of the summer session enrollment can be attributed to students from other colleges and universities.

c) List any related recommendations.

1. We recommend that 5 full-time faculty need to be hired to teach Math 150 and Math 130 in the next 4 years due to increasing enrollment in Math 150 and because of increasing enrollment in community colleges in general.
Fiscal Impact: The average cost for hiring a full-time faculty including the cost of health care and pension is approximately $90,000/year. Therefore, $450,000 for hiring 5 full-time faculty including cost of health care and pension

2. More classrooms need to be available for the increasing enrollment in Math 150. The number of additional classrooms is at the discretion of the Administration. **Fiscal Impact**: $0

3. Hire a full-time technician to supervise and maintain all of the technological equipment in the classrooms, labs and faculty workrooms in MBA. **Fiscal Impact**: Estimated cost including benefits is approximately $80,000.

4. Hire a full-time tutoring coordinator in our Math Study Center to plan, develop and coordinate a comprehensive tutoring program to support students and student success in the Mathematical Sciences Division. **Fiscal Impact**: Estimated cost including benefits is approximately $90,000.

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?

Based on the passage of Proposition 30, there are more funds being allocated to California Community Colleges, which will hopefully result in more money for the General Education Mathematics Program. This would allow for the hiring of additional full-time instructors to teach Statistics and other courses in our program. Over the next few years, enrollment in mathematics courses is expected to increase, driven both by an increase in the general population and the demand of industry for employees with a stronger mathematical background. Hiring additional faculty will provide more continuity in the teaching of courses in the program and help shift the full-time/part-time ratio towards the required compliance.

Internally, a major proposed change deals with the current Business/Biology Calculus sequence (Math 160-161). This sequence currently does not serve either business majors or biology majors well. Most universities have a Business Calculus course which incorporates topics from both Math 160 and Math 161; these schools generally will not accept Math 160 alone in place of their business calculus course. Additionally, the Math 160-161 sequence is heavily weighted towards business applications, which serves biology majors badly. As a result, our committee is proposing to replace the Math 160-161 sequence with a 5-unit Business Calculus course which will receive transfer credit at universities. Biology majors will instead take STEM Calculus (Math 190-191). This plan will not only place them on a par with other biology majors when they transfer to four-year schools, but will supply a firm foundation for those students wishing to attend graduate schools. The plan has been submitted to the Biology faculty and MESA Director, and has received favorable comment from both. We anticipate that the Business Division will likewise be enthusiastic about this proposed change.

Additionally, many local community colleges and universities offer multiple sections of Math 140 (or its equivalent). In particular, it satisfies the Transfer Model Curriculum for CSUs and General Education Requirements for UCs and other private colleges. We plan to offer additional sections of Math 140 to meet this demand.

Two recent institutional changes have adversely affected the General Education Mathematics Program. The Winter Session, which offered multiple sections of Math 150 (Statistics) and Math 130 (College Algebra) with high fill and retention rates, has been eliminated. The scheduled Eight-Week Mid-Semester Session suffered the low enrollment that might have been predicted due to lack of advertising, and was canceled as a result. Retreating to the *status quo ante* by offering a Winter Session and not a Mid-Semester Session would obviously better serve both students and the General Education Mathematics Program.

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

The vision of the General Education Mathematics Program is to provide students with the mathematics courses necessary to be successful in today's competitive environment. Those students wishing a basics mathematics background must be supplied with courses which will

enable them to cope with situations they will encounter in the business world and in daily life. These courses must be acknowledged by the business community as satisfying their requirements with regard to mathematical competence. Those students who wish to transfer to a four-year school must have available courses which will fulfill their needs. These courses must supply not only transfer credit but sufficient rigor so that students at ECC do not find themselves at a disadvantage when they take courses at four-year schools, which require their ECC courses as prerequisites.

There are many indications that enrollment will continue to grow within the General Education Mathematics Program. The fill rate is very high and there are consistent increases in enrollment. Community college enrollment continues to grow. In addition, although success and retention rates are generally high, improvement is always a goal and with collaboration of full-time and part-time faculty and the consistent delivery and analysis of SLOs assessment, it is anticipated that success and retention rates within the General Education Mathematics Program will increase.

It is expected that there will be a need for additional faculty, especially full-time, to meet current and future needs of the General Education Mathematics Program and ensure compliance with the required campus-wide full-time/part time ratio.

As the physicist Leo Szilard once observed, prediction is difficult – especially of the future. But it is relatively safe to say that the population will continue to increase (requiring additional faculty), technology will continue to improve (and need to be updated or replaced), and that demands for greater mathematical competence in the workforce will be required. The General Education Mathematics Program will keep abreast of developments in mathematics and mathematics education in order to help both its students and the community.

c) List any related recommendations.

1) Replace the Business/Biology Calculus sequence (Math 160-161) with a one-semester 5 unit course in Business Calculus. **Fiscal Impact:** An increase of $3,500 or a decrease of $4,500 per academic year.

2) Offer at least one section of Finite Mathematics (Math 140) each semester.
Fiscal Impact: $10,500/section

3) Cancel the low-demand Eight-Week Mid-Semester Session, and replace it by either restoring the Winter Session or offering additional sections of the canceled courses at the start of the regular semester.
Fiscal Impact: $8,000/3-unit course, $10,500/4-unit course, $13,000/5-unit course

4) Hire additional full-time instructors to meet the demand of the increase in enrollment in the General Education Mathematics Program. **Fiscal Impact:** The estimated cost (including health care and pension) for hiring a full-time instructor is $90,000 per year.

10. Prioritized Recommendations

a. Provide a single, prioritized list of recommendations and needs for your program/department (drawn from your recommendations in sections 1-9). Include cost estimates and list the college strategic initiative that supports each recommendation (see Appendix A). Use the following chart format to organize your recommendations.

Recommendation	Cost	Strategic Initiative
1. The General Education Mathematics Program highly recommends creating a one-semester Business Calculus Course to make it easier for those students who transfer to CSUs. This will reduce the number of units required for most Business majors from 7 units to 5 units. Since we typically offer 11 sections of Math 160 (4-units ~ $10,500) and 3 to 4 sections of Math 161 (3-units ~ $8,000) per year, our current cost is either $139,500 or $147,500. If we do eliminate Math 161 and increase Math 160 from 4 to 5 units, our projected cost of offering 11 sections of a 5-unit Math 160 is $143,000. This would result in either an increase of $3,500 or a decrease of $4,500 per academic year. ***From Sections 3, 5, and 9 of Program Review***	An increase of $3,500 or a decrease of $4,500 per academic year	A, B, E, C, D
2. We also recommend that faculty computer laptops be replaced by Spring 2015 to keep up with classroom technology. ***From Sections 6 and 7 of Program Review***	$1,500 per new laptop for FT faculty	A, F,G
3. Hire a full-time technician to supervise and maintain all of the technological equipment in the classrooms, labs and faculty workrooms in MBA. Depending on education and experience, the annual salary including benefits is approximately $80,000. ***From Section 8 of Program Review***	Annual salary is $80,000	A, B, F
4. The General Education Mathematics Program recommends that the College provide students and faculty the bare necessities, such as: Classrooms: erasers, pencil sharpeners, emergency landline phones Common areas: printers, scanners, clocks, pencil sharpeners, dry erasers ***From Section 6 of Program Review***	Total estimated cost for classrooms is $2,645 and for common areas is $6,000	A, F
5. Increase number of sections of Math 150 by offering additional sections of evening, weekend, and/or hybrid classes, scheduling the dedicated classrooms efficiently, and offering more sections during the summer sessions. We can start by offering 50 sections per year and then increase (or decrease) as necessary. ***From Sections 2 and 8 of Prog. Rev.***	$10,500 per additional Math 150 class	B, E, G

6. The statistics instructors would like to explore the Possibility of adding a lab component to our current Math 150 course. Since each section of this course requires a common set of manipulatives, technological equipment and statistical software, we recommend that Math 150 have three to four dedicated classrooms and schedule the times for Math 150 before scheduling other courses. ***From Sections 2, 3 and 6 of Program Review***	$0	A,B,F
7. Funding should be established to maintain existing equipment and purchase new equipment (document readers, laptops, computers) and software as needed, retain currency (license renewals of *Mathematica*, *Scientific Notebook*), and provide for new and innovative technologies (tablet PCs, SMART boards, InterWrite pads, clicker sets) in the classrooms, computer labs, tutoring center, and faculty offices. ***From Sections 6 and 7 of Program Review***	Estimated between $150,000 and $200,000	A, F, G
8. Hire a full-time tutoring coordinator in our Math Study Center to plan, develop and coordinate a comprehensive tutoring program to support students and student success in the Mathematical Sciences Division. Depending on education and experience, the annual salary including benefits is approximately $90,000. ***From Section 8 of Program Review***	Annual salary estimated to be $90,000	A, B, C, E, F
9. We recommend hiring 5 full-time faculty in the next 4 years to teach Statistics (Math 150) and College Algebra (Math 130) to accommodate increasing enrollment in Mathematics 150, to improve the low success rates in Math 130, and for students who attend summer sessions. The average cost of hiring a full-time faculty member including the cost of health care and pension is approximately $90,000/year. ***From Sections 8 and 9 of Program Review***	$450,000 for hiring 5 full-time faculty including cost of health care and pension	A, B, E
10. Renew the campus license of Minitab for Statistics classes. ***From Section 7 of Program Review***	$3,500 per year	A, F
11. We also recommend continuing to offer at least one section of Finite Mathematics every semester, as it satisfies the Transfer Model Curriculum Model for CSUs and General Education Requirements for UCs and other private colleges. In the past 4 years, we offered only one section per year but it always had robust enrollment with 35 to 36 students enrolled per section. We would like to increase slowly to 2 sections each semester, one in the morning and one during the afternoon or evening. ***From Sections 3, 5, and 9 of Program Review***	$10,500 per additional Math 140 class	C, D, B, E

12. Purchase four classroom sets of forty TI-84 graphing calculators for students in the General Education Mathematics Program. ***From Sections 2, 3, and 9 of Program Review***	Estimated at $19,200 to $24,000	A, F
13. Funding for professional development workshops or conferences be provided to focus on using iPad technology in General Education Math Courses. ***From Section 7 of Program Review***	Anywhere from $3,000-$5,000 per semester	A, C, F
14. Increase the number of sections of the other courses in the program and continue to add sections each semester as long as the fill rates warrant it. ***From Section 2 of Program Review***	Approximately $8,000/3-unit course, $10,500/ 4-unit course, and $13,000/ 5-unit course	A, B, D, E, F
15. In order for SLO assessment to become more meaningful, there needs to be more robust participation by the poorly compensated CM2 part-time faculty. If they were paid more, they would be stretched less thin and have more time that they could devote to constructing SLO assessment instruments, conducting assessments, analyzing data, and discussing improved teaching methods with their colleagues. It would be difficult to place a cost estimate on this recommendation, though a 5% salary increase for each of the next three years would certainly help. ***From Section 4 of Program Review***	5% increase in salary for both full-time and part-time faculty	A, B, C, E
16. It is recommended that part-time faculty participate in TracDat training sessions. Though part-timers in CM2 will probably not be called upon to write SLO reports, by attending the sessions they will become more immersed in the SLO process and be provided opportunities to discuss SLO assessment with their colleagues. Since there are so many TracDat training sessions scheduled throughout the semester, it is possible that more PT instructors will have a chance to attend some of them. ***From Section 4 of Program Review***	$0	A, B, C, E
17. Another recommendation is to ask students where their stumbling block is located when they are learning a certain skill or concept. If based on an SLO assessment, the target success rate is far above what students actually learned, so the students themselves may be able to provide insight into the problems that they are having. This may be conducted as informally as a classroom discussion following an exam or more formally as a student survey, in which students explain their difficulties when being assessed for an SLO. ***From Section 4 of Program Review***	$0	A, B, C, E

18. Dedicate additional lecture rooms in MBA exclusively for the Division of Mathematical Sciences. ***Section 6 of Program Review***	$0	B, E, F
19. Convert an existing office to a faculty library for storing references and teaching tools. ***From Section 6 of Program Review***	$0	B, E, F
20. Cancel the low-demand Eight-Week Mid-Semester Session, and replace it by either restoring the Winter Session or offering additional sections of the canceled courses at the start of the regular semester. ***From Section 9 of Program Review***	Approximately $8,000/3-unit course, $10,500/ 4-unit course, and $13,000/ 5-unit course	A, B, D E

b. Explain why the list is prioritized in this way.

The list above is prioritized based on a combination of frequency of the recommendations mentioned in the program review, cost estimates, immediate needs, and long-term needs. CM2 Committee met on September 4, 2015 and voted unanimously to approve this prioritized list. Please see College Mission and Strategic Initiatives on the next page which were used to match our recommendations.

APPENDIX A
COLLEGE MISSION AND STRATEGIC INITIATIVES

ECC MISSION STATEMENT:
El Camino offers quality, comprehensive educational programs and services to ensure the educational success of students from our diverse community.

STRATEGIC INITIATIVES for 2011-14

Strategic Initiative A
Enhance teaching to support student learning using a variety of instructional methods and services.

Strategic Initiative B
Strengthen quality educational and support services to promote student success.

Strategic Initiative C
Foster a positive learning environment and sense of community and cooperation through an effective process of collaboration and collegial consultation.

Strategic Initiative D
Develop and enhance partnerships with schools, colleges, universities, businesses, and community-based organizations to respond to the workforce training and economic development needs of the community.

Strategic Initiative E
Improve processes, programs, and services through the effective use of assessment, program review, planning, and resource allocation.

Strategic Initiative F
Support facility and technology improvements to meet the needs of students, employees, and the community.

Strategic Initiative G
Promote processes and policies that move the College toward sustainable, environmentally sensitive practices.

Revised 2.20.2014

APPENDIX B – Math 160 Student Survey (Fall 2013 and Spring 2014)

1. What is your major? _____

2. Do you need to take Math 161? _____ YES or _____ NO

3. List the top 3 universities that you are planning to transfer to:

_____ _____ _____

Math 160 Students Fall 2013 Survey Results (5 sections of Math 160)

MAJOR	BUSINESS	ECONOMICS	BIOLOGY	PSYCHOLOGY	OTHER NATURAL SCIENCE MAJORS (ENVIRON-MENTAL, GEOLOGY, VETERINA-RIAN)	OTHERS (PE, COMMUNICA-TIONS, ADMIN OF JUSTICE, MUSIC, NURSING, AND UNDECIDED)	TOTAL NUMBER OF STUDENTS SURVEYED FROM 5 SECTIONS OF MATH 160
Number of Math 160 students	80	12	11	5	3	6	117
% of total Math 160 students	68.4%	10.3%	9.4%	4.3%	2.6%	5.1%	100.0%
2. Students who need Math 161	50	10	11	0	3	1	75
% of total Math 160 students	42.7%	8.5%	9.4%	0.0%	2.6%	0.9%	64.1%
2. Students who do NOT need Math 161	30	2	0	5	0	5	42
% of total Math 160 students NEED 160	25.6%	1.7%	0.0%	4.3%	0.0%	4.3%	35.9%

***Please note that there were only 11 biology majors (9.4%) out of 117 Math 160 students in Fall 2013. This is NOT enough to offer a separate track of calculus just for these few biology students. Even if a class were created, it will not fill 35 seats and there is also no guarantee that the time/date of the class can fit in all of their schedules. One can only assume that the majority of the biology students are already taking STEM Calculus Sequence Math 190/191 because there are plenty of those sections to choose from. See similar results provided on the next page for the Spring 2014 semester.**

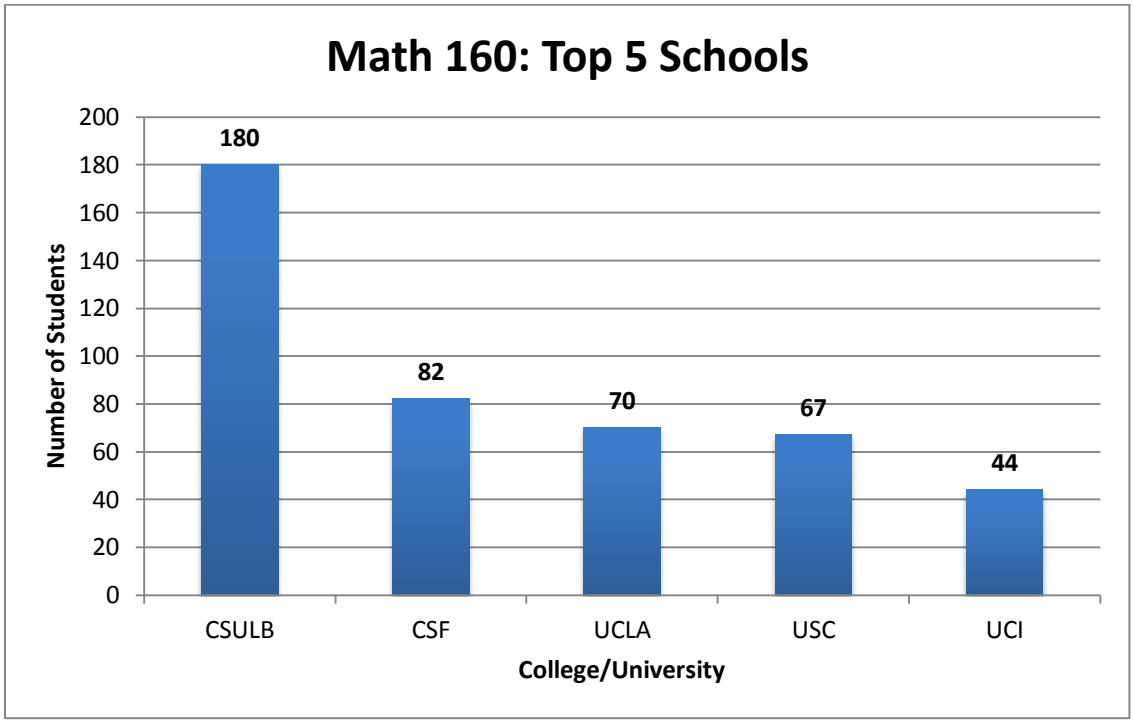
Math 160 Students Spring 2014 Survey Results (6 sections of Math 160)

MAJOR	BUSINESS	ECONOMICS	BIOLOGY	PSYCHOLOGY	OTHER NATURAL SCIENCE MAJORS (ENVIRON-MENTAL, GEOLOGY, VETERINA-RIAN)	OTHERS (PE, COMMUNICA-TIONS, ADMIN OF JUSTICE, MUSIC, NURSING, AND UNDECIDED)	TOTAL NUMBER OF STUDENTS SURVEYED FROM 6 SECTIONS OF MATH 160
Number of Math 160 students	126	21	17	4	7	17	192
% of total Math 160 students	65.6%	10.9%	8.9%	2.1%	3.6%	8.9%	100.0%
2. Students who need Math 161	61	17	13	1	4	2	98
% of total Math 160 students	31.8%	8.9%	6.8%	0.5%	2.1%	1.0%	51.0%
2. Students who do NOT need Math 161	65	4	4	3	3	15	94
% of total Math 160 students	33.9%	2.1%	2.1%	1.6%	1.6%	7.8%	49.0%

***In Spring 2014 6 sections of Math 160 were offered, and there were only 17 biology majors (8.9%) out of total of 192 students taking Math 160. When compared to the data in Fall 2013, there is definitely an overall % decrease in the number of biology majors taking the Math 160/161 sequence.**

2013-2014 Academic Year Math 160 Students Survey Results (11 sections)

Top 3 colleges of choice	CSULB	CSF	UCLA	USC	CSUDH	CSUN	UCI	UCSB	UCR	LMU	UCSD	UC BERKELEY	CSULA	OTHER CSUs	OTHER UCs
Number of students	180	82	70	67	41	37	44	22	28	30	19	29	42	44	29
% of students out of 309 surveyed	58.3%	26.5%	22.7%	21.7%	13.3%	12.0%	14.2%	7.1%	9.1%	9.7%	6.1%	9.4%	13.6%	14.2%	9.4%



APPENDIX C

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Demographic and Enrollment Characteristics
Math, General Ed – Fall

Fall						ECC Student Population	District Boundary Population
		Term					
		2009	2010	2011	2012	Fall 2012	2010 Census
Term Headcount		1,406	1,407	1,337	1,276	*23,409*	*556,400*
Gender	F	53.2%	49.6%	52.2%	54.5%	*52.5%*	*51.0%*
	M	46.8%	50.3%	47.8%	45.5%	*47.5%*	*49.0%*
Ethnicity	African-American	11.2%	10.4%	11.2%	10.7%	*17.0%*	*15.1%*
	Amer. Ind. or Alask. Native	0.6%	0.4%	0.1%	0.1%	*0.2%*	*0.2%*
	Asian	25.5%	24.2%	23.3%	21.7%	*16.1%*	*13.6%*
	Latino	31.7%	36.1%	39.9%	40.0%	*44.7%*	*34.5%*
	Pacific Islander	0.9%	0.8%	1.0%	0.6%	*0.5%*	*0.5%*
	White	18.1%	17.1%	17.9%	19.0%	*15.6%*	*32.8%*
	Two or More	1.1%	2.6%	3.5%	4.6%	*3.8%*	*2.9%*
	Unknown or Decline	11.0%	8.5%	3.1%	3.2%	*2.0%*	*0.4%*
Age/ Age Group	<17	0.1%	0.1%	0.1%	0.2%	*0.8%*	*24.2%*
	17	1.0%	0.8%	0.9%	1.2%	*2.0%*	
	18	7.8%	5.9%	5.1%	4.9%	*11.6%*	*2.5%*
	19	20.4%	20.5%	19.0%	15.9%	*14.7%*	
	20	17.8%	19.2%	19.7%	20.5%	*13.1%*	*1.2%*
	21	12.5%	13.3%	13.5%	15.4%	*9.5%*	*1.2%*
	22	8.8%	8.3%	9.1%	8.8%	*7.3%*	*3.9%*
	23	6.3%	6.4%	5.8%	6.7%	*5.6%*	
	24	5.1%	5.3%	4.6%	5.4%	*4.6%*	
	25-29	11.0%	11.8%	13.4%	11.4%	*12.7%*	*7.4%*
	30-39	6.7%	5.4%	5.8%	5.9%	*9.0%*	*14.9%*
	40-49	2.0%	1.7%	2.2%	2.7%	*4.7%*	*15.9%*
	50-64	0.5%	1.1%	0.5%	1.1%	*3.5%*	*18.1%*
	65+	0.1%	0.1%	0.1%	0.0%	*0.8%*	*10.6%*
Class Load	Full-time	57.1%	54.1%	54.0%	49.2%	*29.8%*	
	Part-time	42.9%	45.9%	46.0%	50.8%	*69.2%*	

Academic Level	College degree	7.8%	8.8%	10.3%	11.0%	*12.3%*	
	HS Grad	89.3%	88.4%	87.4%	87.2%	*83.2%*	
	Not a HS Grad	1.2%	1.1%	1.3%	0.7%	*1.4%*	
	K-12 Special Admit	0.1%	0.1%	0.1%	0.3%	*1.1%*	
	Unknown	1.6%	1.6%	0.8%	0.8%	*1.9%*	
Educational Goal	Intend to Transfer	42.0%	37.4%	36.6%	38.5%	*31.4%*	
	Degree/Certificate Only	1.4%	1.4%	1.4%	1.3%	*3.9%*	
	Retrain/recertif.	2.3%	1.8%	1.8%	1.5%	*3.8%*	
	Basic Skills/GED	5.0%	4.7%	5.5%	7.6%	*5.3%*	
	Enrichment	4.2%	5.0%	3.7%	4.2%	*4.1%*	
	Undecided	20.3%	19.9%	19.6%	16.0%	*16.7%*	
	Unstated	0.0%	0.0%	0.0%	0.0%	*35.0%*	

Demographic Success Characteristics
Math, General Ed
Fall: 2019 to 2012

	Fall 2009		Fall 2010		Fall 2011		Fall 2012	
Ethnicity	Success	N	Success	N	Success	N	Success	N
African-American	44.8%	143	42.6%	136	44.7%	141	35.8%	137
Amer. Ind. or Alask. Native	62.5%	8	83.3%	6	0.0%	2	100.0%	1
Asian	73.4%	354	69.8%	328	70.3%	306	72.2%	281
Latino	55.0%	418	53.8%	472	47.3%	503	49.3%	515
Pacific Islander	72.7%	11	60.0%	10	54.5%	11	37.5%	8
Two or More	50.0%	14	80.6%	36	67.4%	46	50.8%	59
Unknown or Decline	62.3%	146	61.3%	106	68.3%	41	54.8%	42
White	67.9%	249	68.0%	231	69.2%	234	59.7%	243
Gender								
M	60.6%	632	60.8%	674	59.8%	624	53.2%	585
F	63.4%	711	60.3%	650	56.1%	660	56.6%	701
X	0.0%	-	100.0%	1	0.0%	-	0.0%	-
Age Groups								
19 or less	67.3%	400	66.0%	377	63.7%	328	65.8%	284
20 to 24	57.8%	677	57.2%	692	53.9%	679	53.2%	730
25 to 49	66.3%	258	61.5%	239	60.4%	268	47.7%	258
Over 49	37.5%	8	64.7%	17	66.7%	9	71.4%	14

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 and Enrollment Characteristics
Math, General Ed - Spring

Spring						ECC Student Population	District Boundary Population
		Term					
		2010	2011	2012	2013	Spring 2013	2010 Census
Term Headcount		1,585	1,611	1,580	1,640	*22,660*	*556,400*
Gender	F	52.2%	50.1%	52.7%	53.6%	*52.0%*	*51.0%*
	M	47.7%	49.9%	47.3%	46.4%	*48.0%*	*49.0%*
Ethnicity	African-American	9.1%	10.0%	11.6%	10.7%	*16.6%*	*15.1%*
	Amer. Ind. or Alask. Native	0.4%	0.0%	0.4%	0.1%	*0.2%*	*0.2%*
	Asian	25.2%	25.1%	22.5%	20.9%	*16.0%*	*13.6%*
	Latino	34.8%	36.4%	40.7%	45.3%	*45.1%*	*34.5%*
	Pacific Islander	1.0%	0.7%	0.7%	0.2%	*0.5%*	*0.5%*
	White	19.0%	19.2%	18.0%	15.9%	*15.9%*	*32.8%*
	Two or More	2.3%	3.0%	3.2%	4.0%	*4.0%*	*2.9%*
	Unknown or Decline	8.3%	5.6%	3.0%	3.0%	*1.7%*	*0.4%*
Age/ Age Group	<17	0.1%	0.1%	0.1%	0.0%	*0.2%*	*24.2%*
	17	0.4%	0.5%	0.3%	0.3%	*0.6%*	
	18	13.2%	12.0%	9.4%	7.7%	*9.8%*	*2.5%*
	19	20.7%	17.9%	18.8%	16.2%	*14.8%*	
	20	16.8%	19.0%	18.2%	19.3%	*13.6%*	*1.2%*
	21	12.3%	13.6%	13.9%	15.7%	*10.4%*	*1.2%*
	22	8.8%	8.7%	9.5%	10.4%	*8.0%*	*3.9%*
	23	5.4%	4.7%	7.0%	6.7%	*6.0%*	
	24	4.2%	4.5%	4.8%	5.2%	*4.7%*	
	25-29	10.9%	10.7%	10.8%	11.1%	*13.4%*	*7.4%*
	30-39	4.6%	5.6%	5.0%	4.9%	*9.4%*	*14.9%*
	40-49	1.8%	2.1%	1.7%	1.6%	*4.4%*	*15.9%*
	50-64	0.7%	0.6%	0.6%	0.8%	*3.7%*	*18.1%*
	65+	0.0%	0.1%	0.0%	0.0%	*0.9%*	*10.6%*

Class Load	Full-time	57.2%	56.0%	54.9%	50.4%	*26.7%*	
	Part-time	42.8%	44.0%	45.1%	48.7%	*69.0%*	
Academic Level	College degree	6.2%	7.6%	7.9%	8.8%	*12.3%*	
	HS Grad	91.1%	90.2%	90.1%	89.3%	*83.8%*	
	Not a HS Grad	1.1%	0.7%	0.8%	0.5%	*0.5%*	
	K-12 Special Admit	0.1%	0.1%	0.1%	0.0%	*0.6%*	
	Unknown	1.6%	1.3%	1.1%	1.5%	*2.9%*	
Educational Goal	Intend to Transfer	37.9%	36.1%	36.5%	38.2%	*31.0%*	
	Degree/Certificate Only	1.8%	1.9%	1.6%	1.3%	*3.9%*	
	Retrain/recertif.	2.0%	2.2%	1.5%	1.8%	*3.6%*	
	Basic Skills/GED	4.7%	6.0%	7.1%	7.2%	*5.6%*	
	Enrichment	4.5%	3.3%	3.7%	3.5%	*4.2%*	
	Undecided	19.1%	20.6%	18.5%	15.5%	*16.2%*	
	Unstated	0.0%	0.0%	0.0%	0.0%	*35.5%*	

Demographic Success Characteristics
Math, General Ed
Spring: 2010 to 2013

	Spring 2010		Spring 2011		Spring 2012		Spring 2013	
Ethnicity	Success	N	Success	N	Success	N	Success	N
African-American	44.5%	137	40.3%	154	43.4%	175	39.0%	177
Amer. Ind. or Alask. Native	80.0%	5	0.0%	-	33.3%	6	100.0%	1
Asian	66.7%	390	72.0%	404	70.9%	347	73.5%	347
Latino	48.9%	521	44.6%	560	49.6%	599	52.1%	754
Pacific Islander	50.0%	16	50.0%	10	60.0%	10	0.0%	3
Two or More	57.1%	35	54.2%	48	56.0%	50	60.6%	66
Unknown or Decline	60.8%	130	57.3%	89	43.2%	44	49.0%	49
White	63.8%	298	64.8%	301	65.0%	266	71.4%	266
Gender								
M	53.6%	731	56.8%	796	55.9%	712	59.0%	770
F	60.5%	800	55.6%	770	57.2%	785	58.0%	893
X	100.0%	1	0.0%	-	0.0%	-	0.0%	-
Age Groups								
19 or less	61.8%	537	62.7%	482	60.1%	436	63.9%	402
20 to 24	56.5%	727	50.3%	787	54.4%	805	57.0%	954
25 to 49	49.2%	256	61.5%	288	57.7%	246	55.1%	294
Over 49	63.6%	11	55.6%	9	50.0%	10	69.2%	13

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.