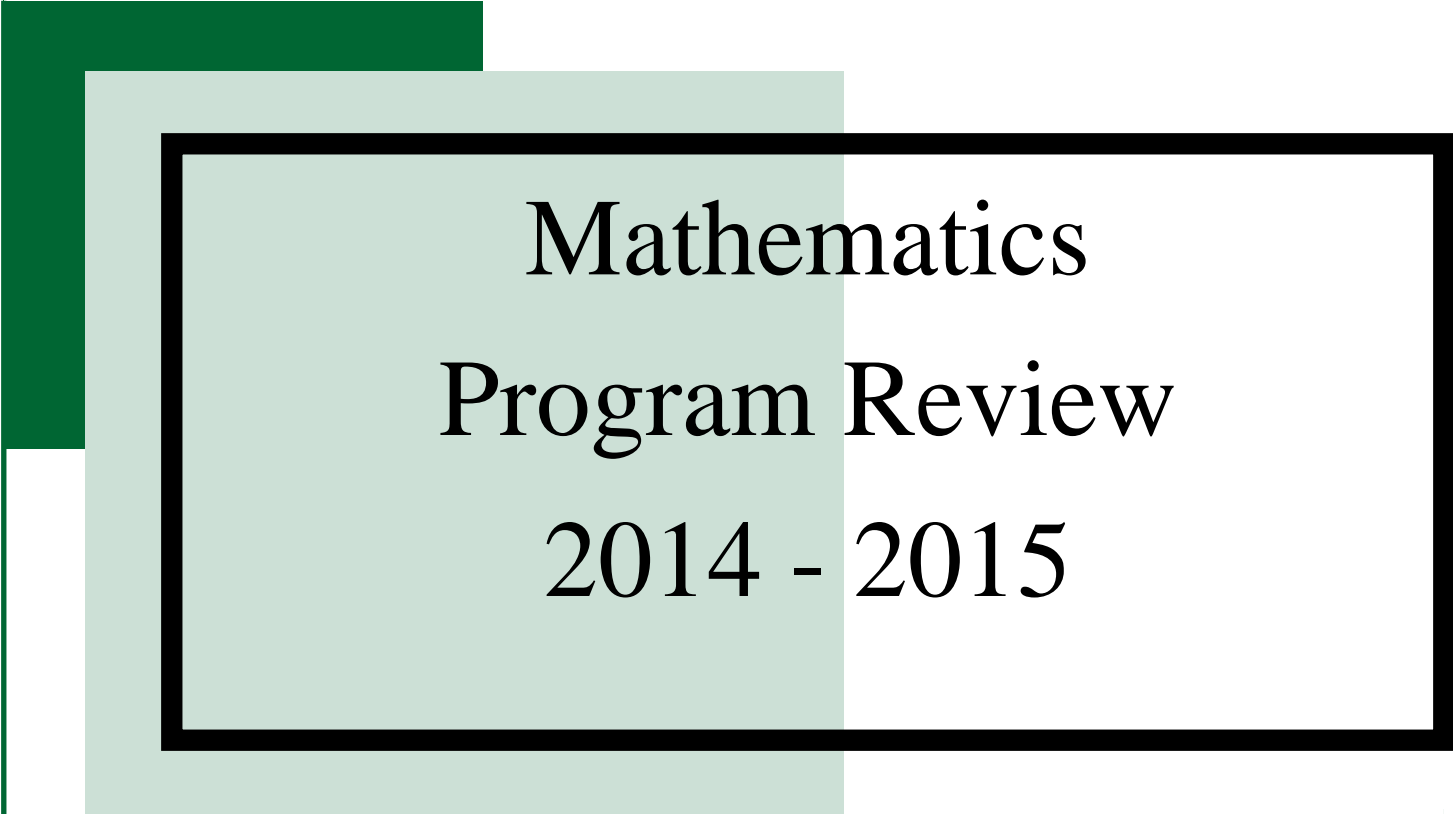# EVERGREEN VALLEY COLLEGE

Mathematics
Program Review
2014 - 2015

...a place where learning is everyone's responsibility

Evergreen Valley College
Program Review Self-Study Document

SECOND DRAFT

Department / Program Name: Mathematics
Current Year: 2014-2015
Area Dean: Michael Highers

Contributors

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PART I: Resource Allocation Tools
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Description:

Courses in mathematics provide a foundation for quantitative analysis, discovery, life-long learning and reasoning. In addition, the program contributes to the Evergreen Valley College (EVC) mission by providing:

- basic skills preparation,
- courses that satisfy degree requirements,
- skills necessary to complete a number of occupational programs,
- transfer requirements,
- coursework that fosters student growth and achievement,
- an atmosphere that celebrates cultural diversity, particularly through the Mathematics and Science Resource Center (MSRC), which is strongly supported by the math program.

The Mathematics Department provides students with multiple pathways to meet their degree requirements; the Mathematics Department sees its program as comprised of four different, but interconnected strands: Developmental, non-STEM Transfer, Statistics, and the AS-T (Associate in Science for Transfer) in Mathematics. Each of these different strands has unique challenges, so having adequate student data for each of these strands is crucial for designing adequate educational interventions.

The department is interested in participating in the MESA (Mathematics Engineering Science Achievement) community college program (MCCP) because we feel that it would be beneficial to our students and our demographics exceed by far the required percentages. The department also needs to obtain the following data to assess the program (not used in this program review report because they were not available):

- Student data disaggregated by ethnicity, age and delivery methods
- Cohort data to measure pipeline input for Math AS-T, basic skills, STEM and Non-STEM pathways.

Moreover, the department needs the resources to develop multiple measures to assess student learning outcomes (course and program). Future program review reports would benefit from having this data and measures because they could provide a better gauge of the performance of all the Mathematics offerings.

Current measures used to assess the program:

The department only has access to enrollment, number of sections, student success, and retention for all courses. Data disaggregated by course or by strand or by delivery method is not available. For basic skills courses, the Chancellor's Office has just recently provided access to ARCC data. In the future, the Math Department will be using this information provided by the Chancellor's Office to monitor basic skills pathways in lieu of the data needed to do a more effective assessment. Cohort data for all strands (disaggregated by ethnic group, age, and financial status) would be very helpful. Student outcomes assessment is not used extensively yet since assessment is not robust, reliable, or valid in many courses. Effective training in the area of assessment would be helpful. Assessment expertise is slowly progressing, but bias and distortion have not yet been minimized in the current assessment tools.

Short summary of findings:

The efficiency faculty load of the program is very high and the faculty work closely with some of the learning communities to help students succeed. However, additional resources are required to facilitate identification and implementation of more effective teaching and learning methods in order to increase marginal rates of student success and retention. This is especially needed for our larger basic skills student population.

Success in math courses, particularly developmental math, is low. There is an achievement gap between students of different ethnicities. Specifically, the success of Latina/o and African American students needs to be improved to achieve state averages. Improvement in this area needs to be the main focus of the Math Department in the future. It is of the greatest importance to reduce enrollment per section in developmental courses so that retention and success can improve. Furthermore, classrooms need to be better designed (e.g., smaller size classrooms with group work areas) to implement more effective teaching methodologies (cooperative and collaborative learning) to provide much better chances of success to our largest customer student population. In fact, the ARCC report and Datamart data indicate that our success rate is approximately 32%, which is approximately the same as the state average, although a bit lower than other community colleges in the Bay Area. EVC performs better in the ARCC report than our sister college, SJCC (27%). Other ARCC data shows that completion and persistence are comparable to the state averages but lower than some community colleges in the Bay Area (e.g., San Mateo, Skyline, La Canada, De Anza, Foothill, Ohlone, and Las Positas).

One possible reason for this poor performance is that only a small percentage of our offerings in developmental mathematics are taught by full-time faculty. This is important because the majority of our students are enrolled in developmental mathematics, and we do not require expertise in or provide training for faculty who teach developmental mathematics. Another possible reason for this low performance is the use of outdated teaching methodologies, particularly in developmental courses. Our two-year old Math AS-T program (higher level math) is not on a robust footing at the present time: out of 250 students who have declared majors in Math, only 24 students have graduated with an AS-T in Mathematics during the last two years. Unfortunately, student equity data for this strand has not been provided for analysis and discussion so we need to implement indirect assessment for gathering information about the quality of learning in this new program. Another area where there is very little information is in the area of distance education. As of this review, we have seen no distance education data to assess the status and adequacy of those courses, particularly in developmental mathematics.

Where would you like your program to be three years from now?

Because there are currently many gaps in different areas, we have several future objectives:
- Have the CTAs, mission, and vision statement for the Mathematics Department updated. These should be aligned to the college mission and to the CTAs and goals of the division and the college. The last update was in April 2007.
- Increase retention and success rates for underperforming (less than college average) ethnic groups by at least 2% every year over the next six years.
- Increase course completion rates in each of the four different strands offered by the Mathematics Department (developmental, Statistics, Precalculus and Math AS-T courses) for all ethnic groups by at least 4% every year over the next six years.
- Narrow the achievement gap between the highest performing group of students and the lowest performing group of students (2% per year).
- Increase hybrid offerings for more transfer level courses in order to meet varying student needs for access.
- Design distance education courses for the Math AS-T degree to attract more students to the college and provide better access.

- Develop program learning outcomes on a solid footing for Mathematics with sustainable and robust student learning outcomes and a valid and reliable assessment plan in place.
- Develop a reliable and precise set of assessment instruments for 80% of the courses, including those not usually taught by full time faculty.
- Lower the class sizes of developmental courses to less than 30 students. Class sizes (n=44) in these developmental courses at EVC is among the highest in the Bay Area. This greatly impacts our student success and retention in these courses.
- Establish better consistency in course content from instructor to instructor in all courses with an emphasis on the new common core forms of assessment (authentic assessment).
- Employ better technology in the classrooms (in addition to much better classroom designs) from software to hardware to make the educational environment of the classroom more collaborative and cooperative and, consequently, more conducive to student success.
- Increase the percentage of developmental courses to be taught by full time faculty. In order to accomplish this goal, full time faculty must teach one five-unit developmental course every semester. The Dean and the faculty will work together to create a mechanism to meet this goal.
- Offer more professional development in the area of learning theory and cooperative learning. This is a must for all faculty (including adjunct instructors). Many of our instructors appear to use a lecture format which may in itself be inadequate to the needs of our students (learning style). Indeed, the cognitive load caused by this lecture format may be hampering the progress of our lowest-performing students, thus increasing the already wide achievement gap between ethnic groups.
- Provide robust professional development activities for all faculty, tutors, and staff for Mathematics courses one, two, and three levels below transfer and the first level of transfer courses. This will give faculty the tools to implement educational, student-centered pedagogies that foster student success including adult learning theory, cognitive learning strategies, collaborative and cooperative learning strategies.
- Provide load reduction to the faculty member who coordinates SLO efforts in the mathematics developmental courses (coordinating assessment in 42 sections is not trivial).
- Develop new interventions such as small group peer-assisted learning, supplemental instruction, accelerated math pathways, summer bridge programs to increase success, retention, completion, and transfer rates. For example, a variety of professional tutors, supplemental instruction, peer mentors, and faculty mentors will be assigned to help students succeed in their courses, persist in their pathways and complete their programs of study (e.g. Math AS-T degree).
- Obtain disaggregated student data per strand and better access to cohort data to identify learning gaps and to monitor completion and student progress at each stage of a pathway,
- Build a culture of evidence in which practitioners have robust and complete information in order to evaluate the progress and success of education interventions and to more precisely identify achievement gaps. Moreover, findings of program reviews need to be used for budget allocation and integrated planning.
- Review and refine program review processes to ensure that they are systematic, linked to institutional planning, resource allocation, and used assess and improve student achievement.
- Provide meaningful training to assist faculty in supporting the District values of access, equity, and social justice. This training will promote appreciation for and understanding of diverse races and cultures, including the expansion of the diversity of college personnel (faculty, tutors, etc.) and therefore should be fully funded and implemented.
- Last but not least, the Mathematics Department (staff and faculty) needs to work on performance metrics that could measure progress towards the future goals of the department. These future goals need to include the use of a student learning outcome assessment for gauging student achievement. Faculty need to be trained in multiple measures of student learning outcome achievement such as item analysis, indirect assessment, and authentic assessment. This performance-based conception of assessment lies at the heart of what is needed to translate the Mathematics courses into a robust curriculum and assessment system at EVC.

PART A: Overview of Program

1. **Identify your program/department's Commitments to Action (CTAs) — as they relate to the college strategic initiatives — for this year.**

2007-2008 Commitment to Action for the Department of Mathematics (Status and Outcome)

These CTAs are from almost 7 years ago (April 2007). Since then, the College CTAs appear not to have changed: no update of the college strategic planning has taken place since then. Overall, only three CTAs out of 12 proposed CTAs were completed. Metrics to measure progress in the CTAs were, in most cases, not very well defined (fuzzy). As a result, it was very difficult to measure progress in each of the CTAs and whether the goals were achieved. The proposed time frames to complete the actions are from April 2007.

INITIATIVE: STUDENT-CENTERED	TIME FRAME TO COMPLETE ACTIONS	OUTCOME STATUS
•Set up intervention programs to increase completion rates in pre-calculus and trigonometry.	•Oct 2007	Not met
•Offer pre-calculus & trigonometry at high schools during summer and evenings.	•Jun 2008	Not met
•Consider changing 7:45 offerings to 8:00 a.m.	•Jan 2008	It has been met: only a single class meets at 7:45am.
•Work with the ACCC, consider revising criteria for online courses to facilitate their development especially for courses beyond developmental math.	•Jun 2008	Forms for Math 25 and 63 were written in 2009
•Offer Math courses in a coordinated way with other programs.	•Jan 2008	Met 2013
•Work with the Nursing and Counseling departments, study the feasibility of a math course for Nursing.	•Jun 2008	
•Conduct math workshops for finite math and statistics	•Jun 2008	Met 2008
•Create new transfer agreements for math students.	•June 2008	N/A: Articulation Officer
•Add additional tutoring hours and tutors.	•Sep 2008	N/A: Tutoring Department
INITIATIVE: ORGANIZATIONAL TRANSFORMATION	TIME FRAME TO COMPLETE ACTIONS	OUTCOME STATUS
•Schedule a shared governance hour when no one is taking or teaching classes. •Issue picture ID for faculty	Not Set	In progress (College CTA) IN progress (College CTA)
•Schedule Division Meetings and governance meetings on the same days.	Not set	
•Provide a Division Staff Lounge/conference room.	2016	In progress (College CTA)
•Establish a better process for handling division issues that rise up among our diverse staff.	Not Set	In progress (new facility) N/A (College CTA)

•Develop a better way for college to recognize faculty and staff who are excellent at what they do. Could include teaching, research paper (that are refereed), campus involvement etc.	Not Set	N/A(Division CTA)
•Create a visible presence in libraries to assist residents in our service area that have math educational needs.	Not Set	Not Met
•Periodically inform the campus of the activities, issues and success of the math department.	•June 2008	<u>Emails about student projects and presentations are sent periodically.</u> Web site is updated regularly. (e.g., The Math website has news about the math contest and the groundbreaking for the new building.
•Closely work with the counseling department to make sure our students are effectively served.	•June 2014	The Dean met with the entire counseling staff two months ago to discuss course prerequisite overrides and some of the ways we do multiple measures.
INITIATIVE: COMMUNITY ENGAGEMENT	TIME FRAME TO COMPLETE ACTIONS	OUTCOME STATUS
•Participate in high school visits and inform students of the programs and services available at EVC.	•June 2008	N/A: No records of visits by the math department. Student Services organize these visits.
•Create a department website.	•June 2008	<u>Department web site updated December 2014</u>
•Create a guideline for assessment and placement for the counseling department.	•Jan 2008	The Dean sent a placement guideline to Counseling; there is a flowchart showing math placement scores.
•Establish partnership with local elementary and middle schools to provide internship opportunities for our students in EDUC12MS	•Jan 2008	Unknown. Only one record of interns placed in local high schools (2008)
•Establish partnerships with local industry to conduct classes or workshops in "Math in the Workplace"	•June 2008	Not Met

2. Please explain how your program's CTAs are aligned with the goals of the College. How does your program help + the College fulfill its Mission and Strategic initiatives?

CTAs have not been updated in 7 years (since April 2007). The Mathematics Department needs to create new goal performance metrics and associated time frames for completion based on the student data presented

below (e.g., leaky pipeline to transfer level, inequitable outcomes, low retention and success in developmental courses and very low enrollment in the Math AS-T strand).

3. **Please state at least three recent accomplishments for your program which show how it contributes to the College's success.**

Academic Program: Strengths

- We have a caring Math faculty who are willing and able to help our students. We have a pool of competent math students who are willing to become mathematics tutors in the Math and Science Resource Center. The current tutors provide an invaluable service that not only assists other students in succeeding in mathematics, but also further hones their own skills both in mathematics and as tutors.

- We continue to strengthen our efforts in meeting the educational needs of students (access and outreach). The Mathematics Department has introduced alternate pathways for students by creating online and hybrid offering in the areas of developmental (Math 111, Math 013); statistics (Math 63) and transfer level (Math 61, Math 25). Also, the Mathematics Department has a new degree: the Math-AS-T degree that has attracted the interest of many students. Furthermore, the department continues to serve Science and Engineering students by offering honor student projects and by hosting the students' presentations of their projects in lieu of a much-needed MESA center.

- We have increased the percentage of full-time students from 35% to 39% over the last five years, even though we are primarily an institution that serves part-time and developmental students. This is significant because our full-time students are more likely to persist through the developmental sequence and graduate or transfer.

Academic Program: Weaknesses

- We need to be careful not to fall even more behind in technology and technology-based courses as the years go by. Student work demands have changed their school demands. Working adults are seeking more distance education courses. Technology to support viable on-line or hybrid courses is developing rapidly.

- We don't have enough full-time faculty to share the workload for committee and college work. Indeed, it would be <u>highly desirable</u> to have faculty to better reflect our target population and the demographic shift that has taken place (e.g., 33% of the students are Hispanic according to the Chancellor's Office).

- We need to increase the pipeline to higher-level math in order to open a great opportunity for the Math Department and the entire college. Enrollment in the higher-level math courses is relatively low (barely 12% of all students). Indeed the number of students who are placed into basic skills courses continues to grow every year: 70% of new students are placed in developmental math courses.

- <u>All full-time faculty</u> need to actively participate in efforts to improve student success, primarily in the developmental algebra sequence, in order to lead to increased student persistence toward goal completion, completion of certificates and AA degrees, and transfer rates.

- We need to expand the diversity of the pool of students who can be math tutors because it currently does not reflect the ethnic makeup of the Mathematics student population.

4. **State the goals and focus of this department/program and explain how the program contributes to the mission, comprehensive academic offerings, and priorities of the College and District.**

Courses in Mathematics provide a foundation for quantitative analysis, discovery, life-long learning, and reasoning. In addition, the program contributes to the College's mission by providing

- basic skills preparation,
- courses that satisfy degree requirements,
- skills necessary to complete a number of occupational programs,
- transfer requirements,
- coursework that fosters student growth and achievement, and
- an atmosphere that celebrates cultural diversity, particularly through the MSRC center, which is strongly supported by the Math program.

5. **Student Demographics**

Source: Oracle Research Portal (Nov 10, 2014)

Overall Enrollment by Headcount

Overall enrollment by headcount has slightly increased from fall 2009 (n=1,911) to spring 2014 (n=1,980), according to the data from the Portal. The trend seems robust. Most of the growth, however, is coming from developmental courses offered by the Mathematics Department. Approximately two-thirds of our students are in basic skills (they are at-risk students as defined by the Chancellor State Office.)
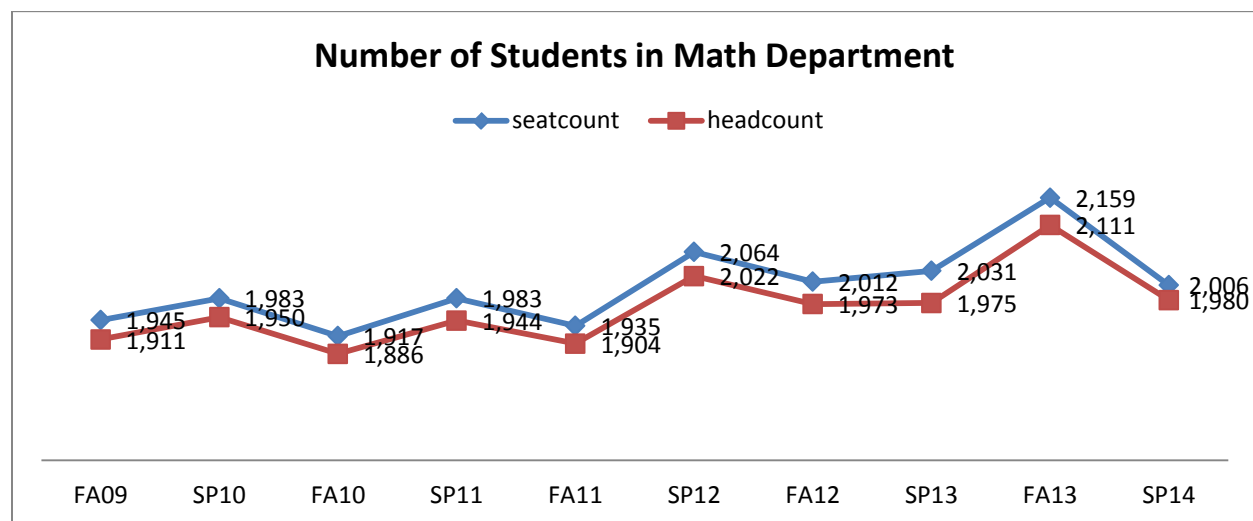
Fig. 1 *Apparent enrollment in ALL mathematics courses since fall 2009: Semester to Semester. Source: RIE (Portal)*

Student Demographics by Gender Fall 2013

Male students represent a slight majority of the students (52%) according to Portal (RIE). This is somewhat expected given the fact that female students are a very slight minority of the students in the entire college. This information points out that the gender disparity is likely to be more pronounced in the higher level mathematics strand.

Fig. 2 *Enrollment by gender since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

Overall Enrollment by FTES

Overall FTES has declined from 284.1 FTES in FA 2009 to only 267.5 FTES in the spring 2014. The overall decrease matches the trend that the entire college is experiencing.
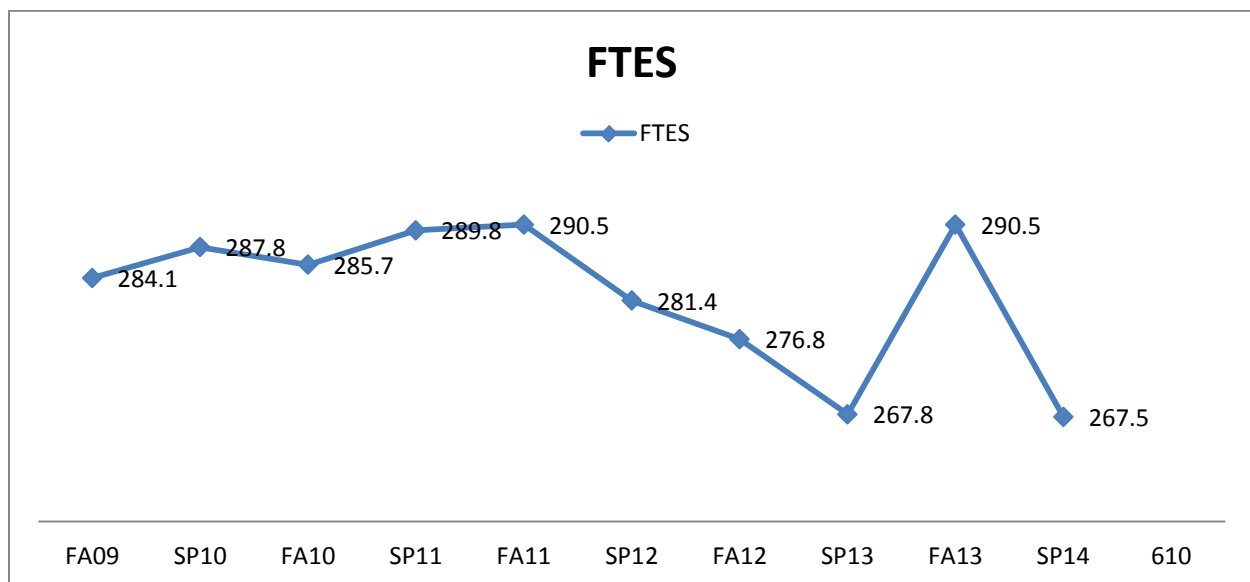
Fig. 3 *Enrollment by FTES since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

Weekly Student Contact Hours (WSCH)

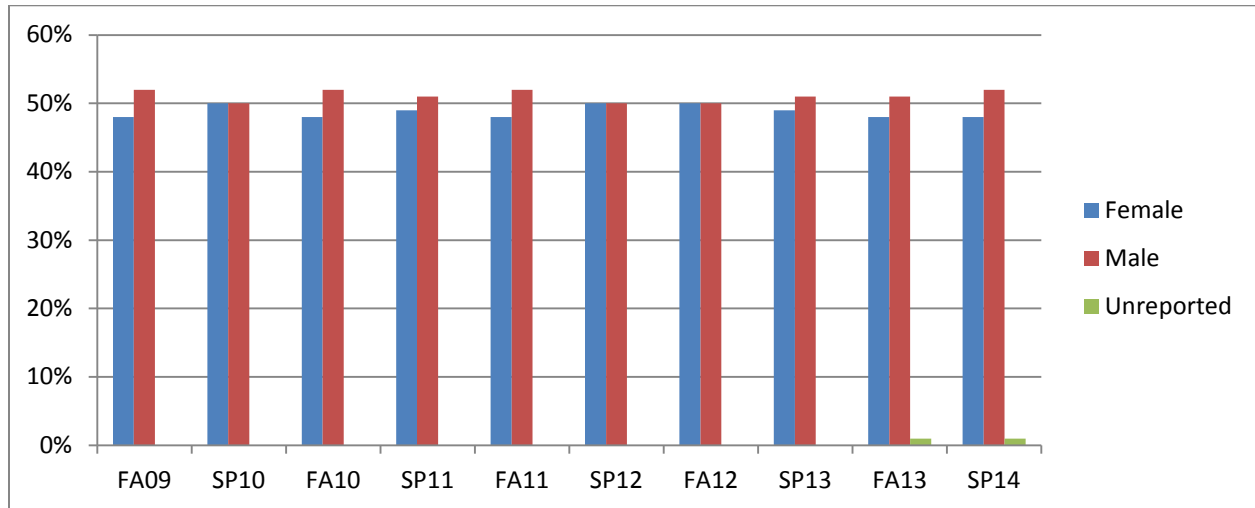WSCH represents the total hours per week a student attends a particular class. WSCH for the mathematics department has fallen possibly due to a decrease in the fill rates in the mathematics courses. More information is needed to answer this question.
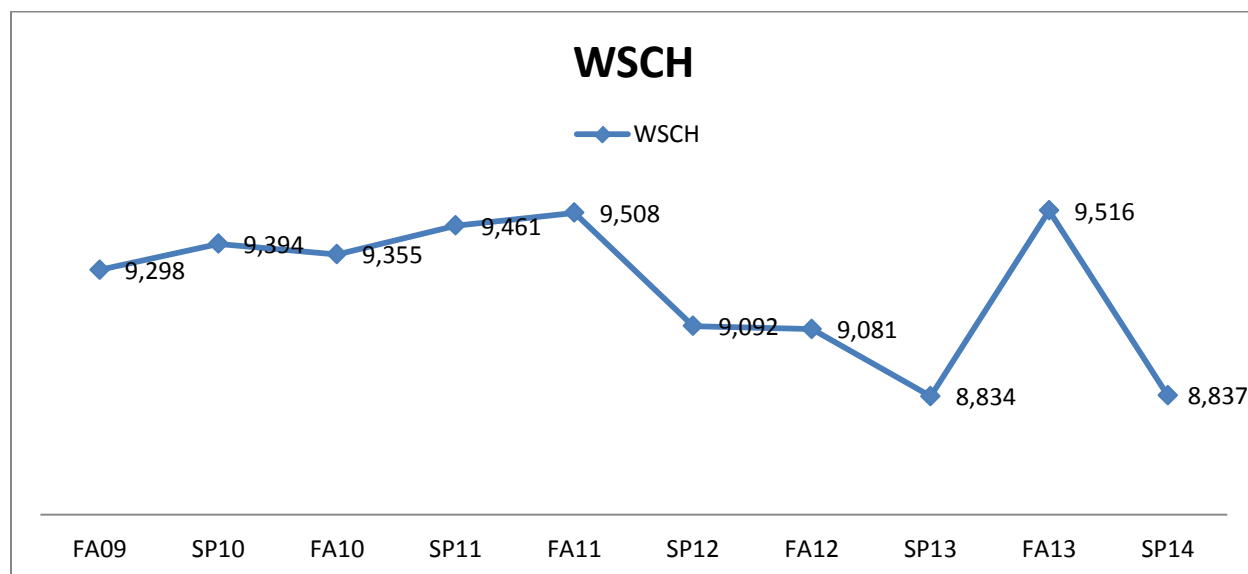
Fig. 4 *Weekly Student contact hours since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

Full Time Equivalent Faculty (FTEF)

FTEF is as a measure by the State to calculate the sum total of faculty resources (full-time and part-time combined) that equate to measurable units of 15 hours per week of "teaching time," i.e. as being equal to one (1) full-time equivalent faculty.

The figure shows that FTEF has increased slightly even though the WSCH are decreasing. This is somewhat unusual and it is probably due to a decrease in the number of course sections. However, our average class size in the developmental courses has increased producing a negative impact in the success rates of those courses. More resources are needed to increase the success rate and retention in the developmental offerings.
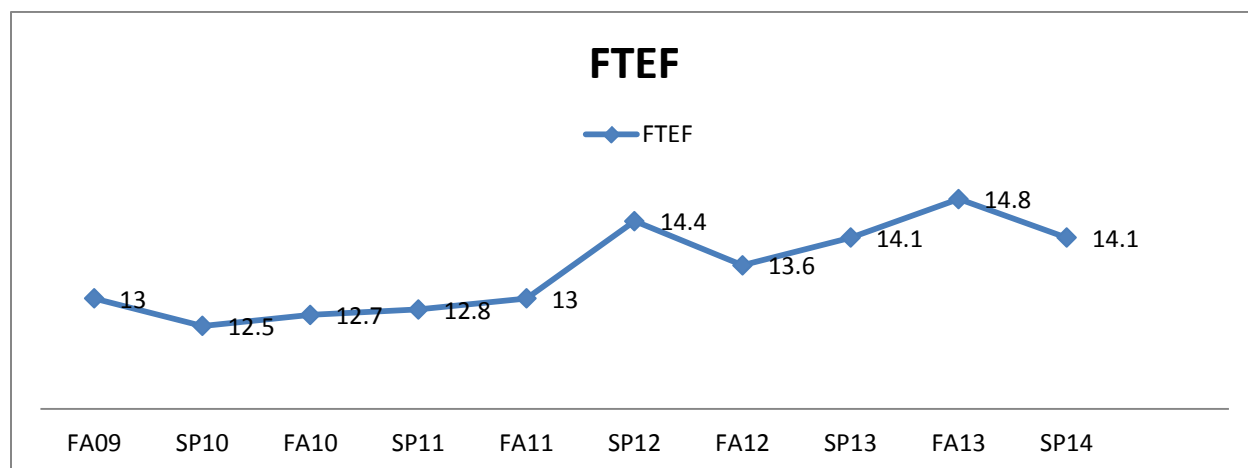
Fig. 5 *Full Time Equivalent Faculty since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

Productivity

Theoretically speaking, productivity represents the ratio between the faculty's hours of instruction per week ("faculty load") and the weekly hours of enrolled students in his/her sections. It is proportional to the total weekly student contact hours (WSCH) divided by the faculty member's load. Productivity has fallen in the last five years from 714.3 in the fall 2009 to just 628.3 in the spring 2014. This is probably a result of smaller fill rates in our higher level courses. Enrollment in higher level courses is noticeably less than developmental courses.
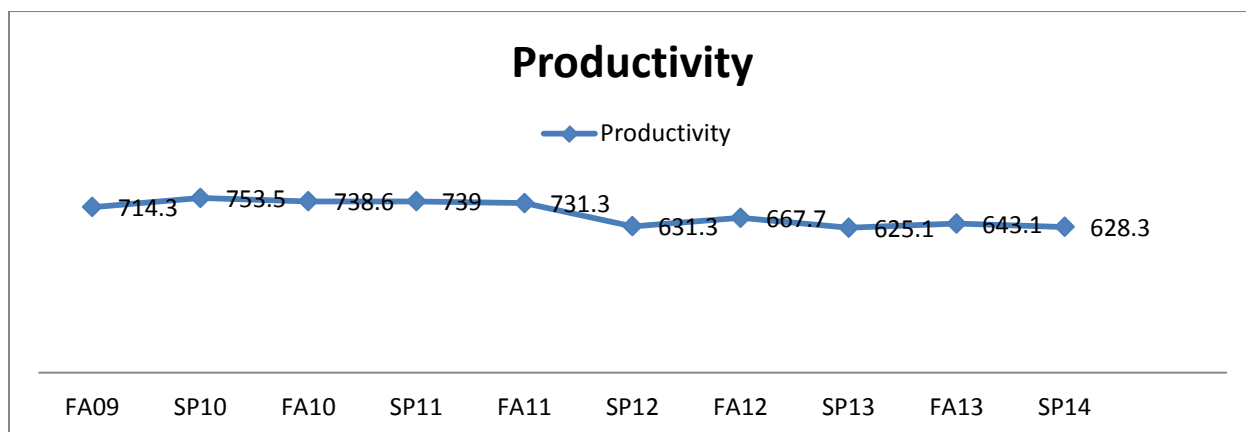
Fig. 6 *Productivity (WSCH/FTEF) since fall 2009: semester to semester. Calculations of the productivity need to be revisited. Source: PORTAL (RIE)*

Courses Offered per Strand

The data of courses offered by strand is very stable. Most of the Mathematics courses are in the development strand: approximately two-thirds of the student population attends Math developmental courses. Because it serves a sizable portion of the at-risk population of the college, the Mathematics Department contributes greatly to the college mission. However, most of the developmental courses are taught by part-time faculty, whereas most higher-level courses are taught by full-time faculty. Only one third of the developmental offerings are facilitated by a full time faculty. High-level Math courses are approximately only 12% of the total enrollment.
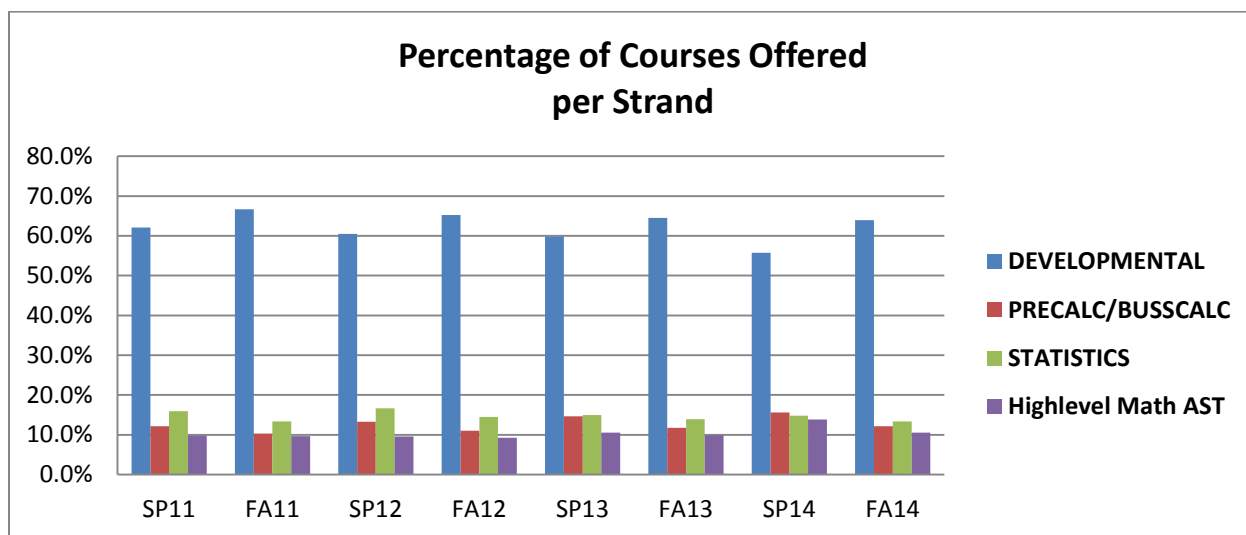
Fig. 7 *Offerings in the four strands by the Mathematics Department since fall 2009: semester to semester. It shows that the department is serving mostly the at-risk population in the college. Enrollment in the Math AST courses is barely 12% of the total enrollment. Source: WebRg (scheduling tool)*

Ethnicity of the Mathematics student population

There are strong fluctuations in the data, but overall, Latino/as represent the largest group by ethnicity (roughly 36%), Asian/Vietnamese students comprise the next largest group (34%), and White students comprise about 13%. The data, however, seems to deteriorate with time since the size of the other/unknown classification is increasing quickly with time, (i.e., there has been a notable increase in students who do not want to specify their ethnicity). The analysis could be improved if the source of the data PORTAL (RIE) would revisit the different classifications (e.g., perhaps allowing students to "select all that apply" rather than selecting only one group).
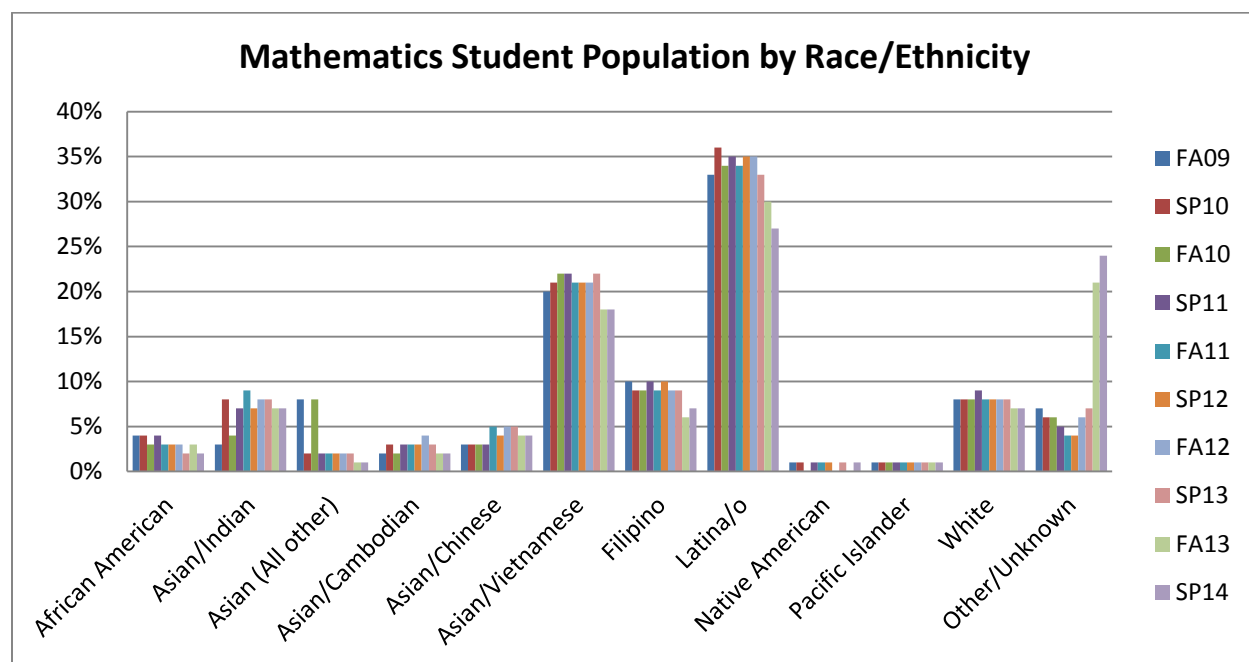
Fig. 8 *Math student enrollment by race/ethnicity since fall 2009: Semester to Semester. When all the Asian groups are aggregated, the Asian population is approximately the same as the Latina/o population. Source: PORTAL (RIE)*

Enrollment by Age Group

The most significant trend in the age distribution of the college since 2009 has been the decrease in students 18-19 years of age. This demographic has decreased 9% from fall 2009 (33%) to Spring 2014 (24%). At the same time, the College has seen a 3% increase in students less than18 years of age and a 3% increase in students in the 30-39 years range. Most of the students appear to be in the 20-22 range.
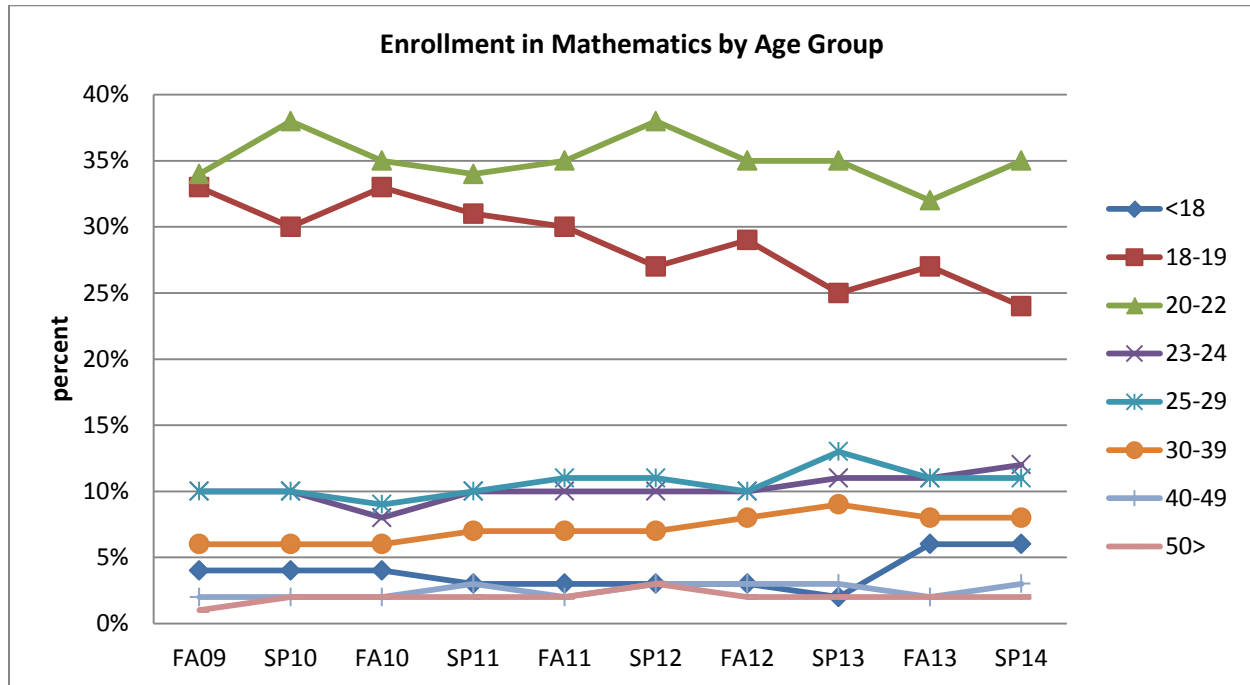
Fig. 9 Enrollment *by Age Group over the last five years. Source: PORTAL (RIE)*

Persistence Rates

Persistence rates are consistently fluctuating. From the graph below, it seems that the spring to fall persistence is lower, as expected (e.g., because of graduations, transfers, employment, etc.), than Fall to spring persistence.
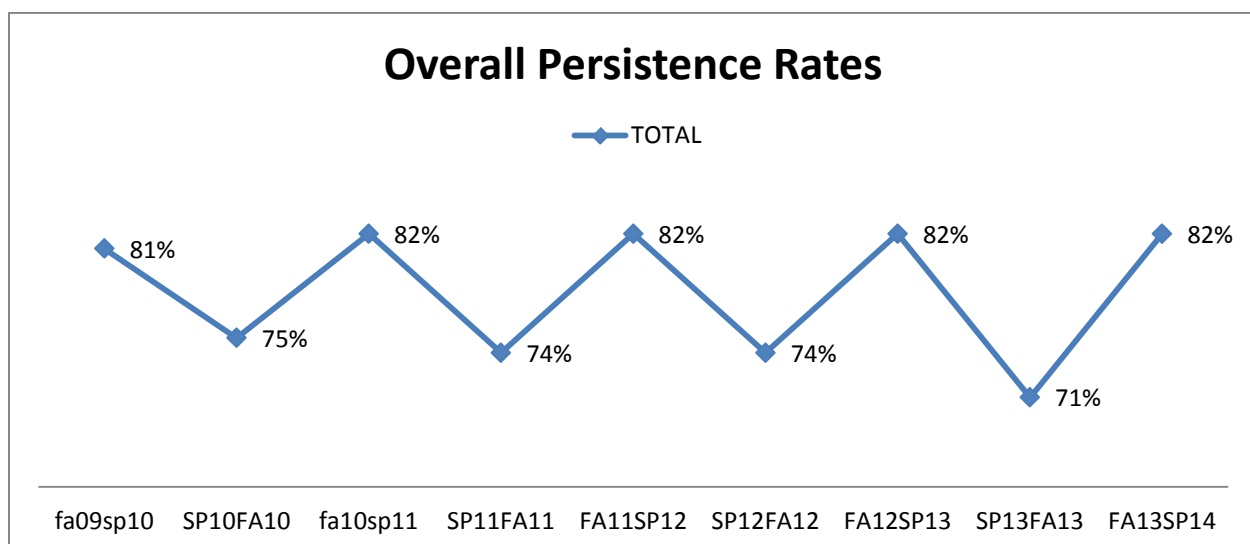
Fig. 10 *Persistence Rates since fall 2009: Semester to Semester. Persistence rates in developmental courses are approximately 40%: substantially lower than the average. Source: PORTAL (RIE) and Chancellor State Office.*

When disaggregated by race/ethnicity, persistence rates appear to be stable. African American, Latino/a, and White are the groups with the lowest persistence rates. In contrast, Native Americans seem to have noticeably higher persistence rates.
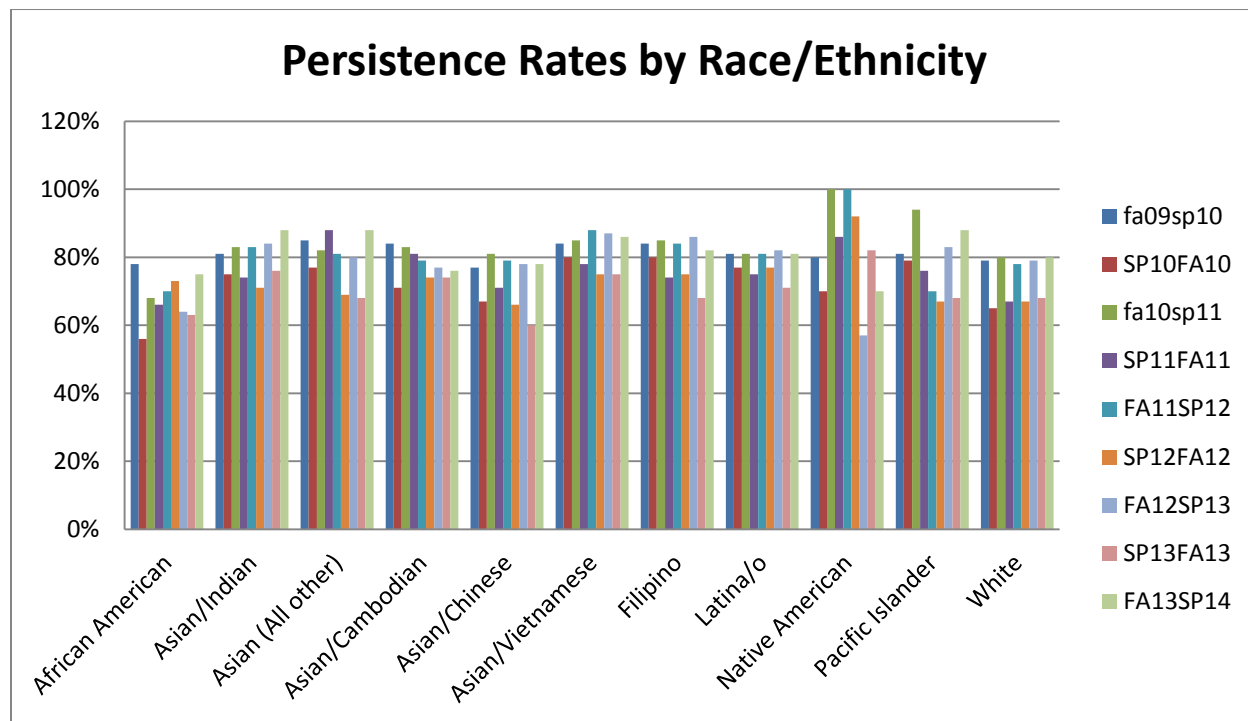
Fig. 11 *Persistence Rates per Race/Ethnicity since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

Retention and Success Rates

The overall retention rate seems to be increasing slightly except for a small dip in fall 2011. Interestingly, success seems to have peaked that particular semester. This is completely unexpected because higher success implies higher retention. This is possibly a problem with the quality of the data from Portal. Also, it is unfortunate that we cannot disaggregate this information by strand and by delivery method. It would be very important for the Math Department to know which delivery methods increase success and retention.
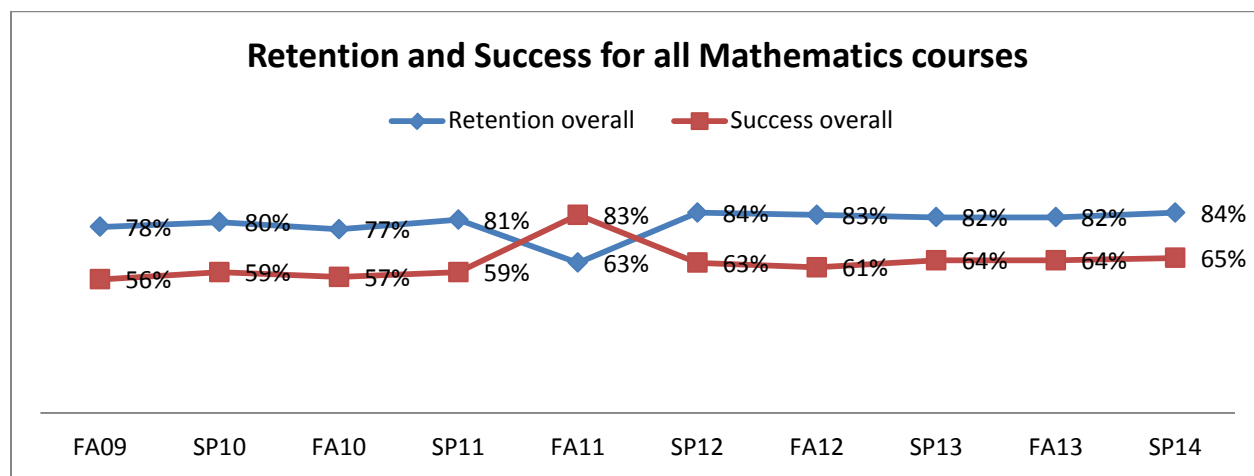
Fig. 12 *Success and retention since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

Retention by Race and Ethnicity

Retention fluctuates more than expected. However, it appears that Latina/o, African Americans and Native Americans are the groups with the lowest retention rates. African Americans appear to be slightly above 70% on average and Latina/o group is approximately on average 70% (see fall-11 where Latino/a retention is below 40%). The retention for these groups falls below the average retention rate of 80% for the department.
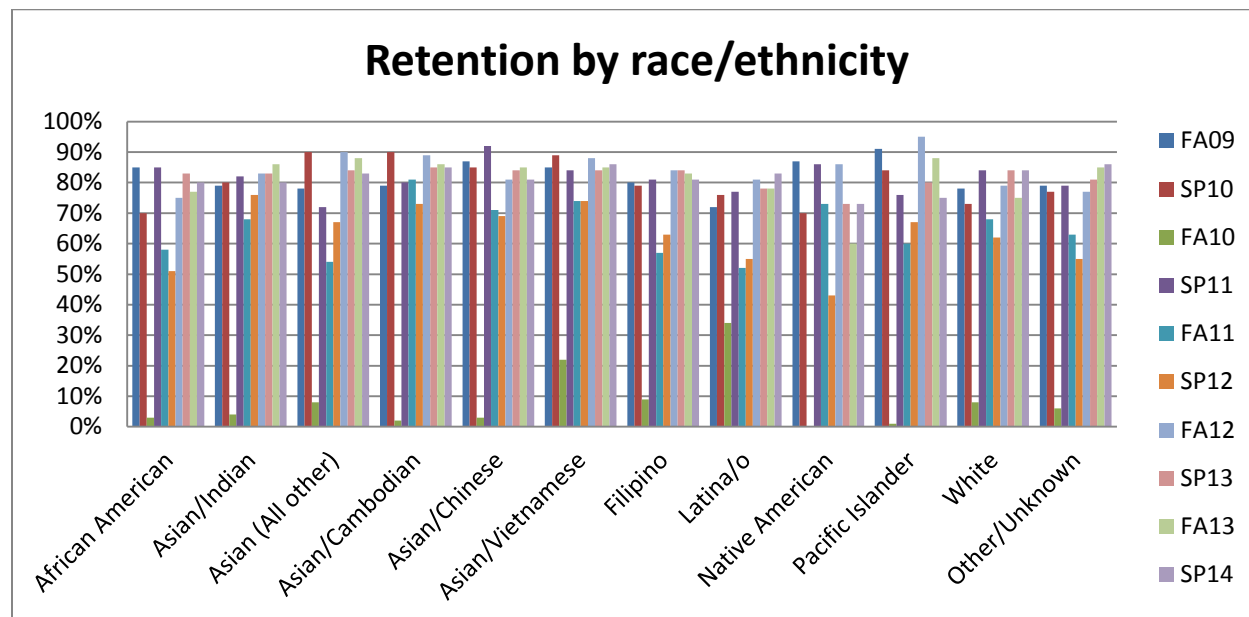
Fig. 13 *Success and retention by race/ethnicity since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

Success by Race and Ethnicity

Success rates fluctuate greatly, similar to\ the retention rate. However, just like the retention rates, it appears that Latina/o, African Americans, and Native Americans are the groups with the smallest success rates. African Americans appear to be slightly below 50% on average and the Latina/o group is approximately on average 60%. The success rates for these groups fall below the average success rate of 65% for the department. Anecdotal information leads us to believe that most of the students from these groups are in developmental courses where the success rates tend to be lower. It would be helpful for planning and goal setting to have access to success rates disaggregated by strand and by delivery method. Information from the Chancellor's Office shows that the success rates for developmental courses are about 54%, which is well below the average of 81% for the entire set of offerings of the math department. The department is NOT producing equitable outcomes at the present time. Having large class sizes at the developmental level is not helping our lowest-performing groups. The scorecard report and the ARCC report of the Chancellor's Office shows somewhat disappointing success rates in our developmental offerings. More resources to develop educational interventions (curriculum and new teaching methodologies) to support at-risk populations are needed.

A very interesting outcome of the chart below is that the Asian/Cambodian success rates seem to be decreasing faster than any other group.

Success Rates for all Mathematics Course by Race/Ethnicity

Legend: FA09, SP10, FA10, SP11, FA11, SP12, FA12, SP13, FA13, SP14

Categories: African American, Asian/Indian, Asian (All other), Asian/Cambodian, Asian/Chinese, Asian/Vietnamese, Filipino, Latina/o, Native American, Pacific Islander, White, Other/Unknown
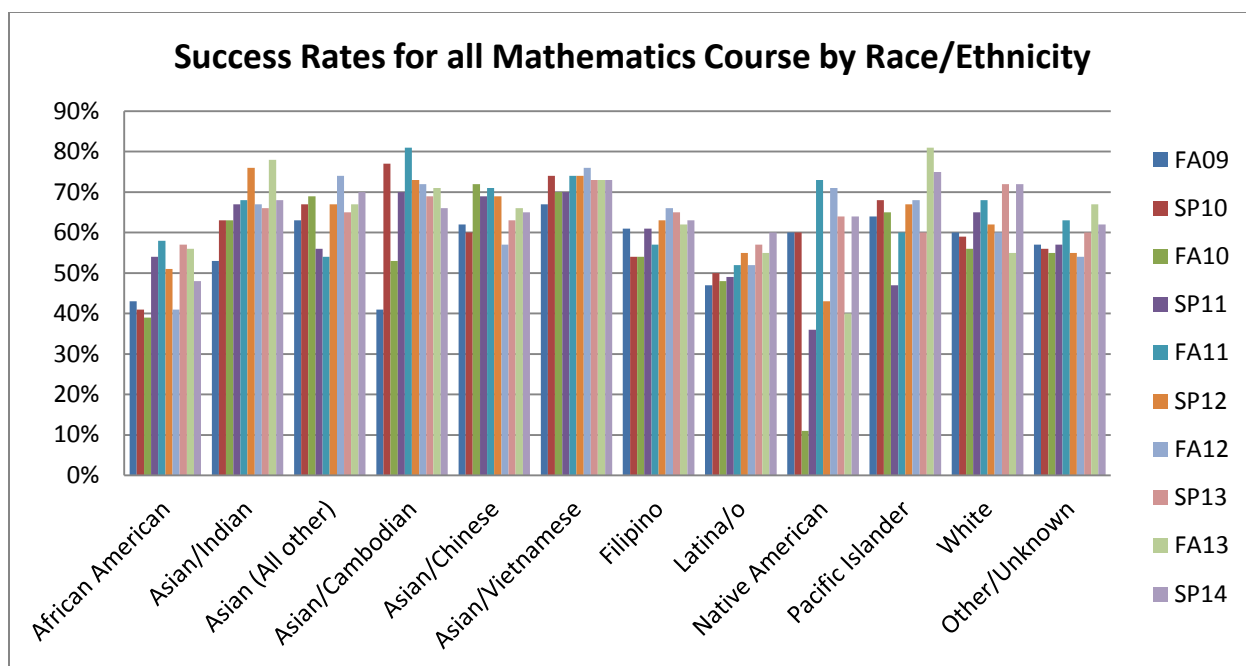
Fig. 14 *Success per race/ethnicity since fall 2009: Semester to Semester. Source: PORTAL (RIE)*

In short, there continues to be the disparity where Asian and White students succeed at a far higher rate (74% and 68%, respectively) than African American and Latina/o students (41%, 60%, and 65%, respectively). The department is interested in a MESA (Mathematics, Engineering, Science Achievement) Program, but there seems to be very little support from the college to fund such a program. A MESA program would help to increase enrollment in the Math AS-T program where enrollment is barely 12% of the total number of students taking Mathematics courses.

Cohorts of the favorite pathway from developmental to transfer level Mathematics

In 2009, a group of students were tracked for four years. The fall 2009 cohort shows that out of 560 students enrolled in Beginning Algebra (two levels below transfer), 138 were able to complete Statistics. On average, it appears that the number of students completing Statistics after four years is less than 20% (enrolled in Beginning Algebra and four years later complete a Mathematics transfer level course). Although the data is typical for most community colleges, more resources are needed to improve this pipeline to transfer level for all students. Note that we do not have access to disaggregated data for this cohort, so we do not have enough information to identify the ethnic groups that are more affected by the leaky pipeline. It would have been very useful to know at what rate those groups with the lowest success rates are completing statistics.
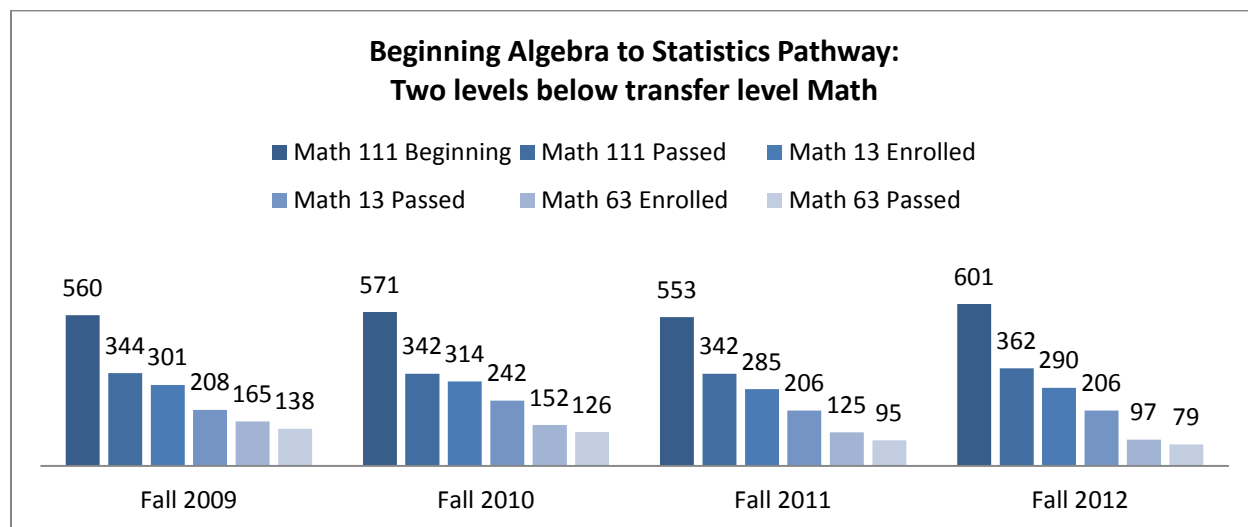
Fig. 15 *Pipeline from two levels below (Beginning Algebra) to completing a Math transfer level course (Statistics). Data shows that less than 20% of the students will complete a higher level course. Source PORTAL (RIE).*

On the other hand, if the students enroll in just one level below transfer level math, about 30% of the students will eventually complete Statistics in a period of four years. This confirms that the more time students remain at the developmental level, the less likely the students will reach transfer level. At this time, we do not have access to disaggregated data for this cohort. It would be interesting to know at what rate those groups with the lowest success rates (high at-risk students) are able to complete any higher-level math course.
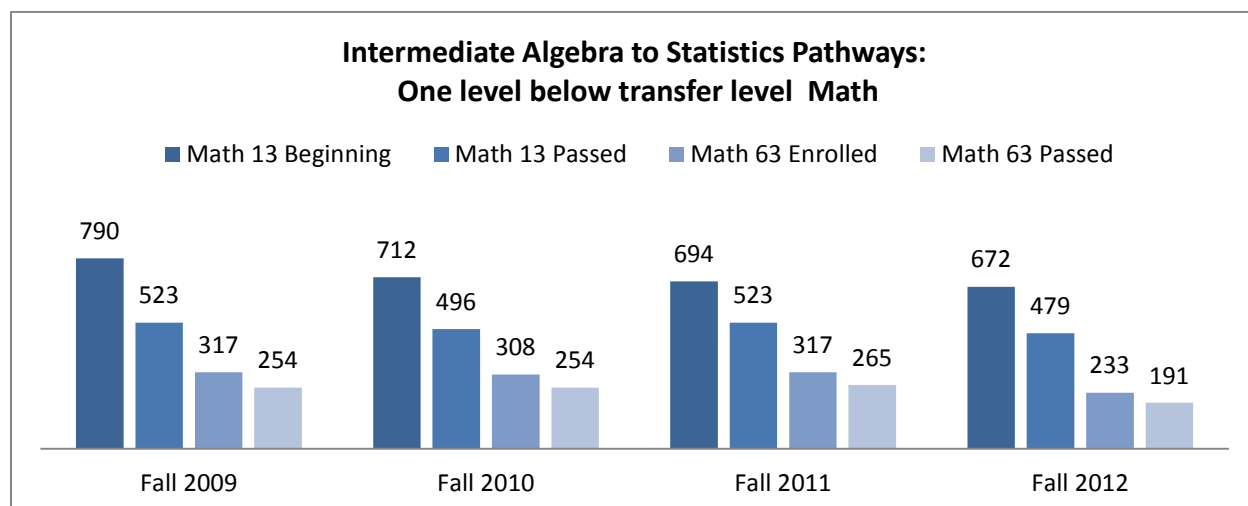
Fig. 16 *Pipeline from one level below (Intermediate Algebra) to completing a Math transfer level course (Statistics). Source PORTAL (RIE)*

These two last graphs and the one below show that there is a lot of work to do to improve the pipeline from remedial mathematics to college-level mathematics. The cohort of fall 2011 shows that we lose many of our students in Math 111 (Beginning Algebra) and some more in Math 13 before they even enroll in Math 63 (Statistics). Although the data is comparable to other community colleges in the state, we have set targets to improve our pipeline (see the executive summary) and to move our students into college-level courses. This program review process has shown to us that developmental mathematics (our largest student segment) must be a priority for the department. Unfortunately, the Mathematics Department does not have access to disaggregated data by ethnic groups (cohorts), so it is problematic to design educational interventions that would target the most underperforming groups and it is impossible, at the present time, to define indicators that could help us to gauge the success of any educational intervention. Nevertheless, compressed courses and a bridge program are some of the interventions that the Mathematics Department wants to implement, but we need the support to complete these projects.
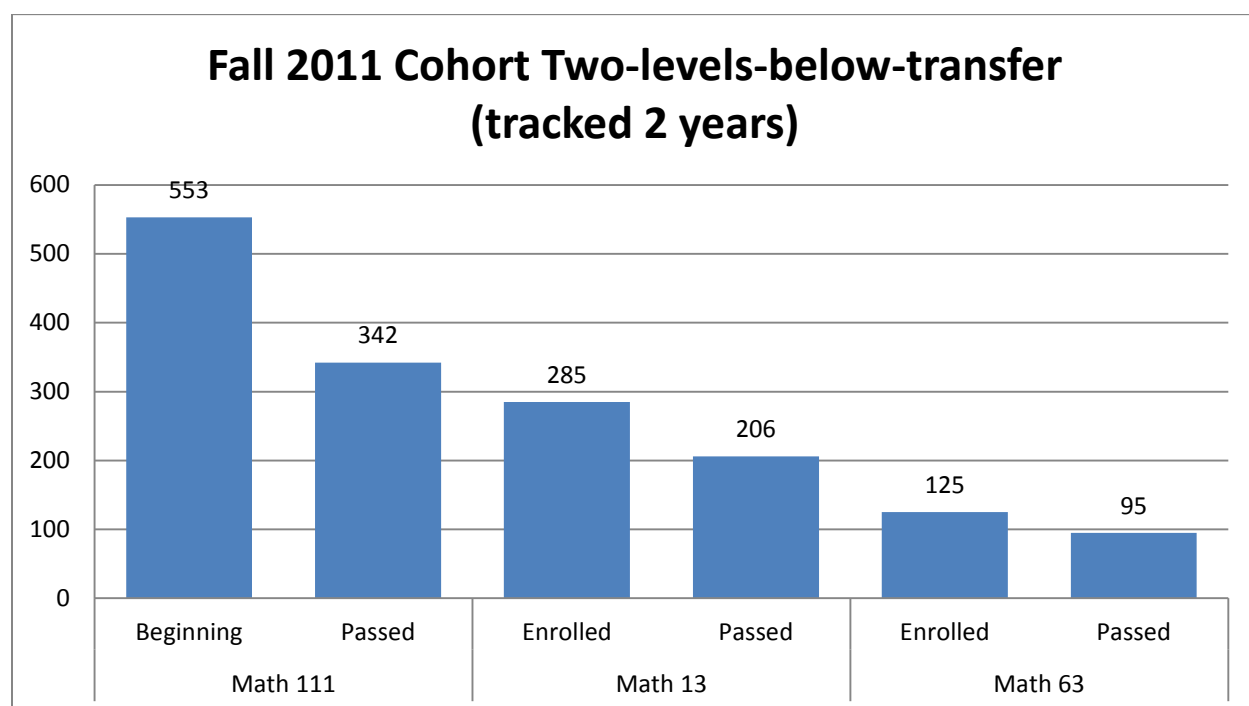
Fig. 17 *Pipeline from two levels below (Beginning Algebra) to completing a Math transfer level course (Statistics). Note how less than 20% of the students ever complete a transfer level course. Source PORTAL (RIE)*

In addition to reducing class size, better classrooms (i.e., designs that facilitate cooperative and collaborative learning) will be needed to meet the educational needs of the developmental students. Moreover, new learning methodologies that will take advantage of state-of-the-art classrooms will be required to help all students prepare for and move into college-level courses more quickly: professional development for ALL instructors and sustained college support is a must if the college is serious about improving the outcomes of ALL mathematics students.

Cohort of Fall09-Summ13
Three Levels Below Transfer

Fall09-Summ13

Category	Value
Enrolled Three Levels Below Transfer	324
Passed Three Levels Below Transfer	210
Enrolled Two Levels Below Transfer	153
Passed Two Levels Below Transfer	105
Enrolled One Level Below Transfer	88
Passed One Level Below Transfer	70
Enrolled Transfer	57
Passed Transfer	49
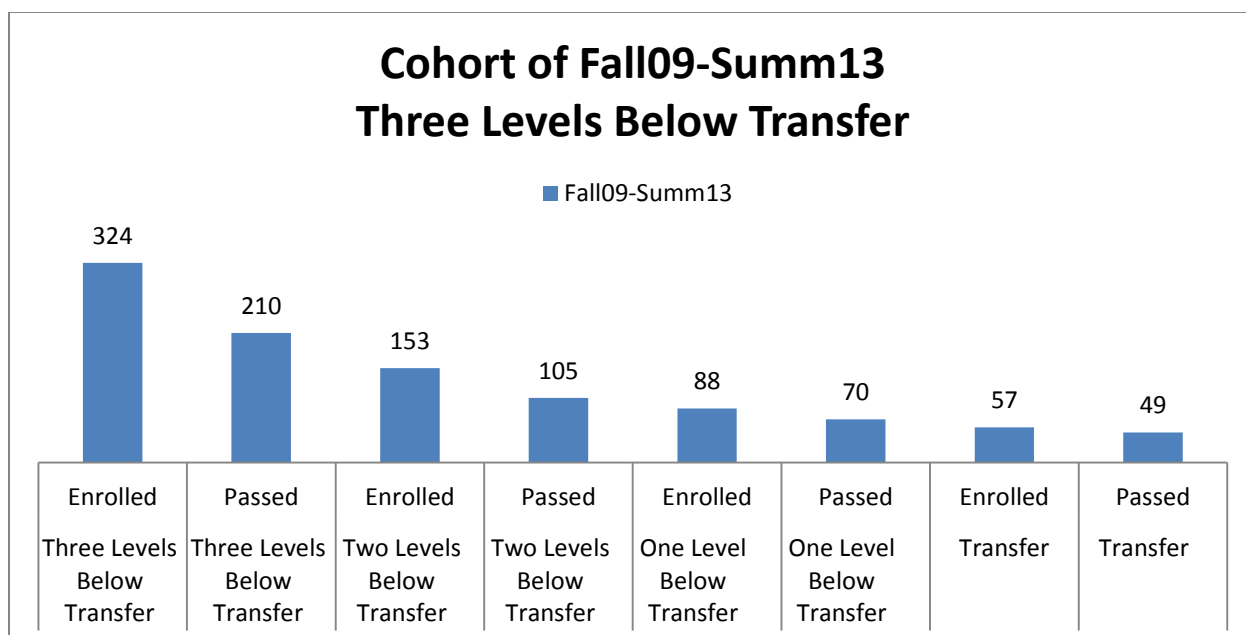
Fig. 18 *Pipeline from three levels below (Arithmetic and Prealgebra) to completing a Math transfer level course (any course). Note how fewer than 20% of the students ever complete a transfer level course. Source Chancellor State Office.*

TRANSFER LEVEL Pathway findings

Another smaller cohort of students (n=343) that was disaggregated by race shows that White, Latino/a and African-American groups have a low chance of being successful in finishing a transfer level course in Mathematics. By looking at the number of attempts in the table below, one may conclude that many students gave up after few attempts. The cohort data for two levels below transfer disaggregated by race/ethnicity was not provided even after multiple requests to the research office. The data shown below comes from the Chancellor. Not having appropriate student data to help us to analyze the health of the mathematics program made the writing of this program review report more difficult.

DATA FROM THE STATE CHANCELLOR'S OFFICE (see the scorecard reports).

	Fall 2011-Summer 2013 Cohort						
	One Level Below Transfer			Transferable			
	Students	Attempts	Success	Students	Attempts	Success	Pipeline percentage
Mathematics Total	343	418	257	179	279	137	39.9%
African-American	12	15	7	5	5	4	33.3%
American Indian/ Alaskan Native	1	1	1	1	3	1	100.0%
Asian	143	163	119	80	135	69	48.3%
Latino/a	136	175	90	64	94	45	33.1%
Multi-Ethnicity	9	12	6	6	12	5	55.6%
Unknown	10	12	9	7	9	5	50.0%
White Non-Hispanic	32	40	25	16	21	8	25.0%

Transferable includes all the transfer-level courses offered by the Mathematics Department. Most of the 137 students that were successful took Math 63 (Statistics). Twenty-one students of this cohort eventually reached Calculus (Math 71). Only one student of the cohort of 343 students finished Math 73. In other words, most of the students who begin their education at the college at the developmental level course will never reach a Calculus level course. Moreover, the table above shows that there is an adverse impact on the following ethnic groups (own average is below the pipeline average for the college): African-American (33.3%), Latina/o (33.1%) and White Non-Hispanic (25%). Also, most people who reach the transferable level take a Math 63 course as its final Math course. This conclusion can be found from examining the data for completion of the Math AS-T degree. The graph below shows the number of students declaring intention of completing the Math AS-T degree and the number of students that, so far, have completed the degree. The data may indicate that many students decide to transfer before completing the Math AS-T degree. More information to confirm this hypothesis is needed.
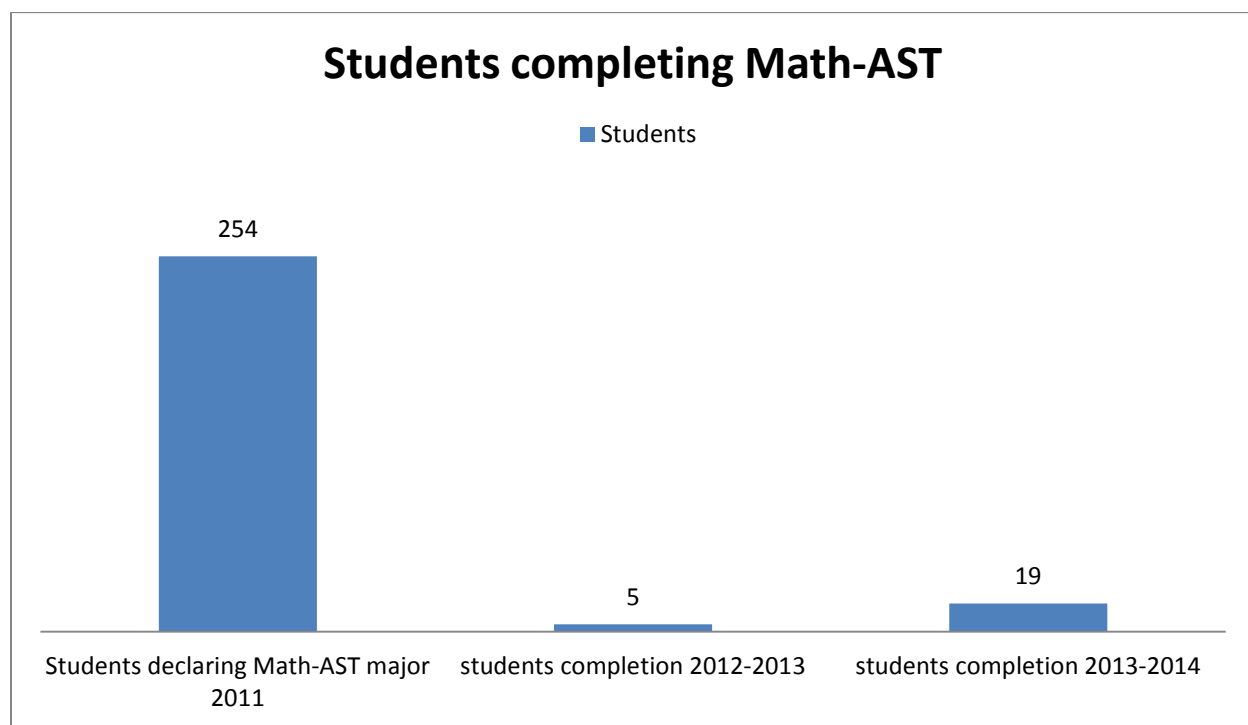
Fig. 19 Completion Data of the Math-AST degree. *Source Data Mart Chancellor's Office*

In short, it appears that one of the challenges of the Mathematics Department is to shake the notion that Evergreen Valley College is a place where you complete your developmental courses before you transfer to another community college.

Advisory boards and/or professional organizations, describe their roles.

Not applicable. The Math Department does not have grants or has not applied for grants.

FLOW COUNTS (by ethnic group for Math310 to Math13)

The data below shows a revealing picture of how many students, who are successful in Math 310/311 (arithmetic), were able to finish the basic Math skills courses at EVC: only 17% (487 out of 2797 students) were able to complete the sequence. African Americans and Latina/o were the two worst performing groups (9% and 13% respectively). More data about the pipeline to transfer Math courses (statistics, precalculus and calculus courses) is needed to understand better the reasons for the output rate.
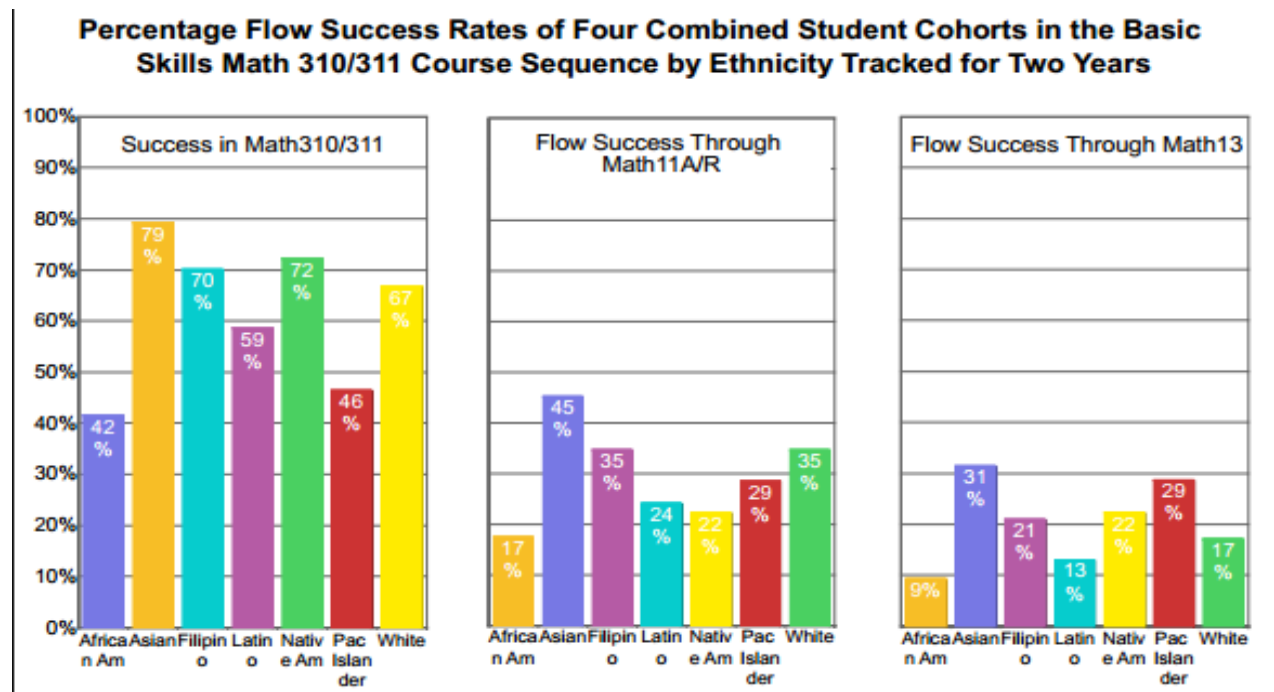
Percentage Flow Success Rates of Four Combined Student Cohorts in the Basic Skills Math 310/311 Course Sequence by Ethnicity Tracked for Two Years

Combined Cohort Flow Counts and Flow Success Rates of Four Combined Student Cohorts in the Basic Skills Math 310/311 Course Sequence by Ethnicity Tracked for Two Years

Ethnicity	1st Level Course			2nd Level Course				3rd Level Course			
	Attmp Math310/311	Succ Math310/311	Succ Rate	Attmp Math11A/R	Succ Math11A/R	Succ Rate	Flow Succ Rate	Attmp Math13	Succ Math13	Succ Rate	Flow Succ Rate
African Am	183	76	42%	68	32	47%	17%	34	17	50%	9%
Asian	515	408	79%	340	233	69%	45%	254	162	64%	31%
Filipino	167	117	70%	102	58	57%	35%	69	35	51%	21%
Latino	1,413	827	59%	733	341	47%	24%	400	184	46%	13%
Native Am	18	13	72%	10	4	40%	22%	6	4	67%	22%
Other/Unkwn	280	183	65%	133	69	52%	25%	76	44	58%	16%
Pac Islander	28	13	46%	14	8	57%	29%	12	8	67%	29%
White	193	129	67%	103	67	65%	35%	76	33	43%	17%
Combined	**2,797**	**1,766**	**63%**	**1,503**	**812**	**54%**	**29%**	**927**	**487**	**53%**	**17%**

Note: All flow success rates are the number of individual students earning a grade of C or Pass or better at least once at each sequence level as a percentage of the initial cohort count, that is, the number of students attempting and receiving a grade (including the W grade) in the initial first-level course during the cohort year.

Definitions:
1. Cohorts are defined as students taking and receiving a grade in the initial course in the Fall or Spring term of the specified cohort year.
2. Counts are unduplicated; students may have attempted and/or succeeded in a course more than once; multiple attempts and multiple successes at each level are counted only once.
3. Cohorts are followed from their initial term through the Summer of the last of the indicated number of years (including summer terms between).
4. Students are tracked for classes after the initial college-based, first-level attempt at the same college.
5. Combined Cohorts is the aggregation of all available annual cohorts. See report page "Sequence by Cohort" for details of each cohort.

FLOW COUNTS (by ethnic group from Math 11 to Math 21/22/25 STEM transfer courses)

The data below shows an interesting picture of how most students, who are successful in Math 13 (intermediate algebra), appear to choose the statistics path (Math 63) rather than to continue towards the STEM math sequence: only 193 out of 1431 possible students decided to continue to STEM, and only 78 out of those 193 completed successfully a precalculus course: **1% were females** (25 female students) and 3% males (53 male students). Much more work and outreach are necessary to increase the pipeline to STEM (Mathematics, Physics and Engineering courses) at EVC.

Percentage Flow Success Rates of Four Combined Student Cohorts in the Basic Skills Math 11A/R Course Sequence by Ethnicity Tracked for Two Years

Combined Cohort Flow Counts and Flow Success Rates of Four Combined Student Cohorts in the Basic Skills Math 11A/R Course Sequence by Ethnicity Tracked for Two Years

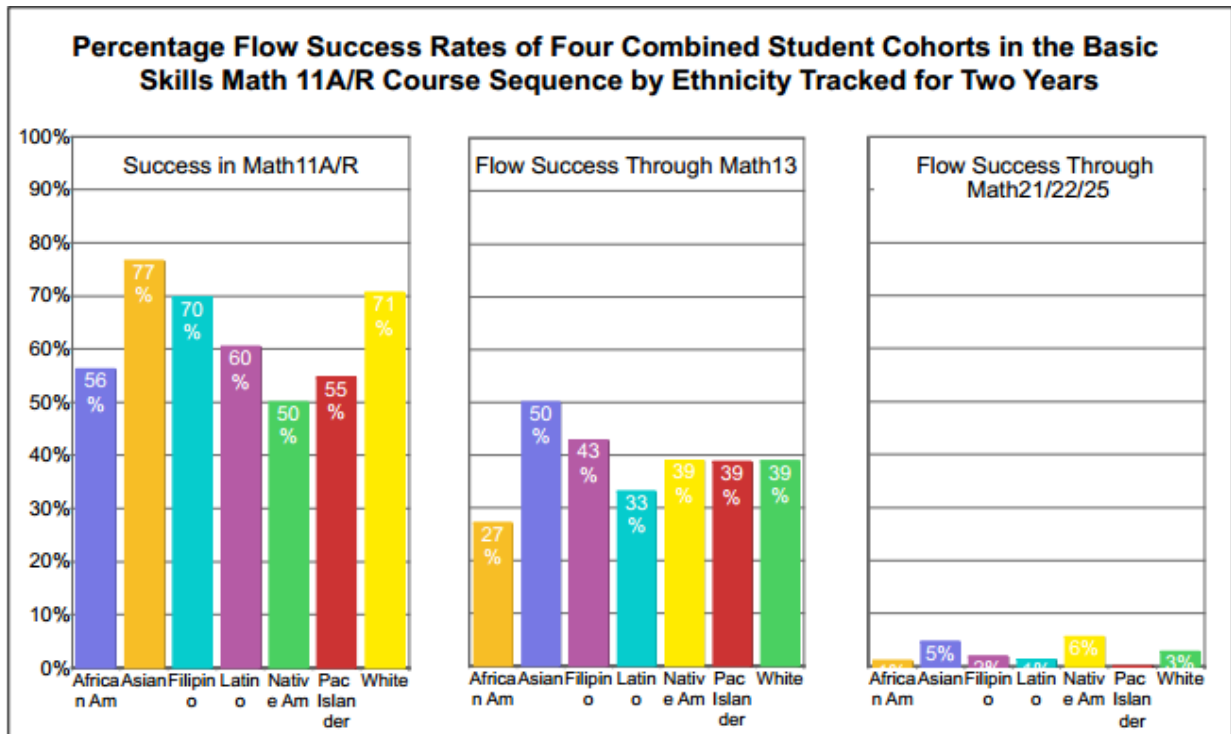| Ethnicity	1st Level Course			2nd Level Course				3rd Level Course			
	Attmp Math11 A/R	Succ Math11 A/R	Succ Rate	Attmp Math13	Succ Math13	Succ Rate	Flow Succ Rate	Attmp Math21/22/25	Succ Math21/22/25	Succ Rate	Flow Succ Rate
African Am	192	108	56%	108	52	48%	27%	8	2	25%	1%
Asian	733	561	77%	537	366	68%	50%	65	34	52%	5%
Filipino	320	223	70%	221	137	62%	43%	19	6	32%	2%
Latino	1,760	1,063	60%	1,055	582	55%	33%	66	23	35%	1%
Native Am	18	9	50%	8	7	88%	39%	1	1	100%	6%
Other/Unkwn	342	230	67%	230	141	61%	41%	14	3	21%	1%
Pac Islander	44	24	55%	31	17	55%	39%	2	0	0%	0%
White	333	235	71%	211	129	61%	39%	18	9	50%	3%
Combined	**3,742**	**2,453**	**66%**	**2,401**	**1,431**	**60%**	**38%**	**193**	**78**	**40%**	**2%**

Note: All flow success rates are the number of individual students earning a grade of C or Pass or better at least once at each sequence level as a percentage of the initial cohort count, that is, the number of students attempting and receiving a grade (including the W grade) in the initial first-level course during the cohort year.

Definitions:

Part B: Curriculum

1. **Identify all courses offered in the program and describe how the courses in the program meet the needs of the students and relevant discipline(s).**

   <u>Developmental Mathematics Courses</u>

   Mathematics 300 – Basic Mathematical Skills
   Mathematics 310 – Basic Mathematics
   Mathematics 311 – Pre-Algebra
   Mathematics 111 – Elementary Algebra
   Mathematics 013 – Intermediate Algebra
   Mathematics 014 – Geometry

   <u>College-level Mathematics</u>

   Mathematics 021 – Precalculus Algebra
   Mathematics 022 – Trigonometry
   Mathematics 025 – Precalculus Algebra and Trigonometry
   Mathematics 051 – Mathematics for General Education
   Mathematics 052 – Mathematics for Elementary Education
   Mathematics 061 – Finite Mathematics
   Mathematics 062 – Calculus for Business and Social Science
   Mathematics 063 – Elementary Statistics
   Mathematics 071 – Calculus I with Analytic Geometry
   Mathematics 072 – Calculus II with Analytic Geometry
   Mathematics 073 – Multivariable Calculus
   Mathematics 078 – Differential Equations
   Mathematics 079 – Linear Algebra

Many of the students who attend Evergreen Valley College (EVC) are in need of remediation in mathematics. Accordingly, the majority of mathematics sections offered by the college are in developmental mathematics (54 out 87 total sections in the fall of 2014). They included one section of Basic Mathematical Skills, seven sections of Basic Mathematics, seven sections of Pre-Algebra, 17 sections of Elementary Algebra, 18 sections of Intermediate Algebra, and four sections of Geometry.

Students must complete at least one college-level mathematics course to earn an associate degree or transfer to a four-year university to earn a baccalaureate degree. This requirement can be met by completing a course in Precalculus Algebra, Mathematics for General Education, Mathematics for Elementary Education, Finite Mathematics, Calculus for Business and Social Science, or Elementary Statistics. EVC offers two sections of Precalculus Algebra, one section of Mathematics for Elementary Education (per year), two sections of Finite Mathematics, three sections of Calculus for Business and Social Science, and 14 sections of Elementary Statistics. Courses in Finite Mathematics and Calculus for Business and Social Science target students majoring in Business. The college offers the 14 sections of Elementary Statistics for students who are majoring in Business, Nursing, or Psychology, as well as students satisfying a general educational requirement.

Each semester, EVC also offers two sections of Precalculus Algebra, one section of Trigonometry, four sections of Precalculus Algebra and Trigonometry, three sections of Calculus I, two sections of Calculus II, two sections of Multivariable Calculus, one section of Linear Algebra, and one section of Differential Equations (once a year). These courses serve the educational needs of students in Business and Economics, and STEM fields such as Physics, Chemistry, Engineering, and Computer Science, as well as Mathematics majors.

2. **State how the program has remained current in the discipline.**

The Mathematics faculty is continually involved in staff development activities, including upper division and/or graduate-level coursework as well as attendance and participation at professional conferences and/or workshops. Several of our faculty members have played prominent roles in professional associations. The department offers hybrid and/or on-line courses in Intermediate Algebra, Precalculus Algebra and Trigonometry, Finite Mathematics, and Elementary Statistics. Some of our faculty members have begun to incorporate technology (such as ALEKS) into our developmental offerings. The department is also looking into a computer algebra system such as Mathematica to support our mathematics courses for STEM students.

3. **All course outlines in this program should be reviewed and revised every six years. If this has not occurred, please list the courses and present a plan for completing the process, including timelines and dates for each course.**

With the exception of Mathematics 51 (Mathematics for General Education), every course in our Mathematics curriculum has been updated within the last six years. Although Mathematics 51 has not been offered at EVC in the last five years, the department recently decided to keep this course "on the books," and will complete a curricular update of the course in the Spring of 2015.

4. **Identify and describe innovative strategies or pedagogy your department/program developed/offered to maximize student learning and success. How did they impact student learning and success?**

The Mathematics department has developed a wide range of innovative strategies that suit the varied needs and learning styles of our students. Some of these practices include the following:

1. Technological innovation

Web-based course management systems such as MyMathLab, MyStatLab, MyMathText, and Enhanced WebAssign, have been incorporated into many of our mathematics offerings. These systems provide an interactive homework component with pre-worked examples, step-by-step interactive problems, selected videos, text references, direct e-mail to the instructor with reference to a particular problem, and quizzes. In addition, students who use MyMathLab are eligible for free phone tutoring in the evening.

Online courses and web mediated courses enable students to listen to video lessons created by the instructor as well as those created by the authors of online textbooks. These courses make use of electronic texts, costing only a fraction of the cost of traditional textbooks, contain an incredibly robust assortment of resources and offer excellent course management systems.

2. Honors Projects

One of our faculty members is supervising honor students' projects in Multivariable Calculus, Differential Equations, and Linear Algebra. These projects address problems which are deeper and more difficult than those typically encountered in these courses. When a student's work is particularly good, the student has an opportunity to present his or her work in a student session at a mathematics conference sponsored by the Mathematical Association of America.

3. Mathematics Education

The department offers several courses that are directed at future elementary school teachers: Mathematics for Elementary Education, Edu 12, and Edu 13. Students are trained to use Mathematics manipulatives and give oral teaching presentations. Finally, a Service Learning component, which enables students to get credit for tutoring Mathematics in local elementary schools, has been incorporated into the course.

4. Enlace Courses

Enlace courses in Mathematics include a lecture/lab format that offers hands-on learning in a collaborative, bilingual, and multicultural setting. Group work, cultural relevance, and a mastery approach are some of the features of these classes. Enlace students are required to use graphing calculators in Mathematics 13 (Intermediate Algebra) and Mathematics 63 (Elementary Statistics). ALEKS is also being incorporated into some of the Enlace classes. The Enlace STEM Project seeks to recruit, support, and transfer students into STEM careers. Many of these students are working as tutors in the Math and Science Resource Center. Enlace has also established partnerships with NASA to offer internships and job shadowing to some of our students.

5. Discuss plans for future curricular development and/or program (degrees & certificates included) modification. Use a Curriculum Mapping form if needed.

A. In 2011, the department established an Associate Degree for Transfer (AS-T) in Mathematics. Following much discussion in the years since, the department made the decision to update our PLOs as well individual course SLOs in 2014. The latest version of our AS-T in Mathematics is the following:

Criteria A. Appropriateness to Mission.

1. Statement of Program Goals

The Associate in Science in Mathematics for Transfer is designed for students intending to transfer to a California State University and pursue a baccalaureate degree in Mathematics, Applied Mathematics, and related fields such as Statistics, Engineering, or Computer Science.

Upon completion of the Associate in Science in Mathematics for Transfer, the student should be able to:

1. Develop creative and logical solutions to various abstract and practical problems.
2. Use mathematics to model and solve applied problems in engineering and science.
3. Demonstrate didactic reasoning to construct elementary proofs to theorems.

2. Catalog Description

Mathematics has been an important academic discipline in its own right for over 2500 years. In addition, mathematics provides the foundation for the study of physical, biological, health and computer sciences, engineering, statistics, economics, and many other disciplines. Graduates who complete a baccalaureate degree in Mathematics are prepared for employment as computer programmers, actuaries, data analysts, financial analysts, operations researchers, and educators. Others continue their studies and pursue advanced degrees in business, medicine, and law.

The Associate in Science in Mathematics for Transfer (AS-T) degree is intended for students who plan to complete a baccalaureate degree in Mathematics or a related field of study at a California State University. Students who complete this degree are guaranteed admission to the CSU system, *but not to a particular campus or major*. Students transferring to a CSU campus that accepts the Associate in Science in Mathematics for Transfer will be required to complete no more than 60 semester units after transfer to earn a baccalaureate degree.

To earn an Associate in Science in Mathematics for Transfer degree, students must complete the following requirements:

- 21-23 semester units in the Associate in Science in Mathematics for Transfer major, each with a grade of C or better. *[Title 5, section 55063(a)]*;

- either the California State University General Education Breadth pattern (CSU GE), which requires 39 units, or the Inter-segmental General Education Transfer Curriculum (IGETC) which requires 37 units; and
- a minimum of 60 CSU-transferable semester units with a minimum GPA of 2.0.
- <u>Please Note:</u> No more than 60 units are required for this degree and no additional requirements will be imposed by Evergreen Valley College (CEC section 66746). In addition, remedial non-collegiate level coursework will not be counted toward units required for the associate degree for transfer.

Students should meet with their counselors as early as possible in order to develop an effective educational plan.

ASSOCIATE IN SCIENCE DEGREE IN MATHEMATICS FOR TRANSFER

REQUIRED CORE COURSES		UNITS
MATH-071	Calculus I with Analytic Geometry	5.0
MATH-072	Calculus II with Analytic Geometry	5.0
MATH-073	Multivariable Calculus	5.0
	Total Core Units:	**15.0**

Students must also complete a minimum of six units from Group A and Group B with at least three units (and possibly seven) selected from Group A.

Group A

MATH-078	Differential Equations	4.0
MATH-079	Linear Algebra	3.0

Group B

COMSC-072	Discrete Mathematics	4.0
COMSC-075	Computer Science I: Introduction to Program Structures	4.0
MATH-063	Elementary Statistics	3.0
PHYS-004A	General Physics	5.0
	Total Required Units:	**21- 24.0**

CATEGORY	UNITS
Units in Major	21- 24.0
CSU GE or IGETC	37- 39.0
Possible double counting of CSU GE or IGETC	3 - 6.0
Transferable Electives	2 - 8.0
Total Units	**60.0**

Sample Two-Year Program

First Semester

Course	Units
MATH 71 (Area B4 G.E.)	5.0
ENGL 1A (Area A2 G.E.)	3.0
Area D (G.E.)	3.0
Area B2 (G.E.)	3.0
Total	**14.0**

Second Semester

Course	Units
MATH 72	5.0
Area A3 (G.E.)	3.0
Area D (G.E.)	3.0
Area C2 (G.E.)	3.0
Total	**14.0**

Third Semester

Course	Units
MATH 73	5.0
MATH 79[*] or Group B	3.0-4.0
PHYS 4A (Area B1 G.E.)	5.0
Area A1 (G.E.)	3.0
Total	**16.0-17.0**

Fourth Semester

Course	Units
Math 78* or Group B	3.0-4.0
Area D (G.E.)	3.0
Area C1 (G.E)	3.0
Area C2 (G.E.)	3.0
Area E (G.E.)	3.0
Total	**15.0-16.0**

(*) Students must complete at least one of Math 78 or Math 79.

B. The department offers an Associate in Arts in General Studies with Emphasis in Mathematics for Secondary School Teaching. The summary of the program follows.

Upon completion of the AA degree in General Studies with an Emphasis in Mathematics for Secondary School Teaching, a student will be prepared to enter a BA or BS degree program at a four-year college or university with a major in mathematics. Further, the student will have completed education courses and Service Learning to be on track with the UC Cal Teach Program or a CSU teacher preparation program leading to a fifth-year Secondary School Credential Program. Students must complete all Area of Emphasis requirements with a "C".

Upon completion of the Associate in Science in Mathematics for Transfer, the student should be able to:

1. Apply problem-solving methods to application problems involving linear equations and inequalities.
2. Categorize and distinguish the particular and special characteristics of linear, quadratic, absolute value, exponential, and logarithmic functions.
3. Analyze polynomial functions of higher order, and apply to them the remainder theorem, factor theorem, and fundamental theorem of algebra and its corollaries to study their rational, irrational, and complex roots.
4. Apply the principles of analytical trigonometry, including fundamental identities and formulas, in solving a variety of practical problems.
5. Use matrix methods to solve problems that involve systems of three or more linear equations.
6. Use the methods of calculus to solve problems involving rates of change, vectors, and interpretations of areas and volumes.
7. Recognize and identify the best practices in teaching.
8. Assess the diversity of learners in a classroom and evaluate teaching methods that address the variety of ways that students learn.
9. Distinguish between learner-centered and teacher-centered curricula and distinguish between classroom approaches that are inquiry-based (hands-on) and those that are informational.
10. Describe how national and state standards in science and mathematics affect curricular design and testing.

<u>Area of Emphasis Requirements</u>

MATH 071	Calculus I with Analytic Geometry*	....	5.0
MATH 072	Calculus II with Analytic Geometry	....	5.0
MATH 073	Multivariable Calculus	....	5.0
EDUC 012MS	Math & Science Future Teacher Seminar I	....	3.0
EDUC 013MS	Math & Science Future Teacher Seminar II	....	3.0
EDIT 010	Computers in Education	....	3.0

<u>General Education Requirements</u>
Complete a 39 unit (minimum) CSU Lower Division General Education requirements. Students should see a counselor in order to select the best method to meet their academic goals.

Area A: English Language Communication & Critical Thinking 9.0
>(One course from each area)
>A1　　Oral Communications
>A2　　Written Communication (English 001A)
>A3　　Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning 6.0*
>(One course from B1, B2, B4; one with lab)
>B1　　Physical Science (Physics-004A Recommended)
>B2　　Life Sciences B4 Mathematics/Quantitative Reasoning*

Area C: Arts & Humanities 9.0
>(Minimum one course from each area)
>C1　　Arts: Arts, Cinema, Dance, Music, Theater
>C2　　Humanities: Literature, Philosophy, Language Other than English

Area D: Social Sciences 9.0
>(3 courses in at least two categories)
>(2 of these courses may be used to satisfy the American Institutions requirement:
>HIST-017A & History 017B or HIST-001 and POLSC- 001)
>Psych 001 (Recommended)

Area E: Lifelong Learning & Self-Development 3.0

Area of Emphasis Requirements	....	24.0
General Education Requirements	....	36.0
Physical Activity	....	1.0
Total	....	**61.0**

*3 units of General Education (area B4) can be met with Math 071

C. Discuss how your program is articulated with the High School Districts, CCOC (if applicable), and/or other four-year institutions. (Include articulation agreements, common course numbering etc.)

Students who attend middle schools and high schools that feed the San Jose/Evergreen Community College District can take Elementary Algebra, Intermediate Algebra, Geometry, Precalculus Algebra and Trigonometry, and Elementary Statistics, and receive high school credit for Algebra I, Algebra II, HS Geometry, Precalculus Algebra and Trigonometry, and Elementary Statistics, respectively. Moreover, students are able to get credit for Calculus I and II by taking the AP Calculus exam.

Precalculus Algebra, Precalculus Algebra and Trigonometry, Finite Mathematics, Calculus for Business and Social Science, Elementary Statistics, Calculus I with Analytic Geometry, Calculus II with Analytic Geometry, and Multivariable Calculus are all transferable to the California State University and the University of California.

Some University of California campuses combine Differential Equations and Linear Algebra and give students credit only if they have taken both. Otherwise, these courses are transferrable to the University of California. Some of the CSU campuses offer Differential Equations and/or Linear Algebra as upper division courses and will only give students content credit for comparable lower division courses taken at Evergreen Valley College. Otherwise, our new AS-T in Mathematics should be a factor in mitigating any difficulties associated with transfer of these courses to the CSU.

D. If external accreditation or certification is required, please state the certifying agency and status of the program.

This is not applicable since Mathematics is not a vocational program.

1. **On the course level,**
   A. **List all the courses and their student learning outcomes and provide a link to the ACCC course outline of record.**
   B. **List or describe all assessment mechanisms you are using to evaluate program student learning outcomes. Please provide the link to the SLO assessment matrices.**
   C. **Since your last program review, summarize SLO assessment results at the program level.**
   D. **What plans for improvement have been implemented by your program as a result of SLO assessment?**

   The following courses have current student learning outcomes:

Course Number	Course Title	Updated
Mathematics 300	Basic Mathematical Skills	2009
Mathematics 310	Basic Mathematics	2008
Mathematics 311	Pre-Algebra	2010
Mathematics 111	Elementary Algebra	2011
Mathematics 013	Intermediate Algebra	2010
Mathematics 014	Geometry	2010
Mathematics 021	Precalculus Algebra	2012
Mathematics 022	Trigonometry	2012
Mathematics 025	Precalculus Algebra and Trigonometry	2012
Mathematics 051	Mathematics for General Education	2006
Mathematics 052	Mathematics for Elementary Education	2010
Mathematics 061	Finite Mathematics	2013
Mathematics 062	Calculus for Business and Social Science	2011
Mathematics 063	Elementary Statistics	2011
Mathematics 071	Calculus I with Analytic Geometry	2013
Mathematics 072	Calculus II with Analytic Geometry	2013
Mathematics 073	Multivariable Calculus	2013
Mathematics 078	Differential Equations	2014
Mathematics 079	Linear Algebra	2012

Every course in our curriculum has been updated within the last six years except Math 051. The department is in the process of updating this course even though two principal faculty members who have been teaching the course already retired or are in the process of retiring.

The course outlines and student learning outcomes for each of these courses may be found at the following link (must be accessed through the SJECCD local network):
\\Do_data_whse\r&p\Curriculum\Course Outlines\5 – Final

The course outlines of Record may also be found on the Division T-Drive.

Student Learning Outcomes for each course have been evaluated since 2012. All the SLO assessment matrices may be found at:
http://www.evc.edu/discover-evc/student-learning-outcomes-(slos)

The Math Department courses and their SLOs and assessments are:

Mathematics 300—Basic Mathematical Skills

The department is in the process of doing the assessment for this course. No assessment has been done in the last three years since it has been taught by adjunct faculty. The future of this course is uncertain since it has a very low enrollment every semester, and is five levels below transfer.

Mathematics 310—Basic Mathematics

Student Learning Outcomes:

1. Demonstrate mastery of arithmetic operations on integers, fractions, and decimals.
2. Evaluate and simplify Algebraic expressions containing exponents and square roots.
3. Solve simple equations using the addition and multiplication properties of equality.
4. Demonstrate the ability to factor numbers into primes and to convert numbers between standard notation and scientific notation.
5. Apply critical thinking skills to solve applications involving areas, perimeters, percentages, ratios or proportions.

Assessment Tools:

The tools we used to assess these SLOs were questions from exams and/or the final exam at the end of the semester. The following contain some questions embedded in the final exam. The assessment results were reported in EVC's SLO assessment matrices.

- Solve problems using arithmetic operations on integers, fractions, and decimals. An expression was given to students to test their knowledge on operations used to simplify an expression containing integers, fractions, and decimals (SLO # 1).
- Evaluate and simplify Algebraic expressions containing exponents and square roots. An algebraic expression containing exponents and square roots was given to students to evaluate (SLO # 2).
- Solve simple equations using the addition and multiplication properties of equality. An equation was given to students to solve (SLO # 3).
- Demonstrate the ability to factor numbers into primes and to convert numbers between standard notation and scientific notation. Students were asked to convert between a number in standard decimal notation and a number in scientific notation (SLO #4).
- Apply critical thinking skills to solve applications involving areas, perimeters, percentages, ratios or proportions.
- Students were given a parallelogram with given dimensions and were asked to calculate its area (SLO # 5).
- Find the area of a parallelogram with a base of $(Z + 12)$ and a height of $(Z + 5)$.
- Solve the following equation: $6t - 36 = 12t + 72$.

Evaluation Timeline:
These SLOs were assessed in summer 2013, fall 2013, and spring 2014.

Assessment Results:

Beginning in summer 2013 and continuing through spring 2014, these SLOs on the course level have been assessed at least once. This course serves as a bridge between Math 310 (Basic Mathematics) and Math 111 (Introductory Algebra). The results were good for the so called arithmetic and order of operations portion and of the course: 98% answered correctly on solving problems using arithmetic operations on integers, fractions, and decimals (SLO # 1), 85% answered correctly on evaluating and simplifying Algebraic expressions containing exponents and square roots (SLO # 2). This is to be expected, since much of this arithmetic and

order of operation material serves as a review for many of these students. As for the results of the algebra, geometry, and applications portion of the course, the numbers are more modest: 61% answered correctly for solving equations (SLO # 3), 65% answered correctly on application problems involving converting between decimal notation and scientific notation (SLO # 4), and 53% answered correctly in calculating perimeters, areas, and volumes of geometric figures (SLO # 5).

Action Plan and Timeline:

SLO assessment for this course has begun and continued every semester since spring 2012. The current 5 SLOs on record for this course have been assessed so far. We are approaching the 3 year point (about the midpoint) of the current 6 year assessment cycle for SLOs at EVC, and we are well within the parameters for meeting EVC's SLO assessment requirements for this course. The course outline for Math 311 will most likely be revised sometime during 2015. We will continue to re-assess the current SLOs for this course. Beginning in fall 2015 semester, Professor Lombard will regularly be teaching at least one section of Math 311 each semester; this will allow us to assess these Math 311 students and provide us an opportunity to improve on the assessment results for this class, and perhaps adjust the curriculum for this course, as needed. Professor Lombard will be the instructor of record who will revise this course outline sometime during 2015. We will continue to examine the current way we are teaching this course and we will reassess student learning outcomes to see if results can be improved.

Mathematics 311—Pre-Algebra

Student Learning Outcomes:

1. Add, subtract, multiply, and divide whole numbers, fractions, and decimals without a calculator.
2. Solve application problems using whole numbers, fractions, and decimals.
3. Solve problems using order of operations.
4. Identify prime numbers and be able to factor composite numbers into their prime factors.
5. Round numbers to specific place values.
6. Convert between fractions, decimals and percentages.
7. Solve problems using percent.
8. Apply conversions in applications using both the English and metric measurement systems for length, weight (or mass) and volume.
9. Calculate perimeters and areas for rectangles, triangles and circles.
10. Simplify numerical expressions containing exponents and simple square roots.
11. Add, subtract, multiply, and divide signed numbers.
12. Solve simple equations.
13. Evaluate variable expressions.

Assessment Tools:

The tools we used to assess were questions from the final exam at the end of the semester. The following contain some questions embedded in the final exam. The assessment results were reported in EVC's SLO assessment matrices.

- Solve problems using order of operations. An expression was given to students to test their knowledge of order of operations (SLO # 3).
- Round numbers to specific place values. A whole number was given to students to test their knowledge of order of rounding (SLO # 5).
- Add, subtract, multiply and divide signed numbers.   An expression was given to students to test their knowledge of performing operations with signed numbers (SLO # 11).
- Identify prime numbers and be able to factor composite numbers into their prime factors. A composite number was given where students had to decompose the given composite number into prime factors (SLO # 4).

- Calculate perimeters and areas for rectangles, triangles and circles. Students were given a rectangle with given dimensions and were asked to calculate the area of the rectangle (SLO # 9).
- Add, subtract, multiply, and divide whole numbers, fractions, and decimals without a calculator. Students had to evaluate an expression to test their knowledge of order of operations (SLO # 1).
- Simplify numerical expressions containing exponents and simple square roots (SLO # 10).
- Find the area of a rectangle with a length of 22 in and a width of 12 in.
- Evaluate the expression: -3^2.

Evaluation Timeline:

These SLOs were assessed in spring 2012, fall 2012, spring 2013, fall 2013, and spring 2014.

Assessment Results:

Beginning in spring 2012 and continuing through spring 2014, these SLOs on the course level have been assessed at least once, and some more than once.

This course serves as a review of whole numbers, fractions, and decimals, and provides an introduction to signed numbers, algebra, and geometry. The results were good for the so called arithmetic portions of the course: 90% answered correctly on order of operations (SLO # 3), 80% answered correctly on rounding whole numbers (SLO # 5), 89% answered correctly on decomposing composite numbers into prime factors (SLO # 4), 86% answered correctly on adding, subtracting, multiplying, and dividing whole numbers, fractions, and decimals without a calculator (SLO # 1). This is to be expected, since much of this arithmetic material serves as a review for many of these students. As for the results for the signed numbers, algebra, and geometry portions of the course, the numbers are more modest: 59% answered correctly for evaluating an expression involving signed numbers (SLO # 11), 60% answered correctly on simplifying numerical expressions containing exponents and simple square roots in Fall 2012 (SLO # 10) [Note: SLO # 10 was re-evaluated in Spring 2014 and 76% answered correctly], 80% answered correctly on calculating perimeters and areas for rectangles, triangles and circles in Fall 2012 (SLO # 9) [Note:
SLO # 9 was re-evaluated in fall 2013 and 61% answered correctly].

Action Plan and Timeline:

SLO assessment for this course has begun and continued every semester since spring 2012. At least half, if not more, of the current 13 SLOs on record for this course have been assessed so far. We are approaching the 3 year point (about midpoint) of the current 6 year assessment cycle for SLOs at EVC, and we are well within the parameters for meeting EVC's SLO assessment requirements for this course. The course outline for Math 311 is currently being revised. So, the current 13 SLOs for this course are being streamlined in 6 new condensed SLOs. Once this course revision is officially adopted by the district (most likely in spring 2015), we will continue to work from these 6 streamlined SLOs. Students will be presented (at least in my Math 310 class) different statements of similar problems, to help students see concepts in ways other than standard situations. For instance, SLO # 9's correct percentage dropped when students were asked to find the area of a rectangle (successful way was when a figure was visually given to them...less successful way was when statement of problem was given to them without accompanying geometric figure drawn). We will continue to examine the current way we are teaching this course and we will reassess student learning outcomes to see if results can be improved, like in SLO # 10, during spring 2014, above.

Mathematics 111—Elementary Algebra

Student Learning Outcomes

1. Perform operations on real numbers using properties of real numbers and appropriate symbols.
2. Simplify and evaluate algebraic expressions, including exponential, polynomial, and rational expressions.
3. Find the equation of a line, graph it, and determine whether two lines are parallel or perpendicular.

4. Solve linear, quadratic, and rational equations and inequalities in one variable, and represent the solution set of the linear inequalities on the number line and using interval notation.
5. Solve systems of linear equations in two variables by graphing, substitution, and addition methods.
6. Solve application problems using systems of linear equations, quadratic, and rational equations.

Assessment Tools

Question(s) related to the six SLOs described above were given to students on an in-class quiz or test. The following questions were embedded in such quiz/test:

- Simplify an algebraic expression using the order of operations. (SLO # 1)
- Simplify and evaluation polynomials. (SLO # 2)
- Determine if two given linear equations in two variables are parallel, perpendicular, or neither. (SLO # 3)
- Solve a system of two linear equations by graphing, substitution, or addition. (SLO # 5)

Evaluation Timeline

At least one of the SLOs was assessed every semester. SLO #'s 1, 2, and 5 were assessed in spring 2012, fall 2012, spring 2013, and spring 2014.

Assessment Results

- Students did not meet our expectations on SLO # 1. Only 65% of the students got two correct answers, 25% got one correct answer, and 15% did not get a correct answer.
- Students did very well on SLO # 2; 92% of them answered the question correctly. Usually, students perform well on simplification and evaluation of polynomials.
- Only 61% met our expectations on SLO # 3. They might have forgotten the definitions of parallel and perpendiculars.
- Students did not meet our expectations on SLO # 5. Only 69% of students got the correct answer. Some students forgot what it meant to solve a system of two linear equations. Others were able to solve, but incompletely — they either only solved for one of the variables or found both but did not write them as an ordered pair.

In general, students did not perform satisfactorily on these SLOs. We would like them to pass each SLO at 70% or higher.

Action Plan and Timeline:

- We should inform instructors early in the semester which SLOs will be assessed and a couple reminders via emails during the semester so they can better prepare their students.
- Assessment result(s) from the previous semester(s) should be shared with the current instructors so they know which topics need to be emphasized.
- Reassess the SLOs that students did not perform satisfactorily (scoring less than 70%) in the next semester.
- Assign more homework problems and provide time for in-class work in small groups.
- SLO # 4 will be assessed in spring 2015.
- SLO # 6 will be assessed in fall 2015 and this will complete our assessments of all the SLO's for this course.

Mathematics 013—Intermediate Algebra

Only the SLO assessment for SLO #1 has been completed. However, no one faculty member is responsible for the entire course (comprising 21 sections) due to a misunderstanding. Therefore, the final report has not been completed at the time of writing this report. We will get the remainder of the SLOs to be assessed by May 28, 2015.

Student Learning Outcomes

1. Create and interpret the numeric, algebraic, verbal, and graphic representations of relations and functions, including inverse functions and composition functions, and know how to describe their domain and range.
2. Evaluate and simplify absolute value, rational, radical, exponential, and logarithmic expressions.
3. Solve equations and inequalities involving absolute value, rational, radical, exponential, and logarithmic expressions.
4. Solve systems of linear equations in two and three variables, and interpret their solutions as part of application problems.
5. Use appropriate notation on the study of sequences and series and identify the use of the latter concepts on a variety of applications.

Assessment Tools:

The tools we used to assess the first two SLO questions mostly from the tests and online homework (MyMathLab) for spring 2012 and fall 2014.

- Develop mathematical expression such as 0.10x + 7 to represent the statement "seven more than ten percent of some number", or develop an expression (e.g. 2k, where k is an integer), as a formula for generating even numbers (SLO #1)
- Sketch or plot graphs of linear and other simple functions (e.g. those given by the rule f(x) = x - 5 or g(x) = x + 5 as inverse function) using a table of values or a graphical calculator (SLO #1)
- Simplify mathematical expression (e.g. $(3x^4 - 5x^2 - 4x + 5) - (x^4 - 2x^3 - x^2 - 3)$) using properties including grouping like terms and the distributive law, and explain these properties by manipulation of physical models (SLO #2)
- Compute: $\sqrt[4]{16}$ or $(2)^{-1/2}$ using the definition of radical or rational exponents (SLO #2).
- Find the solution set by using interval notation , set-builder notation, and graph for $|2x - 3| > 3$ (SLO #2).

Assessment Results:

Based on the assessments from spring 2012 and fall 2014, we did not meet the target for success. Our target is to get all students to answer at least 70% of the questions correctly, and we are also working with our calculus students to help tutor this group of algebra students in fall 2015. By fall 2015, we will have the SLOs for this course to be on schedule for assessment in the next cycle.

Action Plan and Timeline:

We will assess the rest of the SLOs by May 28, 2015, and the report will be written by June 4, 2015.

Planned Improvements:

- The same SLOs for the course approved by the ACCC must be listed on a syllabus of each section. They must be checked every semester before starting doing the assessment.
- A lead instructor with release time of 10% may be desirable to improve validity and reliability of the assessment instruments.

Mathematics 014—Geometry

The only assessment for this class is from the fall of 2012. This assessment shows that students are not achieving the student learning outcomes, particularly in the area of applying the geometric concepts to real-world problems. Another area of weakness appears to be that the students are having difficulty learning how to perform basic geometrical proofs. The assessment also shows that the learning outcomes need to be revisited since learning outcomes 1 and 5 are not, at the present time, easy to measure.

Given that assessment for this course was not completed for five semesters, a new assessment cycle needs to be initiated. The strategy then is to begin to gather data and plan for continuity in the assessment of this course. Rewriting some of the learning outcomes and adopting a textbook that emphasizes application of the concepts and links geometric concepts to subsequent courses need to be part of the strategy. The learning of geometry also requires physical manipulation of geometric shapes since this helps students to bridge concrete sensory environment to the abstract understanding of Mathematics. Lastly, better training in writing student learning outcomes and assessing them would benefit the part time faculty who often are the ones that do the assessment in many of the mathematics courses.

Math 021—Precalculus Algebra
Math 025—Precalculus Algebra and Trigonometry

The most recent review of the student learning outcome assessment results indicate that the course level student learning outcomes should be revised to better reflect the goals of the precalculus courses. Moreover, better and more reliable assessment tools should be developed for the student learning outcomes, and the communication and tracking of the student learning outcomes should be improved. Course level SLO assessment has NOT been useful to the department in identifying what areas students are struggling in the courses

Speeding Up the Assessment Cycle:

The original cycle plan was assessing course level student learning outcomes over a six-year period, rather than attempting to assess every learning outcome in the course during the year. This six-year plan has proven to be too slow in producing results and generating insights that would help to improve teaching and learning in this class. By revising the student learning outcomes and their assessment tools, we will be better equipped to assess every outcome in a timely fashion and swiftly identify strengths and areas for improvement. The new plan will cycle course level assessments within two academic years.

Revision of the Course Student Learning Outcomes:

Currently, the student learning outcomes are poorly aligned to the program student learning outcomes of the Math AS-T. Moreover, some of the students learning outcomes of these courses are difficult to assess since the SLOs may be too general to design reliable and valid assessment for some of them, and thus the assessment tools tend to focus on one aspect of a course without considering the overall effect of the course on the student. In some cases, the assessment tools were limited in scope to one out of up to six course student learning outcomes. Also, the focus of each assessment was limited to summative evaluation which is not a recommended best practice in teaching mathematics.

Planned Improvements:

(a) Review and rewrite course SLOs (b) Design assessments that are reliable and valid and provide the faculty with more meaningful information to improve learning. (c) Use applications problems to measure SLO achievement to align with the common core. (d) Increase the number of units of Math 25 (Precalculus Algebra & Trigonometry) from 5 to 6 to help students to meet the student learning outcomes. (e) Multiple measures of assessment may be necessary to get a complete picture of student learning and to increase the reliability and validity of the assessment.

In short, the current method of assessment and the results do not provide a reliable measure of student outcome achievement at the present time. Also, it is difficult to identify specific topics to target for teaching improvement except for the fact that more time will help to meet the learning outcomes. Overall, student learning outcomes for these mathematics courses need to be revised and the assessment needs to be aligned with the assessment of the program learning outcomes of the Math AS-T. A large percentage of students taking these courses will eventually be taking the Math AS-T courses, so it is necessary to align the assessment of these courses with the program assessment. New and improved assessment tools need to be created (e.g. formative assessment) to reflect a broader continuous effect on each student's success. Unfortunately, the college does not seem to provide training in implementing multiple measures to assess student learning outcomes.

Currently, Math 21 and Math 25 are being modified (units, slos and content) to get a C-ID (course identification descriptor) from the chancellor state office. It is expected that the modified courses will be offered in the fall 2015 after they go through the curriculum committee and the C-ID's are granted.

Action Plan and Timeline:

A new assessment cycle will start after the new C-ID courses are offered in the fall 2015.

Math 022—Trigonometry

The department is in the process of assessing this course. No assessment has been done in the last three years since it has not been taught by full time faculty. Training for all faculty in student learning and how this learning can be assessed should be a major component of the professional development of the college. Training must be linked to actual experience in the classrooms. Forums during professional development days are not producing the desirable outcomes, in some cases since many adjunct faculty are not required to attend.

Evaluation Timeline:

At present, Math 22, like Math 21 and 25, is being modified (slos and content) to get a C-ID from the State Chancellor's office. It is expected that the modified courses will be offered in the spring 2015, after the outline is approved by the curriculum committee and the C-ID designation is granted.

Action Plan and Timeline:

A new assessment cycle will start after the new CID courses are offered in the spring 2015.

Mathematics 051—Mathematics for General Education

There is no assessment for this course since it hasn't been offered in the last six years.

Mathematics 052—Mathematics for Elementary Education

Student Learning Outcomes:

1. Analyze multiple approaches to solving problems from elementary and advanced levels of mathematics using concepts and tools from sets, functions, and logic.
2. Compare numeration systems, including their historical development, with attention to base numeration systems, exponents, scientific notation, and place values.
3. Evaluate the equivalence of numeric algorithms and explain the advantages and disadvantages of equivalent algorithms in different circumstances.
4. Analyze algorithms from number theory to determine divisibility in a variety of settings, such as different base systems and modular arithmetic.
5. Analyze the structure of least common multiples and greatest common divisors and their role in standard algorithms.
6. Explain the concept of rational numbers, using both ratio and decimal representations; and justify their equivalence.

Assessment Tools:

The tools we used to assess were questions mostly from the tests and online homework (MyMathLab) throughout the semester.

- Problem solving and deductive reasoning (SLO#1)
- Numeration systems past and present (e.g. Egyptian, Babylonian, Mayan, …) (SLO#2)
- Non-decimal positional Systems (Base-Five notation) (SLO#2)

- Addition and subtraction of whole numbers: set, measurement, missing addend, comparison algorithms (SLO#3)
- Multiplication and division of whole numbers: repeated addition, array, rectangular area, Cartesian product, repeated-subtraction, partition, algorithms (SLO#3)
- Divisibility of natural numbers: divides, divisors, Factors, multiples, primes, testing for primes (SLO#4)
- Tests for divisibility (SLO#4)
- Algorithms for adding and subtracting whole numbers: …other bases (SLO#4)
- Algorithms for multiplying and dividing whole numbers …Other bases (SLO#4)

Evaluation Timeline:

The course is only offered during Spring Semester. Data was collected spring 2012 and spring 2014.

Assessment Results:

Overall average of items assessed ranged from 84.7 – 99.4 success rate.

Action Plan and Timeline:

Given the high success rate for students on the items tested, no changes in the course are recommended at this time.

Mathematics 061—Finite Mathematics

Student Learning Outcomes:

1. Perform operations on matrices and utilize matrices to solve systems of linear equations.
2. Formulate and solve linear programming problems, utilizing both graphical and simplex algorithm methods and appropriate technology.
3. Model and solve business applications involving simple and compound interest, and present and future value of an annuity.
4. Use the multiplication principle, permutations, combinations, Bayes' theorem, and the concepts of conditional probability and independent events to compute probabilities.

Assessment Tools:

The tools we used to assess were questions mostly from the tests and online homework (MyMathLab/Moodle) throughout the semester, and a few from online practice tests. The questions embedded in those are following.

- Find the inverse of the matrix and solve the system of linear equations using matrix equations and inverses. (SLO #1)
- Perform the indicated operations. If the operation cannot be performed, explain why. (SLO #1)
- Solve the following system of linear equations by using augmented matrices and Gauss-Jordan elimination. (SLO#1)
- Solve maximization with problem constraint of the form $\leq$ by the graphical method. (SLO #2)
- Solve maximization with problem constraint of the form $\leq$ by the simplex method. (SLO #2)
- Solve a minimization with problem constraint of the form $\geq$ by setting up the dual problem. Also read the solution for the dual problem and primal problem. (SLO #2)
- Given an applied problem. Write a linear programming problem which indicates how this problem will be solved. Define the variables and explain what they represent. Indicate the objective function and whether it is to be maximized or minimized. List all of the constraints. (SLO #2)
- How long will it take $A to grow to $B if it is invested at C% compounded semiannually? (SLO #3)
- A family has a $A, 30-year mortgage at B% interest, compounded monthly. Find the monthly payment that is needed to amortize the loan. (SLO #3)

- Using the given results to build an amortization table. Show the first 2 payments of the table. Clearly indicate how much of each monthly payment is going towards interest and how much is going towards the principal of the loan (SLO#3).

Evaluation Timeline:

These SLOs were assessed in spring 2012, fall 2012, fall 2013, and fall 2014.

Assessment Results:

- Based on the results from some tests and homework during the semester, students did pretty well in the SLO #2. About 80% of students met our expectation. With the clear concepts and instructed procedures from instructors for solving linear programming problems using the simplex method – one of the hardest topics for the course, it turned out that students could do well. They even chose this method over the graphing method for solving this kind of problem. On the other side, those students who did not satisfy our requirement were due to their weakness of algebra that they could not handle computation when using matrices.
- The results collected in fall 2012 for the SLO #3 were not a pleasure. According to this, only 52% of students met our expectation when taking the test. We also had the result collected from homework and in-class assignment. They were 59% and 68% respectively. For the homework part, most of the 0 scores here were from students who did not look at the homework at all.
- On SLO #1, the results were fair enough. However, because the result was just based on the small group of students (no full time faculty taught the course at the time, and only one adjunct faculty volunteered doing this), this item needs to be assessed again in the near future for the accuracy.
- On SLO #4, a total of 7 students participated in the assessment. (in the section that we did assessment, we did not require MyMathLab for homework, so not all 11 students participated in this SLO assessment) For both homework sets, 86% (6 students) did acceptable work. (they did more than 70% of the homework problems correctly) In terms of the results, we are relatively happy. We will try to cover prior material more quickly so that we can get to this material sooner. This will also allow the Department to incorporate some of these questions more thoroughly on an exam.

Action Plan and Timeline

- Need to assess the SLO #1 with more sections involved. In order to do this, we need at least one full time faculty member to conduct this course, or at least to find a way to attract more adjunct faculty involved.
- Find different ways to encourage students to do homework. If homework was assigned online, shortening the time for due dates to enforce them doing homework on time may be necessary; or having them doing homework using traditional way with paper/pencil version to see the difference.
- Remind/emphasize to students for keywords in the problems (example: "compound," "mortgage/loan") to properly identify which formula to use for the annuity and amortization problems, since most of the errors were the result of starting with the wrong formula at the beginning. Provide more opportunity to demonstrate understanding of the course material.
- Emphasize the need to take practice tests heading into actual tests in class.
- SLO #3 will be reassessed in fall 2015.
- SLO #4 will be re-evaluated in spring 2015 since last time we only assessed a small group of students.

Mathematics 062—Calculus for Business and Social Science

Student Learning Outcomes:

1. Calculate limits of various mathematical functions at given points and determine continuity.
2. Interpret the derivative of a function as an instantaneous rate of change, as it relates to the concepts of marginal propensity to consume and marginal propensity to save.

3. Apply the theory of derivatives to the graphing of functions, optimization problems involving revenue, cost, profit, supply, and demand.
4. Use sigma notation and Riemann sums to find elementary definite integrals.
5. Identify critical points for a function of several variables subject to constraints by applying the method of Lagrange multipliers.
6. Analyze, represent, and evaluate basic mathematical information numerically, graphically, symbolically, and verbally.

Assessment Tools:

The following questions were embedded in two different tests:

- Find the limit (if it exists) (SLO # 1)
- Describe the intervals on which the following functions are continuous.   (SLO # 1)
- Given the consumption function expressing national consumption in terms of national income, find the marginal propensity to consume and the marginal propensity to save.
- Analyze and sketch the graph of the function. Label intercepts, relative extrema, points of inflection, and asymptotes. (SLO #3).
- Given the following demand and total cost functions, find the price that yields a maximum profit, and find the average cost per unit when the profit is maximized. (SLO #3)

Evaluation Timeline:

SLOs 1, 2 and 3 were assessed in spring 2014, and SLOs 4, 5 and 6 were assessed in fall 2014.

Assessment Results:

- For SLO # 1, 63% of limit questions were answered correctly, while 78% of continuity questions were answered correctly.
- For SLO #2, 74% of questions were answered correctly.
- For SLO #3, 61% of graphing problems were answered correctly, while 82% of optimization problems were answered correctly.

Action Plan and Timeline:

- Many students do not take Math 62 immediately after completing Math 21, and therefore many are rusty in their algebra skills. A brief review of precalculus concepts (especially graphing) at the beginning of the semester is recommended.
- The concept of limit is hard to grasp for some students, especially at the beginning of the semester. Therefore taking more time to introduce limits and additional in-class practice in small groups would be very helpful.
- SLO's 4, 5 and 6 will be evaluated in spring 2015, and SLO's 1, 2 and 3 will be reassessed in fall 2015.

Mathematics 063—Elementary Statistics

Student Learning Outcomes:

1. Analyze raw data from sociology, law, medicine, politics, business, and other sciences using sample statistics and graphs.
2. Calculate probabilities including basic, binomial, and normal distributions.
3. Use confidence intervals for population means and proportions for one and two populations, and calculate sample sizes required for various confidence levels.
4. Conduct hypothesis tests of a population means and proportions for one and two populations.

5. Plot scatter diagrams of real life data, perform linear regression and correlation on paired data to analyze such data, predict values of a dependent variable from the regression equation, and determine whether the correlation is sufficient to make the regression equation a useful predictor.
6. Test sample real life data for independence and homogeneity in two-way tables.

Assessment Tools and Timeline:

Questions were given on the tests, quizzes and the final exam. Some of the questions were given during the lab part of the class. These SLOs have been consistently assessed since spring 2012, and at least one of them was done in each semester.

Results:

- SLO #1: 94% met the understanding level in this outcome.
- SLO #2: 61% met the understanding level in this outcome.
- SLO #3: 69% met the understanding level in this outcome.
- SLO #4: 76% of the students who were tested on these concepts earned C or higher on these concepts.
- SLO #5: For the laboratory, all students managed to get a score somewhere between 78% and 100%. 65% of the students answered all 4 parts correctly on the lab, hypotheses, test statistic, P-value and conclusion. For the questions embedded on the final, 30% of students answered three out of three questions correctly based on the standard statistics computer output.
- SLO #6: A total of 271 students (in ten statistics sections) answered the question. The question had a total of six parts. Students were asked to decide if a test of homogeneity or a test of independence was more appropriate, to state the hypotheses, to check the assumptions, to find the number of degrees of freedom, to find the p-value, and to give an appropriate conclusion in the context of the problem.

  63.1% of the students answered the first part correctly, 74.2% of the students answered the second part correctly, 36.5% of the students answered the third part correctly, 93.4% of the students answered the fourth part correctly, 80.8% of the students answered the fifth part correctly, and 37.6% of the students answered the sixth part correctly.

Action Plan:

- SLO #1: Although 94% of the students have shown a strong grasp of the concept, we feel that the results could have been better. To improve results, additional class work and homework will be given starting in spring 2015.
- SLO #2: Many students failed to read the questions carefully and as a result, they answered the questions incorrectly. We need to make sure that students understand the meaning of phrases such as "at least", "at most", "less than", "no more than", and "exceeds". We will put more emphasis on terminology starting in spring 2016.
- SLO #3: Some of these students need to be more careful with the use of statistical terminology in these topics. We need to provide more opportunities for students to engage in learning how to write interpretations within the context of the problems and not just in generic terms. This will be emphasized in our statistics classes starting in spring 2016.
- SLO #4: Many students did not state the assumptions correctly, and many stated the Type I and Type II errors incorrectly. Starting in spring 2016, we will give more examples in class for these concepts.
- SLO #5: Students struggled to identify the difference between the explanatory variable and the response variable. We need to spend more time explaining the difference in class and give even more problems for practice. Starting in spring 2016, we will implement the changes.
- SLO #6: The main reason that only 36.5% of the students got the third part correct was that they weren't familiar with the wording that was used. For questions in which students are asked to check assumptions, the typically phrasing is "check the assumptions". For the SLO question, "test the conditions" was used instead. Some students did not realize "test the conditions" had the same meaning as "check the assumptions" and a result, they got the question incorrect.

Only 37.6% got the sixth part correct. This was not as surprising since many students struggle with writing an appropriate conclusion for hypothesis testing problems. (This issue was cited before for SLO #3.) Some students have a hard time understanding that a very small p-value means that it is unlikely that the null hypothesis is true.

For four of the ten sections, the SLO was assessed again. Before the second assessment, it was emphasized to students that there was no difference between "test the conditions" and "check the assumptions".

Other common mistakes were also discussed. Additional problems with independence/homogeneity were discussed in class and students were given more problems to work on at home. The SLO was assessed again using a different question on the final exam (at the end of the fall 2014 semester). This time, 95.6% of the students got the first part correct, 91.2% got the second part correct, 60.3% got the third part correct, 98.5% got the fourth part correct, 86.8% got the fifth part correct, and 58.8% got the sixth part correct.

We feel that the results indicate that we have successfully met the SLO requirement and we will incorporate the aforementioned changes when teaching independence/homogeneity problems in the future.

Mathematics 071—Calculus I with Analytic Geometry

The SLO assessments for this course have been completed; however, instructors teaching this course had different student learning outcomes in their syllabi, i.e., the instructors teaching different sections did not assess the same SLOs. Therefore the results are, regretfully, neither reliable nor valid.

Planned Improvements:

- The department is in the process of updating the course to meet the C-ID descriptor.
- The same SLOs for the course approved by the ACCC must be listed on a syllabus of section. The instructors of record will need to check every semester that the SLO's listed in their syllabus are current so that the assessment is reliable and valid.
- A lead person for this course must be selected to coordinate this assessment.
- The SLO's will be reassessed starting in the fall semester of 2015 and be completed in two years.

Mathematics 072—Calculus II with Analytic Geometry

Student Learning Outcomes:

1. Evaluate integrals graphically, numerically, and analytically.
2. Use appropriate integrals and differential equations to model applications such as volumes, areas, and population dynamics.
3. Determine the convergence/divergence of an infinite sequence/series by using convergence/divergence tests.

Assessment Tools: The tools we used to assess were questions from the tests including the final test throughout the semester. The questions embedded in those for this cycle are following.

- Evaluate the indefinite integrals using different techniques such as substitution, integrations by parts, trigonometric integral, trigonometric substitution, and partial fraction (SLO#1)
- Set up the integrals to find the volumes of the solids obtained by rotating the regions about different axes using different choices of techniques (SLO#2).
- Calculate force using Pascal law for hydrostatic pressure (SLO#2).

- Test the series for convergence or divergence by using different techniques such as p-series, integral test, ratio test, root test, comparison tests, nth term test, geometric series (SLO#3).
- Find a representation of a power series and determine the interval of convergence (SLO#3).

Evaluation Timeline:

Different sets of SLOs have been assessed in successive semesters since spring 2012.

Assessment Results:

- On the SLO#1, the average percentage of correct responses was about 63%. This was considered to be fair enough for this level. Most of students actually did well on partial fractions, and substitution. However, they still had problem on any technique that has trigonometry involved. It was easy to understand this since trigonometric problems have never been their favorite.
- On the SLO#2, applications were always student's enemies. The problem in general was that the thought was always stuck in their minds. Some of them didn't even want to try when they saw them. The result from the past years was not a pleasant for this item. In average, 61% of students met the expectations. Looking through the mistakes that students made, we could easily see where the problems arose. On the volume problems, student actually did well when the region was rotating about the x or y-axes. However, when the axes were changed (about different lines), they had a hard time to imagine the pictures. Also, some students had difficulty recognizing which technique should be used. On the other application (hydrostatic force), most of students did not have a good enough understanding of physics, and their weak foundation in algebra/geometry was also a problem.
- On the SLO#3, responses from 71 students (2 sections) were collected using scantrons. Average percentage of correct responses in an average of 73% for this SLO. A little note for this item was that students did like ratio test, root test, p-series, and geometric series. They were not comfortable with integral test. For the nth term test for divergence, some of them still confused on the purpose of this test.

Action Plan and Timeline: Even though there are only three SLOs to assess, each one contains several topics. We would like to finish all 3 in one year cycle with different topics (e.g. on the SLO#1, the topic can be evaluating integral numerically). After that we would like to revisit these topics. By that time, the following can be a suggestion for what we should change.

- Some of the topics that students learned from the beginning were assessed in the final test. We might want to look at the result from the first test to see the difference.
- As mention above, more items can be added to increase the internal reliability and content validity of the assessment relative to the very lengthy SLO.
- Of course, more in-class practice needs to be done, especially about application problems. An instructor may need to come up with the guidelines to show steps on how to solve a multi-steps problem.
- To make a problem easier to understand on the applications, an instructor may need to use a model/computer to visualize a subject for students. Having an updated computer or available software for students doing homework/projects at home or for in-class presentation would be definitely helpful.
- Timeline for reassessment: SLO#1 will be re-evaluated in fall 2015; and SLO#2 will be in spring 2015 to complete the loop.

Mathematics 073—Multivariable Calculus

This is a summary of the SLO assessments of Math 073 from the fall of 2012 through the fall of 2014. The course was updated in 2013 to conform more closely to the student learning outcomes described in the C-ID course descriptor for multivariable calculus, and the SLO for our course was re-designed during the course update. Consequently, the SLO assessments matrices we submitted to school in 2012 were for the old SLO and those for the year 2013 and 2014 were for the current SLO. Though the old and new

SLO were worded differently, the new SLO does cover all the topics of the old SLO. For this reason and for the reason the new SLO is more current, we have decided to use the new SLO for this summary of the assessments. Fortunately, we have kept all the raw data for the SLO assessments in the past, and in the following, we have re-evaluated the raw data against the new SLO.

Student Learning Outcomes:

Following are the current Student Learning Outcomes (SLO):

SLO 1. Perform vector operations such as the dot and cross products to obtain the equations of lines, planes, and other space curves; describe cylindrical and quadric surfaces, compute arc lengths; and solve application problems such as motion in space, and torque problems.

SLO 2. Use partial derivatives, implicit differentiation, chain rule, directional derivatives, Lagrange multipliers, and the gradient vector to find local maximum and minimum values or absolute maxima and minima in a given region for functions of several variables and solve optimization problems with one or more constraints.

SLO 3. Set up and evaluate double integrals in Cartesian and Polar coordinates and triple integrals in Cartesian, cylindrical, or spherical coordinates to determine volumes, surface areas, centers of mass, expectation values using joint probability distributions.

SLO 4. Compute differential operations on vector fields, such as the curl and divergence, and evaluate line and surface integrals in the applications of Stokes', Green's and Gauss' theorems to establish path and shape independence for conservative vector fields.

Evaluation Timeline and Assessment Tools:

Starting in the fall of 2012 through the fall of 2014, all the above SLO's of the course have been assessed at least once, and some more than once. The tools used for assessments were all questions embedded in the regular tests and final examinations for the course. Following are some sample problems in the test for assessing the SLO:

- Find an equation of the line, in parametric form, which passes through the point *P (4,0,6)* and is perpendicular to the plane $x - 5y + 2z = 10$. You must show your steps and reasoning to get credit (**_SLO 1_**; fall 2012 Test 1, Problem #5).
- Consider the space curve $\boldsymbol{R}$ (t) = $\boldsymbol{i}$ + $(t^2/2)\boldsymbol{j}$ + $t^3\boldsymbol{k}$. Find the arc length of the curve for *t* between 0 and 1, also find the curvature and radius of curvature of the curve at the point. You must show your steps to get credit. (**_SLO 1_**; spring 2014 Test 2, Problem #1).
- A gun has muzzle speed 150m/s. Find the two angles of elevation that can be used to hit a target 800 m away, assuming both the gun and the target are at the horizon. You need to show your steps for credit. (**_SLO 1_**; fall 2014 Test 2, Problem #1).
- Let $f(x,y,z) = x^2y + y^2z + z^2x$, and *P(1,2,-1)*. Find the directional derivative of *f* at *P* in the direction along the vector <1, 1, -1>. Also, determine the direction at the point *P* in which the function increases most rapidly. Also find this maximum rate of increase (**_SLO 2_**; fall 2012, Test 2, Problem #7).
- Use the method of Lagrange Multipliers to find the base radius and height of the closed right circular cylindrical can of smallest surface area whose volume is 16 cm^3. You need to show your steps to get credit. (**_SLO 2_**; fall 2013 Test 3, Problem #1).
- Set up an integral, in spherical coordinates, for the volume of the solid that is bounded by the cone $z^2 = x^2 + y^2$, between the *xy* plane and the plane $z = 2$. You need to write the integral as an iterated integral together with all its limits of integration (**_SLO 3_**; fall 2013 Test 3, Problem #7).
- Set up an integral for the total mass (but do not evaluate it) for the cone of base radius *L* and slant height *2L* in both a) the cylindrical and b) the spherical coordinates, given that the density for the solid at any point equals to the distance of the point to the axis of the cone. (**_SLO 3_**; spring 2014, Final Exam Problem #7).

- Compute the outward flux for vector field $F(x,y,z) = <5x3 +12xy^2,\ y^3 + e^y\ sinz,\ 5z^3 + e^y cos\ z>$ by a surface integral of the region between the spheres $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 2$. Show your steps for credit (***SLO 4***; spring 2014, Final Exam Problem #10).
- Compute the line integral for the vector field $< sinx+3z,\ z+e^y,\ x+2y+tanz>$, using Stokes' Theorem, along the closed loop consisting of the straight line segments from the point (3,0,0) to (0,2,0), and from there to (0,0,6), and finally from this point back to (3,0,0) (***SLO 4***; Fall 2012, Final Exam Problem #11).

Assessment Results:

Based on the results from the tests, more than 67% of students met our expectation on the SLO #1 and the SLO #2, but only 55% meet our expectation on SLO #3 and SLO #4. We are not satisfied with these results, and believe that they can and should be improved. There are various reasons for the low percentage of student meeting our expectations. Multivariable calculus is traditionally one of the most challenging classes at college, and we have set a high expectation for students to thoroughly master the skills and understanding of the subject at this level. On the other hand, some students, due to their lack of preparation or poor study habits, are not prepared to make the kind of commitment required for a demanding course as this one, as evidenced by the fact that some of them are not able to complete the basic assignments required for the class. We will carefully look the way we are currently teaching the course and see how the results can be improved.

Action Plan and Timeline

We propose to take a hard look at the way we currently are teaching the course. Starting from the spring of 2015 we will experiment with devoting more time on the homework problems in class, providing study guides for the tests, and implementing extra credit problems to better motivate students. We will also monitor student performance more closely and give them early warning after the first test. We will re-assess ***SLO #3*** and #***4***, the two SLO with lower acceptable rate in the past. If the acceptable rates are improved, we will continue the practice mentioned above and assess the ***SLO #1*** and #***2*** again in the fall of 2015.

Mathematics 078—Differential Equations

This is a summary of the SLO assessments of Math 078 from the spring of 2012 and the spring of 2013 (The course is not offered in the fall semesters). The course was updated in 2014 with the SLO completely re-designed, and the new version will be offered for the first time in the spring of 2015. The assessments obtained in the spring of 2012 and 2013 were still based on the old SLO, which are listed in the next paragraph.

Student Learning Outcomes:

1. Apply effective methods for the solutions of ordinary differential equations. Students will solve those equations using various algebraic, numerical, series and transform methods depending on the differential equation and initial conditions encountered.
2. Set up and solve physical problems arising from linear models, especially simple circuit problems involving any combination of resistors, inductors and capacitors and spring problems.
3. Model situations in science which lead to ordinary differential equations and be able to formulate appropriate differential equations from accepted scientific principles.
4. Use a computer algebra system to solve ordinary differential equations and systems.

Evaluation Timeline and Assessment Tools:

SLO 1 and SLO 2 were assessed on February 29, 2012, SLO 3 was assessed on March 23, 2012, and SLO 4 was assessed on February 27, 2013. The tools used for assessments were all problems embedded in the regular tests. All the assessment results were reported in the school's *SLO Assessment Matrices*.

For a class such as differential equations, it is easy for students to make numerical errors even when they understand both the theory and the method. We therefore consider as acceptable when the student scored 70% or higher. The following are results of our assessments:

For SLO 1, 65.2% students performed at the acceptable level. For SLO 2 the percentage of students performing at acceptable level was 78%, that for SLO 3 was 61%, and that for SLO 4 was 70.5%. We feel these are what we can expect for a demanding course such as differential equations. However, we will endeavor to continue our efforts in monitoring students' performance and seek for their improvements.

Action Plan and Timeline

One consistent problem for the course in the past was that in an effort to conform with the course content and student learning outcomes, as set in the C-ID Course Descriptor, we needed to cram in a large amount of content in a relatively short time span and students frequently lacked sufficient time to absorb the material. However, we have redesigned the course, expanding it from 3 units to 4 units, and will offer it for the first time in the spring of 2015. We expect that in the new course, students will have more time to absorb the material and will improve their performance. We will, however, keep monitoring the students' performance and finding ways to improve the course. Starting from spring of 2015, we will assess the new SLO's.

Mathematics 079—Linear Algebra

Student Learning Outcomes:

1. Utilize matrix and determinant theory to find the solutions for a system of linear equations.
2. Apply the concepts of linear independence and span to solve related problems.
3. Find bases and dimensions of vector spaces including the row space, column space, and null space associated with a matrix.
4. Identify a matrix representation and determine the kernel and range of a linear transformation.
5. Determine eigenvalues and eigenvectors of a square matrix, and when possible, use them to diagonalize the matrix.
6. Use the Gram-Schmidt process to find an orthogonal basis for an inner product space, and apply the techniques to engineering and geometric problems.

Assessment Tools:

The tools we used to assess were questions mostly from the tests throughout the semester, and a few from the in-class or take-home projects. The questions embedded in those are following.

- Solve the system of linear equations by using the method of the inverse matrix (SLO #1).
- Determine whether the set of vectors is linearly independent, and find the basis for the space spanned by the set the vectors just found (SLO #2).
- Show that the set $\mathcal{B}$ is a basis of a certain space, and find the coordinate vector $[x]_{\mathcal{B}}$ of x relative to the given basis $\mathcal{B}$ above (SLO #2).
- Prove the Unique Representation Theorem (SLO #2).
- Show that that if v_1, v_2, v_3 are linearly independent, then the vectors $w_1 = v_1 + v_2, w_2 = v_1 + v_3, w_3 = v_2 + v_3$ are also linearly independent (SLO #2).
- Find a basis for a column space, a null space, and a row space of a given matrix, and state the dimension of each space (SLO #3).
- Given a descriptive linear transformation, find a matrix representation; and find the kernel and the range of this transformation (SLO #4).
- Use excels or engineering paper, and a graphing calculator to do a letter transformation project (SLO #4).
- Find the eigenvalues and eigenvectors of a square matrix, and use them to diagonalize the matrix (SLO #5).

- Eigen Discovery Project (SLO #5).
- Use the Gram-Schmidt process to find an orthogonal basis for the column space of a given matrix (SLO #6).

Evaluation Timeline:

Since the course is offered once a year, the SLOs were assessed in fall 2010, fall 2011, and fall 2013.

Assessment Results:

- Based on the results from the tests and the projects given throughout each semester, more than 80% of students met our expectation on SLO#3 and SLO#5. The concepts and the procedures on how to solve problems in these topics are clear enough so that they could master them easily. Also, the take-home and in-class project regarding SLO#5 definitely helped the students to understand more. The concepts in this class are usually new and abstract to students. Giving them an opportunity to discover fully about eigenvalues/vectors absolutely helped them to overcome any confusion or difficulty that they might have. We believe that this was one of the reasons why students did so well on these SLOs.
- On SLOs #1 and #4, the percentage of students showing their understanding was fair enough (almost 70% of students passed the challenges). The problems that students had in these two SLOs were due to two reasons. First of all, they did not read the question carefully. That led them to do the problem in different ways that weren't asked for by the question. Some of students still think that having the correct answer is enough. They need to realize that the procedure or different approaches leading to the solution are also important. Another mistake came from the terminology of the course. As mentioned above, this course is very abstract. Throughout the semester, students were constantly introduced to many new terminologies that they hadn't heard before. In addition, even the definitions to describe them were not simple. Students tried to choose the easy way by cutting it short to understand them, which usually led them to a wrong meaning.
- On SLO#6, the percentage of students passing the requirement was not pleasing. Conceptually, most of students got it. While only 32% of them got it perfectly, 82% of them actually understood the concept. They knew exactly how to do the problem. The biggest reason they could not meet our expectation was that they couldn't handle the difficult algebra and processes involved in solving the problem.
- SLO#2 was the one that students had the most trouble with. One of the problems was terminology as mentioned above. Another problem involved a new skill that students need to master at this level—mathematical proof. Although this technique was introduced in prerequisite math courses, most of the students did not have many opportunities to work with and master it. When students reached this higher level course, they were expected to fully understand the different approaches to proving mathematical statements and logic, which they definitely struggled with a lot.

Action Plan and Timeline

Even though the results were fair enough, there is always room for improvement, especially when we already understand the problems. Here are some changes that we need to make for future goals (next 3 years).

- Continue on what we have been doing that helps students to master the subject such as in-class work, homework, and projects; or motivate their thinking by giving them extra credit/challenge problems.
- Clarification of terminology needs to be emphasized by reminding students on a periodic basis or asking them to state clearly the definitions on quizzes/tests if necessary.
- Give students chances to practice more on the problems that involve hard-concepts as well as heavy-calculations in class so that they can overcome their algebraic mistakes since, as we know, "practice makes perfect."

- Spend more time discussing or explaining how to prove mathematical theorems and corollaries. Also give students these types of problems as much as possible to help them to improve these core mathematical skills.
- Timeline for reassessment: SLO #1 and SLO #6 will be in spring 2015; SLO #2 and SLO #4 will occur in fall 2015. This will complete the loop.

2. **On the program level,**
   A. **Defined as a course of study leading to a degree or certificate, list the Program Learning Outcomes (PLO), if applicable.**
   B. **List or describe all assessment mechanisms you are using to evaluate program student learning outcomes. Please provide the link to the PLO assessment matrices.**
   C. **Since your last program review, summarize PLO assessment results at the program level.**
   D. **What plans for improvement have been implemented to your program as a result of PLO assessment?**

Associate in Science in Mathematics for Transfer (2MATH.AST.1)

The Associate in Science in Mathematics for Transfer, offered at Evergreen Valley College, is designed for students intending to transfer to a California State University and pursue a baccalaureate degree in mathematics, applied mathematics, and related fields such as statistics, engineering, or computer science. Students who complete this degree are guaranteed admission to the CSU system, *but not to a particular campus or major*. Students transferring to a CSU campus that accepts the Associate in Science in Mathematics for Transfer will be required to complete no more than 60 semester units after transfer to earn a baccalaureate degree.

Program Learning Outcomes

Upon completion of the Associate in Science in Mathematics for Transfer, the student should be able to:

1. Develop creative and logical solutions to various abstract and practical problems.
2. Use mathematics to model and solve applied problems in engineering and science.
3. Demonstrate didactic reasoning to construct elementary proofs to theorems.

The AS-T Program in Math was created in 2011, and just updated recently in 2014. Even though it is still new, it has attracted a decent number of students to join the program. Since it started, there were 254 students declaring as Math majors. In the last two years, 2013 and 2014, the numbers of students completing the program were 5 and 19, respectively (http://datamart.cccco.edu/). These numbers obviously did not look good overall (see section A of this program review report for a chart with this data). However, on the positive sign, more students completed the degree in the year of 2014 compared to the year of 2013. It is hopeful that this number is increasing each year in the near future since we have many qualified math students who are willing to become math tutors in the Math and Science Resource Center.

Along with this degree, the department has been offering honor student projects in some of our Math73, and Math 78, and Math 79. In the last 2 years, there were total of 12 students completing this honor program. In addition, their projects were presented at Student Mathematics Conference in Northern California sponsored by Mathematics Association of America.

For the program SLOs assessment, its matrix may be found at the link: http://www.evc.edu/discover-evc/ student-learning-outcomes-(slos). The tools we usually used to assess were questions mostly from the tests throughout the semester, and/or the final test. Since the program is new, and it was redesigned last year, most of the data we collected from summer 2014, and fall 2014. Although students are required to finish 60 units for the completion of the program, only the core math courses such as Math 071, Math 72, Math 073, Math 078, and Math 079 have been assessed.

Since the program was just redesigned, only the first two program learning outcomes were assessed. Overall, students did well in each course offered during the semesters listed above (summer 2014 and fall 2014). In fact, for each SLOs, in most of the courses, more than 70% of students met our expectation for each course (scored at least 70%, a level of understanding). Only Math 71 on the first SLOs got 68% of students passing, which was also acceptable. The SLO #3 will be assessed in spring 2015.

The results overall look pretty decent, there won't be any significant change in the future. While the teaching methods for most of the courses will be the same, the following additions will be needed in the near future.

- Math 71, Math 72, and Math 73 are offered every semester with multiple sections. They will be taught by full-time and adjunct faculty. We need to ensure that all course syllabi have the same course objectives and current SLOs starting in spring 2015.
- Since some SLOs cover a lot of different topics, it will be more accurate and more effective if all of these sections for each math class are assessed with the same questions or at least same type of questions on the tests. In fact, Math 73 was assessed in this manner this semester. We just need to make this consistent for all other math courses in the future.
- Software is needed to improve our program's quality with a modern technology nowadays, especially for these upper level math courses. As of today, the department still does not have any software available. In order to include the technology, which eventually will be required, in the future SLOs development, we need to have them on a table. Note that these courses are district courses, and technology is part of the ILO's at SJCC. It was very hard to work with SJCC since Math department at EVC hasn't had any software program on hand yet.
- As many schools now offer online courses in Mathematics, our department needs to start this soon, or at least some math courses should be offered online/hybrid. This might help students to finish the program faster so that the number students completing the program will be increasing.
- Indirect Assessment for the AS-T in Math needs to be implemented soon to gather more information about the quality of student learning and to ensure the program' success.

Associate in Arts in General Studies with Emphasis in Mathematics for Secondary School Teaching

The Associate in Arts in General Studies with Emphasis in Mathematics for Secondary School Teaching, offered at Evergreen Valley College, is designed for students who will enter a BA or BS degree program at a four-year college or university with a major in mathematics. Further, the student will have completed education courses and Service Learning to be on track with the UC Cal Teach Program or a CSU teacher preparation program leading to a fifth-year Secondary School Credential Program. Students must complete all Area of Emphasis requirements with a "C".

Program Learning Outcomes

Upon completion of the Associate in Arts in General Studies with Emphasis in Mathematics for Secondary School Teaching, the student should be able to:

- Apply problem-solving methods to application problems involving linear equations and inequalities.
- Categorize and distinguish the particular and special characteristics of linear, quadratic, absolute value, exponential, and logarithmic functions.
- Analyze polynomial functions of higher order, and apply to them the remainder theorem, factor theorem, and fundamental theorem of algebra and its corollaries to study their rational, irrational, and complex roots.
- Apply the principles of analytical trigonometry, including fundamental identities and formulas, in solving a variety of practical problems.
- Use matrix methods to solve problems that involve systems of three or more linear equations.
- Use the methods of calculus to solve problems involving rates of change, vectors, and interpretations of areas and volumes.
- Recognize and identify the best practices in teaching.

- Assess the diversity of learners in a classroom and evaluate teaching methods that address the variety of ways that students learn.
- Distinguish between learner-centered and teacher-centered curricula and distinguish between classroom approaches that are inquiry-based (hands-on) and those that are informational.
- Describe how national and state standards in science and mathematics affect curricular design and testing.

Although the current learning outcomes reflect the skills learned in the program, it has been problematic to put together a robust plan of assessment for the program because of the difficulty in measuring the current learning outcomes and the lack of a full time faculty that can see the completion of any assessment plan. For that reason, the department is in the process to update the program learning outcomes to be closer to the SMART (specific, measurable, achievable, relevant and time-bound) criteria.

At the same time, the department will redouble the effort to convince the administration to hire more full time faculty with appropriate and updated skills to help us confront this challenge. Basic skills, math education and the impact of the common core in our curriculum are, no doubt, the greatest challenges that the math department faces given the limited resources.

Timeline and action:

- The department is writing the program update now and will submit this through the All College Curriculum Committee by the end of spring 2015 semester.
- The program's assessment will be established in fall 2015.

As a result of SLO assessment data, will you be requesting additional resources for your program or courses (i.e. additional faculty, equipment request, program personnel…)?

- The department needs to hire additional instructors so that the class size for Math 300, 310, 311, 111, and 14 can be reduced to less than 30 students, which is the recommended number for remedial classes.
- The department needs a testing center for online courses with well trained personal to run it, especially when we propose to have online/hybrid math courses for the AS-T degree.
- Training in distance-education course design and good practices in online-education needs to be required for instructors teaching the future online/hybrid offerings.
- Disaggregate student data (retention and success) for the different modalities of courses is needed to gauge the appropriateness of distance-education courses.
- Software is needed to provide incoming students with an avenue for reviewing their math prior to taking an assessment test, and needed for upper level math courses to enhance the courses' qualities.
- Professor Matusow has retired and Professor Kachuck is in the process of retiring and they both currently are working only part time. They are the only faculty qualified to teach Mathematics 052 - Mathematics for Elementary Education. Moreover, Professor Kachuck is recognized as an expert (and the only one here at EVC) in Adult Learning theory. New faculty needs to be hired to replace them, especially when we need a full time faculty to assess the courses' SLOs.
- Math 300, Math 14, Math 22, and Math 61 are currently taught by adjunct faculty. Many of them are somewhat unfamiliar with the SLO assessment process. Training/workshops sessions will be needed in the near future for them to be able to do the job properly.
- Every semester, the department offers a total of 38 plus sections of Math 111 and Math 13. While we are on the process of assessing the same SLOs questions/problems for each section, we need a release time for a coordinator (for each course) who will be in charge of coordinating the SLOs assessment for remedial math courses.

- Robust training for all faculty to enable them to design assessments that are reliable and valid so that the assessment results are more meaningful and can be used more effectively for improving student learning and for curriculum development.

1. **List current faculty and staff members in the program, areas of expertise, and how positions contribute to the program success.**

   A. List of Faculty and Staff Members in the Program
      1. **Faculty Members**
         Burnham, Cynthia R.
         Castilla, Guillermo
         Cong-Huyen, Laimi
         Estrada, J. Henry
         Ho, Chungwu
         Kachuck, Iris
         Knight, Robert W.
         Ky, Teck
         Lombard, Bob
         Quach, Tin
         Vanniasegaram, Sithparran

      2. **Staff Members**
         Marks, Sawanii
         Nguyen, Nguyet
         Pham, Duyen (Bryan)
         Vallin, Jorge

   B. Areas of expertise, and how positions contribute to the program success

      1. Faculty Members

         Burnham, Cynthia R.

         Area of Expertise: Mathematics

         How Does Her Position Contribute to the Program Success?

         Professor Burnham has taught most of the mathematics courses offered, as well as a few courses in computer science. Some of the classes she currently teaches are in the Enlace program, which has an emphasis on empowering students and improving their retention, success and transfer. The teaching approach she uses is a combination of lecture, group work and mastery in a bilingual and multicultural setting. She incorporates technology (such as ALEKS) in some of the classes.

         Professor Burnham also participates in the ENLACE STEM Project that seeks to recruit, support and transfer students into STEM careers. Many of these students are currently working as tutors in the classroom as well as in the MSRC. This program has strategic partnerships with NASA as well as with community mentors, so we are able to offer internships and job shadowing days to some of our students.

         In addition, she is developing an ENLACE pilot to increase completion of educational goals by shortening the pathway. This will be accomplished through an intensive course that will allow students to complete their math requirement more successfully and in a shorter amount of time.

Professional Development in the Last Six Years:

She attended SACNAS (*Society for Advancement of Hispanics/Chicanos and Native Americans in Science*), Great Teacher's Seminar, STEM conferences, CMC[3] and some webinars.

Proposed Professional Development Activities and Reason for such Activities:

She will continue to attend conferences, read journals and plan to take some graduate level Math education courses to continue to stay abreast of current developments in mathematics teaching.

Castilla, Guillermo

Area of Expertise:

Guillermo Castilla has a Ph. D on theoretical physics (UCLA), Master in Mathematics (UC Berkeley) and postdoctoral experience and work experience in National Laboratories in the areas of solid state, numerical linear algebra, ordinary differential equations and partial differential equations. Because of his strong background, Guillermo is very suitable to teach any of the courses that form the Math AS-T program where he can provide well-rounded and rich educational experiences to the students enrolled in this degree. This aligns closely to the goal of providing a learning environment that challenges and supports students in achieving their educational goals. Guillermo is also very knowledgeable about student learning outcomes, data analysis and institutional effectiveness processes at community colleges because of attendance to workshops and his service in several accreditation visits. He was also trained by Dr. Estela Bensimon in "equity mindedness", a cognitive framework that seeks to change a campus expectational climate as well as the students' perceptions of the expectations faculty and staff members hold for the students' performance.

How Does His Position Contribute to the Program Success?

Currently, his main contribution to the mission of the college and to the success of the program is in the area of the student learning outcomes where he has participated consistently in writing the learning outcomes and collaborated with colleagues at SJCC. Another area where he has contributed to the mission of the college and to the strategic goal of providing equitable access is when he helps and support students in the tutoring center to become active, responsible and successful learners (e.g., increasing self-efficacy of all students). In his courses, he emphasizes real-world application of mathematics to promote equitable participation and he tries to implement classroom strategies to help the student to become more self-directed and more self-confident so that they can be successful beyond my classroom. Nevertheless, it is likely that a more coordinated and collective effort (all faculty) may be necessary to close the student achievement gap (55% success rate) and achieve equitable outcomes in all the mathematics courses.

Professional Development in the Last Six Years:

In addition to teaching Mathematics, Guillermo has taught the freshman physics sequence. He attends regularly the annual CMC[3] (teaching) conference of Northern California. He attended workshops on differential equations and biomathematics teaching at the MathFest conference in San Jose. Most recently, in November 2013, Guillermo took the OnCourse workshop I to learn new strategies to improve retention, student success and to improve as a learner-centered instructor. In this OnCourse workshop, Guillermo learned of the importance of formative assessment as a tool to gather information to increase student engagement by modifying learning activities to address misconceptions. In the last eight months, Guillermo has taken four courses on Online and Blended Instruction and two refresher courses in Probability and Statistics.

Guillermo has just recently completed his third accreditation visit for the ACCJC. He is also a referee for the physical review (condensed matter physics area).

Proposed Professional Development Activities and Reason for such Activities:

In order to help much more in the strategic goal of improving success, retention and persistence in ALL Mathematics courses (particularly developmental, since 66% of our math students are at the developmental level), he is planning to attend the follow-up OnCourse Workshop which reviews equitable learning environment and also focuses on strategies for empowering students to become active and responsible lifelong learners. He is also planning to learn much more about formative assessment and its use in student engagement and in raising standards through student learning outcomes assessment. These professional activities, coordinated with the efforts of other colleagues, will help to design a more learner-centered curriculum in mathematics which could improve the pipeline to higher level courses and, perhaps, remediate the lack of equity and gender gaps in higher level math courses (STEM). Finally, he plans to take more courses in the area of blended and online instruction in order to design distance-education, STEM courses in order to provide more access to students in the San Jose community including Latino College Preparatory and Downtown College Preparatory.

Cong-Huyen, Laimi

Area of Expertise:

Upper level mathematics such as Calculus I, II, III; and Linear Algebra.

How Does Her Position Contribute to the Program Success?

In the past six years, she has taught many different Math courses from developmental courses to upper level math courses. As part of our college mission, in order to well prepare for our transferred students, in the upper level courses, she has been helping her students to enhance the learning objectives of each class, and to connect academic learning and community service through the Service Learning Program. As the result, she was recognized by University of California, Irvine for dedicating myself to helping students establish a strong personal and academic foundation, and having the most significant impact on students' academic performance and successful transfer to the University. Additionally, She has coordinated with faculty from EVC and SJCC to update course outlines including developing the SLO's for Math 111, Math 061, Math 072, Math 073, Math 079, and the AS-T Program. As part of the SLO's assessment, she is the lead teacher for Math 061, Math 072, Math 079, and the AS-T Program in Math to meet the accreditation's requirement.

Professional Development in the Last Six Years:

She attended CMC[3] conference five times in the last six years, and participated in several workshops for Math Program such as Web Assign, and MyMatLab. Also, to achieve the strategic initiatives, where student-centered is an important component, she has been a member in different committees that are helping student directly such as the Matriculation and Student Success Committee, where she can work with other team members to promote academic persistence, retention and success by intervening early in the semester for students who are struggling in their classes; and the All College Curriculum Committee, where we can help to review, to approve, or to make changes to the curriculum of the college in order to have a better program for students.

Proposed Professional Development Activities and Reason for such Activities:

Professor Cong-Huyen would like to continue to attend the CMC[3] to participate in more training and workshops in the area of using technologies, especially the online learning, to improve her skills for different teaching techniques and to integrate them in my classes for student success. More importantly, interacting professionally and socially with other faculty members at other colleges may give her a new light for understanding students' world, as well as increasing our visibility in order to develop our Community Engagement, as part of our strategic initiatives.

Estrada, J. Henry

Area of Expertise:

Professor Estrada's formal education was in Math, Physics, and Computer Science. And although he has taught every college level math course offered at EVC, his recent focus has been on teaching Calculus, Linear Algebra, and Computer Science.

How Does His Position Contribute to the Program Success?

Professor Estrada was the principal architect for our A.S. Degree for Transfer in Mathematics, which was approved in 2012. The new degree provides the foundational training that students need to meet their higher educational goals in Mathematics and Applied Mathematics. Since 2012, he has been actively engaged in getting high-tech companies, government agencies, universities and public schools to partner with EVC to develop curriculum in Cyber Security. He was the principal investigator on grant proposals to the National Science Foundation, and other funding agencies concerned with Cyber Security. In the past year, he has updated the curriculum for Computer Science 75 (Introduction to Program Structures) and Computer Science 76 (Introduction to Data Structures). The principal changes to these courses included changes to content and SLOs, and they subsequently received approval as C-ID courses. In the case of Computer Science 75, the change was essential as the course in an elective in our A.S. Degree for Transfer in Mathematics. Finally, he has added two new courses to our computer science curriculum: Computer Science 20 (Introduction to Programming Concepts and Methodologies) and Computer Science 77 (Computer Organization and Systems). Computer Science 77, which will be offered for the first time in the spring of 2015, will serve as a capstone course for students planning to transfer to universities and major in computer science, software engineering, and computer engineering. The Computer Science 20 course was designed as a service course for non-majors, but also as a way of attracting more students into mathematics and computer science. We are planning to offer this new course for the first time in the fall of 2015.

Professional Development in the Last Six Years:

Since most of the students he encounter in his classes are in STEM fields, Professor Estrada makes an effort to stay current in applications of mathematics to several areas of science and technology, as well as mathematics education. He has attended all of the training sessions at EVC on SLO development and assessment. He has also attended workshops and conferences on topics such as sustainable energy systems, smart grids, and cybersecurity (with emphasis on data encryption). He took a sabbatical during the 2009-2010 academic year, and did the research to develop and write a state-of-the-art course on Energy Systems and Sustainability (now in the EVC catalog as SETS 10). He also wrote and submitted a grant proposal to the National Science Foundation to support the development of a complete curriculum for an A.S. Degree on Sustainable Energy. When the proposal was not funded, he changed my focus to cybersecurity. Subsequently, Professor Estrada attended several conferences and workshops sponsored by Homeland Security, SRI International, and the NSF funded CyberWatch West. In the years to come, we can expect the cybersecurity space to employ an increasing number of applied mathematicians and computer scientists.

Proposed Professional Development Activities and Reason for such Activities:

He plans to attend the upcoming and future CMC[3] and, where practical, AMATYC conferences. He is also planning to update his knowledge of pedagogically sound technologies for mathematics instruction. Moreover, he expects to focus on further developing our curriculum in Computer Science, particularly, SLOs and their assessment. He will make every attempt at remain current on methods of SLO implementation. Professor Estrada will also continue to work toward developing an A.S. Degree for Transfer in Computer Science, and once we have an established program in Computer Science, he plans to revisit the area of cybersecurity.

Ho, Chungwu

Area of Expertise:

Professor Ho focuses on upper level mathematics, applications of mathematics, and working with individual honor students on research projects.

How Does His Position Contribute to Program Success?

Professor Ho coordinated with faculty members from EVC and SJCC to update Mathematics 073 and Mathematics 078, expanding the former from 4 to 5 units and the latter from 3 to 4 units in an effort to thoroughly cover the C-ID course contents and learning objectives. He has helped developing the SLO for calculus, multivariable calculus, discrete mathematics and differential equations, and have been the faculty member assessing the SLO for multivariable calculus, discrete math and differential equations. Currently, he is coordinating the AS-T SLO assessments for the courses multivariable calculus and differential equations. These are part of the Department efforts to provide quality and efficient programs to ensure student success, as delineated in the School Strategic Initiatives, and to ensure that our students are well prepared when they transfer to a university or to enter the workforce, as stated in the District Mission Statement *"to meet the diverse educational and workforce needs of our community by empowering our students …"*.

He has also been directing students honor research projects related to multivariable calculus, differential equations, and discrete math courses. For the past six years, 33 students completed their honor's research projects under his supervision, and six of them presented their research in a conference sponsored by the *Mathematical Association of America* for college students in Northern California and Southern Oregon, and 12 others presented their research to the students and faculty of Evergreen Valley College. Three more students are currently working on their projects with him this term. These are part of the Department efforts in ensuring that our students are well prepared when they transfer to a university, enter the workforce, or embark on a path of lifelong learning, as stated in the District Mission Statement.

Professor Ho has been working extensively with students of diverse background: Among the 40+ students who have completed their honor's research projects under my supervision, there were, in addition to white, Hispanic, and Asian American students, also students from Vietnam, China, India, Pakistan, Cambodia, and Thailand. This is a part of the department efforts of empowering and preparing students from diverse backgrounds to succeed academically, as stated in the School Mission Statement.

Professional Development in the Last Six Years:

He has been learning the C-ID course requirements for Math 73, 78, and Comsc 72, and methods for assessing the SLO for these courses. Professor Ho participated in several workshops on MS Office and Moodle. He has also been engaged in research and published a paper in the journal,

Mathematics Magazine of the Mathematical Association of America, and has published two poems in the literary magazine, *Leaf by leaf.*

To keep abreast with the advancement of knowledge, he has been a member of the *American Mathematical Society* and the *Mathematical Association of America.* Professor Ho is also a former associate member of the *American Academy of Poets.*

Proposed Professional Development Activities and Reason for such Activities:

Professor Ho will continue his efforts in updating and assessing the SLO of the courses he will be assigned to teach and expanding my knowledge in mathematics so that he can bring in meaningful applications of mathematics in my class and interesting topics for student research.

Kachuck, Iris

Area of Expertise:
Mathematics Education, Instructional Technology, and Developmental Mathematics

How Does Her Position Contribute to Program Success?

Given that the majority of students enrolling in EVC mathematics classes enter at the Developmental level, Professor Kachuck's expertise working with precollege level Mathematics directly contributes the success of our course offerings. By incorporating the use of small groups and community building exercises in my classroom, she is able to "create a trusting environment where everyone is valued and empowered" which addresses both our District strategic initiative and successful Developmental Pedagogy. Furthermore, her teaching supports the District Mission to "offer a wide spectrum of educational experiences and flexible methodologies" by offering Hybrid and Online courses in addition to traditional lecture classes

Professional Development in the Past Six Years:

She has attended numerous CMC[3] conferences and participated in several trainings and workshops in the area of online learning and utilizing instructional technology through the statewide @One Institute. In addition, she has participated in numerous campus-wide trainings in SLO development and implementation. As a result of the campus training and to comply with Accreditation standards, she has participated in the development of course and program level SLO's and with ongoing course level data collection.

Proposed Professional Development Activities and Reason for Such Activities:

Professor Kachuck would like to continue training in the areas of successful Basic skills/Developmental Math instruction given the current need and goals of our District. She also plans to continue attending training in the area of online instruction since more and more of our students are asking to receive instruction in this modality.

Knight, Robert W.

Area of Expertise:

Professor Knight's field of expertise is the use of technology in math education and specifically online education.

How Does His Position Contribute to the Program Success?

In his position as a mathematics instructor (professor) at EVC, Professor Knight is able to teach online courses and incorporate the Learning Management System (LMS) called MyMathText into the teaching of Statistics. In doing so, he has completely eliminated the cost of textbooks for his Statistics students. Over the past two years, he has saved EVC students approximately $150,000 in textbook costs by using MyMathText in conjunction with Open Educational Resource Textbooks.

Professional Development in the Last Six Years:

In the last six years Professor Knight has continued his professional development activity of serving on the Board of Directors of the California Mathematics Council for Community Colleges (CMC[3]). He has also served as the CMC^3 President, and has been awarded the President's Award and the Distinguished Service Award from CMC[3].

This fall he is completing the @One Online Teacher Certification Program. This program has required my taking several online certification courses given by @One and accredited through Fresno University. By completing this certification program, he will become one of the very few (if not the only) certified online instructor in the SJECCD district.

Finally, he has been invited by @One to become an Online Course Reviewer for @One in cooperation with the California State Chancellor's Office for Community Colleges.

Ky, Teck

Area of Expertise:

Professor Ky's expertise is in college Mathematics and Statistics.

How Does His Position Contribute to the Program Success?

As a Mathematics and Statistics faculty, Professor Ky has had the honor to work with students at many different levels. This allows him to continue to review his course presentation to meet his student's needs and level of instruction so his students develop the knowledge of the curriculum to be successful. He has realized that having an understanding and respect for the diversity of our students, ethnicity, racial, culture, gender and abilities has given him the opportunity to assist students to achieve their academic goals. He is active in working with students in our current special programs, AFFIRM, ASPIRE, ACCEL and DSP. AFFIRM and ASPIRE programs emphasis in working with African American and Asian students. The ACCEL program is and Eastside Union High School Program housed at EVC. EVC's DSP has allowed him to grow in working with students with various developmental needs.

Professional Development in the Last Six Years:

In the past six years, Professor Ky has been involved in several professional development activities:
- He updated the Math 63 Statistics Student Solutions Manual with Frank Soler.
- He helped to assess the Student Learning Outcomes (SLO) for Math 63 and Math 71 to meet accreditation requirements.
- He continued to develop concept lecture notes for students, to assist their understanding of Statistics.

Proposed Professional Development Activities and Reason for such Activities:

- Professor Ky would like to continue to work with the AFFIRM, ASPIRE, ACCEL and DSP program students to assist them with their aspiration to transfer to the University of their choice.
- He would like to participate in the instruction at our new campus site in the city of Milpitas. He feels that this will allow him to continue to work with students in their continued growth in the workforce and their path towards lifelong learning.

Lombard, Bob

Area of Expertise:

Professor Lombard's expertise lies in developmental mathematics, precalculus, and differential equations. He teaches a majority of his load in developmental mathematics every semester, and is considered a lead instructor in Math 310 (Basic Mathematics) & Math 311 (Prealgebra). He has worked with both full time and part time faculty in both of these courses in the development and assessment of SLO's for the last four years here at EVC. Working on SLO's collaboratively with other department members ties into Strategic Initiative 3: Organizational Transformation. It helps to transform the college's image via (a).Student Access: Completion of Educational Goals, (b) Employee Development, and (c) Transparent Infrastructure. He also possesses a 'fair' amount of knowledge in the subject of differential equations, and is an available resource for students who take this course in our department; over the past four years, there have been instances where students from this course have sought him out in our Math and Science Resource Center to help them with this class. He can easily teach this course upon request or if needed.

How Does His Position Contribute to the Program Success?

Given that most of the course offerings in our department are developmental, it is essential that our math department have some members who have an emphasis in developmental mathematics. Helping other instructors with course information and counseling students on the next mathematics course they should take is just a couple of the important responsibilities which he welcomes every day. Professor Lombard is one of those full time math faculty members who meet this important need of having expertise in developmental mathematics in our department. He has also been a lead instructor in the development of SLO's and updating of the Precalculus series course outlines, for the last four years.

Professional Development in the Last Six Years:

As part of the district mission statement, student success is the heart of its mission and the district has aspired to hiring the best and brightest faculty to ensure that our students are well prepared after leaving our institution. Since learning is a lifelong endeavor and instructors need to maintain currency in their field. He has chosen to be a member of two professional math organizations: (1) The California Mathematical Council for Community Colleges (CMC[3]) and (2) The American Mathematical Association of Two Year Colleges (AMATYC). He usually attends the yearly conference every December in Monterey, California for CMC[3] and subscribes to mathematical journals from AMATYC.

Proposed Professional Development Activities and Reason for such Activities:

Professor Lombard loves to interact with students every day; that is why he has chosen teaching as a profession. This is the beginning of his fifteenth year teaching full time at EVC. He plans on teaching here for an additional twenty years. But, teaching requires a lot of time interacting with

students, which he obviously immensely enjoys. In the future, he is considering taking a yearlong sabbatical in the second half of his tenure here at EVC. This would allow him to focus on several aspects of professional development, outside of the class room, but still focused on helping students inside the classroom.

Quach, Tin

Area of Expertise:

Applied Mathematics

How Does His Position Contribute to Program Success?
Professor Quach has taught most of the mathematics courses offered at a community college level. When teaching advanced math courses such as Calculus and Differential Equations, he regularly uses technology (graphing calculator, computer algebra system, etc.) during the lectures. He worked with other math faculty to update the course outlines, and has also given graphing calculator workshops for advanced math students.

Professional Development in the Past Six Years:
He has regularly attended CMC[3] conferences and workshops providing training in the area of using technologies and teaching mathematics to improve my teaching skills. He always volunteers to conduct peer evaluations every semester.

Proposed Professional Development Activities and Reason for Such Activities:
Professor Quach plans to attend workshops and conferences with emphases in teaching mathematics, using technologies, improving student success, etc. He will continue to volunteer to conduct peer evaluations and also serve on college committee(s).

Vanniasegaram, Sithparran

Areas of Expertise:

Professor Vanniasegaram's areas of expertise are mathematics and statistics. In his mathematics and statistics classes, he uses a wide range of teaching strategies (lecture, group work, hands on demonstrations, etc.) so that students from diverse backgrounds can be successful in his classes. This approach is consistent with the EVC Mission Statement. He tries to maintain high standards in his classes so that his students are well-prepared when they transfer or when they enter the workforce. This approach is also consistent with the District Mission Statement.

How Does His Position Contribute to Program Success?

The fall 2014 semester is Professor Vanniasegaram's first semester teaching at Evergreen Valley College. Before starting his position at Evergreen Valley, he taught part-time at De Anza College, where he taught statistics, calculus, pre-calculus, trigonometry, intermediate algebra, and elementary algebra, and will continue to teach those courses at Evergreen Valley College. Additionally, he plans to teach linear algebra, differential equations, and multivariable calculus in the future.

While at De Anza, he also served as the advisor to the Math Club, and hopes to start a math club at Evergreen Valley College in the near future and serve as its advisor. This semester, he is serving on the Evergreen Valley College technology committee. Beginning next year, he plans to serve on the statistics textbook and curriculum committees.

This semester, he is assessing SLOs for the Math 63 and will assess SLO's for other classes in the future as needed.

<u>Professional Development in the Past Six Years</u>:

Recently, he attended the CMC[3] conference and was trained in CurricUNET. (This is his first year of full-time teaching; he is definitely planning on doing more professional development activities in the future.) He is a past member of the American Statistical Association.

<u>Proposed Professional Development Activities and Reason for Such Activities</u>:

Professor Vanniasegaram plans to attend the CMC[3] conference every year starting this year. He hopes to learn new teaching strategies from faculty members at other colleges to help improve the retention and success rate in his classes. He also plans to being trained in Moodle, an open source learning platform that is currently being used by several faculty members at Evergreen Valley College. Some of his colleagues have reported that their students have responded positively to Moodle.

2. <u>Staff</u>

Marks, Sawanii,

Ms. Marks is a Mathematics Instructional Support Assistant. She provides students and student tutors with guidance, support, and tutoring assistance. Her area of expertise is in the interrelationship between the tutors and students. As for her professional developments, she was trained and worked with MyMathLab, and she participated in EdFund's Training Workshop, "Creating Outstanding Customer Service Success."

Nguyen, Nguyet

Ms. Nguyen is a Mathematics Instructional Support Assistant. She provides students and student tutors with guidance, support and tutoring assistance. In the future, she plans to attend workshops offered by the School District to improve her skills for working with students.

Pham, Duyen (Bryan)

Mr. Pham is a Mathematics Instructional Support Coordinator. He coordinates the daily operations of the EVC Math and Science Resource Center (MSRC), which provide efficient math tutoring and other essential student learning services to ensure student success for all Evergreen Valley College Math/Science students. He works closely with the Campus Tutoring Program Coordinator on the hiring, mentoring, supervising, and evaluating of all MSRC student tutors.

Vallin, Jorge

Mr. Vallin is a Mathematics Instructional Support Assistant. He provides students and student tutors with guidance, support and tutoring assistance. Jorge is a team player who works closely with the Enlace instructors. His excellent communication skills with both English and Spanish contribute to being a successful instructional assistant**.** The bilingual ability provides for challenging math concepts to be explained in the language that students bring with them to EVC. The examples he uses to illustrate the math concepts are culturally relevant and as a result, students are highly engaged.

2. **List major professional development activities completed by faculty and staff in this department/program in the last six years and state proposed development and reasoning by faculty in this program**

   A. <u>Summary of Faculty Activities and How These Activities Contribute to the School Mission.</u>

   In addition to their regular teaching and committee work, faculty members have engaged in a variety of activities that enhance their teaching and service to the students.

   a. Activities that Help Serving the Students

   To ensure we offer a quality and efficient program, as described in the Strategic Initiatives of the Program Review Self-Study, all the faculty participated in various training sections of SLO assessments in 2012, and in the past two years, have been actively working in the SLO assessment in each of their classes by submitting an assessment of two or three SLO's of each of their classes.

   Many faculty members have also actively been participating in various student programs such as *ENLACE, EXCEL, ASPIRE* and the *EVC Honors Program* to ensure we meet the school mission of empowering and preparing students from diverse backgrounds to succeed academically.

   b. Activities that Enhance Faculty's Knowledge

   The quality of a program depends directly on the depth and the scope of the knowledge of its teaching staff. A few full time and adjunct faculty members in the Department of Mathematics hold doctoral degrees. Many other faculty members have taken additional graduate level courses or have been attending various workshops by *@One Institute* or elsewhere. Most of the faculty members are also members of professional organizations, such as *CMC³, AMATYC, MAA*, and *AMS.* These faculty members participate in professional conferences and subscribe professional journals to ensure that they have ample knowledge to carry out a quality program.

   c. Keeping Abreast with New Technologies and Current Educational Findings

   To keep abreast with new technologies and educational findings, math faculty members have been actively participating in many professional conferences such as the ones offered by *CMC³, AMATYC, MAA,* as well as *OnCourse Workshops.* The department now offers several online courses, and many classes are now having an online component such *Moodle* or *MyMathLab.* To meet students of diverse background a few faculty are very active in participating conferences and workshops such as *SACNAS*, *STEM, WebAssign*, and *CurricUNET*.

   B. <u>Summary of Staff Activities and Their Significance</u>

   The Mathematics Instructional Support Assistants are of valuable assets to the Evergreen Valley College Mathematics department. In accordance with the District mission and strategic initiatives, the Mathematics Instructional Assistants are doing a great job providing an efficient mathematics tutoring program and essential student learning services to ensure student success. Besides providing tutoring to students, they also supervise, train, support, and evaluate student and volunteer tutors, the Instructional Assistants are also going to developmental math classrooms to serve as Teacher Assistants. Overall, with their focus on supporting a student-centered environment, the Mathematics Instructional Support Assistants are doing a formidable job serving as bridges between math students and mathematics instructors. They play a very important role in student retention and student success in the Evergreen Valley College Mathematics department.

3. **Identify current schedule for tenure review, regular faculty evaluation, adjunct faculty evaluation, and classified staff evaluation**

A. Evaluation and Tenure Schedule of Non-Tenured Faculty.

Non-tenured faculty members in the past six years have been evaluated by following very closely the procedure described in *Article 20* of the *FACBA*. At the beginning of the non-tenured member's first semester a *Tenure Review Committee* (*TRC*) is formed according to the selection procedure delineated in section *20.2* of the *FACBA*: a committee consisting of the Dean, and two tenured faculty members, one of which is selected by the faculty being evaluated and the other selected by the Dean.

In the first three years of service for non-tenured faculty, a *Pre-evaluation Conference* is convened by the end of the ninth week of the non-tenured faculty member's first semester, and by the end of the fifth week of the non-tenured member's third and fifth semesters.

The faculty member's classes are then visited and student evaluations are collected by the *TRC* members. The non-tenured faculty member also makes a *Self-evaluation* and designs a *Growth and Development Plan* according to *FACBA 20.8.2*. A *Progress Review Conference* is convened by the end of the fourteenth week of the non-tenured faculty member's first, third and fifth semesters to review the information from the *TRC* members, student evaluations and the faculty's *Growth and Development Plan*. A *Post-Evaluation Conference* is convened by the fourth week of the non-tenured faculty member's second, fourth, and sixth semesters to review and finalize the non-tenured faculty member's *Growth and Development Plan.*

In the fourth year, the *Pre-Evaluation, Progress Review Evaluation*, and the *Post-Evaluation Conferences* are all completed by the end of the non-tenured faculty member's seventh semester. At the fourth year, the TRC chair drafts a *Summary Evaluation Report* based on the classroom observations, administrator and student evaluations, job description and the non-tenured faculty member's *Growth and Development Plan* and a tenure recommendation is submitted to the College President.

B. Evaluation of Tenured Faculty Members

The department evaluates tenured faculty members once in every three years according to the procedure set in *FACBA Article 22*. The dean first informs the faculty being evaluated in advance of the procedure and criteria of evaluation. The faculty being evaluated makes a *Self-Evaluation* according to *FACBA 22.2.4* and designs a *Growth and Development Plan* according to *FACBA 22.7*. An Evaluation Committee (*EC*) is then established, which consists of the dean and a tenured faculty member. A *Pre-evaluation conference* is then held for the faculty member with the EC members. The committee reviews and modifies the Growth and Development Plan, and schedules the classroom observations. After the EC members visit the classes and collect the student evaluations a *Post-Evaluation Conference* is then held, in which the EC members evaluate the faculty member's performance according the criteria delineated in *FACBA 22.6*, reviews and finalizes the faculty member's Growth and Development Plan, and complete the *Summary Evaluation Report.*

If the faculty member agrees with the report, it is then finalized and signed by the EC members and the faculty member. If the faculty being evaluated does not agrees with the summary, he/she will be given an opportunity to make a written response, which will be considered as a part of the final evaluation report.

C. Evaluation of Adjunct Faculty

Adjunct faculty have been evaluated according to the procedure as spelled out in Article 19 of *Faculty Association Collective Bargaining Agreement* (*FACBA*). An evaluation committee is formed, which usually consists of the Dean of the Division and one or two full-time faculty members. The

adjunct faculty is fully informed in advance of the procedures of the evaluation process and the criteria upon which evaluation are conducted. At least one, sometimes all, of the committee members observe the performance of the adjunct faculty member, using the criteria for evaluation listed in the *FACBA 19.3*.During the observation, student evaluations are conducted and collected by the committee member.

The adjunct faculty member is given a written summary of these evaluations and a post evaluation conference is held with the adjunct faculty and the evaluation committee. The evaluation for adjunct faculty has been carried out according to the status of the faculty: those who have achieved seniority rehire preference (SRP) are evaluated every sixth semester, those who are assigned 33% or more load are evaluated in each of three consecutive semesters, and those working less than 33% without SRP are evaluated in the first semester of employment and thereafter every sixth semester of employment.

4. **Describe the departmental orientation process (or mentoring) for new full-time and adjunct faculty and staff (please include student workers such as tutors and aides).**

   A. The Departmental Orientation Process for New Faculty

   The District Orientation for new full-time faculty is described in *FACBA 5.13.1*, which usually takes place on or near the day before the first Professional Development Day of the fall semester for a maximum of 6 ½ hours, and the Faculty Union will have up to 3 hours of the orientation meeting. In addition to this District Orientation Program, the Division also has a mentor program: each of the new faculty members, in his/her first semester of service, is assigned a tenured faculty as his/her mentor, who provides guidance and assistance to the new faculty member to fit into the school environment, assisting the new member in questions related both to students (such as admission and registration procedures, adding and dropping classes, etc.) and faculty (such as tenure procedure, teaching assignments, and committee work).

   B. The Departmental Orientation Process for Adjunct Faculty

   The District also has an orientation program for new adjunct faculty is described in *FACBA 5.13.2*. New adjunct faculty will receive two hour pay for attending the school adjunct orientation, including a 30 minutes orientation with the Faculty Union. In addition, when an adjunct faculty is hired, he or she is provided with the learning objectives for the class the faculty member is assigned to teach and the syllabus used by our current faculty members. The dean or a current faculty member also describes in detail how our classes are conducted, together with student matters such as adding and dropping students, attendance policy, etc.

The department is challenged by the maintenance and improvement (professional development) of full-time faculty, as well as staff and administrative levels to support instructional needs and student support services and keep abreast with recent retirements. Indeed, to sustain current levels of service, the college must commit to a staffing plan, linked to resource allocation, which analyzes human resource needs based upon the size, scope, and changing needs (demographics shifts and gender gaps) of the department: it is then a good idea, for the mathematics department, guided by more extensive student data and by the college and district educational master plans, to assess and analyze the level and diversity of its full-time faculty and staff. The math department and the college could then use the results of that assessment to develop, adopt, fund, and implement long-range staffing that will ensure a sufficient number of qualified and diverse fulltime faculty, part time faculty and staff (including tutors) to foster an equitable and inclusive environment for all students and assure the quality of the program. Gender gaps in full time faculty and in STEM courses need to be addressed promptly.

PART E: Facilities, Equipment, Materials, and Maintenance

1. **Identify and discuss the facilities, equipment, equipment maintenance, and materials allocated to the program. Identify and explain additional facility needs and rationale.**

The number of sections the Math Department offers is greater than 50 per semester, for an enrollment of slightly fewer than 2,900 students, with most of them in developmental mathematics. The Mathematics Department is at capacity, with all the classrooms in use all of the time at peak times. Approximately two thirds of these sections (close to 40 sections) are remedial courses. According to the data provided by the research office and corroborated by the Datamart site (http://datamart.cccco.edu/) at the Chancellor State Office, this is because most of the students that take Mathematics courses at the college are at-risk students.

When this information is coupled with the recommended optimal size for development courses (no more than a manageable size of 30 students: see North Carolina report, 2009), it follows that the facilities needs of the department are for small and flexible classrooms that would allow a more productive and supportive educational environment for our at-risk population, and an easier implementation of more student-centered pedagogies that would include supplementary instruction, student-student structured interaction, and a close student-instructor interaction (see the article http://files.eric.ed.gov/fulltext/EJ901288.pdf) .

Small learning spaces are needed to implement active learning, improve self-regulation, confidence, and skills of the students which would positively impact the pipeline from developmental to college level courses in mathematics and, moreover, help to close the existing equity gaps in the entirety of mathematics course offerings. One of the most important activities of a college or university is enabling student learning. So there has to be an evolution from classroom setting where you transfer information to the modern concept of an active learning space where there is a conscientious effort to take advantage of new technologies to implement environments that use collaborative and cooperative learning.

At the time of this Review being written, the following describes the plans for the "South Campus" which is the new building that will be used by many Math classes. There will be less hard wiring for Internet use and more wi-fi available the new classrooms and labs. Every corner of the classrooms and labs will have wi-fi access.

Unfortunately, the classrooms are not appropriate for teaching developmental courses because these classrooms are more for a lecture format rather than for implementing student-centered practices such as collaborative and cooperative learning.

The South Campus Building and the New Mathematics Classrooms and Resource Center

1. First floor
    a) Seven classrooms
        1. 1385 sq. ft
        2. 60 student seating capacity
        3. two ceiling mounted projectors,
        4. two projection screens,
        5. white boards,
        6. tack boards,
        7. assisted listening ceiling speakers and teacher's microphone, and
        8. a teacher's station with podium for lecturing,
        9. document camera,
        10. SMART touch-screen computer monitor,
        11. VGA and HDMI auxiliary connections (up to two separate sources).
    b) Math and Science Resource Center with study room and two offices, 1100sqft
    c) Computer lab, 41 student seating capacity
    d) Two-tiered classrooms dedicated for Physics and Social Science (could be used for math courses if not in use)

2. Second floor
   a) Four classrooms (see above)
   b) One tiered classroom dedicated for Chemistry (could be used for math courses if not in use)

2. Describe the use and currency of technology used to enhance the department/program. Identify projected needs and rationale.

The Mathematics Department does not have access to state of the art technology for cooperative and collaborative learning. A more evidence-based approach to the design of classrooms has to be followed (see the books and papers at www.educause.edu and at the following book ISBN: 978-1-118-87011-2) so that ALL students (particularly our developmental students) can have the benefit of a more effective learning environment. For example, locations of the whiteboard, selection of projectors, document viewers, Bluetooth enabled projectors and software need to be driven by best practices in learning (see articles in Educause and at the *New Directions for Teaching and Learning: Active Learning Spaces (March 2014)*) and expertise of the faculty and not by other needs. Indeed, with the paradigm shift to student-centered learning, many colleges and universities are redesigning the spaces in which students learn, collapsing traditional lecture halls and labs to create new, hybrid spaces—large technology-enriched studios—with the flexibility to support active and collaborative learning in larger class sizes (https://net.educause.edu/ir/library/pdf/P7102cs26.pdf).

The configuration of classrooms, the technology within them, and the behaviors they encourage are frequently represented as a barrier to enacting student-centered teaching methods, because traditionally designed rooms typically lack flexibility in seating arrangement, are configured to privilege a speaker at the front of the room, and lack technology to facilitate student collaboration (see the discussion in the publication above). Faculty need to play a more pivotal role in facilities design and selection of technology for the classroom because in higher education, we are entering a period in which it is the *connections* between everything and everyone that are of importance. This development is enabled by information technology, social media, and mobile devices. We are witnessing—and contributing to—the advent of *connected learning,* which is having an impact on all colleges and universities, faculty, and students. The learner can connect to an ever-widening circle of peers, mentors, coaches, resources, and instructors, even beyond those directly affiliated with a course. Instead of "island hopping" from one course to the next, learners can now craft and connect together all the elements of their learning experiences, both before and after graduation. More funding for professional development for the faculty to update skills and to exploit this new environment is urgently needed.

Furthermore, in matters of distance education there should be more technical support, orientation and professional development for both students and faculty. Workshops in principles of instructional design in distance education such as principle of contiguity, modality, redundancy and personalization need to be offered every year at the college. Improved technical infrastructure to support online courses for tests is needed (distance education testing) to meet the latest regulations of the ACCJC and the Chancellor's Office. Last but not least, additional funding for instructional software such as MathType, MatLab and Minitab would increase positively the educational experience of students in the Math AST (higher level math courses).

3. If applicable, describe the support the program receives from industry. If the support is not adequate, what is necessary to improve that support?

NOT APPLICABLE

Mathematics Department Annual Budget – Fiscal Year 2015

GL Account	Category	Annual Budget
10-21-1700-00000-51111	Regular Classroom	864,008.00
10-21-1700-00000-51310	Hourly Instruction - Day	576,018.00
10-21-1700-00000-51340	Hourly Instruction - Summer	226,999.22
10-21-1700-00000-52210	Instructional Aide - Classified	134,303.00
10-21-1700-00000-52410	Hourly, Instructional Aide	250.00
10-21-1700-00000-53110	STRS	127,438.00
10-21-1700-00000-53120	STRS Non-Instructional	19.00
10-21-1700-00000-53210	PERS Instructional Aide	22,158.00
10-21-1700-00000-53220	PERS Regular Classified	2,891.00
10-21-1700-00000-53310	OASDI Certified Inst. Aide	39,186.00
10-21-1700-00000-53320	OASDI Classified/Non-Inst. Aide	835.00
10-21-1700-00000-53410	H & W - Instruction	232,872.00
10-21-1700-00000-53420	H & W Non-Instruction	2.00
10-21-1700-00000-53510	Unemployment Insurance Inst.	6,139.00
10-21-1700-00000-53520	Unemployment Insurance Non-Inst.	22.00
10-21-1700-00000-53610	Workers' Compensation Instruction	35,375.00
10-21-1700-00000-55200	Conferences	150.00
	Total	**2,268,665.22**

Source: *Datatel GLBR*

The Mathematics Department needs additional support for on-line education.

- Much more technical support, orientation and professional development for both students and faculty.
- Improved technical infrastructure to support online courses for tests is needed (distance education testing) to meet the latest regulations of the ACCJC and the Chancellor Office.
- Additional funding for instructional software such as MathType, Matlab and Minitab would increase positively the educational experience of students in the Mathematics program

The Mathematics Department needs support in basic skills

- Class sizes need to be reduced to less than 30 students per section following best practices in developmental education.
- Classrooms need to be better designed (smaller size with group work areas) to provide much better chances of success to our largest customer student population. In fact, size of the classrooms is less than optimal for the developmental courses. A more evidence-based approach to the design of classrooms has to be followed (see the books and papers at www.educause.edu) so that ALL students (particularly our developmental students) can have the benefit of a more effective learning environment.
- Investment in training (professional development) in the area of learning theory, collaborative learning and active learning methodologies for full time and part time.
- A larger percentage of our basic skills courses need to be taught by full time faculty: more full time faculty need to teach a variety of basic skills courses to raise the 33% percentage.

Technology

- Document viewers, Bluetooth enabled projectors and software in general need to be driven by the needs of the students and the expertise of the faculty and not by other needs.
- Training on *connected learning.* The advent of *connected learning,* which is having an impact on all colleges and universities, faculty, and students. The connected learner and now has greater personal agency with respect to his/her learning and academic progress. The learner can connect to an ever-widening circle of peers, mentors, coaches, resources, and instructors, even beyond those directly affiliated with a course. Instead of "island hopping" from one course to the next, learners can now craft and connect together all the elements of their learning experiences. More funding for professional development for the faculty to update skills and to exploit this new environment is needed.
- Training in e-design principles need to offered in a regular basis and must be required for all faculty teaching distance-education courses (hybrid or Internet).

TO BE INCLUDED IN A SUBSEQUENT VERSION OF THIS REPORT

NOT APPLICABLE

Part I: Resource Allocation Table

Productivity - Most Recent Academic Year

	Fall 2013	Spring 2014	Average
WSCH	9,516	8,837	9,176.5
FTES	290.5	267.5	279.0
FTEF	14.8	14.1	14.5
Productivity (WSCH/FTEF)	643.1	628.3	635.7

Student Success - Most Recent Academic Year

Ethnicity of Students	Seatcount			Retention				Success			
	Fall 2013	Sp 2014	Av.	Fall 2013	Sp 2014	Av	Av %	Fall 2013	Sp 2014	Av	Av %
African American	57	50	53.5	44	40	42	78.5	32	24	28	52.3
Asian (All other)	151	139	145	130	111	120.5	83.1	118	95	106.5	73.4
Asian/Cambodian	24	23	23.5	21	19	20	85.1	16	16	16	68.1
Asian/Chinese	42	41	41.5	36	35	35.5	85.5	30	27	28.5	68.7
Asian/Indian	80	72	76	68	58	63	82.9	53	47	50	65.8
Asian/Viet.	388	362	375	329	312	320.5	85.5	284	266	275	73.3
Filipino	139	133	136	115	108	111.5	82.0	86	84	85	62.5
Latina/o	638	538	588	500	448	474	80.6	353	322	337.5	57.4
Native American	10	11	10.5	6	8	7	66.7	4	7	5.5	52.4
Pacific Islander	16	12	14	14	9	11.5	82.1	13	9	11	78.6
White	156	137	146.5	117	115	116	79.2	86	98	92	62.8
Other/Unknown	458	488	473	389	419	404	85.4	308	302	305	64.5
Total:	2,159	2,006	2082.5	1,769	1,682	1725.5	81.4	1,383	1,297	1340	65.0

Number of Sections Offered – Most Recent Academic Year

	Fall 2013 – 90 Total	Spring 2014 – 83 Total
Math 300	1	1
Math 310	7	6
Math 311	8	7
Math 111	17	13
Math 013	20	16
Math 014	4	4
Math 021	2	3
Math 022	1	1
Math 025	4	3
Math 051	0	0
Math 052	0	1
Math 061	2	3
Math 062	2	3
Math 063	13	12
Math 071	3	4
Math 072	2	3
Math 073	2	2
Math 078	0	1
Math 079	1	0
Source: *RIE Data Portal*		

Changes in Enrollment – Most Recent Academic Year vs. Three Years Ago

Comparing Academic Year 2010-2011 to Academic Year 2013-2014

	Fall 2010	Spring 2011	Average	Fall 2013	Spring 2014	Average	% Change
Total Seatcount	3,025	2,912	2,969	3,342	2,904	3,123	+5.2
Total Headcount	2,984	2,872	2,928	3,281	2,874	3,078	+5.1

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10-21-1700-00000-55200	Conferences	150.00
	Total	**2,268,665.22**

Source: *Datatel GLBR*

Current External Funding (From Fund 17)

Not Applicable

Future Needs: Faculty (Estimated Additional Cost)

Full-Time to Part-Time Ratios Based Upon Bodies:

Spring 2014:	Full Time = 10 Math Faculty (2 on reduced load)	Part-Time = 27 Math Faculty
Fall 2014:	Full Time = 11 Math Faculty (2 on reduced load)	Part-Time = 30 Math Faculty
Average:	**FT =36.8%**	**PT = 63.2%**

Percent Full-Time to Part-Time Based Upon Sections Taught:

Spring 2014: Full Time = 44.8% Part-Time = 55.2%

Fall 2014: Full Time = 37.5% Part-Time = 62.5% Math Faculty

Average: FT =72 sections : 41.1% PT = 103 sections: 58.9%

Full-Time to Part-Time Based Upon Load:

Spring 2014: FTE Load taught by Part-Time Faculty (including overloads) = 13.5

Fall 2014: FTE Load taught by Part-Time Faculty (including overloads) = 14.1

The History of Math Positions at Evergreen Valley College Since 2009

- Steve Matusow retired in June, 2009; Bruce Carroll retired in June, 2012
- Kevin McCandless transferred to SJCC in August, 2012; Tin Quach transferred to EVC Fall 2013
- Iris Kachuck is at 50% load for the year; Chungwu Ho has 33% load in the Math Department
- The Division had a growth position approved in 2009, screened applicants, and recommended finalists at which point the position was canceled due to budget constraints
- Sithparran Vanniasegaram was hired in Fall 2014
- Since 2009, the Department is down two positions (Lost 3 + 1 reduced load + gained 2); net loss of 2
- 100% of Math 14, Math 22, and Math 61 are taught entirely by adjunct faculty

Our conclusion is that the MSE Division needs at least two new math faculty members to maintain the level of staffing from 2009.

The estimated cost is thus: $84,000 per faculty member including benefits x 2 = $168,000.
Source: Estimated from FA Contract + estimated benefits (20% of Salary)

Future Needs: Staff (Estimated Additional Cost)

None at this time.

Future Needs: Facilities (Estimated Additional Cost)

The Mathematics, Chemistry, and Physics faculty will be moving to the new South Campus building in the spring of 2016. This building will include rooms for math classes, and a new Math and Science Resource Center. This building is being paid for from Measure G bond funds.

Future Needs: Supplies (Estimated Additional Cost)

To be determined in second version of this report.