



Mathematics PROGRAM REVIEW REPORT 2014 - 2015

Faculty and Staff (List all)

| Full Time | Adjunct | Support Staff |
|------------------------|---------------------------|---------------|
| Anderson, Brian T. | Cheng, Tanshee T. | |
| Dominguez, Victoria L. | Chun, Mina K. | |
| Everest, Robert B. | Croft-Seidler, Hannah E. | |
| Gong, Catherine J. | Dominguez, Cynthia C. | |
| Gonzalez, Rudy | Fogel, Charles J. | |
| Gutierrez, Jesus E. | Kassab, Mohamad S. | |
| Low, Joyce | Kim, Edward B. | |
| Medrano, Esmeralda | Lei, Li H. | |
| Nguyenhuu, Rick H. | Leung, Sing L. | |
| Odrich, Steve I. | Llosent, Giovanna | |
| Paek, Heddy | Lopez Najera, Sandy O. | |
| Scott, Chris M. | Manrique, Miguel A. | |
| Swan, Alfie A. | Martinez, Jeannie S. | |
| Swatzel, James P. | Nguyen, Cynthia N. | |
| Tippins, Ralph E. | Nguyen, Tracy | |
| Trad, Mohamad | Nguyen, Trina T. | |
| White, Sheila R. | Pearsall, Sam A. | |
| Zhuang, Ying | Saravia, William V. | |
| | Stevenson, Matthew E. | |
| | Trujillo Aparicio, Ana Y. | |
| | Tseng, Kelly | |
| | Vo, Kiet T. | |
| | Vo, Phuongthao H. | |
| | Yu, Tinghui | |



Mathematics

I. Executive Summary

Program Description:

Each semester, one of every three Citrus students completes a math class. Math courses are prerequisites or are strongly recommended for successful completion of 49 courses in other Citrus disciplines. Thus mathematics is a core component of degree, certificate, and transfer curriculum, especially in the sciences, engineering, vocational/technical, and health sciences (see Attachment C, Mathematics Program Impact Report). Since 80% of students enter college with math skills well below college level and their graduation requirement has recently been raised to Intermediate Algebra, mathematics education is the longest course sequence they face (see Liberal Arts and STEM sequences below).

Courses are offered in the day and evening, in early and late-start, 8-week fast track, online, and learning community formats. Mathematics facilities include two computer classrooms and the Math Success Center (tutoring center). All classrooms are equipped with multimedia presentation systems. Mathematics shares the STEM Center with science, technology, and engineering programs.

In September, 2011, the college was awarded a new five-year Title V HSI Cooperative Grant (RACE to STEM) in the amount of \$4,285,500; a five-year, HSI, STEM co-op grant with California State University Fullerton (\$147,091 first year) was also awarded. These grants will fund further development and exploration of supplemental instruction, tutoring, and peer-to-peer mentoring to improve student success among Hispanic and other underrepresented students in STEM fields.

Strengths/Effective Practices:

We have 18 full-time faculty members who are committed to student success. Our faculty are leaders in the academic community. Some have presented at professional conferences, and others have participated in the brainstorming, writing, and submitting of multiple successful grant proposals. Additionally, one faculty member serves on the Executive Board for the California Mathematics Council for Community Colleges South, and a recent faculty member is a highly successful author of developmental mathematics textbooks.

Students have greatly benefited from various components of the STEM grant. We have supplemental instruction, a mentoring program, and a Math Success Center where students can receive assistance. There was a faculty lead program for Math 029 and Math 030 that allowed for

greater consistency in the way those courses are taught. Furthermore, two classroom sets of TI inspire graphing calculators were purchased by the STEM grant and are currently being used in the Trigonometry and Pre-Calculus courses. In general these calculators help students visualize solutions of Trigonometric equations and other concepts.

Weaknesses/Lessons Learned:

Over the past 3 years, we have had 4 full-time faculty members retire and only one of them has been replaced. During the same time period, the number of course offerings were reduced due to statewide budget cuts. Currently course offerings are being restored to previous levels. To meet this demand there is a strong need to hire at least 2 full-time math instructors.

There is also a critical need to replace hardware technology throughout the entire math building. It is difficult to present lecture material with obsolete computers that malfunction and/or underperform on a regular basis. Moreover, in the absence of a regular maintenance regimen the previous issues are inadequately addressed.

As the STEM grant winds down over the next two years, several programs funded by the grant run the risk of being shut down. These programs include the Math Success center and the Supplemental Instruction program. These programs have had a positive impact on student success, and have played a key role in improving completion rates. These programs should be either institutionalized or new grants must be established to ensure that these programs remain intact. Without such programs students will not receive the support required for their continued success in the math program.

Currently, the Mathematics program has no discretionary budget. The lack of such a budget prevents the program from purchasing and maintaining educational equipment such as Redcat microphones, batteries for class room calculators, new pencil sharpeners, and other items needed for day to day operations. It is hoped that having such a budget will provide funds for faculty to participate in faculty development. Faculty need to keep abreast with educational trends such as developing new curriculum like a math alternative pathway to Statistics and training to prepare for the future impact on the math program of students who are currently being educated at the K-12 level in the new common core curriculum.

Finally, modifications need to be made to courses to ensure compliance with laws and procedures implemented. Instructors should begin to review and adopt more open educational resources to reduce the burden of books prices on students in the math program. The Senate bills 1052 and 1053 have been passed that will establish a California Open Education Resources Council, which will select 50 lower division courses so that digital textbooks can be created for them, and a California Digital Open Source Library will be developed as a website where students will be able to download free digital open source textbooks and related materials. If more instructors begin to

adopt such open resources, then the costs of book supplies will be reduced, and more students will have access to the content needed to successfully pass courses in the math program. Another statewide trend impacting the math program is the requirement for a Course Identification Numbering system (CI-D). Almost all the core courses needed for completion of math degrees have had their CI-D numbers rejected. The main reason is that course content for many of these courses does not match the content required by the evaluators of the CI-D numbers; thus, to increase content and insure that the CI-D numbers are approved several courses may need to have the unit load increased from 4 to 5 units. Finally, all instructors that teach online courses do not have the mandatory training needed to teach online courses. It will be strongly recommended that these instructors receive the proper training to ensure that our courses are in compliance with any state law requiring such training.

Recommendations/Next Steps:

1. Hire two full-time Math Instructors.
2. Remove the outdated computer hardware in all classrooms and offices, and replace them with WIFI tablets. Furthermore, develop a reasonable budget to maintain them.
3. Establish a department budget for the following needs:
 - a. staff development to address the emerging curriculum changes resulting from the impact of common core.
 - b. for instructional equipment such as redcat microphones, batteries for classroom calculators, etc.
4. Schedule regular maintenance of hardware and software throughout the math building.
5. Replace computers in all math labs: MA 127, MA 129, and MA 130.
6. Make changes or delete one or both of the following degrees: A.S. in Biological and Physical Science (and Mathematics) and A.A. in Liberal Arts in Mathematics and Science.
7. Institutionalize the Math Success Center so that full-time faculty oversee it with reassigned time.
8. Develop a diagnostic non-credit math course to help high school seniors improve performance on the math portion of the Citrus College placement test.
9. Continue to explore the use of open educational resources (OER).
10. Develop a sub-transfer level math sequence as an alternate pathway for prospective math students.
11. In order to conform to the additional CID curriculum requirements, our STEM courses (Math 175 Pre-calculus, Math 190 Calculus I, Math 191 Calculus II, Math 210 Calculus III, and Math 212 Linear Algebra) need to change from 4 to 5 units to allow enough time to cover the additional topics.



Mathematics

II. Curriculum

| Course Number and Title (Courses must be reviewed every six years to remain active) | Date of last Curriculum Committee Review | 2013-2014 Course offerings By Term and # of Sections | | | | SLOs Assessed (Semester / year) |
|--|--|---|------|--------|--------|------------------------------------|
| | | Summer | Fall | Winter | Spring | |
| MATH020 Arithmetic Fund | S11 | 3 | 10 | 4 | 10 | SP14 |
| MATH029 Pre-Algebra | S14 | 4 | 17 | 4 | 14 | SP14 |
| MATH 030 Elementary Algebra | S11 | 5 | 24 | 4 | 21 | SP14 |
| MATH031 Plane Geometry | S14 | 0 | 2 | 0 | 1 | SP14 |
| Math 032 | S13 | 0 | 0 | 0 | 3 | SP14 |
| MATH142 | S13 | 0 | 0 | 0 | 3 | SP14 |
| MATH148 Int Algebra I | S11 | 0 | 0 | 0 | 0 | Not Offered |
| MATH149 Int Algebra II | S11 | 0 | 0 | 0 | 0 | Not Offered |
| MATH150 Int Algebra | S11 | 9 | 30 | 7 | 28 | SP14 |
| MATH151 Plane Trigonometry | S10 | 1 | 5 | 1 | 6 | SP14 |
| MATH160 Survey of Math | S11 | 0 | 0 | 0 | 1 | Not Done |
| MATH162 Intro Math Analysis | S14 | 1 | 2 | 0 | 2 | SP14 |
| MATH165 Introductory Statistics | F13 | 4 | 12 | 4 | 14 | SP14 |
| MATH 168 Mathematics for Elementary Teachers I | S11 | 0 | 1 | 0 | 0 | F13 |
| MATH 169 Mathematics for Elementary Teachers II | S11 | 0 | 0 | 0 | 0 | Not Offered |
| MATH170 College Algebra | F11 | 1 | 3 | 2 | 3 | SP14 |
| MATH175 Pre-Calculus | S14 | 1 | 5 | 2 | 4 | F13 |

| | | | | | | |
|---------------------------------------|------------|---|---|---|---|-----------------|
| MATH190 Calculus with Analytic Geom I | S11 | 0 | 3 | 1 | 3 | Not Done |
| MATH191 Calc Analy Geom II | S14 | 0 | 2 | 0 | 3 | Not Done |
| MATH210 Calculus III | S14 | 0 | 1 | 0 | 1 | F13 |
| MATH211 Differential Equations | S11 | 0 | 0 | 0 | 1 | Not Done |
| MATH212 Intro to Linear Algebra | S14 | 0 | 1 | 0 | 0 | F13 |

III. Degrees and Certificates

| Title | Type | Date Approved by Chancellor's Office | Number Awarded 2011 | Number Awarded 2012 | Number Awarded 2013 | Number Awarded 2014 |
|---|------|--------------------------------------|---------------------|---------------------|---------------------|---------------------|
| Biological and Physical Sciences (and Mathematics) | AS | 1950 | 212 | 224 | 277 | 373 |
| Liberal Arts: Math and Science | AA | 2011 | 23 | 19 | 18 | 93 |
| Mathematics | AS | 2009 | 5 | 9 | 1 | 1 |
| Mathematics | AS-T | 2012 | | 2 | 17 | 18 |

TYPE: **AA** = Associate in Arts **AS** = Associate in Science Degree **C** = Certificate **S** = Skill Award
AA-T = Associate in Arts for Transfer **AS-T** = Associate in Arts for Transfer

IV. Sections Offered

Review the data sheet for section counts, which includes the following information by course category:

1. Section counts
2. Enrollment by student demographic
3. Success and retention

Provide a brief narrative analysis and describe any trends or concerns you noticed.

The types of courses offered by the Mathematics department can be divided into four types: major core courses, major elective courses, general education courses, and basic skill/pre-collegiate courses.

- Major core courses consist of those classes needed by students to complete the AS or the AS-T degree in Mathematics, and consist of the three courses that comprise the calculus sequence: Calculus I, II, and III.
- The major elective courses consist of two courses that are used as electives for completion of the AS or the AS-T degree, and consist of two courses: Differential Equations and Linear Algebra.
- The general education courses are those courses needed by students to fulfill transfer requirements or complete certificates and degrees in other areas, there are twelve such classes that range from Intermediate Algebra to Pre-calculus.
- The basic skill or pre-collegiate courses consist of all those courses that teach basic numeracy to elementary Algebra, such courses range from basic math to elementary algebra.

Every class in each segment of the course offerings plays a vital role in helping students achieve success in the mathematics program whether such students are seeking transfer as a STEM major or simply brushing up on basic math skills for personal development.

The major core and elective courses can be grouped together. These courses are needed by students to help them transfer to a university for a wide range of STEM majors. The mathematics department has recently developed an AS-T in Mathematics designed to guarantee admissions for students who are STEM majors and seek to transfer to a Cal State or UC. The following bullet points describe key aspects of course offerings related to mathematics major core and elective courses during the past five years.

- These courses have had greater retention and success rates during the winter and summer intercessions, yet very few classes are offered during these time periods. However, one Calculus section has now been offered during the winter and summer intercession over the past year.

- Retention rates have slightly fallen during the past year from a high averages in the preceding four years. Success rates have also fallen in the same time period. Moreover, the number of classes offered in this area has also risen greatly.
- There has been a 38% and 47% increase of females who have taken these courses during fall and spring, respectively. There has been a 49% and 34% increase of males who have taken these courses during fall and spring, respectively Furthermore, the number of Hispanics taking such courses during fall and spring in the same time period has risen over 60%, and the number of Asians has risen over 50% .
- The number of whites have increased slightly during the fall semesters, but leveled over during the spring semester. The number of blacks has fallen slightly.
- There has been a huge increase in students who have completed one of the three types of math degrees offered by the program. The AS-T degree for Mathematics completion rate has risen by 400%; the AS degree for Mathematics has risen by 176%; and, the AA degree in Math and Science has risen by 481%.

The courses grouped in this category are critical for success in STEM majors. These majors will be in high demand in the future as STEM education produces critical thinkers, augments science literacy, and enables the next generation of innovators. The math department is devoted to ensuring all students who complete this course segment will be prepared to transfer and succeed in STEM majors at the university.

The general education courses are those courses needed by students to fulfill transfer requirements or complete certificates and non-STEM degrees. The purpose of these courses is to ensure that students receive a broad education. These courses are introductory in nature and provide students with fundamental knowledge and skills in mathematics. The following bullet points describe key aspects of course offerings related to general education mathematics courses during the past five years.

- Math 142 (Beginning &Intermediate Algebra II) was created to combine topics in Math 030 and Math 150 to reduce repetition of overlapping concepts and is primarily offered in a fast track format to improve student success rates.
- There has been a moderate increase in course offerings in all semesters and intercessions. Very few short-term classes have been added to the fall and spring semesters.
- As the economy improves and more funding is provided more of these courses will be offered to meet the demand of students who need to complete general education requirements.
- Success rates range from 63% to 78% during intercessions and from 50% to 61% during regular semester. Retention have remained relatively high with a range of 83% to 96% for all semesters and intercessions.

- However, retention rates have fallen over the past year for all semesters and intersections possibly due to the increase in course offerings. In that same period success rates have fallen for summer and fall, but rose moderately for winter and spring.
- There has been a increase in females taking theses courses at an average rate of 26% increase per year for intercessions and 4.5% increase per year for fall and spring semesters.
- There has been a increase in males taking theses courses at an average rate of 32% increase per year for intercessions and 6% increase per year for fall and spring semesters
- There has been an increase in latinos taking theses courses at an average rate of 34% increase per year for intercessions and 10% increase per year for fall and spring semesters
- There has been an increase in asians taking theses courses at an average rate of 30% increase per year for intercessions and 11.5% increase per year for fall and spring semesters
- There has been an increase in whites taking these courses over intercession with an average rate of 17.5% increase per year, but there is a decrease of whites taking these courses over the fall and spring semesters with a and a 2.5% decrease per year for fall and spring semesters
- The number of distance education courses has remained stable with the exception of an increase winter offerings over the past two years.

The basic skill or pre-collegiate courses consist of all those courses that teach basic numeracy to elementary Algebra, such courses range from basic math to elementary algebra. The basic skill courses or pre-collegiate courses teach the foundational skills needed to be successful in mehods. These courses are non-degree credit courses. The following bullet points describe key aspects of course offerings related to basic skill or pre-collegiate courses mathematics courses during the past five years.

- Math 131 has been changed to a basic skills course and has been recoded as Math 031.
- Math 32 (Beginning &Intermediate Algebra I) was created to combine topics in Math 030 and Math 150 to reduce repetition of overlapping concepts and is primarily offered in a fast track format to improve student success rates.
- The retention rates have high for both interssessions and regular semesters. This may be due to the wide range of services offered such as supplemental instruction, early intervention, and tutorial services.
- The success rates for students taking courses over the intercessions have an average of around 67% and the success rates for students taking the courses over fall and spring are 50%. More classes are being offered in the fast track format to improve student success.

- There has been a large average annual percent increase for males and females taking these courses over intercession, but the average annual percent increases for fall and spring has been minimal.
- There has been a large average annual percent increase in males taking these courses over intercession, but the annual percent has been minimal.
- There have been significant annual percent increases for latino students in these courses.
- There have been moderate annual percent increases for asian students in these courses.
- The average annual percent increase for whites in the classes are high for intersessions, but low for fall and spring semesters.

The courses grouped in this category lay the ground work needed by students to succeed in higher level courses. Without mastery of these basic concepts students will falter and not complete goals for transfer and degree completion. The mathematic department is working to ensure students receive a solid education in these courses so that students will be able to accomplish their intended goals at Citrus College.

V. Student Demographics

Review the data sheet for program enrollment, retention, and success which includes data on these metrics by student demographic

Provide a brief narrative analysis and describe any trends or concerns you noticed.

The Mathematics program serves a diverse group of students who seek to learn the mathematical skills necessary to complete their educational goals at Citrus College. By working diligently with the STEM and HSI grants, the Mathematics program has developed programs designed to assist underrepresented student segments transition into STEM related majors. A few such programs designed to assist and train students are Supplemental Instruction (SI), the summer research experience for undergraduates (REUs), STEM Counseling, and the (STEM)² peer mentors. Furthermore, the mathematics program has devoted resources to the Math Success center to provide tutoring to help students from different backgrounds get the extra help needed to achieve success in Mathematics. Some of the demographic highlights over the past five years are listed below.

- Retention rates and success rates for the intercessions are on average higher than traditional semesters.

- Success rates for both intercessions and traditional semesters are on average much lower than that of the entire campus.
- Retention for younger age groups are slightly less than that of the entire campus, the average retention rate is the range of 88% to 98% for these groups. However, retention and success diminish as the age of the student increases with the over 50 age group holding on average lower retention and success rates.
- The retention rates for the age group less than 20 are on average greater than the program wide retention rates and on par with the campus wide retention rates. The success rates for this group are on average greater than that of the rates of the program, but less than that of the campus wide rates.
- Retention rates for male and female are on average around 90% for both groups and are on par with the average rates for the program. The success rates for males and females are both around 62% and these rates are on par with the program, but they are over 10% less than the average campus wide rates.
- Hispanics make up the largest enrolled ethnic group and have maintained an average of 90% retention and 59% success rates, which are less than the campus wide average of 94% retention and 75% success rates.
- Whites make up the second largest enrolled ethnic group and have maintained an average of 90% retention and 62% success rates, which are slightly less than the campus wide average of 94% retention and 75% success rates.
- Asians make up the third largest enrolled ethnic group and have maintained an average of 93% retention and 72% success rates, which are nearly on par with the campus wide average retention rate of 94% retention, and are slightly less than the campus wide average success rates of 75%.
- Blacks make up the fourth largest enrolled ethnic group and have maintained an average of 87% retention and 52% success rates, which are significantly less than the campus wide average of 94% retention and 75% success rates.
- The average retention and success rates for traditional classes are 91% and 64%, which are moderately less than the campus wide average of 94% retention and 75% success rates.
- The average retention and success rates for distance education classes are 82% and 41%, which are lower than both average campus wide and program wide retention and success rates.

The math department will continue to work towards improving both retention and success for all students to ensure these students successful in every class they enroll in. New programs

and instructional methods may have to be developed and implemented to try to bring all groups retention and success rates in alignment with the retention and success rates of the entire campus. Some areas that might help improve the retention and success rates are to continue creating new STEM programs to stimulate interest in the study of mathematics, hire a full-time instructor to run the Math Success center and expand its operational hours, develop programs that help student segments such as older students and blacks improve performance in math courses, and change instructional methods to improve performance of those students taking distance education math courses.

VI. Student Accomplishments

Provide current, interesting information about accomplishments of students who have participated in this program.

- John Cureg received an internship in Mechanical Engineering. At Cal. State Fullerton.
- Wayne Blake a Citrus College alumnus now teaches Mathematics at a local high school.
- Christian Ramirez was a former Citrus College man of the year in 2011 and transferred and graduated in Mathematics from UCLA. He is currently teaching for “Teach for America.”
- Matt Stevenson is a former Citrus College student who teaches Math at Citrus College.
- Di Reagan a Citrus College alumnus was hired as a full-time Math instructor at Porterville College.
- Erica Puhawan a Citrus College alumnus recently received her bachelor’s and teaching credential from Cal Poly Pomona, and teaches full-time at Golden Valley Middle School in San Bernardino.
- Elidia Andrea Esqueda a Citrus College Alumnus is currently finishing a law degree University of California, Hastings.

VII. Student Learning Outcomes Assessment Reflection

Academic Senate Approved 4/11/12

All SLOs for every course will need to be assessed at least once within the 5-year comprehensive program review cycle. Upon reflection with program colleagues (or self-reflection for programs with only one instructor), please provide a brief narrative to the following (at least one row for one SLO needs to be completed for each course at this time):

Complete SLO assessment and analysis in the table at:

<http://intranet/SLO/Pages/default.aspx>

DOCUMENT REFLECTION DISCUSSION BELOW (FOR BOTH SUMMER/FALL 2013 AND WINTER/SPRING 2014)

The SLOA's performed during the past year have been a tremendous tool in helping instructors better understand how well students comprehend and retain the information being taught in their math courses. Mathematical education follows a sequential learning pattern. For example, most topics learned in a math course are built upon topics learned earlier in the course. Furthermore, the concepts learned in one course will eventually apply to a subsequent course. Thus, all math courses are linked together by a long chain of interrelated concepts, and the SLOA's for each course help instructors assess weak links in the sequence. The weak links can then be modified and improved upon to ensure future success. To help search out weak links and other trends it has been decided to divide the math courses into three categories: basic skill courses, transfer courses, and core courses. The findings for each course group are listed below.

The basic skill courses consist of Math 20, Math 29, Math 30, Math 032, and Math 131. The SLOA's for the Math 20 course were performed on a specific assessment, which consisted of operations on mixed numbers. It measured the number of attempts by students to pass a software module for the subject, and the resulting average was 4.15 attempts. The future goal is to use new methods of instruction to reduce this average. For Math 29, solving a linear equation was assessed and measured using a grading rubric. The success rate for the assessment was 65%, and new educational strategies will be implemented to improve this rate in the future. The SLOA's for Math 30 examined the solution of a radical equation, and compared results between the fall and spring semester. It was found that during the spring semester results were significantly better than that of the fall semester, and there is ongoing discussion as to why this is the case. For Math 032, the SLOA consisted of assessing students understanding of solving a linear system in 3 variables. The results were extremely high as 90% of the students were capable of performing this goal. The SLOA for Math 131 was to assess student understanding of congruence triangles, and there was a success rate of 71%, which was slightly greater than the 70% benchmark set by the instructor. To continue improving instructional methods in basic skill courses the SLOA's revealed

the following: more class time needs to be allocated for group work and other non-traditional instructional formats, supplemental instruction should be expanded to more classes, and students should be encouraged to participate in college success workshops. For the next assessment, a better dialogue must be organized between all instructors of basic schools to seek all improvement at all levels.

The transfer courses consist of Math 142, Math 150, Math 151, Math 160, Math 162, Math 165, Math 168, and Math 170. All SLOA's were performed for this group except for Math 160. For Math 142, the SLOA consisted of assessing students understanding of solving a radical equation. The results were that 67% of the students were capable of performing this goal. The SLOA for Math 150 consisted of two different types of assessments: solving mixture and simple interest word problems. The success rates were 47% and 27%, respectively. These rates are near the typical percentage of success for such topics. A future goal would be to elaborate on real world concepts such as interest rates; types of chemical solutions; etc. to help students better comprehend these types of problems. For Math 151, a SLOA was executed to determine how much student absences correlated with low performance on quizzes. It was found that there is a strong correlation, and new attendance policies will be implemented to help students show up to class and learn the necessary course material. In math 162, a problem involving the product rule for differentiation was assessed, and it was found that 73% of the students were able to apply the product rule correctly. The SLOA for Math 165 consisted of a pre-test and post-test to measure how effectively students are learning statistical concepts. The average percent on the pre-test was 22% and the average on the post test was 80%, which ensures that students are successfully mastering statistical concepts. However, there is always room for improvement. In Math 170, the SLOA was very similar to that of Math 165. There was a pre-test and a post-test, which have had averages of 23% and 78%, respectively. The SLOA's reveal that new strategies need to be incorporated into helping students comprehend such difficult concepts, such as flipping the classroom, offering a non-stem course sequence, and increasing supplemental instruction. For the next assessment, a plan for completing the SLOA for Math 160 should be in place.

The core courses consist of Math 175, Math 190, Math 191, Math 210, Math 211, and Math 212. All courses were assessed except for Math 190, Math 191, and Math 211. The SLOA for Math 175 two assessments were used to test student knowledge of graphs. It was found that the success rate on the first assessment was 68%, and the success rate on the second assessment was 86%. For Math 210, the SLOA consisted of having students graph a 3-D region and determine the volume by converting from rectangular to polar coordinates. The success rate was 88.75%, and it was felt that the lower class size led directly to these impressive results. The SLOA for Math 212 consisted of having students was to find the basis of an Eigen space for a specific matrix. The result of the SLOA was that 60% of students were able to pass the assessment. However, it was felt that such problems need to be re-worded so that the question will be broken up into multiple parts. Overall, the SLOA's for the core courses revealed that newer strategies should be implemented to help students think more abstractly in order to grasp the more challenging concepts presented in these courses. Examples of how this challenge can be met are

to apply computer generated representations of abstract concepts, incorporate group demonstrations into lectures that utilize conceptual manipulatives, and integrate more real word examples of natural phenomena into lectures. For the next assessment, a plan should be in place to assess Math 190, Math 191, and Math 211.

Overall, the SLOA process was a success. The assessments have generated discussions that have led to several long term program goals that may be incorporated into a future program review. These goals are listed below.

- Goal#1: There is a strong need to offer more supplemental courses on a broader scale. Supplemental instruction has played an instrumental role in helping students achieve success in the mathematics program, and expanding this service will enhance greater success rates.
- Goal#2: There is a strong need for higher level courses to expand the units from 4 to 5 units. The reason being is that many topics are abstract and require more time for greater clarification. The classes being affected would be Math 175, Math 190, Math 191, Math 210, Math 211, and Math 212.
- Goal#3: To continue developing new strategies for offering course content. Several new methods have been developed such as flipping the class room, project based learning, and non-stem pathways should be implemented for future success.



Mathematics

VIII. Progress toward previous goals

During 2013-2014, we accomplished:

| | Previous Goals | Progress/ Persons Responsible | Status | Institutional Goal |
|---------------------------------|--|---|--------------|--------------------|
| Goal 1 2011-12 | Implement an effective SLO assessment cycle that promotes consistency - consider a grade-based SLOA strategy | During the past 2 years all courses but Math 131 has had their course SLOs completed. Our current cycle is running effectively. | In progress | 5.2, 1.2 |
| Goal 2 2011-12 | Assess Math 170, 175, 190, 191 and 210 for appropriate unit value and modify curriculum as needed | Math 170 has been modified from 3 to 4 units, but changes to the other course unit values are pending | In progress. | 1.2 EFMP 1 |
| Goal 3 2012 | Examine the possibility of redesigning curriculum to recognize the nature of this two-track (STEM, Liberal Arts) program | Data and dialogues are ongoing to find the appropriate method for making this transition. | In progress | 2.2 EFMP 1 |
| Goal 4 2013 | We would like to hire a permanent faculty lead to run the Math Success center. | A group of faculty will communicate the need to institutionalize the math success center by holding communicating the importance of this center to the institutional resource committee and financial resource committee. | In progress | 2.2 EFMP 1 |
| Goal 5 2013 | We would like to increase the percentage of full-time faculty to teach basic skills math courses and Math 190 and above. | There has been an increase in the amount of full-time instructors teaching these courses by a slight amount. Hopefully, once new faculty members have been hired they will assume this responsibility. | In progress | 2.3,2.3 EFMP 1 |

In addition to previous goals, during 2014-2015, we plan to:

| | Description | Actions / Target Date | Data Index* | Institutional Goal** |
|--|-------------|-----------------------|-------------|----------------------|
|--|-------------|-----------------------|-------------|----------------------|

| | | | | |
|---------------|--|--|--|---------------------------|
| Goal 1 | Hire two full-time Math Instructors. | Currently an F-NIC request has been submitted and is pending approval via the F-NIC committee. | | 1.2,2.2,2.3 EFMP 5 |
| Goal 2 | Remove the outdated computer hardware in all classrooms and offices, and replace them with WIFI tablets. Furthermore, develop a reasonable budget to maintain them. | Pending approval by the physical resource and financial resource committees, which will use this program review document to grant the request. | | 1.1,1.2,3.1,3.2 EFMP 5 |
| Goal 3 | Establish a department budget for the following needs: staff development to address the emerging curriculum changes resulting from the impact of common core abd for instructional equipment such as redcat microphones, batteries for classroom calculators, etc. | Pending approval by the physical resource and financial resource committees, which will use this program review document to grant the request | | 1.1,1.2,3.1,3.2 EFMP 5 |
| Goal 4 | Schedule regular maintenance of hardware and software throughout the math building. | Pending approval by the physical resource and financial resource committees, which will use this program review document to grant the request | | 1.1,1.2,3.13.2 EFMP 5 |
| Goal 5 | Replace computers in all math labs: MA 127, MA 129, and MA 130. | Pending approval by the physical resource and financial resource committees, which will use this program review document to grant the request | | 3.1,3.2 EFMP 5 |
| Goal 6 | Make changes or delete one or both of the following degrees: A.S. in Biological and Physical Science (and Mathematics) and A.A. in Liberal Arts in Mathematics and Science. | A committee has been formed of several faculty members to begin the process. One degree has been confirmed for deletion, and another is being modified to a Health Science degree. | | 1.1,1.2,2.1.2.3 EFMP 5 |
| Goal 7 | Institutionalize the Math | Pending approval by the, | | 3.1,4.1 |

| | | | | |
|----------------|--|---|--|-------------------------------|
| | Success Center so that full-time faculty oversee it with reassigned time. | institutional resource, physical resource, and financial resource committees, which will use this program review document to grant the request | | EFMP 5 |
| Goal 8 | Develop a diagnostic non-credit math course to help high school seniors improve performance on the math portion of the Citrus College placement test. | A committee has been formed of several faculty members to begin the process. A meeting date has been scheduled for 10/16/14 with the Dean of Non-Credit, Dr. Jim Lancaster. | | 2.1,2.2,2.3 EFMP 4 |
| Goal 9 | Continue to explore the use of open educational resources (OER). | Currently, the math faculty is seeking to promote a co-chair of the book store committee who will hopefully oversee adoption of more OER. | | 2.1,2.2,3.1 EFMP 1 |
| Goal 10 | Develop a sub-transfer level math sequence as an alternate pathway for prospective math students. | A small nucleus of math instructors are in the pre- planning stages, and will ask the Dean of Mathematics to introduce the group to contacts he has who have effectively implanted this course at other community colleges. | | 1.1,1.2,2.1,2.2,2.3 EFMP 5 |
| Goal 11 | In order to conform to the additional CID curriculum requirements, our STEM courses (Math 175 Pre-calculus, Math 190 Calculus I, Math 191 Calculus II, Math 210 Calculus III, and Math 212 Linear Algebra) need to change from 4 to 5 units to allow enough time to cover the additional topics. | A group of concerned faculty will be formed to present the case before the curriculum committees after classes have been updated in the near future via Curricunet by the Curriculum representative. | | 1.2,2.1,2.3 EFMP 1 |

**For instutional goals visit link below.*

<http://www.citruscollege.edu/admin/planning/Documents/StrategicPlan2011-2016.pdf>

***For Educational and Facilities Master Plan, use table below.*

EFMP 1 – Update curriculum and pedagogy with an awareness of the cultural and generational

| |
|--|
| characteristics of the current student population such as the desire to work in groups |
| EFMP 2 – Collect data using tools such as tracking a cohort across the mathematics curriculum |
| EFMP 3 – Institutionalize the elements of the Power Math program that have resulted in students moving through the mathematics course sequence more effectively |
| EFMP 4 – Conduct placement testing at the feeder high schools prior to graduation so students in need of remedial mathematics course work could take these during the summer |
| EFMP 5 – Develop student mathematics educational plans to assess needs based on educational goals |



Mathematics

IX. Budget Recommendations for 2014-2015

(Add rows or attach additional pages as needed for complete description / discussion)

Certificated Personnel (FNIC)

| Position | Discuss impact on goals / SLOs | Impact | Priority |
|---|--|--------|----------|
| Hire 2 full-time math instructors in the Math Success center. | We have had three instructors retire over the past three years, and have hired only one replacement. To keep up with student growth and to ensure that students are able to complete transfer and degree in adequate time we must hire at the minimum one full-time instruction. | 1-1-3 | 1 |
| | | | |

Classified Personnel

| Position | Discuss impact on goals / SLOs | Impact | Priority |
|----------|--------------------------------|--------|----------|
| | | | |
| | | | |

Staff Development (Division)

| Item | Discuss impact on goals / SLOs | Cost | Impact | Priority |
|--|---|----------|--------|----------|
| Develop a budget for staff development activities. | Faculty need to be trained to keep up with latest educational trends in mathematics as well as learning about how to prepare for students entering the college who have been educated using the Common Core methodologies now being taught in K-12. | \$10,000 | 1.1.5 | 5 |
| | | | | |

Facilities (Facilities)

| Describe repairs or modifications needed | Discuss impact on goals / SLOs | Building / Room | Impact | Priority |
|--|--------------------------------|-----------------|--------|----------|
| | | | | |
| | | | | |

Computers / Software (Tecs)

| Item | Discuss impact on goals / SLOs | Cost | Impact | Priority |
|--|--|---------|--------|----------|
| Regular maintenance of software, hardware, and | Most technology equipment in the math rooms are outdated and are falling | \$8,000 | 4-1-2 | 3 |

| | | | | |
|--|--|---------|-------|---|
| podiums in each classroom to ensure student success. | apart. In fact, many instructors cannot access important software programs needed to provide a stimulating lecture environment to enhance student learning. Furthermore, equipment that is sitting on top of the dilapidated podiums runs the risk of collapsing and being damaged. Keeping technology up-to-date and properly maintained is conducive to improving the learning environment, which leads to better success rates. | | | |
| Improve WI-FI access throughout the Math building. | Many students now have access to tablets that contain e-books. To ensure students have access to these e-books in class, the Math building should be completely wireless. Furthermore, instructors will have more tools to utilize in presenting material by allowing students to access applications on their tablets or smart phone to enhance learning and improve success rates. | \$3,000 | 4-1-2 | 2 |

Equipment

| Item | Discuss impact on goals / SLOs | Cost | Impact | Priority |
|--|---|---------|--------|----------|
| All pencil sharpeners, Redcat devices, and other items needs to be replaced. | Most technology equipment in the math rooms are outdated and are falling apart. In fact, many instructors cannot access important software programs needed to provide a stimulating lecture environment to enhance student learning. Furthermore, equipment that is sitting on top of the dilapidated podiums runs the risk of collapsing and being damaged. Keeping technology up-to-date and properly maintained is conducive to improving the learning environment, which leads to better success rates. | \$2,000 | 4-1-2 | 4 |
| | | | | |

Supplies (Division)

| Item | Discuss impact on goals / SLOs | Cost | Impact | Priority |
|------|--------------------------------|------|--------|----------|
| | | | | |
| | | | | |

General Budget Guidelines

Budget Preparation Tips:

- Include items on the budget form that are needed for program success even if there is no financial need associated with the request (ie training that could be accomplished with on-campus resources, sharing of resources with another discipline or department etc.)
- Whenever possible, obtain actual cost for the items / equipment you wish to purchase. This avoids situations where items are considered for purchase but it is determined that the actual cost greatly exceeds the original estimate.
- Identify unit cost (cost per item) and the number of units desired in requests.
- Indicate if there is a lower level of financial support that would be workable in your educational plan – if you request \$30,000 for a classroom set of equipment (one item for each student), if \$15,000 were available, would it be possible for two students to share an item? Is the request “All or nothing”?

Determining Budget Impact:

Indicate one or more of the following areas that your request will affect:

M = Mission: Does the request assist the program in meeting the District’s mission and established core competencies and / or diversity?

N = Need: Does the request assist the program in addressing needs based on labor market data, enrollment, articulation, advisory committee, regional agreements, etc.?

Q = Quality: Does the request assist the program in continuing or establishing appropriate lecture/lab unit values? Will the request assist in the regular reviewed / updated of course outlines? Is faculty development adequate? Does program need support in addressing the State and District emphasis on critical thinking, problem solving and written expression? Does program need support to meet stated objectives in the form of SLOs? Do course pre-requisites and co-requisites need to be validated?

F = Feasibility: Does the request assist the program maintain adequate facilities, equipment, and library resources? Is there a need for repair or modification of facilities? Is there a need for new equipment or supplies? Are course offerings frequent enough for students to make adequate progress in both day and evening programs? Does the program have adequate communication with & support from Counseling?

C = Compliance: Does the request assist the program in meeting Federal, State & District requirements? (Do the course outlines meet state, district & federal regulations for content? Do vocational programs have regular advisory meetings?)

Budget Priorities:

When establishing priority, consider the following:

Priority 1: This item is mandated by law, rule, or district policy.

Priority 2: This item is essential to program success.

Priority 3: This item is necessary to maintain / improve program student learning outcomes.