



## One Year Periodic Program Review Report

Academic Programs

*Mathematics*

*AA – Mathematics*

### **Statement of Collaboration**

The program faculty, college staff, students, and community members listed below collaborated in an open and forthright dialogue to prepare this Periodic Program Review. Statements included herein accurately reflect the conclusions and opinions of this group.

### **Participants in the review:**

**Department Faculty:** Robert Kuzma

**Non-discipline Faculty:** Cindy Garrison

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**Student/Alumni:** Ted Swendra

**Academic Support Staff:** Julie Curwick

### **Date Submitted to the Dean of Instruction**

### **Authorization**

After the document is complete, print just this page and submit it to the Office of Instruction for the Dean's signature.

**Signature of Dean** \_\_\_\_\_

## Report Sections and Guidelines

The report sections are described below. If you have questions on any section, please contact the [Office of Instruction for assistance](#).

### 1. Mission and Goals

Identify the certificate(s) and degree(s) under review. Write the mission and goals for each certificate and degree program(s) under review. Briefly describe the relationship of your program to the college's Mission, Vision, Core Values, and College Goals. List the program outcomes for each program under review.

#### Certificates and Degrees

AA - Mathematics

#### Mission and Goals

Mission Statement: The mathematics department at Mohave Community College fosters the growth of quantitative literacy for students from varied backgrounds with diverse goals through a dynamic, innovative, learning-centered approach which illuminates the importance of mathematical reasoning, problem solving, and critical thinking as essential tools for success in mathematical and non-mathematical fields.

Programmatic Goals for Student upon completion:

<i>1. Use a variety of models to define, represent, and solve mathematical problems</i>
<i>2. Apply mathematical problem-solving strategies to problems from within and outside mathematics at the necessary level to transfer to a 4-year institution to achieve a degree in a STEM field</i>
<i>3. Utilize two- and three-dimensional geometric models, properties of figures, analytic geometry, vectors, and trigonometry to represent and solve problems</i>
<i>4. Articulate Mathematical Relationships by Representing, Analyzing, and Using Functions</i>
<i>5. Use critical thinking and problem solving skills to analyze and assess the validity of mathematical information.</i>

### 2. Program Data and Trend Analysis

Data will be supplied by Institutional Research. Faculty will be asked to respond to the trends found within the data. (See *Appendix B in the Periodic Program Review Guide for Faculty 2015* for detailed listing of the data sets.)

#### 2.1. Data

2.1.1. *Program Resources (Profit/Loss)*: Please provide commentary on the program resources data points related to program revenue and expenses. Please comment on the adequacy of program resources, including such things as classroom and office space, laboratory space (if applicable), library and technology resources, and personnel. For fiscal year 2012,

the math department, in conjunction with the transitional math prefix operated at \$147,246 in the black, fiscal year 2013 at \$79,642, and fiscal year 2014 at \$60,556. Even with decreased enrollment over the past four semesters, the department was managed to operate under budget and bring additional funds into the college. However, often math classrooms are chosen as the easiest to place them in, not providing technology needs. The department would be appreciative of additional technology. Further, the department is low on manpower, with current associate faculty and faculty carrying heavy overloads to cover the courses required for the college.

- 2.1.2.*Student Metrics*: Please provide commentary on the student metrics related to program success. Please comment on the adequacy of student metrics as the effect the program under review. While enrollment in MAT and TRM prefix courses remains high, relative to enrollment at the college at large, the associates of arts in mathematics remains low. This is due to the nature of the program, existing mainly for transferability, while other programs, like engineering and computer science, offer a similar field of study with more direct usage. Furthermore, direct job applicability for the degree as a standalone is less than other fields.
- 2.1.3.*Instructional Productivity*: Please provide commentary on the instructional productivity related to program success. Please comment on the trends found in this data. Currently, all courses are operating within the requirements for transferability. Only two courses are in early consideration for redesign under a new credit hour count, MAT 160 and MAT 161, which would align with the new standards for Arizona State University. No action is currently planned.
- 2.1.4.*Enrollment Trends*: Please provide commentary on the enrollment trends for the program(s). The math department enrollment for courses has decreased, as with the rest of the college, recently, but is still offering 114 sections of MAT a year, down from the two years prior total of 152. However, the negligible number of students enrolled in the degree program has remained consistent.
- 2.1.5.*Faculty Data Points*: Please provide commentary on the faculty data points related to program success. Please comment on any trends or gaps found in the data. In order to facilitate the number of courses and sections offered each year and the regulations for associate faculty loads, resident faculty are consistently being asked to, and accepting, overload schedules, from 16 to 21 credit hours. As a result, additional sections of in demand courses cannot be offered, as no faculty can take additional credits. To increase the effectiveness of the math department, additional faculty will be required.
- 2.1.6.*Other Data Points*: Please provide commentary on any additional data points reviewed for this review.

## 2.2. Strengths, Weaknesses, Opportunities, Threats (SWOT)

### 2.2.1. What are the strengths of your program as indicated in the above data?

- MCC offers an ease of transfer to the Universities for which it has agreements to allow students to continue on in their education after the associate level.
- As not all students who pursue a math or science, technology, engineering, and math (STEM) degree start at the calculus level, there is a strong program to bring students up from developmental mathematics to upper division status.
- Resident and Associate Faculty are dedicated to the instruction of all Math classes 000, 100, and 200 level.
- MCC offers Tutoring and Supplemental Instruction in all disciplines at no additional cost to students. These types of programs are very important for students who need assistance in Math and are instrumental in assisting students to achieve their goals.
- Computer Programs such as MYMATHLAB have been in place at MCC for many years. This program provides many resources that help students with learning the various fundamentals of Math. MYMATHLAB is available to all students enrolled in TRM 090, TRM 091 on ground and online.
- Several campuses now houses a Math Smart Room which is designed so that instructors teaching 200 level Math courses have access to better technology which is a benefit to students. This type of technology is quite advanced and the college uses Big Blue Button and Plural or “P” classes are programs that are used in many disciplines on the MCC campus. This is extremely helpful with class capacity. In past semesters some 200 level classes did not make enrollment. Big Blue Button and “P” classes enable students campus wide to participate in classes that otherwise may have been cancelled due to low enrollment.
- MCC is dedicated to all practices involved with the Math department to assist students to meet and exceed their Math expectations.
- The math department developed a MAT 101 class that better aligns with the needs of the non-traditional and non-STEM courses.
- The math department is providing class tutoring for the PNC students and developed videos for DA instruction
- Faculty willing to create testing to support the needs of the college
- The math department consistently operates at a net gain for the college

### 2.2.2. What are the weaknesses of your program as indicated in the above data?

- Through both geographic and transfer agreement, there are not many choices of Universities to transfer to
- The degree map does not list the pre-requisites of trigonometry
- The general education webpage lists Intermediate algebra and college algebra or an additional mathematics course not being used to meet the requirements, which leaves only statistics for a student who can start at the calculus level.
- The degree may lack rigor
- In an effort to advance student learning it may be better to look at offering TRM classes on ground only. There are many reasons why students do not do well in TRM classes. Offering these classes on ground would give the students a very good advantage to aide in classroom participation, being able to meet other students that are having difficulties, forming study groups. If a student doesn't like Math they may not have a very positive experience taking the class online. I have heard from both sides and it seems that a lot of students who have taken TRM classes online, end up retaking the class on ground. Another point is online students seem

to be very surprised that they need to take proctored exams. Are our students acquiring all of the tools they need to succeed in Math when they take an online TRM class?

- Some faculty have difficulty with change and are set in their ways
- Not enough resident faculty. Associate faculty who do not have offices and are off campus most of the day cannot adequately help students. At least not to the degree that resident faculty can.
- Lack of higher level courses such as Calculus III and Intro to Differential Equations. They usually get cancelled due to small class size.
- Low numbers of students enroll or complete the degree
- Lack quality trained tutors for mathematics and lack of math presence in the success center
- Lack of embedded tutors without any reason or explanation

2.2.3. What opportunities exist for your program based on the above data?

- Adding Discrete Math would strengthen the program.
- Reviewing pass fail rates
- Advances in technology
- Instructor access
- Tutoring
- Class structure
- Student participation
- Course offerings with attention to days and times
- Meeting the needs of all students
- Develop transitional classes for students who are weaker in math and need supplemental assistance
- Create entrance math tests rather than pay for outside programs. thus saving MCC money
- Guarantee higher level courses every semester no matter the class size. This will be a serious advantage to transfer students.
- Career specific math courses. These would have to be online classes, and should be CAREFULLY implemented. As a former student, tutor and teacher, I have never seen more woefully lost students than those taking online math courses.
- MCC would benefit from hiring more qualified Math Instructors to meet student need. The schedule for Math has proven problematic over the past few semesters.
- Classes not being scheduled at times consistent with student success.
- More classrooms designated as Math classrooms with the technology to advance student learning.
- If eight week TRM classes are offered during the summer semester, enrollment would greatly benefit from targeting certain students who tested well on the Compass and Assessment Tests.

2.2.4. What threats exist for your program based on the above data?

- Not offering upper level and upper level prerequisites every fall and spring semester.
- With changes to education and the qualifications of instructors in the future, this may have a negative impact on Community Colleges across the U.S.
- Lack of financial support
- Lack of some faculty interest in growth and change
- Dwindling enrollment.

- Fewer classes being offered.

### **3. Assessment of Student Learning**

3.1. What percentage of courses have identified student learning outcomes (SLOs)? (comment of progress/lack of progress)

All TRM prefix courses and MAT 101, 121, 142, 151, and 181 currently have SLOs identified for them, either through common finals or other common assignments. This is moving forward with 4 more classes ready to implement before the next cycle of learning. All courses will be able to have SLOs implemented within 5-6 years.

3.2. What percentage of courses have ongoing SLO assessment? (comment on progress/lack of progress)

Currently, all aforementioned courses have at least one ongoing SLO assessment, through either the aforementioned finals or through recently implemented assignments on student understanding and learning.

3.3. How has assessment of course level SLOs led to improvements in student learning and achievement?

Through detailed analysis, we have confirmed that the majority, 70% or more, of students have understanding of the material. Through analysis in our cycle of learning, with our new in house data collection, we have found that when students in tracked classes are not successfully solving problems, they are usually due to minor mistakes or being caught by distractors left in the problems. This allows us to focus on the distractors a little more instead of targeting the whole process in our teaching pedagogy, as that is not where the problem lies.

3.4. How has assessment of program-level SLOs led to improvements in transfer or certificate/degree awards?

N/A

3.5. What challenges remain to make course and program level SLOs more effective?

The only challenge is formally making the SLOs, as most of the remaining courses do not have the enrollment to justify more than one section a semester or year. This will allow all the data to be collected relatively quickly when they are in place.

### **4. Evaluation of Progress Toward Previous Goals**

4.1. Evaluate steps taken to achieve goals established in the last periodic program review.

In the previous program review, ensuring courses be offered consistently was the major objective. Through use of matrix and scheduling, all math department courses are offered on all campuses. Also, through use of conferencing technology, all courses are able to be offered at all campuses.

4.2. In cases where resources were allocated towards goals, evaluate the efficacy of that spending.

NA

## 5. Program Goals and Plan

- 5.1. Short-term Goals (two year cycle): Based on the above data and analyses, identify 2 or more concrete goals, measurable outcomes, and activities that you would anticipate resulting in improvements to the program in the next 2-year cycle.

Goal 1: (Goals describe what you wish to accomplish in support of program improvement.)  
Increase number of courses utilizing open educational resources (OER) for ease of access to students

Measurable Outcome: Increase the number of MAT prefix courses utilizing OERs by two

Plan: (Briefly describe how you will accomplish this goal.) Identify courses that require the most supplemental material or have the lowest value for their respective textbook. Research appropriate OER materials to be used. Plan and pilot 1-2 sections, if effective replace current textbooks, if ineffective, revise.

Responsible Party(ies): Faculty of the Math Department

Goal 2: Implement a screening process for online student enrollment

Measurable Outcome: A consistent method for gauging student readiness for online transitional mathematics courses is in place.

Plan: Identify key attributes required for, or beneficial to, student success in online courses.

Develop a questionnaire that can be administered to students with a rubric to analyze student readiness for online math classes. All students enrolling in transitional/developmental math classes would be administered the questionnaire if they were interested in taking the course online. Based on the results, if a student passed the evaluation, they would be allowed to enroll in an online section, if not, they would either be advised to speak with a math faculty who would further evaluate or deny enrollment for online sections.

Responsible Party(ies): Faculty of the Math Department, Advising for student services

What specific aspects of these goals can be accomplished without additional financial resources? If speed is not an issue, the entirety of the OER goal can be accomplished with no additional cost, as the resident faculty will be able to investigate during their "other duties as assigned" time. Most of the questionnaire is actually finished, needing only an evaluation rubric and the method of administration to be developed.

- 5.2. Long-term Goals (four year cycle): Based on the above data and analyses, identify 2 or more concrete goals, measurable outcomes, and activities that you would anticipate resulting in improvements to the program within the next six years.

Goal 1: (Goals describe what you wish to accomplish in support of program improvement.)

Develop and implement a math emporium/boot camp for students who underperformed on their initial placement or their previous math class

Measurable Outcome: Course available for regular enrollment

Plan: (Briefly describe how you will accomplish this goal.) Course package already drafted. Initiate first trial using MyMathTest in structured lab on all three southern campuses. Analyze data from 4 week course, revise for next semester. Look at expansion to be used more often. If fully successful, analyze aspects for open enrollment open exit (OEOE).  
Responsible Party(ies): Math Faculty, Office of instruction, registration, advising, associate dean of competency based education

Goal 2: Full implementation of standardized minimum LMS shells for developmental math courses utilizing best practices for the online components. As many courses of developmental math are taught by associate faculty who may have less connection to professional resources, a common minimum should guarantee the resources to aid student success.

Measurable Outcome: 100% of all courses TRM 090, 091, MAT 101, and 121 have a set minimum shell containing elements matching best practices for the discipline.

Plan: Design initial shell for TRM 090, 091, and MAT 121 online components under supervision of math department. Use data from items to gauge effectiveness for common elements. Revise as needed. Identify components that are most critical to student success and apply to on ground courses. Modify as needed.

Responsible Party(ies): Math Department

What specific aspects of these goals can be accomplished without additional financial resources? Design of math emporium is nearly complete and ready to be implemented, revision as necessary can be accomplished at no additional cost. No additional resources required for LMS shells



**6. Requests for Resources**

For any specific aspect of a goal listed in 5.0 that would require additional financial resources, complete the form below.

Type of Resource	Requested Amount	Potential Funding Source
Personnel	1 additional mathematics resident faculty for online instruction	Grants, existing budget, reallocation of associate faculty budget
Facilities		
Equipment	SMART boards/podiums/tablet technology for all math classrooms	CELT budget, math department surplus in revenue
Supplies		
Computer Hardware	Computers upgraded to the ability to run SMART-technology	CELT budget, math department surplus in revenue
Computer Software	Software necessary to run SMART-technology, Quality program for running P-courses	CELT budget, math department surplus in revenue
Training	Training necessary to use SMART technology	No additional funding should be necessary
Other	Stipends to expedite processes of implementation of goals over summer and other breaks	Math department surplus in revenue
Total Requested Amount		

- 6.1. Describe the resource request(s). Technology to keep up with the needs of the students, faculty to present the coursework needed, and funds to look for what is best for the students.
- 6.2. What program outcome(s) does the resource request(s) address? Technology upgrades from the long term goals will be impacted as well as the mathematics emporium, as all will rely on technology. Furthermore, as more OERs are adopted, commonly of the electronic variety, this will give ease of instructions to the program
- 6.3. What measurable outcome(s) will result from filling this resource request? Through usage of technology, not only will our technology goal be accomplished, but also, we will be able to better communicate effective teaching methods and content methodology. Furthermore, with more integrated technology, data collection for assessment will be stronger.

## 7. Executive Summary

- Please list 3 – 5 strengths of the program(s). Fiscally operating in the black consistently, necessary for all fields of study at the college, transferability to universities.
- Please list 3 – 5 areas of enhancement for the program(s). Increase in technological availability, technology in the classroom, upgrading data collection and analysis of assessment
- Please identify ways the department will address student learning (assessment efforts, curricular redesign, etc.). Improved data collection for refinement of teaching methods, continued research into improvement of curriculum and affordability, improved technological capabilities.
- Based on programmatic analysis, please list 2 – 3 specific questions or areas which you would like the program reviewers to comment on or make recommendations. What is the optimal technology for the classroom setting? What resources are available for developing and/or integrating effective OERs?
- Identify any requests for resources that result from this review. Improved technology for all mathematics classrooms, additional resident faculty