Instructional Program Review

Program Name: **Mathematics**
Program Contact: **Hom, Melvin L.**
Academic Year: **2016-2017**
Status: **Submitted for review**
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1. Description of Program

Provide a brief description of the program and how it supports the college's College Mission and Diversity Statements, CSM Strategic Goals 2013/14 to 2015/16, and other Institutional Program Planning as appropriate. What is the program's vision for sustaining and improving student learning and success over the next three years?

The Mathematics Program is comprised of three types of courses:

A. Non-transferable courses, including basic skills: Math 811, 802, 850, 110, 111, 112, 115, 120, 122, 123, 190

B. Transferable courses for Liberal Arts and Business majors: Math 125, 145, 147, 200, 241, 242;

C. Transferable courses for Science, Engineering, and Math Majors: Math 130, 222, 251, 252, 253, 268, 270, 275.

Currently, Math 110, 120, 145 and 200 are offered in hybrid format and Math 110, 120 and 200 are offered in online format in summer session. Math 110 will become in a fully online format beginning Spring 2017.

The program offers two Associate degrees: AS in Mathematics and AS-T in Mathematics.

The department offers student support in the Math Resource Center which is staffed by student tutors.

The department is using Supplemental Instruction in 10 to 11 sections per semester.

The department is has added Math 190, Pre-Stats, since the Fall 2015 semester, a 6-unit course giving the necessary Math needed toward Statistics (Math 200) but only for those who need Statistics.

The Mathematics Department supports the goal of the College Mission and Diversity Statements to improve student success and promote academic excellence. The Faculty strive to provide a student-centered learning environment that provides equal opportunity to all students. Faculty together with student tutors and SI (Suppelmental Instruction) leaders reflect the diversity of the student body and thus models a positive, collaborative environment amongst a diverse population in support of student learning and academic success. The department supports College Strategic Goals 1 and 2 (Improve Student Success and Promote Academic Excellence) in that it contributes to academic progression and success of students at all levels of Mathematics, from basic skills through transfer degree candidates, and continuously works to improve its academic support through the Math Resource Center and Supplemental Instruction program. The Math Department supports the 5 in 5 College Strategies for Basic

Skills/Below Transfer students, non-STEM transfer students, and STEM transfer students by working collaboratively with the Learning Center in identifying, hiring, and training student tutors.

2. Student Learning and Program Data

A. Discuss Student Learning Outcomes Assessment

1. Reflect on recent SLO assessment results for courses and degrees and certificates offered by the program. Specify how SLO assessment informs curriculum development and changes to curriculum.

For 2014-2015, SLOs were mostly attained by students in Math 110, Math 112, and Math 270. They were slightly below the target level (70%) in Math 111, Math 122, and Math 811, and were far below the target level in Math 120 and Math 123. More work needs to be done in Math 120 and Math 123 to have a higher percentage of students achieving SLOs in these courses.

For 2015-2016, we are in the process of gathering the data and will report when data collection is completed.

2. Comment on the success rates in the program SLOs that are aligned with specific course SLOs. What do the program SLO and course data reveal about students completing the program? Identify trends and discuss areas in need of improvement. Is the alignment between course and program SLOs appropriate and informative? Describe any additional methods used to assess program SLOs and reflect on the results of those assessments. See course-to-program SLO alignment mapping.

For 2014-2015, Program SLOs are aligned with course SLOs in all courses from Math 251 (Engineering Calculus) and higher, which would be Math 251, 252, 253, 268, 270, 275, and 329. For 2015-2016, we are in the process of gathering the data and will report when data collection is completed.

3. For any courses in the program that satisfy a GE requirement, which GE SLOs are supported or reinforced by the course SLOs? What do assessment results for the course SLOs (and for the GE SLOs, if available) reveal about student attainment of the GE SLOs? See GE SLO Alignment Summary Report or All Courses GE SLO Alignment Data.

All Mathematics courses which satisfy a GE requirement satisfy the Quantitative Skills and Critical Thinking GE SLOs.

B. Student Success Indicators

1. Review Student Success and Core Program Indicators and discuss any differences in student success indicators across demographic variables. Also refer to the College Index and other relevant sections of the Educational Master Plan: Update, 2012, e.g., Student Outcomes and Student Outcomes: Transfer. Basic Skills programs should also refer to ARCC data.

The Mathematics Department has had a steady rate of success, retention, and withdrawal rates over the past 3 years, with overall success being about 60%, retention rate about 76%, and withdrawal rate about 23%. Among African-Americans and Hispanics, the success rate was about 49% in 2015-2016. Asians continue to have the highest success rate at about 69%, followed closely by Whites at 63%. There are consistently more males than females taking Math courses.

For the past several years the percentage of Math students taking a transferable course has been increasing from 48% in 2013-2014 to 53% in 2014-2015 to 55% in 2015-2016. The percentage of students taking a Degree-Applicable course has been about 19%-20% for several years. The percentage of Math students taking Basic Skills courses has been dropped from 33% in 2013-

2014 to 28% in 2014-2015 to 26% in 2015-2016.

We are enthusiastic about the opportunity to include collaborative workspaces within the new Emerging/Innovative Technologies Building. These workspaces – a "design space" equipped with whiteboards, multi-purpose computer labs, and a "tech shop" to support prototyping – would allow students to work in interdisciplinary teams and extend what they learn in the classroom to more advanced projects. Students would gain hands-on experience as they prepare for internships and transfer. Projects could go beyond what is currently possible in a single course, making it easier to attract support from local businesses and industry. We look forward to working with faculty in other disciplines to develop the physical and curricular infrastructure for this effort.

2. Discuss any differences in student success indicators across modes of delivery (on-campus versus distance education). Refer to Delivery Mode Course Comparison.

The online course success rates for Math 110, Math 120, and Math 200 are slightly lower than the traditional course success rates. For the last 3 years, Math 110 online/hybrid had a 49.5% success rate compared to 52.7% for traditional courses; Math 120 had a 47.1% online/hybrid success rate compared to 57.0% for traditional courses; and Math 200 had a 47.6% online/hybrid success rate compared to 51.3% for traditional courses. Retention rates were similar for Math 110 and Math 120 but lower for Math 200. Math 110 retention rates for the last 3 years has been 78.4% hybrid compared to 76.6% for traditional courses; Math 120 had a 76.0% online/hybrid retention rate compared to 77.4% for traditional courses; and Math 200 had a 54.8% online/hybrid retention rate compared to 62.3% for traditional courses.

C. Program Efficiency Indicators. Do we deliver programs efficiently given our resources?

Summarize trends in program efficiency as indicated in the Student Success and Core Program Indicators (LOAD, Full-time and Part-time FTEF, etc.)

The LOAD has gone from 538.7 in Fall 2013 to 566.9 in Fall 2014 to 524.5 in Fall 2015, consistently higher than the division and college total. The Percent of Full-time has been about 49% for the past 3 years.

3. Additional Factors

Discuss additional factors as applicable that impact the program, including changes in student populations, state-wide initiatives, transfer requirements, advisory committee recommendations, legal mandates, workforce development and employment opportunities, community needs. See Institutional Research as needed.

According to the Educational Master Plan, San Mateo County is projected to have an increase in demand for biological science, physical science, and computer science majors. Math is required in all of these fields.

4. Planning

A. Results of Program Plans and Actions

Describe results, including measurable outcomes, from plans and actions in recent program reviews.

We were able to hire one full-time faculty with expertise in statistics, while losing one full-time faculty person due to retirement. As of Fall 2016 we have 12 full-time Math faculty, with one on unit-banked leave for Fall 2016 and another on unit-banked leave for Spring 2017. One full-time faculty member will be retiring in the next few years and another in 5-10 years.

B. Future Program Plans and Actions

Prioritize the plans to be carried out to sustain and improve student success. Briefly describe each plan and how it supports the CSM Strategic Goals 2013/14 to 2015/16. For each plan, list actions and measurable outcomes. Plans may extend beyond a single year. Describe the professional activities and institutional collaborations that would be most effective in carrying out the program's vision to improve student learning and success.

The mathematics department sees its program as essentially three different but interconnected programs. Since the three programs provide unique challenges, each will be addressed separately in this program vision, then common needs will be discussed.

1. Developmental Math – Developmental Mathematics facilitates success and persistence among students in basic skills and below-transfer level mathematics. The courses support student completion of certificates, AA/AS degrees, and general education requirements.

As indicated in SLO discussions above and in prioritized plans below, student success and persistence in basic skills mathematics and below transfer level mathematics has long been a departmental concern. However, the current and on-going emphasis on mastery of an identified set of concepts/skills in the algebra sequence seems to be working. We envision a department that will continue to assess progress in student success and persistence in this sequence and who will cooperatively and collaboratively address new challenges as they arise. The Math 811 initiative is an example of this department culture in action. After much discussion and research into what seems to be working elsewhere the consensus was that math 811 students need more time on task, need counselor intervention when life and/or immaturity block success and need to learn how to be students as much as they need to learn arithmetic. We kept running into obstacles, but finally a plan came together and was launched in Fall 2013. As stated in the SLO section above this collaborative effort shows promise. However, the plan only came together when a group of full-time faculty who do not usually teach Math 811 determined to be core faculty at that level for at least the next year and counseling faculty were identified to be part of the project. The SI program is part of this promising Math 811 collaboration. The SI program is another example of faculty working together to support a program that supports student success. The Math department envisions SI sections available for all below transfer level math courses. The department needs more full time faculty who will dedicate part of their time to taking the lead in developmental mathematics initiatives.

2. Transfer Level Sequence– Transfer level courses meet the needs of students intending to transfer in social science, nursing, and liberal arts programs.

Again, cooperation and collaboration among faculty has led to improved student success at this level. A statistics “team” evolved over time that now includes both full-time and part-time faculty, and rich conversation between those using traditional and non-traditional approaches to teaching statistics. We envision deliberate development of teams of faculty who work together to develop strategies and pedagogies that improve student success and persistence at this level. As indicated in SLO discussions above, such an effort is bringing promising results in Math 125. We envision this type of collaboration and sharing developing around other courses at the Transfer Level. However, the department needs full-time faculty interested in these courses and in taking the lead in the effort to develop a faculty team in support of students at this level.

3. Calculus Sequence–The calculus sequence (and beyond) meets the needs of students who desire to earn an AS or AS-T in Mathematics and students intending to transfer into STEM majors.

As indicated above, SLO success and student success and persistence are highest at this level. These courses are the most

mathematically challenging to teach and also, the easiest to teach. Most students arrive with acceptable 'student' skills. Here the challenge is to stretch the students to application in context. The department needs more multi-faceted faculty capable of challenging and being challenged by these students and at the same willing and able to accept the very different challenges of the other two sequences.

Thus we envision an enlarged full-time faculty willing and capable of taking the lead in multiple sequences of the program. We envision a faculty (full-time and adjunct) dedicated to learning and growing as instructors, with the ultimate goal of guiding as many students as possible to success in their educational goals, whether that goal be a certificate, a non-STEM AA, transfer to a non-STEM degree, or transfer to a STEM degree.

5. Program Maintenance

A. Course Outline Updates

Review the course outline update record. List the courses that will be updated in the next academic year. For each course that will be updated, provide a faculty contact and the planned submission month. See the Committee on Instruction website for course submission instructions. Contact your division's COI representatives if you have questions about submission deadlines. **Career and Technical Education courses must be updated every two years.**

Courses to be updated	Faculty contact	Submission month
None to be updated Fall 2016		

B. Website Review

Review the program's website(s) annually and update as needed.

Faculty contact(s)	Date of next review/update

Robert Hasson	Fall 2016
Lena Feinman (MRC pages)	Fall 2016

C. SLO Assessment Contacts

Faculty contact(s)	**Date of next review/update**
Harry Nishanian	Fall 2018

In transfer level courses (non-major courses) a follow-up assessment on one SLO (out of 6 to 10 SLOs per course) is not unusual. Faculty awareness of trouble spots and subsequent changes in pedagogy or time-on-task usually leads to a satisfactory assessment within one year.

At below transfer level and basic skills a "problem area" is almost consistently identified and vary from semester to semester.

6. Dominant Themes Summary for IPC

Briefly summarize the dominant, most important themes or trends contained in this program review, for division deans to collect and forward to the Institutional Planning Committee. What are the key program issues that matter most? (Brief paragraph or bullet points acceptable).

- We need to hire full-time faculty with expertise in statistics.

- We need another full-time faculty member with Mathematics Education expertise, since the only present full-time faculty member with Mathematics Education expertise will be retiring within the next couple of years.

- We need to hire another full-time faculty member who is a generalist and can teach the entire spectrum of courses, since the number of sections we teach is increasing, and we are also anticipating an increase in the number of international students.

- We are considering adding new accelerated programs, such as combined Math 110-120 in one semester (offered before, presently offered at Skyline and other colleges), and Math 225 (combined Math 130 and Math 222 in one semester; presently offered at Canada).

- We want the online/hybrid courses to have a comparable success rate with traditional courses.