

2003–2004 Program Review
Mathematics and Statistics
Yuba College

The Mathematics Department

December 19, 2003

Academic Program Review Cover Page

PROGRAM: Mathematics and Statistics

YEAR: 2003-2004

PROGRAM REVIEW COMMITTEE MEMEBRS: The Mathematics Department

DEPT. ASSOC. DEAN SIGNATURE: _____ Date: _____

COMMENTS:

WCC CAMPUS EXEC./ASSOC. DEAN COMMENTS:

CL CAMPUS DEAN COMMENTS:

PRESENTED TO CURRICULUM COMMITTEE ON: _____

VICE-PRESIDENT OF INSTRUCTION SIGNATURE

DATE

CURRICULUM CO-CHAIR SIGNATURE

DATE

Brief Description of Program

The mathematics program continues to serve a very large number of students. The greatest demand is for the developmental and remedial courses: Math 110, 111, 50, and 52. A second area of high demand is in the core courses, Math 21, 1A, 1B, 2A, 2B, and 3, to serve pre-transfer students with majors in the mathematical sciences, physical sciences, life sciences, and engineering. A third area of demand includes a significant number of pre-transfer business majors and liberal studies majors. See [1, p. 6] for the curriculum pathways taken by these students; also see [1, 2, 3].

The mathematics curriculum and pedagogy are dynamic and under continual scrutiny for needed changes. As the four-year universities change their program requirements, the Mathematics Department has to respond in a timely manner.

The mathematics program does not offer a certificate, but it does offer an A.S. degree in mathematics [4].

Course content is evaluated and changed by a systematic procedure that is consistent with the procedures of the Curriculum Committee and district policy. This activity is faculty driven.

Teaching strategies are effective and course instruction conforms to published, approved course outlines. Students are provided with sufficient written information about the course expectations and instruction has the necessary academic rigor. The main teaching strategy is the traditional lecture-discussion approach; however, various faculty also utilize other teaching strategies such as small-group work.

Mathematics courses are offered at a variety of times to allow a maximal number of students to enroll in the courses [1, 5]. Math 110, 111, 50, and 52 are offered evenly on MWF and TTh schedules throughout the day and evening. Math 21, 7, 1A, 1B, 2A, 2B, and 3 are offered to fit in the schedule of biology, physical science, and engineering majors. Math 9 and 25 are scheduled not to conflict with major business courses. Math 15 and 15B are offered as televised distance education courses.

A variety of mathematics courses, Math 50, 52, 21, 7, 15, and 15B, are offered as televised distance education courses. Math 50 is also offered as an on-line course. We continue to discuss if these courses, or others, are appropriate to be offered as distance education courses.

The Marysville campus houses the Hard Math Cafe (HMC), a drop-in mathematics help center that is staffed by full-time faculty in mathematics who “donate” their office hours to the place; some adjunct faculty who teach mathematics also provide help in the HMC. The HMC is generally open from 9:00 A.M. to 4:00 P.M., Monday to Friday. The HMC generates significant FTES.

On the Marysville campus, the department works closely with the Mathematics, Engineering, and Science Achievement (MESA) program. For example, we offer several mathematics workshops for MESA students every semester. It should also be noted that the department benefits from the MESA program as well. As the MESA program continues to grow and expand, we anticipate a significant increase in the number of students who will major in the mathematical sciences, physical sciences, life sciences, and engineering: this would translate directly into a significant increase in the number of students who will need to enroll in the mathematics core courses.

The college library carries several professional mathematics journals: *Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS)*; *Teaching Children Mathematics*; *The Mathematical Intelligencer*; and *The Mathematics Teacher*.

Full-time faculty belong to professional organizations in their discipline. Faculty publish in professional mathematics journals and present at professional meetings.

Graphs from Annual Update

See [1, 6] for graphs.

SWOT

Strengths, weaknesses, opportunities, and threats

I. Strengths

A. Curriculum

The mathematics program offers 17 mathematics courses and one statistics course. All courses are offered at the Marysville campus at least once a year. The WCC campus offers through 3rd semester calculus and statistics. The CL campus offers the non-transfer level mathematics courses, plus Math 15 and statistics.

B. Associate of Science degree in mathematics

There is an A.S. degree in mathematics that requires 18 units of coursework. See [4].

C. College Success Center, Marysville campus

The College Success Center (CSC), funded through PFE monies, provides computer assisted mathematics tutorials. The tutorials have received positive feedback from students who have taken advantage of the programs. There is also small-group tutoring for many of the mathematics courses, for example, Math 110, 111, 50, 52, and 15. In addition, the Learning Skills General Studies Program offers a one-unit “adjunct course” for Math 110, 50, and 52 that provides supplemental instruction in these courses. The success rate for students who enroll in the “adjunct courses” usually exceeds 75% [7]; this is a much higher success rate than for students who are not enrolled in the “adjunct courses.” The CSC also actively seeks tutors for transfer-level mathematics courses and for statistics.

D. Student help provided through EOP&S, DSP&S, MESA

At the WCC and CL campuses, the Learning Center staff, EOP&S, and DSP&S provide tutorial services. At the Marysville campus, EOP&S, DSP&S, and MESA also provide student support. <http://ms.yuba.cc.ca.us/math/student.html>

E. Library holdings

The college library carries several professional mathematics journals: *Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS)*; *Teaching Children Mathematics*; *The Mathematical Intelligencer*; and *The Mathematics Teacher*.

F. Distance education courses

Math 50, 52, 21, 7, 15, and 15B are offered as televised distance education courses. Math 50 is also offered as an on-line course. We do not yet have data on the distance education televised courses or the on-line course to analyze and, hence, cannot state the effectiveness of this teaching strategy compared to the brick-and-mortar method.

G. Articulation

Math 1A, 1B, 2A, 2B, 3, 7, 9, 10, 15, 15B, 21, 25, and Stats 1 articulate with some campuses of the CSU and UC. These courses serve as prerequisites or requirements for students in many disciplines.

H. Consistency in the mathematics program

All of the campuses and centers are committed to a consistent mathematics program in the courses that are taught. We strive to maintain a consistent mathematics program through timely communication and through the institution of district-wide common final exams in Math 111, 50, and 52.

I. The Hard Math Cafe, Marysville campus

The Hard Math Cafe (HMC) is a drop-in mathematics help center. Full-time faculty in mathematics staff the HMC by “donating” their office hours to the place. The HMC is generally open from 9:00 A.M. to 4:00 P.M., Monday to Friday. Some adjunct faculty who teach mathematics also provide help in the HMC.

Not long ago, we began asking students to sign in when working in the HMC. This has led to the HMC generating significant FTES.

The HMC is located in Room M-700 and is adjacent to the Mathematics, Engineering, and Science Achievement (MESA) Center that is located in Room M-701. This has led to a great deal of cooperation between MESA and us. For instance, we offer several mathematics workshops for MESA students every semester.

<http://ms.yuba.cc.ca.us/MESA>

J. Close working relation with MESA

On the Marysville campus, we work closely with MESA. Not only do we offer services to MESA students, but we also benefit from the MESA program, itself, in terms of enrollment. In fact, as the MESA program continues to grow and expand, we anticipate a significant increase in the number of students who will major in the mathematical sciences, physical sciences, life sciences, and engineering: this would translate directly into a significant increase in the number of students who will need to enroll in the mathematics core courses.

MESA’s success is due in great part to the activities it offers its students. For example, in addition to providing tutoring support and organizing study groups and workshops for its students, last summer seven MESA students attended a three-week mathematics camp at CSU, Sacramento. MESA also collaborates regularly with the MESA programs at other colleges, such as with the program at Butte College.

K. Availability of courses

At all the campuses, mathematics courses are offered at a variety of times to allow as many students as possible to take the courses that they need. Additionally, mathematics core courses are scheduled to allow students to take the science and engineering courses they need and that these core courses support. See, for example, [5].

At the Marysville campus, Math 111 has been offered in a three-week “boot camp” format during the intersession. The “boot camp” format is a lecture period in the morning, followed by a break during which students may review the material or work on their homework in small groups, and then followed by another lecture period. At the Woodland campus, Math 111 has been offered as a weekend course. Anecdotal evidence suggests that these formats were successful for those students who tried the formats; neither format may be suitable for every student.

L. The staff

1. Mathematics faculty throughout the district are qualified to teach the courses they are assigned.
2. Full-time faculty communicate regularly by telephone and e-mail.
3. Full-time faculty belong to professional organizations in their discipline. Faculty publish in professional mathematics journals and present at professional meetings.
4. Full-time faculty participate in a large variety and number of committees and engage in the shared governance process.

M. Facilities or equipment

1. Every full-time faculty has an individual office.
2. There are sufficient lecture classrooms at the WCC and CL campuses.
3. There is access to a computer lab with a bank of 30 computers and statistics software for the statistics course at each of the Marysville, WCC and CL campuses. Some math software is also currently available at the Marysville and WCC campuses.
4. At the Marysville campus, there are additionally five computers available for use by students in mathematics courses at the MESA Center that is adjacent to the HMC.
5. At the Marysville and WCC campuses, several classrooms have LCD computer projectors and projection screens. Some classrooms have standard overhead projectors and projection screens. At the CL campus, the computer lab has an LCD computer projector and a projection screen, and the classrooms have standard overhead projectors and projection screens. The WCC campus has “smart carts”; however, they are not yet being used by the mathematics faculty.

N. Other

1. There exists extraordinarily high levels of communication and cooperation between the mathematics faculty and the faculty of the various departments that rely on the mathematics preparation of the students in their supported programs.
2. Anecdotal evidence suggests the good success of students who have transferred to four-year universities.
3. We administer the AMATYC Student Mathematics League contest twice a year to interested students.
<http://www.amatyc.org/SML/SML.html>
4. We participate in the Engineering, Mathematics, and Physics (EMP) Award, a scholarship that is awarded to transferring students in one of these disciplines.
http://207.62.207.35/~sklein/EMP_HISTORY.htm
5. We maintain a Web page.
<http://ms.yuba.cc.ca.us/math>

II. Weaknesses

A. Math 111 is a 3-unit course

In order to prepare students better for the algebra sequence, Math 50 and 52, Math 111 should be a 4-unit course.

B. Math 50 and 52 are 4-unit courses

In order to prepare students better for the transfer-level courses, Math 50 and 52 should be 5-unit courses.

C. Course outlines have not yet been updated

D. No reasonable data on student success

We have been given data on student success [8], but we are not sure of the validity of the data. Valid data is very much needed to determine the success or failure of components of our mathematics curriculum, including data on mathematics courses offered as distance education courses. Anecdotal evidence gleaned from interactions with mathematics faculty at other community colleges, however, suggests that our students are succeeding in their mathematics courses at a rate that is at least comparable to that at other colleges.

E. No reasonable cap on class sizes, particularly in the developmental and remedial courses

Large class sizes hamper, if not make impossible, the ability of faculty to use a variety of teaching strategies in the classroom. Additionally, large class sizes make it very difficult for faculty to evaluate students' work (homework, quizzes, tests, etc.) well enough to provide the students meaningful feedback; large class sizes also discourage faculty from assigning non-traditional work, such as writing assignments or other projects, that may help students develop a deeper or broader understanding of the material that is being taught or mathematics at large.

Large class sizes is a particular weakness at the Marysville campus, where it is not unusual to have 50 to 65 students enrolled in the developmental and remedial courses. This is a particular weakness because students who are enrolled in these courses are at the greatest risk of failure in mathematics and require a great deal of attention.

We also should not overlook the need for a reasonable cap on the class size for Stats 1.

See also p. 12 of this report.

F. Lack of funding for student grading help

Grading papers and other assignments in mathematics courses take at least as much time and attention as grading in English course, for example. At the Marysville campus, current funding for student grading help amounts to about 2.5 hours of grading per week per full-time faculty. Faculty at the WCC and CL campuses have no student grading help at all. A faculty teaching a full load in mathematics would require at least 15 hours of student grading help per week even with a drastic reduction in class sizes.

See [9].

G. No consistent practice on calculator use

H. No integrated use of technology in mathematics courses

I. No tutor help for evening students

Students who take evening classes at the WCC or CL campuses do not have tutor help or "dial-in" help available. Students who take evening classes at the Marysville may have limited tutor help available.

J. The staff

1. No mathematics coordinators

When the district-wide final exams for particular courses were first instituted, the task of coordinating, writing, and distributing the exam was rotated among the faculty teaching the courses. During this time, this required that every faculty who was teaching a course with a district-wide final exam know who was the (different) faculty-in-charge of the particular district-wide exam for that particular semester. Mathematics coordinators [10] would mean that the same person would be responsible for a period of time.

See also p. 12 of this report.

2. Few personal meetings

The ability to travel to different campuses for meetings is extremely limited because of our tight schedules and the great distances among the campuses.

3. Limited interaction between full-time and adjunct faculty

There is almost no interaction between full-time faculty in mathematics and adjunct faculty teaching at the Beale Center and the Colusa Center. Interaction between full-time and adjunct faculty could be better everywhere.

4. No adjunct offices or office hours

Our over-reliance on adjunct faculty means that many of our students are taught by adjunct. While these adjunct faculty are well qualified to teach the courses that they are assigned, not having an office or office hours means that students likely would not have any opportunity to interact with their instructors outside of classroom. Since only a portion of instruction or learning can take place in the classroom, this weakness affects students directly.

5. Not enough working with counselors

We do not have enough opportunity to work with counselors, for example, to attend counselor meetings, track student need and success, participate in matriculation. Having mathematics coordinators would go a long way to rectifying this weakness.

6. No mathematics instructional associate (IA) in the HMC, Marysville campus

The HMC is a drop-in mathematics help center that is currently staffed by full-time faculty who “donate” their office hours to the place; some adjunct faculty also provide help in the HMC. This robs faculty of valuable time to work with their own students individually or to catch up on their own class work (like grading or recording grades). The presence of a mathematics IA in the HMC would greatly alleviate faculty voluntary responsibility in the HMC; further, a mathematics IA would be able to coordinate the activities of the HMC to make the place more appealing and beneficial to students, as well as more efficient and productive.

See [11].

We note that, because students sign in when working at the HMC, the HMC generates significant FTES every semester.

K. Distributive education courses

1. No personal help for students

Students at all the campuses, particularly those at the campuses where the course is not being taught “live,” do not have ready access to personal help while viewing the lectures. Also, students do not have “remote help” (e.g., a televised office hour) should they need help outside of class.

2. Test security

At all the campuses, the question of the security of the testing area has arisen. The efforts of the library personnel at all the campuses to ensure academic honesty during testing is commended; nevertheless, the administering of tests for distributive education courses is only one of a multitude of tasks usually assigned to the library staff in this capacity. Consequently, many staff members are engaged in other duties while they are also proctoring tests.

See also p. 14 of this report.

L. Facilities or equipment

1. Marysville campus

a. Classrooms

Mathematics classes are held in rooms with seating capacities that vary from classrooms that will accommodate 30 students to lecture halls that will accommodate 200 students. Some mathematics classes are held in rooms that are also used as labs. Many classrooms have whiteboards or blackboards that need to be upgraded or replaced. These writing boards are heavily used and have become increasingly difficult to clean, resulting in students being distracted during lectures. Many classes still have student desks with inadequate work space. Also, some classrooms seem to have too many student desks in them, enough to cause a safety concern; further, it is very hard to move about the classroom, particularly when students are working in small groups.

b. No offices for adjunct faculty

Some adjunct faculty in mathematics teach a schedule with a break in between their classes, yet they do not have a place where they may work comfortably (preparing for class, grading papers, etc.) or to meet students.

c. HMC

Originally, the HMC occupied Rooms 700 and 701. When the MESA program was started, it was decided to locate the MESA Center in Room 701. In general, science and MESA students have benefitted from this arrangement; however, as the MESA program has grown, so has the use of the space. Consequently, both Rooms 700 and 701 are now often filled to capacity with drop-in help, tutoring, and group work occurring. Many of the non-science students who are enrolled in non-transfer level courses do not feel comfortable in this overcrowded environment and, thus, are not taking advantage of this valuable service.

d. Library

Many students in the advanced (freshman or sophomore) mathematics, biology, engineering, physics, and chemistry courses have formed their own study groups; unfortunately, the community libraries are closed on Sundays, so these students do not have a convenient place to meet to study together. The Marysville campus library closes at 5:00 P.M. on Fridays and remains closed on the weekend and, hence, students do not have a convenient place to meet on the weekend to study together. This poses a particular hardship on students during final exams week.

http://www.yccd.edu/District/Library/Yuba_College.htm

2. WCC and CL campuses

The library is closed in the evenings and on weekends, so students do not have this resource available.

http://www.yccd.edu/District/Library/Woodland_Community_College.htm

http://www.yccd.edu/District/Library/clear_lake.htm

III. Opportunities

A. Mathematics course offerings and enrollments

1. Mathematics courses at all campuses have healthy enrollments [1, 2, 5]. Anticipated revisions in our mathematics curriculum as well as changes in the statewide mathematics requirements will result in a need for more course sections to be offered every semester; see below and also p. 12 of this report. Further, to increase enrollment, the number of sections of high-demand courses should be increased.
2. At the CL campus, there is an opportunity to diversify the course offerings by adding Math 7, 9, 21, and 25 to the schedule.
3. There is an opportunity to expand the mathematics course offerings for the Marysville campus and Beale Center students by coordinating the course offerings at the two sites.
4. Articulation agreements should be a high priority for the college. The four-year universities vary widely in terms of the mathematics courses each will accept. For example, locally, CSU, Sacramento, and CSU, Chico, require different courses for their respective business degrees. UC Davis, CSU, Sacramento, and CSU, Chico, each have different courses that are equivalent to our Math 3, linear algebra. Math 10, the liberal arts mathematics course that we offer, meets the requirement of many of the campuses of the CSU system, but Math 10 does not articulate with CSU, Sacramento's, liberal arts mathematics course, CSUS Math 17.

Most of the effort to keep articulation agreements current is spent on agreements with CSU, Chico, CSU, Sacramento, and UC Davis. Due to the number of courses that transfer and the differences in the requirements at the different campuses of the CSU and the UC systems, more time could easily be spent, and should be spent, on articulation agreements. To keep up with and to expand the articulation agreements with campuses of the CSU and the UC systems and private universities would require a considerable effort on the part of the full-time faculty. Having mathematics coordinators would provide an opportunity for us to keep up with and expand our articulation agreements with four-year universities.

B. Mathematics requirement for the A.A./A.S. degree

1. Resolution 9.05R F02 in the Statewide Academic Senate [12] is a resolution that calls for the recommendation that the Title 5 mathematics requirement for an A.A./A.S. degree be raised from a course at the elementary algebra level to a course at the intermediate algebra level.
<http://www.academicssenate.cc.ca.us/Events/sessions/spring03/materials/Appendix2.pdf>

We note that this is a first step in eventually raising the mathematics requirement to a course at the transfer level. If the mathematics competency of students remains as it has been in the past, there will still be a need for many sections of Math 111 and 50, prealgebra and elementary algebra. In the future, these same students would also need to take Math 52, intermediate algebra, and there will likely be a need for additional sections of Math 52 to be offered every semester.

See also p. 13 in this report.

2. We are discussing the development of a "liberal arts"-type mathematics course that would fulfill the A.A./A.S. degree mathematics requirement. This course would currently be written at the elementary algebra level, but could easily be raised to the intermediate algebra level should that become necessary. When this new course is developed, it will be possible to *remove* GENBUS 56 from the list of courses that can be used to fulfill the mathematics competency requirement for graduation.
3. Distributive education mathematics courses
 - a. Currently, mathematics courses are televised from the Marysville campus only. There now exists the capability for courses to be televised from the WCC and CL campuses,

and we should look into doing so. This would not only allow us to offer televised courses “live” to students at all the campuses, but it would also allow the increased workload of teaching a distance education course to be shared among mathematics faculty across the district.

- b. Math 50, 52, 21, 7, 15, and 15B are offered as televised distance education courses. Math 50 is also offered as an on-line course. We should continue to discuss if these courses, or others, are appropriate to be offered as distance education courses.
- c. We should investigate whether courses other than Math 50 should be offered on-line. Anecdotal evidence suggests that an increasing number of mathematics courses are being offered on-line by other colleges.

4. Cooperation with MESA

At the Marysville campus, the MESA Center is located adjacent to the HMC. This has led to a great deal of cooperation between MESA and us. For instance, we offer several mathematics workshops for MESA students every semester. We should increase our cooperation with the MESA program.

5. Staff

- a. Develop new strategies to recruit qualified adjunct faculty aggressively.
- b. Reinstitute mathematics coordinators [10] to coordinate the district-wide final exams in Math 111, 50, and 52; to keep up with and expand our articulation agreements with four-year universities; and to promote the overall health of the mathematics program.

6. Facilities or equipment

- a. Purchase a classroom set of manipulatives for Mat 15 and 15B for each campus
Textbooks for Math 15 and 15B, mathematics for elementary school teachers, typically discuss the use of manipulatives in teaching mathematics at the elementary school level. Having a classroom set of manipulatives will allow students to experiment with the manipulatives rather than to read about them only.

- b. Purchase mathematics software for each campus
Many universities, for example, UC Davis, require their students to take a computer lab with some of their mathematics courses. The software that is typically used at many universities and colleges are Maple, Mathematica, Matlab, and Geometer’s Sketchpad. We should purchase these software for use at each of our campuses.

- c. Purchase two classroom sets of calculators for each campus
We are considering requiring a specified calculator for different mathematics courses. Students in non-transfer level courses would be required to buy one calculator and students in transfer level courses would be required to buy another, more advanced, calculator. Having classroom sets of calculators would help to ensure that every student has an equal opportunity to use a calculator.

In the lower-level courses, it is difficult to instruct students on the use of a calculator because of the wide variety of calculators that are readily available to them. A standard calculator would allow faculty to teach students how to use a calculator correctly and appropriately, and will also allow faculty to guide students in exploring mathematical concepts and to discover mathematical relations through the use of a calculator.

In the higher-level courses, many students already possess calculators that are sophisticated enough to be considered hand-held computers. It would aid our instruction greatly if students used a common calculator.

Finally, we should also purchase overhead projection equipment for use with the calculators in classrooms should this equipment not be provided by the manufacturer.

IV. Threats

A. Elimination of core courses decimate or eliminate mathematics program

The mathematics core courses are Math 21, 1A, 1B, 2A, 2B, and 3. These are the courses in the A.S. mathematics major [4] or prerequisite courses or courses that majors in several programs require before transferring to a four-year university.

The biggest threat to the mathematics program is the ongoing possibility of the elimination of its core courses either as a result of minimal enrollment in the mathematics core courses or as a result of the decimation or elimination of other programs mainly whose students enroll in the mathematics core courses. These other programs include biology, chemistry, computer science, engineering, and physics. For example, see [13] for a Spring 2003 snapshot of how the mathematics core courses would be affected if the engineering or mathematics program were to be eliminated. *We note emphatically that this is not merely conjecture*, for the 2002–2003 budget shortfall brought several of the programs mentioned above within a hairsbreadth of being eliminated, something that would certainly have resulted in the subsequent elimination of many of the mathematics core courses. We escaped by the skin of our teeth only after a tremendous lobbying effort by the mathematics, science, and engineering faculty and students.

B. Large class sizes hold down student success in mathematics courses

The developmental and remedial mathematics courses are Math 110, 111, 50, 51, and 52.

Large class sizes hamper, if not make impossible, the ability of faculty to use a variety of teaching strategies in the classroom. The variety of classroom teaching strategies include the students working in small groups, the faculty providing individual attention to students while roaming the classroom, and the faculty integrating the use of technology in lessons. Additionally, large class sizes make it very difficult for faculty to evaluate students' work (homework, quizzes, tests, etc.) well enough to provide the students meaningful feedback; large class sizes also discourage faculty from assigning non-traditional work, such as writing assignments or other projects, that may help students develop a deeper or broader understanding of the material that is being taught or mathematics at large.

Large class sizes is a particular problem at the Marysville campus, where it is not unusual to have 50 to 65 students enrolled in the developmental and remedial courses. *We note emphatically that students who are enrolled in these courses are at the greatest risk of failure in mathematics* and require a great deal of attention to assist them to succeed in their mathematics course and ultimately achieve their academic goals.

A survey of several community college mathematics departments [14] reveals that many colleges cap the class sizes of their developmental and remedial mathematics courses between 25 and 40 students per class. Many other mathematics courses also have similar class caps.

C. Insufficient numbers of full-time faculty in mathematics

There is an overall need to hire additional full-time faculty for mathematics not only to cover the number of mathematics course sections offered beginning Spring 2004, but also to accommodate an increased number of mathematics course sections that will need to be offered as a result of revisions in our mathematics curriculum, as well as changes in statewide mathematics requirements, that we anticipate in the near future. (The Statewide Academic Senate has before it a resolution [12] that recommends amending Title 5 to change the mathematics requirement for the A.A./A.S. degree from a course at the elementary algebra level to one at the intermediate algebra level; this would be followed by a subsequent change to a course at the transfer level. This change

has been proposed in part by the latest California high school exit requirement for mathematics, elementary algebra, and in part by positions held by the American Mathematical Association of Two-Year Colleges [16].)

Additionally, we have district-wide final exams in Math 111, 50, and 52. Coordinating input on the final exams and overseeing the administering of the exams has become more challenging as the number adjunct faculty teaching mathematics has grown. For two years, three mathematics coordinator positions [10] were funded through PFE in part to help to address this challenge; unfortunately, because PFE funds were reduced dramatically last year, the funding for the coordinators has been eliminated. The challenge and responsibility remain, however, and full-time faculty are continuing to perform all the duties of the coordinators [10], but *without any compensation*.

Finally, the difficulty in finding qualified adjunct faculty for mathematics makes more dire the need to hire additional full-time faculty for mathematics. For the past two semesters, the search to find adjunct faculty to teach the scheduled classes had been intense and had lasted until the week before classes started. Even with this effort, the only reason that classes were not canceled for the lack of an instructor was the willingness of adjunct and full-time faculty to change their teaching schedules at the last minute and the willingness of full-time faculty to teach courses EP. We also note that some of the adjunct faculty who have taught for the college for many years are nearing retirement and are starting to turn down teaching assignments; the eventual retirements of adjunct faculty who have long taught for the college will necessitate the hiring of new adjunct or full-time faculty.

1. Marysville campus

There is a total of 9.47 FTEF with the following breakdown.

CO: 85 load units EP or NC: 57 load units

See [6, 2]. Note that the CO column in [6, p. 2] includes full-time faculty who are assigned only a partial load in mathematics. This is elaborated upon in the following. The FTEF column in [6, p. 2] is the sum of the CO and EP/NC columns therein.

- a. Full-time faculty

There is a need to hire *at least two* full-time faculty for mathematics in the near future, preferably beginning by Fall 2004 [15].

Currently, three full-time faculty are assigned a full load in mathematics or statistics courses. Four full-time faculty are assigned partial loads in mathematics, with the rest of their respective loads in different disciplines. Of the four full-time faculty who have been assigned partial loads in mathematics, one usually had 8 load units in mathematics, another usually has 6 load units in mathematics, a third typically has 4 load units in mathematics, and the last teaches mathematics only occasionally; in Fall 2003, the last faculty, who teaches mathematics only occasionally, has 4 load units in mathematics.

We have noted the need to hire one additional full-time faculty for mathematics at the Marysville campus in previous program review reports [1]. This need has been heightened recently with two full-time faculty with full loads in mathematics having retired in Spring 2003 and one more full-time faculty with a full load in mathematics retiring in Fall 2003. Although the college has hired two full-time mathematics faculty for mathematics to begin in Spring 2004, the college has also increased the number of courses in mathematics to be offered by one full load beginning Spring 2004; therefore, *there is a need to hire* at least two more *full-time faculty for mathematics in the near future*.

- b. Adjunct faculty

The number of adjunct faculty who teach mathematics varies between seven and 12 per semester.

2. Woodland Community College campus

a. Full-time faculty

One full-time faculty is assigned a full load in mathematics and one full-time faculty is assigned a three-quarter load in mathematics, with the rest of his load in psychology. The college has hired one full-time faculty for mathematics to begin Spring 2004; however, the number of courses in mathematics to be taught has also been increased. As a result, there may be a need to hire another full-time faculty for mathematics in the near future in anticipation of changes in our mathematics curriculum, as well as changes in statewide mathematics requirements.

b. Adjunct faculty

Currently, there are eight adjunct faculty teaching 43 load units of mathematics. *We note emphatically that the ratio of adjunct faculty to full-time faculty for mathematics is excessively high.*

D. Lack of facilities and equipment hamper success of distance education mathematics courses

1. Testing

Currently, students who are enrolled in distance education courses take their tests at their campus library, an arrangement that is less than ideal. At the Marysville campus, for instance, students take their tests at the Media Center that is located in the rear of the library, and are proctored by whoever is checking in and out videos and other media. This means that there is no dedicated, enclosed, quiet location for students to take tests in the presence of a dedicated proctor. As another instance, most faculty who teach distance education courses require their students to take tests on the same day that tests are given in class. This is not possible on Fridays because of the current hours that the libraries are open. Further, at the WCC and CL campuses, evening hours for testing are often difficult, if not impossible.

2. Software

Currently, the WCC and CL campuses do not have access to computer labs in which their mathematics classes would have access to mathematics software. This prohibits the use of such software in any distance education course.

Program Recommendations

The SWOT contains many recommendations for improving the mathematics program. What follows are seven prominent recommendations; the list is *not* ranked.

- Cap class sizes of mathematics courses district-wide.
- Hire at least two more full-time faculty for mathematics at the Marysville campus.
- Hire one more full-time faculty for mathematics at the Woodland campus.
- Purchase mathematics software for each campus.
- Provide at least 20% release time for three mathematics coordinators each district-wide.
- Provide paid office hours for adjunct faculty in mathematics.
- Fund student grading help for full-time faculty at an appropriate level.

We note emphatically, however, that *all of the recommendations contained in the SWOT are important for the mathematics program's moving toward becoming a premiere program.*

Recommendation for Program Review

Program: Mathematics and Statistics

Year: 2003–2004

Recommendation #: One (1)

<p>Recommendation:</p> <p>Cap class sizes of mathematics courses.</p>		
<p>___XX___ District-wide ___ Clearlake ___ Marysville ___ Woodland ___ Other</p>		
<p>Specific Action:</p> <p>Establish the following caps on class sizes.</p> <ul style="list-style-type: none"> • Math 110 and 111: cap at 25 students. • Math 50, 51, and 52: cap at 35 students. • Stats 1: cap at 30 students. • Others: cap at 40 students. 	<p>Timelines:</p> <p>ASAP</p>	<p>Person(s) Responsible:</p> <p>Mathematics Department</p>
<p>Expected Outcome/Goal (include how the outcome is to be measured):</p> <p>Allow faculty to increase the variety of classroom teaching strategies used—such as students working in small groups, the faculty providing individual attention to students while roaming the classroom, and the faculty integrating the use of technology in lessons—or to assign non-traditional work—such as writing assignments or other projects. Expect retention rates comparable to current retention rates, but <i>success rates improved over current success rates</i>. See the 2003–2004 Program Review § IVB, p. 12.</p> <p>Success rates should be measured by student pass rates (“C” grade or better) in the current course and in one course following the current course.</p>		
<p>Specific Costs to Implement:</p> <p>Costs will result from having to offer additional sections of mathematics courses. This will not increase FTES, but would reduce WSCH. This would represent a deliberate investment by the college toward student success in mathematics courses.</p>	<p>Consequences of not following recommendation:</p> <p>Continued mediocre success rates for students in mathematics courses. Students having to repeat mathematics courses several times to pass; this adds time and financial costs to students’ academic progress.</p>	

Recommendation for Program Review

Program: Mathematics and Statistics

Year: 2003–2004

Recommendation #: Two (2)

<p>Recommendation:</p> <p>Hire at least two more full-time faculty for mathematics.</p>		
<p>_____ District-wide _____ Clearlake <u>XX</u> Marysville _____ Woodland _____ Other</p>		
<p>Specific Action:</p> <p>Hire at least two full-time faculty for mathematics.</p>	<p>Timelines:</p> <p>Fall 2004</p>	<p>Person(s) Responsible:</p> <p>Lauren Syda and John Thoo</p>
<p>Expected Outcome/Goal (include how the outcome is to be measured):</p> <p>Increase the number of sections taught by full-time faculty. More student access to full-time faculty. Increase coverage of the Hard Math Cafe. Increased efforts to establish and maintain articulation agreements with four-year universities. See the 2003–2004 Program Review §II, p. 5, § III(A)4, p. 10, § IVB, p. 12, § IV(C)1, p. 13.</p>		
<p>Specific Costs to Implement:</p> <p>\$100,000 per year ongoing costs (salary and benefits).</p>	<p>Consequences of not following recommendation:</p> <p>Continued mediocre success rates for students in mathematics courses. Students having to repeat mathematics courses several times to pass; this adds time and financial costs to students' academic progress. Continued overworking of current full-time faculty in mathematics. Inability of current full-time faculty to implement any revisions in the mathematics curriculum or to implement revisions in the statewide mathematics requirements. Continued insufficient inattention paid to articulation agreements with four-year universities.</p>	

Recommendation for Program Review

Program: Mathematics and Statistics

Year: 2003–2004

Recommendation #: Three (3)

<p>Recommendation:</p> <p>Hire one more full-time faculty for mathematics.</p>		
<p>_____ District-wide _____ Clearlake _____ Marysville <u>XX</u> Woodland _____ Other</p>		
<p>Specific Action:</p> <p>Hire at least one-time faculty for mathematics.</p>	<p>Timelines:</p> <p>Fall 2005</p>	<p>Person(s) Responsible:</p> <p>Matt Clark</p>
<p>Expected Outcome/Goal (include how the outcome is to be measured):</p> <p>Increase the number of sections taught by full-time faculty. More student access to full-time faculty. Increased efforts to establish and maintain articulation agreements with four-year universities. See the 2003–2004 Program Review § III(A)4, p. 10, § IVB, p. 12, § IV(C)2a, p. 14.</p>		
<p>Specific Costs to Implement:</p> <p>\$50,000 per year ongoing costs (salary and benefits).</p>	<p>Consequences of not following recommendation:</p> <p>Continued mediocre success rates for students in mathematics courses. Students having to repeat mathematics courses several times to pass; this adds time and financial costs to students' academic progress. Continued overworking of current full-time faculty in mathematics. Inability of current full-time faculty to implement any revisions in the mathematics curriculum or to implement revisions in the statewide mathematics requirements. Continued insufficient inattention paid to articulation agreements with four-year universities.</p>	

Recommendation for Program Review

Program: Mathematics and Statistics

Year: 2003–2004

Recommendation #: Four (4)

<p>Recommendation:</p> <p>Purchase mathematics software for each campus.</p>		
<p>___XX___ District-wide ___ District-wide ___ Clearlake ___ Marysville ___ Woodland ___ Other</p>		
<p>Specific Action:</p> <p>Purchase mathematics software for each campus.</p> <ul style="list-style-type: none"> • Maple • Mathematica • Matlab • Geometer’s Sketchpad <p>Software would be installed in computer labs and on faculty computers.</p>	<p>Timelines:</p> <p>ASAP</p>	<p>Person(s) Responsible:</p> <p>Mathematics Department</p>
<p>Expected Outcome/Goal (include how the outcome is to be measured):</p> <p>Allow faculty to increase the variety of teaching strategies used and to assign a wider variety of exercises that will help students comprehend mathematics better. Students will become familiar with software with which they will be expected to be familiar at increasingly many four-year universities upon their transfer. Allow Yuba College to establish or maintain articulation agreements with four-year universities. See the 2003–2004 Program Review § III(B)6b, p. 11.</p>		
<p>Specific Costs to Implement:</p> <p>\$10,000</p>	<p>Consequences of not following recommendation:</p> <p>Continued mediocre success rates for students in mathematics courses because faculty are unable to use a variety of teaching strategies. Students having to repeat mathematics courses several times to pass; this adds time and financial costs to students’ academic progress. Loss of articulation or an inability to articulate with four-year universities that require their students to take a computer lab along with certain mathematics courses.</p>	

Recommendation for Program Review

Program: Mathematics and Statistics

Year: 2003–2004

Recommendation #: Five (5)

<p>Recommendation:</p> <p>Provide at least 20% release time for three mathematics coordinators each.</p>		
<p>___XX___ District ___ Clearlake ___ Marysville ___ Woodland ___ Other</p>		
<p>Specific Action:</p> <p>Provide at least 20% release time for three mathematics coordinators each.</p>	<p>Timelines:</p> <p>ASAP</p>	<p>Person(s) Responsible:</p> <p>Mathematics Department</p>
<p>Expected Outcome/Goal (include how the outcome is to be measured):</p> <p>For a representative list of expected outcomes, see Enclosure [10] of the 2003–2004 Program Review. Also see § II(J)1, p. 8, § II(J)5, p. 8, and § IVC, p. 12, of the Program Review.</p>		
<p>Specific Costs to Implement:</p> <p>Costs associated with 20% release time for three full-time faculty.</p>	<p>Consequences of not following recommendation:</p> <p>Continued overworking of current full-time faculty in mathematics. Inability of current full-time faculty to implement any revisions in the mathematics curriculum or to implement revisions in the statewide mathematics requirements. Continued insufficient inattention paid to articulation agreements with four-year universities. Weak coordinating, writing, and distributing of district-wide final exams in Math 111, 50, and 52. Lack of communication with counselors.</p>	

Recommendation for Program Review

Program: Mathematics and Statistics

Year: 2003–2004

Recommendation #: Six (6)

<p>Recommendation:</p> <p>Provide paid office hours for adjunct faculty in mathematics.</p>		
<p>___XX___ District-wide _____ Clearlake _____ Marysville _____ Woodland _____ Other</p>		
<p>Specific Action:</p> <p>Provide paid office hours for adjunct faculty in mathematics.</p>	<p>Timelines:</p> <p>ASAP</p>	<p>Person(s) Responsible:</p> <p>Mathematics Department</p>
<p>Expected Outcome/Goal (include how the outcome is to be measured):</p> <p>More student access to adjunct faculty. Increased interaction between full-time and adjunct faculty, thereby improving the uniformity of standards and expectations in mathematics courses that are taught. On the Marysville campus, provide opportunity for adjunct to help in the Hard Math Cafe. See the 2003–2004 Program Review § II, p. 5, § II(J)3, p. 8, and § II(J)4, p. 8.</p>		
<p>Specific Costs to Implement:</p> <p>Unknown; depends on collective bargaining with YCAFT.</p>	<p>Consequences of not following recommendation:</p> <p>Our over-reliance on adjunct faculty means that many of our students are taught by adjunct. Not having paid adjunct office hours would mean at least the following: Continued limited interaction between students and adjunct faculty, leading to continued mediocre success rates for students in mathematics courses. Students having to repeat mathematics courses several times to pass; this adds time and financial costs to students' academic progress. Continued limited interaction between full-time and adjunct faculty.</p>	

Recommendation for Program Review

Program: Mathematics and Statistics

Year: 2003–2004

Recommendation #: Seven (7)

<p>Recommendation:</p> <p>Fund student grading help for full-time faculty at an appropriate level.</p>		
<p>___XX___ District-wide ___ Clearlake ___ Marysville ___ Woodland ___ Other</p>		
<p>Specific Action:</p> <p>Fund student grading help for full-time faculty at all the campuses at an appropriate level (at least 15 hours of student grading help per week per full-time faculty).</p>	<p>Timelines:</p> <p>ASAP</p>	<p>Person(s) Responsible:</p> <p>Mathematics Department</p>
<p>Expected Outcome/Goal (include how the outcome is to be measured):</p> <p>Increased student access to full-time faculty. Allow full-time faculty the time required to explore a variety of teaching strategies or to assign and evaluate non-traditional work. Improved student success rates. See the 2003–2004 Program Review § IIF, p. 7, § IVB, p. 12, and Enclosure [9].</p>		
<p>Specific Costs to Implement:</p> <p>\$23,205 per year. This is based on seven full-time faculty (four at Marysville, two at Woodland, and one at Clearlake), 34 weeks of instruction, and 15 hours of student grading help per week per full-time faculty at \$6.50 per hour.</p>	<p>Consequences of not following recommendation:</p> <p>Continued overworking of current full-time faculty in mathematics. Inability of current full-time faculty to implement any revisions in the mathematics curriculum or to implement revisions in the statewide mathematics requirements. Continued insufficient inattention paid to articulation agreements with four-year universities. Continued mediocre success rates for students in mathematics courses. Students having to repeat mathematics courses several times to pass; this adds time and financial costs to students' academic progress.</p>	

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- [1] 1998–1999 Program Review, Mathematics and Statistics.
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- [3] 2003–2004 Educational Master Plan “Area Needs Analysis” for Area 7, Mathematics and Statistics.
- [4] Yuba Community College District Catalog
- [5] Typical core sequence in engineering.
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- [7] Success rate for “adjunct courses” offered by the Learning Skills General Studies Program.
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- [10] Memorandum of understanding describing the Mathematics Coordinator position.
- [11] PFE proposal to hire two mathematics instructional associates (IA) for the Hard Math Cafe (HMC).
- [12] Resolutions before the Statewide Academic Senate proposing the raising of Title 5 English and math requirements for an A.A./A.S. degree.
- [13] Table and graphs depicting how the mathematics core courses are related to other science and engineering programs.
- [14] Survey of several community college mathematics departments concerning mathematics class caps.
- [15] PFE proposal to hire new full-time faculty for mathematics.
- [16] Position statements of the American Mathematical Association of Two-Year Colleges (AMATYC).