

# MATHEMATICS DEPARTMENT PROGRAM REVIEW 2010

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## PART I – SELF STUDY

### A. Program Description:

Mathematics is one of the oldest intellectual disciplines, yet it has never lost its relevance: we are continually finding new and exciting applications in fields as diverse as biology and counter-terrorism. Mathematical methods play a pivotal role in bioinformatics, cryptography, computer graphics, analysis of large-scale networks, cyber security and operations research, as well as in computer science, engineering, business, and the natural, physical and social sciences. Applications of mathematics can be found in many vocational disciplines, such as carpentry, electronics, automotive technology and welding.

The mathematics department at Las Positas College is dedicated to providing high quality mathematics education integrated with cutting edge technology. We offer a wide range of courses in a variety of formats designed to meet the needs of a diverse student population, including a full lower-division curriculum which prepares students for transfer to four-year institutions, as well as basic skills and associate degree applicable courses. We maintain an extensive website, providing information about all that the mathematics department offers as well as links to useful mathematics websites.

Over the past five years we have developed and expanded a variety of mathematics programs designed to increase and improve student access and success. These include:

- The College Foundation Semester  
This is a cohort based program for under-prepared community college students. Each fall semester we have two cohorts of students who take a two week Foundation Course and then a full load of late start classes. The classes include English, CIS, Psychology Counseling and Math. Students are divided into two cohorts by math level. One cohort is enrolled in elementary algebra and the other in pre-algebra. Beginning in winter 2011, following the Foundation Course students will take English, CIS, psychology, team self-management and a pre-algebra-algebra review course. CFS has been in existence for five years. More than half of the students enrolled in CFS have documented learning disabilities.
- The Open Math Lab in the Integrated Learning Center  
Since its opening in the fall of 2005, the Open Math Lab in the Integrated Learning Center has become increasingly popular with students taking mathematics classes as a place to study, individually or in groups, and to get help

with mathematics problems and lab assignments. Staffed by LPC mathematics faculty, the Open Math Lab provides assistance to students in classes ranging from pre-algebra through Calculus II.

- Alternative Modes of Instruction
  - ▶ Distance Education/Web-Hybrid  
We now offer fully online sections of Math 65 Elementary Algebra and Math 55 Intermediate Algebra. In addition, we have developed and offered web-hybrid versions of all of our statistics courses. And, in the spring of 2011, we will be offering our first web-hybrid versions of Math 65 and Math 55
  - ▶ Math X  
The Math X program offers self-paced learning in mathematics under instructor supervision. In recent years we have worked to develop additional support for students in the Math X program and are currently at work on a major revamping of the program designed to move it forward technologically while maintaining the personal assistance offered by a dedicated staff of faculty and instructional assistants.
- Math Club and the Mu Alpha Theta National Mathematics Honor Society.  
Started and advised by mathematics faculty member Randy Taylor and now co-advised by mathematics faculty member Ashley McHale, the Math Club holds monthly meetings which provide a venue for presentations by LPC full and part-time mathematics instructors, as well as instructors from other California community colleges and personnel from Lawrence Livermore National Laboratory. These presentations provide an opportunity to broaden students' perceptions of mathematics and how it is used in the real world. Students who meet the criteria will automatically become members of the Mu Alpha Theta National Mathematics Honor Society.

## **B. Program Mission**

The mission of the mathematics department is

- to cultivate in our students
  - the ability to think mathematically
  - to demonstrate critical thinking
- to provide assessment-based instruction in all math courses.

We use multiple modes of delivery and support mechanisms to foster student success and to prepare our diverse student body for graduation, transfer and immediate job entry.

Our mission is compatible with the stated mission and goals of Las Positas College, which is to provide “educational opportunities that meet the academic, intellectual, career-technical, creative, and personal development goals of its diverse students.” The study of mathematics helps students develop the critical thinking skills and quantitative literacy that will benefit them in all walks of life. Through the study of mathematics,

“[s]tudents develop the knowledge, skills, ... and abilities to become engaged and contributing members of the community.”

## **C. Program Analysis**

### **1. Course Offerings and Modes of Instruction**

The Las Positas College mathematics department offers a large number of courses at both the pre-transfer and transfer levels, and in a variety of modes.

#### **Pre-transfer level:**

The pre-transfer level curriculum consists of four courses: Math 107 Pre-algebra, Math 65 Elementary Algebra, Math 55 Intermediate Algebra and Math 71 Applied Mathematics for Technicians. Although often referred to as “basic skills” courses, they cultivate in students the ability to think mathematically, critically and analytically. In order for a student to succeed in these classes, they must learn problem solving techniques which include analyzing information and presenting work in a logical and organized manner.

Three of these courses (107, 65, and 55) have undergone significant revision since the last program review, as part of a departmental effort to improve student success and retention in these core courses.

In the fall of 2007 we revised and combined the co-existing courses Math 106 Basic Mathematics and Math 107 Pre-Algebra into one course, now called Math 107 Pre-Algebra. The new course consists of three units of lecture and three units of lab. While preserving the review of fundamental arithmetic process found in the older courses, the new course also provides a stronger foundation for the study of algebra, incorporating simple equation solving into every aspect of the material. Student learning and success are strengthened by the extensive lab time, which provides skill building activities and conceptual learning activities. Since we began teaching the revised course in the fall of 2008, we have used the adaptive learning computer software ALEKS to provide remediation and build skills. Due to mixed feedback from students and instructors, and a high cost, currently we are evaluating the effectiveness of this software and investigating alternative choices for use in the course.

In the fall of 2008, two years of research and discussion culminated in the presentation of revised Math 65 and Math 55 outlines to the curriculum committee. Poor success rates in both courses, a push for greater mathematical literacy, and the pending implementation of the Intermediate Algebra requirement for the associate degree, prompted the LPC Mathematics Department to embark on a two-year process in which we dissected the algebra curriculum and explored alternative approaches to teaching pre-collegiate algebra. The result was a decision to adopt what, in mathematics pedagogy, is called a sequential approach to the teaching of algebra. The sequential paradigm allows for more in-depth coverage of core material and includes a greater emphasis on contextual and applied learning, with less repetition of core skills as students move through the sequence of courses. As a result, several topics formerly included in Math 65 have been

eliminated from this course and are now covered in Math 55; two topics were moved from 55 to 65; and we added new material to the Math 55 content (matrix solutions of systems of linear equations). These changes in content allow for increased time on the topics that are covered, providing for deeper understanding and a greater appreciation for the power of mathematics to explain and predict our world.

Implementation of the revised curriculum has allowed us to adopt a single text which is used in both the elementary and intermediate algebra courses. This significantly reduces the cost to students taking both courses. It also has enabled us to broaden the technological scope of the courses as instructors have the option of using a multimedia online software called MyMathLab™. Instructors can use this software to have students do their homework online and submit it electronically. The software provides instant feedback to students when doing their homework as well as a host of support mechanisms including worked examples, tips for completing work, video lecture clips, and the entire textbook available online as an e-book. For courses that require MyMathLab™, students can purchase the software access code bundled with the textbook (new) for a small additional cost, or students can purchase the access code separately. Some students purchase only the access code and no longer purchase the textbook, since the access code gives them the entire book online (a considerable cost savings). For students in courses that are not using MyMathLab™ we provide a generic portal which gives them full online access once they purchase the access code. The access code is good as long as a student is taking an LPC algebra course with a MyMathLab™ course ID.

In a survey conducted in the fall of 2009, our first semester teaching with MyMathLab™, an overwhelming majority of students in classes that used MyMathLab™ reported they were “satisfied” (25%) or “very satisfied” (59%) with the software. For comparison, just 19% reported they were “unsatisfied” and 3% were “very unsatisfied”. This tables shows the responses to three key questions:

	Strongly Agree	Agree	Disagree	Strongly Disagree
MyMathLab helped me to achieve a higher grade in my course than I would have gotten without it.	N=13 41%	N=8 25%	N=9 28%	N=2 6%
Regardless of whether I got a higher grade or not in the course I felt MyMathLab helped me to understand the subject matter better.	N=14 44%	N=10 31%	N=5 16%	N=3 9%
MyMathLab adequately helped me to prepare for written quizzes or exams where I had to show my work/thinking on paper.	N=10 31%	N=11 34%	N=7 22%	N=4 12%

Again, the majority of the students agree or strongly agree with the statements, showing a high degree of satisfaction with their experience with the software.

The TBA lab hour remains an important component of both the elementary and

intermediate algebra courses. The lab assignments, which students work on in the Integrated Learning Center, provided an opportunity to build skills, explore concepts in more depth and support the student learning outcomes of the courses. A set of core labs, linked to the SLOs for the algebra courses, were developed by mathematics faculty members Teri Henson and Kristy Woods in the summer of 2007, under a grant from the Basic Skills Initiative. These labs are made available to all elementary and intermediate algebra instructors.

While elementary algebra remains significant as a requirement for introductory business courses, science classes for non-technical majors, and the nursing program, and is the prerequisite for intermediate algebra, the importance of intermediate algebra has increased in recent years. This course, which stands not only as the gateway to transfer level mathematics courses, but also as the standard for mathematical proficiency for the associate degree under recent changes to Title 5, remains a challenge to many students. Of great concern to the mathematics department is the large number of students who assess at a level below this course, and often below the level of elementary algebra, despite having completed similar courses in high school. While we believe the reasons for this are myriad, and largely outside of our control, we are taking steps to address this issue. In the spring we are piloting a new course, Math 100 Pre-Algebra and Algebra Review. This one unit course is intended to review basic mathematics and algebra content prior to taking the assessment exam for placement into a mathematics course or as a refresher prior to taking a mathematics course after a significant amount of time has passed since taking the prerequisite course or assessment. The course will consist of small group lecture and/or independent study using a computer program to review and refine those concepts as needed by each student.

The outline for the Math 71 course, Applied Mathematics for Technicians, was updated in the fall of 2009. Originally intended to address the mathematical needs of a variety of career/technical disciplines, demand for this course has declined as certain technical programs have been discontinued and others have revised their requirements. Today, only students enrolled in the welding program still take this class and it is offered only in the Math X mode as there are not sufficient students to offer it as a lecture course. Although this course used to satisfy the mathematics proficiency requirement, it no longer does so due to recent changes to Title 5. As a result, even though this course still meets the mathematical needs of the welding program, it does not help students who wish to get an associate degree. Currently we are investigating ways to add an online homework component to this course, similar to what we offer with 65 and 55, and we are exploring ways to re-package the course content so that it can meet the mathematics proficiency requirement.

The basic skills curriculum is offered in a variety of modes.

- Half-paced lecture. Both elementary and intermediate algebra are offered in a half-paced lecture mode (65A, 65B, 55A and 55B). These late start courses, in which we cover half of the material covered by the full-terms course, are designed to provide a slower-paced alternative for students who need more time to

assimilate the material. They are recommended for students who suffer from math anxiety or who have less time to spend on homework due to other commitments. And, because these are late-start courses, they provide an option for students who are quickly overwhelmed in their regular-paced lecture Math 65 or 55 classes; a student who is struggling in 65 or 55 can drop that course and add the half-paced course without waiting a semester.

In 2009/2010 we have had sufficient FTEF to increase the number of sections offered, in part due to cuts in the number of Math X sections offered. In fall 2009 and spring 2010 we were able to offer three sections each of the “A” half of 65 and 55, and two sections each of the “B” half. The fill rate was good in the “A’s” in both fall 2009 and spring 2010: 93% in 65A, 91% in 55A in the fall; 86% in 65A, 80% in 55A in the spring. Since students are often reluctant to take the half-paced courses because it will take them two semesters to complete one course, we believe these fill rates are good, although a bit below the average fill rate for math courses, and show there is a demand for these courses. However, the “B’s” did not do so well: in fall 2009, we had 55B at 77%, 65B at 67%, and in spring 2010, we had both 65B and 55B at 67%. These lower fill rates are a concern as they indicate either low success rates in the “A’s”, or low persistence rates from A to B. Some research will be needed to determine the cause. There are concerns that the current budget crisis may impact our ability to maintain the number of sections of A’s and B’s offered in 2010/2011 and subsequent years.

- Math X. Students may complete course work in 107, 71, 65 and 55 through this supervised mastery learning program. Each course is broken into two modules (roughly half of the course in one module). While students can work at their own pace, benchmarks are provided to help students monitor their own progress. Complete information about the Math X program can be found on our website.
- DE and lecture/hybrid. We have been offering both elementary and intermediate algebra as DE courses for a number of years. The course content and all work is done online, with students coming to campus only for proctored testing at designated times. In the spring of 2011 we will be offering, for the first time, web-hybrid versions of these courses, in which the students will meet on campus once a week and complete the remainder of the course online.

Much work has been done in the past several years to update and revitalize the pre-transfer curriculum. We believe that the current curriculum is much better than what we had before, and we are excited by the possibilities afforded by the use of online resources to support student learning. We will be looking closely at student success data for 2009-2010 and future years, when it becomes available, to see what effect these changes have had, if any.

### **Transfer Level.**

We offer fifteen transfer level mathematics courses, designed to meet a variety of educational goals and needs. From courses which satisfy IGETC or CSU-GE breadth, to

a complete undergraduate mathematics curriculum, we have the courses students need to achieve their educational goals. While our focus within the department has been on the pre-transfer level courses over the past few years, we have updated the outlines for all of our transfer level courses to ensure currency and articulation. In particular, we updated our Math 1, 2, 3, 5 and 7 outlines to meet the LDTP requirements in 2006.

Here is a brief description of our transfer courses:

Math 45, College Algebra provides an in depth look at theory of functions, including exponential and logarithmic functions, linear systems and sequences and series.

Finite Mathematics, Math 33, is a survey course in which students learn to apply mathematical and critical thinking processes to problems in business and finance. Math 34, Calculus for Business and Social Science applies the mathematics of change to business and social sciences. Math 33 and 34 provide skills and knowledge applicable in the workplace. For example, in Math 34 we cover the maximization of profit and minimization of cost, important concepts in business and economics.

Statistics is a requirement for business, economics, and some social science majors (*e.g.*, psychology). Math 44 includes statistics and probability, Math 42A/B has the same content as Math 44 and is a two-semester sequence, and Math 41 is statistics for business majors. Since computer skills are desirable for businesses and transfer institutions, all four of these courses contain computer laboratories using Excel.

For majors in mathematics, the natural and physical sciences, computer science, and engineering the department offers a variety of degree applicable courses. These include Math 38, Math 20, Math 1, Math 2, Math 3, Math 5, Math 7 and Math 10.

The trigonometry with geometry course, Math 38, includes a review of fundamentals of geometry as well as the study of numerical and analytical trigonometry. Trigonometry is a prerequisite for preCalculus and proficiency in this subject is essential to students who wish to take physics and engineering courses.

PreCalculus, Math 20, is a foundation course that prepares students for the study of Calculus. The Calculus sequence, Math 1, Math 2 and Math 3 develops students' understanding of Calculus concepts and their applications to the life and physical sciences. Our Calculus sequence imparts skills which are critical for success at a four year institution, not only for our math, science and engineering students, but also for students majoring in business or economics and transferring to a University of California campus.

In Differential Equations , Math 5, students learn to develop techniques for solving differential equations which commonly arise in technical fields. Linear Algebra, Math 7, combines applied computational linear system techniques and the theory of vector spaces and linear transformations. Since many universities now require their students to learn the software package MatLab™, both Math 5 and Math 7 include a two hour lab in which students learn to solve course related applications using MatLab™. Experience with this

software helps our students with career entry as well, since many jobs at places such as Lawrence Livermore National Lab and Sandia National Laboratories require knowledge of MatLab™.

In Discrete Mathematics, Math 10, students learn methods of proof and logical thinking and apply them to a variety of computer science and discrete mathematics topics.

All of our transfer level courses transfer widely within the UC and CSU systems. The courses are designed with an appropriate degree of rigor to ensure that the students who successfully complete these courses have acquired the necessary mathematical understanding and skills to succeed in subsequent courses. Technology is integrated throughout many of these courses: use of graphing calculators is a regular part of the curriculum in most transferable mathematics courses and mathematical software is used where appropriate. Although we do not envision any major changes to our transfer level offerings in the near future, we are exploring the possibility of developing and offering a Mathematics for Liberal Arts course. We believe that such a course may attract students who need a transfer level math course, but who have no degree requirements that specify what transfer level course. Many schools offer such courses, designed to satisfy transfer level math requirements. The first steps are to determine whether there would be an audience for such a course and to research the content and transferability of such a course. Even if the development of such a course seems feasible and appropriate, we may encounter a problem if we want to offer it. Without additional FTEF (which seems unlikely in the near future), we would have to cut at least one section of a course that we offer now and that would be a difficult decision to make, as almost all of our courses fill (or overflow). We are hopeful that our research will help us determine whether we could cut something without doing harm to students.

## **2. Staffing Resources**

### **a. Faculty**

In the spring of 2006, the Mathematics Department consisted of nine full-time faculty members and adjunct faculty equivalent to 12 full-time faculty members. With retirements, replacements and new hires, we now have thirteen full-time faculty members, 10 of whom are tenured and the other three of whom are now in their two-year contract period as untenured faculty. The number of adjunct faculty members we employ is roughly equivalent to 10 full-time faculty members. The number of full-time faculty members has doubled in the past ten years.

The full-time faculty members of the mathematics department are actively involved in the college community, serving on many committees, contributing to educational programs and participating in many on-campus activities. In the past five years, members of the mathematics department have served as the president of the Academic Senate, as chairs of several important committees, including the Curriculum Committee, the College Enrollment Management Committee, and the Instructional Program Review Committee, and as part of the executive board of



the Academic Senate. Professionally, the members of the department are active in such professional organizations as the American Mathematical Association of Two Year Colleges (AMATYC), the California Mathematics Council for Community Colleges (CMC3), the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM), and regularly attend both national and California mathematics conferences. Two of our faculty members, Kristine Woods and Cynthia, participated in the AMATYC Project Access, a two-year professional development program for new, untenured mathematics instructors.

Mathematics has been a major contributor to various basic skills initiatives on campus, both through its continuing work with the College Foundation Semester program, as well as in the development of course materials (funded by a basic skills grant). We participate annually in events such as the Major Faire and the High School Student/Parents night. The mathematics department, under the strong leadership of Randy Taylor, promotes mathematics scholarship by providing funds for scholarships and by sponsoring the Math Club, its affiliation with the national mathematics honor society, Mu Alpha Theta, and by participating in the AMATYC student math league competition. Mathematics faculty member Dale Boercker has promoted staff development across the campus through the offering of the FELI workshops in summer 2009 and summer 2010.

Although we have seen much growth in the number of full-time faculty in the department, we still have a large number of our courses taught by adjunct faculty (approximately 45%). A number of these adjunct faculty members have participated in SLO development sessions offered by the department and most have (voluntarily) participated in SLO assessment.

b. Math X

Our self-paced mastery learning mathematics program (commonly referred to as Math X) has suffered a significant depletion in staff since our last program review. At that time, we employed three instructional assistants, one of whom was full-time, while the other two were part-time. The full-time instructional assistant coordinated the program, supported by the two part-time IA's. The instructional assistants provided course management support for the instructors who supervised the Math X classes as well as general program support (e.g., updating and developing program materials). In addition, the instructional assistants supported instruction by providing one-on-one tutoring in the classroom and by assisting students with other Math X related questions or concerns.

In the summer of 2009, when we learned that our current full-time instructional assistant had to leave her job (for personal reasons), we were informed that, due to the developing budget crisis, she would not be replaced. This left us with two part-time instructional assistants who could cover 29 hours per week. At that time we had 12 sections of Math X scheduled for the fall semester, requiring a total of 46 hours per week of class time. Many sections had to operate with essentially no

instructional assistant support, meaning that students and instructors were unable to get the help they needed.

As a consequence, we reduced the number of Math X sections we offered in the spring of 2010 to eight and, with IA hours cut back to 25 hours per week for the fall of 2010, we had to cut again. Overall, the program will have suffered a 50% reduction in the number of sections offered from fall 2009 to fall 2010. Our part-time instructional assistants have more than risen to the challenge of maintaining the quality and integrity of the program, but it has taken its toll on both personnel and students. Inevitably, duties that would have been shouldered by the full-time instructional assistant have fallen either on the part-time assistants or on the mathematics department coordinator. Inevitably, students have not always been able to get the help they need when they need it. We do not yet have the 2009-2010 success data, so we cannot quantify, at this time, what impact this may have had.

Most instructors in lecture classes want to work with students who are unable to take a test due to illness or for some other good reason and many will allow students to take a make-up test. Prior to the loss of the full-time instructional assistant in Math X, the instructional assistants in Math X were able to offer test proctoring to all mathematics instructors. This was a real boon to full-time and adjunct faculty alike, as finding a time and place to give a make-up test is always difficult – especially for adjunct faculty. With the loss of the full-time IA and cut-backs in the Math X program, we are no longer able to offer this service. We hope that in the future we will see an increase in instructional hours which will enable us to offer this vital service once again.

c. Integrated Learning Center

When the Integrated Learning Center (ILC) first began operation, in the fall of 2005, the mathematics staffing was funded through a combination of TBA lab hours attached to lecture classes and special assignment hours. The special assignment hours allowed us to keep the center open for 58 hours per week, including four hours on Saturday, and to provide extra math help during peak hours.

Over the past four years the special assignment funding has been reduced every year, to the point where, this year, we have no special assignment funding. As a consequence, we have had to reduce the hours of operation of the ILC, so that it is now open only 45 hours per week. These reductions in staffing and the resultant reduction in the hours of operation, have affected students adversely. With fewer hours per week, it is harder for students to find a time to schedule their TBA lab hour and to take advantage of the help offered by the Open Math Lab. Also, the combination of reduced hours, but more students, has meant more crowding (and, unfortunately, more noise) during the hours of operation. With reduced staff, students must wait longer sometimes to get help, and the amount of help they can get is curtailed. We are very appreciative of the full-time and adjunct faculty who

augment the regular staff by scheduling office hours in the ILC or by volunteering one or more hours per week.

d. Student Assistants

Using a combination of MSEPS division funds and federal work study dollars, we have been able to hire a student assistant to work 8-10 hours per week in the Math X program every year. In addition, we have been able to obtain federal work study funds to provide a student assistant in the ILC, also for 8-10 hours per week. These student assistants provide tutoring and, in Math X, support for the instructional assistants. This fall, with the reduced budget, we had essentially no funds with which to hire a student assistant for Math X. Fortunately, we were able to find a qualified student who had CalWorks support and we were able to hire her, even though we had no division funds. Future funding for this position will continue to be important as we rely on the student assistant to provide support for the instructional assistants and faculty in Math X.

e. Coordinator

One full-time faculty member of the department serves as department coordinator, and receives 4.0 CAH release time. The coordinator's duties include, but are not limited to

- Production of course schedules
- Works with the Dean to assign adjunct faculty to courses; notifies adjunct faculty of proposed assignments and forwards acceptances to the Dean for final approval
- Coordination of SLO efforts
- Maintenance of the course outline list; ensuring curriculum updates are done when needed
- Management of the department budget
- Coordination of the math X program (absent a full-time IA)
- Community outreach
- Responding to prerequisite challenges and questions about mathematics the program
- Creation and management of discipline plans
- Ordering of textbooks for all courses each semester
- Producing and maintaining the algebra technology requirements list, updating it on the web and promulgating it to the appropriate persons (e.g., bookstore)
- Program review
- Coordination of meetings and math department initiatives
- Maintenance of the mathematics department website

The mathematics department offers around 75-80 sections of classes in any given semester. With thirteen full-time faculty and nearly thirty adjunct faculty, plus two instructional assistants, it is the size of a small division. Yet there is no dedicated staff assistance for this department. In other comparably-sized departments, there is sufficient IA support to provide assistance to the coordinator in performing their duties. We hope that in the future there will be sufficient funding to increase the number of hours of instructional assistance for the

department and that some of that instructional assistance time can be used to provide administrative support for the mathematics coordinator.

### **3. Physical Resources**

#### **a. Math Classrooms**

To ensure a quality educational experience for our students and promote learning in a supportive environment, it is essential that our classes be scheduled in classrooms with complete audio-visual equipment (document camera, computer, and projector), the ability to access mathematical software, and a large amount of whiteboard space. We are fortunate to have excellent a/v equipment in most of our LPC classrooms, but, surprisingly, there are some rooms in which the whiteboard space is insufficient for our purposes. The other key criterion for mathematics classes is classroom size. With demand for mathematics courses increasing, often an instructor's ability to add students to a class is limited by the size of the classroom. Over the past several years, we have worked with the scheduler to have as many of our classes as possible scheduled in larger rooms, but in some instances we still have high demand classes scheduled in rooms that hold only 35 students, making it impossible to add students in those cases.

#### **b. Math X and the ILC**

Up until the spring of 2010, the Math X program was housed in a specially designed space in building 500 consisting of two classrooms, a separate, secure, testing area and a staff office. One of the Math X classrooms doubled as a lecture class room when not being used by the Math X program. Each of the Math X classrooms had a capacity of 45 students. With the two classrooms side-by-side, and contiguous with the testing room and staff office, we were able to offer two sections of Math X classes at the same time or at overlapping times. The Integrated Learning Center, which housed the TBA lab hours in Math, English 1A and ESL and the Open Math Lab, was located in building 1200. With the completion of the Center for the Arts, the 600 building became vacant and the administration decided to renovate this building and move the ILC into half of the building and the Math X program into the other half. The renovation was completed over the summer of 2010 and both Math X and the ILC were established in the new space at the start of fall semester 2010.

The new space provides some nice features, including two study rooms in the ILC which can be used for group study and workshops. The Math X space includes a small study group area; the capacity of the classroom is 52 students. One consequence of the move is a greatly reduced capacity in the Math X program. We will no longer be able to offer more than one section at a time. While this is not a problem at the present time, due to the reduction in the size of the program caused by budget cuts, it will limit somewhat our ability to expand the program in the future, should we wish to do so. Also, the testing area in the new space has a slightly reduced capacity, seating 18 students (compared to a capacity of 22 students when located in 500).

#### 4. Technology Resources

##### a. Hardware

Many mathematics classes make use of the audio-visual equipment (such as computers and document cameras) provided in the classrooms. It is essential to our efforts in the classroom that this equipment functions correctly and reliably. We applaud the hard work of the IT staff in maintaining and upgrading this equipment.

All of our statistics courses, as well as Math 5 and 7, have required computer lab components. These are scheduled in computer classrooms, which are shared with other disciplines. Often, both the lecture and the lab are in the same room. This can pose a problem as students will sometimes be tempted to use the computers for non-instructional purposes during class.

Graphing calculators are an important component in most transfer-level mathematics courses. The graphing calculator is not only a vital tool for students taking mathematics courses, it can also be used in a number of science and engineering courses. The cost of a graphing calculator ranges from \$85 - \$125, depending on the model and where purchased. For some students, this cost is prohibitive. Mathematics department member Randy Taylor has, for many years, operated a small-scale graphing calculator loaner program. He has ten graphing calculators which students can rent for a small fee, which is re-funded when the calculator is returned. The calculators he rents are TI-83™'s, which while adequate, are somewhat out-of-date. Those available commercially are TI-83Plus™ or TI-84™, which have expanded features and capabilities.

We would like to expand this calculator rental program and purchase the more up-to-date types of graphing calculators. Being able to rent graphing calculators, rather than buying them would be especially useful for those students who will be using the calculator in only one course, and it would also be helpful for students who cannot afford to buy one. Unfortunately, we do not have the resources, either financially or in terms of personnel, to purchase additional calculators or to administer an expanded program. If funding could be found to purchase additional graphing calculators, the management of the loan/rent program could be a duty shouldered by a full-time instructional assistant (if we had one).

##### b. Software

We use a variety of mathematical software packages to support and enhance instruction. Some of these software packages are supported by the college, while others are purchased by students for use in their math courses. Many mathematics faculty members also use special mathematical editing software.

- College-maintained software

The Mathematics Department uses Excel, MatLab™, and Maple™ in a variety of mathematics courses. The number of site licenses available is adequate for our needs at this time. Students can access these software

packages in all of the computer lab classrooms and in the ILC. While the version of Excel used has been updated recently, we are using older versions of MatLab™ and Maple™ than are currently available. In particular, we are using a version of Maple™ which is around six years old. While functional for our needs, this version does not contain the latest features and is not always compatible with newer versions.

- Student-purchased software

In Math 107 students use ALEKS™, an adaptive learning program that builds an individualized course of instruction for each student, based on assessment results. As mentioned in part C.1., the cost of this software is high and its overall effectiveness is in question. We are looking into alternative software for this course.

Also, as discussed in part C.1., many of our elementary and intermediate algebra courses are now using MyMathLab™. Preliminary feedback from students is very positive, as noted in that section.

- Department-purchased software

A number of years ago, the college provided a site license for a mathematical editing software called MathType™. Compatible with Microsoft Word™, MathType™ allows users to integrate mathematical statements seamlessly into word documents. Although the original license was purchased by the college, the department used a large portion of its budget for fiscal year 2009-2010 to purchase an upgrade in this software.

c. Other

With a large number of courses being taught in computer labs, instructors have noted a growing concern with managing student access to computers during instruction time. Instructors would like to have the capability to control student use of computers through some type of software which can alert an instructor when a student is inappropriately using a computer and allow the instructor to shut it down.

The graphing calculator giant Texas Instruments© has developed an exciting new software called TI-Smartview™. TI-Smart View™ is an easy-to-use software that emulates the Texas Instrument© (TI) graphing calculator (TI-83/84™). Students are required to purchase and use a graphing calculator for many of our courses and most of them purchase either the TI-83™ or TI-84™. Graphing calculators can deepen students conceptual understand of course content through numerical and graphical exploration of concepts. Proficiency with technology, including the use of the graphing calculator, is one of our Program Level SLOs in the following mathematics courses: Statistics (41, 42A, 42B, 44), mathematics for business (33, 34), calculus preparation (38, 20), calculus (1, 2, 3), and more advance mathematics courses (5,7). Even in courses that do not require students to use graphing calculators, instructors may use graphing calculator

demonstrations in class to motivate or explain content being covered in the class.

**Why it would be useful:** the TI-Smart View™ allows the instructor to project an interactive representation of the calculator's display for the entire class. The software enables the instructor to display different aspects of the calculator simultaneously; for example, the instructor can project the representation of the physical calculator keypad and window (allowing students to see which buttons are being manipulated and what the input and output displayed will look like) while also displaying zoomed-in screen shots of the resulting graph, table and symbolic calculations. It is an ideal demonstration tool for motivating and focusing classroom instruction of mathematical and science concepts.

## 5. Fiscal Resources

In the past the mathematics department budget, \$1000 per fiscal year, has been used primarily to purchase supplies for the Math X program and to provide whiteboard markers for the faculty in lecture classes. Occasionally, it has been used to purchase software or software upgrades. This budget has been sufficient for our needs.

Through a combination of federal work study dollars and division funds, we have been able to hire student assistants for both the Math X program and the ILC. With staffing cuts, the student assistants provide critically needed help. We need to ensure we will have continued funding so that we are able to fill this much-needed position.

The fiscal resources provided by the mathematics department budget and the division, and the limitations on what we can use the math budget for, leave us with a number of unmet fiscal needs. We would like to have the fiscal resources to:

- Purchase newer, more advanced graphing calculators which can be loaned to students.
- Purchase student editions of our textbooks which could be put on permanent reserve in the library. Currently we have instructor's editions on reserve, but these have answers to all of the problems in them, making them unsuitable for student use.
- We would like to have funding to pay for additional staffing in the ILC, allowing us to increase the hours of operation and provide additional help during peak hours.
- Offer conference funding to all full-time mathematics faculty.
- Pay stipends to adjuncts who attend mathematics conferences or mathematics department workshops.

## 6. Students

### a. Enrollments

The Mathematics Department does not offer an associate degree. However, a student completing an associate degree in Liberal Arts and Sciences may elect an area of emphasis in mathematics. The majority of students who are taking math

courses are doing so either: to satisfy the math proficiency requirement for an associate degree; to satisfy the mathematics requirement for transfer to a 4-year institution; or, to satisfy mathematics requirements in their chosen major (e.g., the physics major requires completion of the Calculus sequence).

For the time period fall 2005 through spring 2009 our enrollments in all courses have been robust, with an average of 2870 students taking a math class each semester. The FTES average for this time period is 422.6, while the fill rates have averaged 89%.

In non-transferable math, we have had an average of 1884 students taking a math class each semester. This number accounts for approximately 66% of all students taking a math class. Fill rates have ranged from a low of 76% to a high of 95%, and average 87%. In contrast, while just 34% of students taking a math class are taking a transfer level math class, the fill rate is much higher: 94% on average, ranging from 89% to 100%.

Upon reviewing Math enrollments it has become clear that our transfer classes have been severely impacted by recent events (such as the enrollment caps set at the CSU's and UC's). In particular Trigonometry, Pre-Calculus, and Calculus sections filled very rapidly in the fall of 2009 and had high counts on the class-web "hit list". Unfortunately given the state of the California budget and the property tax shortfall, it seems unlikely that LPC will receive funding to increase the number of sections for these classes in the near future. It is possible that our transfer classes have spiked in enrollment due to the California universities decreasing the number of students they are admitting, therefore a detailed survey of our student population needs should be performed before we build in significant growth in this area.

#### b. Demographics

Our racial/ethnic demographics are generally in-line with college-wide racial/ethnic data. We do see some slight trends:

- In transferable mathematics courses
  - The number of white students has declined steadily, from a high of 65% in spring 2006, to 51% spring 2008 through spring 2009 (a 7% decline from fall 2005 to spring 2009).
  - The number of Asian students has increased by about 6% overall
  - The number of Hispanic students has increased by 2%.
  - Numbers for other race/ethnicities have remained fairly constant.
- In non-transferable mathematics courses
  - The number of white students has declined steadily, from a high of 60% in fall 2005, to 51% in spring 2009
  - The number of Asian students has increased by about 4% overall
  - The number of Hispanic students has increased by 3%.
  - Numbers for other race/ethnicities have remained fairly constant.



It would be interesting to know how these trends compare with the college wide demographic during the same time period. Although the Student Characteristics Report for 2008 (based on fall 2008 census data), gives a more detailed view of the racial/ethnic makeup of the college, we can make some comparisons (for purposes of comparison we have equated Latino with Hispanic).

<b>Comparison of Racial/Ethnic Data for Fall 2008</b>			
<b>Race/Ethnicity</b>	<b>Las Positas</b>	<b>Transferable Math</b>	<b>Non-transferable Math</b>
<b>African-American</b>	4.5%	2%	6%
<b>Latino*</b>	15.7%	14%	18%
<b>Asian-American</b>	10.9%	20%	13%
<b>White</b>	51.4%	51%	51%

\*If Filipino is included the percentage is LPC 19.2%

The biggest disparities are in the Asian-American population and in the African-American population. These numbers are not dissimilar to national trends.

Looking at gender data averaged over four years, we see fewer women in transferable math compared to college demographics. In transferable math courses, we have an average of 54% male, compared to 46% female, while for the college overall we have 44.5% male, 53% female, with 2.5% declining to state. However, we will note that for AY 2008-2009, we do see an increase in the percentage of female students in transferable math courses (49% for fall 2008 and 48% for spring 2009). While this data reflects national trends, it leaves us with a question: how do we attract more women to transferable level math classes? It is important to note here that transferable math is not just Calculus and other mathematics courses geared for science and engineering majors. Transfer level courses in business math and statistics are also included here. It would be interesting to know what the gender data is course-by-course. Would we see the numbers reversed (or at least more equal), in the transferable courses geared toward the liberal arts and non-science student?

When we look at non-transferable mathematics courses, the demographic picture that emerges more closely reflects the college demographic: 46% male and 54% female. This data could have some interesting implications. It may be an indicator that more women than men are entering college under-prepared in mathematics. It would be useful to find out how this data compares to assessment and placement data.

c. Educational goals

Some results that stand out:

- About 67% of students in non-transferable math indicate a goal of transfer. This is important because these students may need to take as many as three mathematics courses, depending on where they placed, before **reaching** transfer level. Then they will need to take and pass a transfer level course.

- Surprising: only about 79% of students in transferable math indicate a goal of transfer, while about 15% of students in transferable math state they are undecided. About 5% were taking a transferable because of a job related goal or for personal enrichment. The large number of “undecideds” was surprising, but it is possible that these are students who want to be poised to transfer if they decide to do so, or that these students have not yet determined on a major, but are considering in the math/science/engineering fields.
  - Overall, about 66% of students taking mathematics have a goal of transfer, compared to only 39% college-wide. The number of “undecideds” is about the same for those in math vs. college-wide.
  - We need college-wide learning disability data to compare with LD data for mathematics
- d. Student Success (fall 2005 – spring 2009)
- Math 106 & Math 107 – In the fall of 2008, Math 106 was replaced by the newly revised Math 107 curriculum. We have insufficient data at this time to draw conclusions about the success rates in the new course. In two semesters of offering the revised course we have had success rates of 43% (fall 2008) and 65% (spring 2009). It is difficult to make comparisons with the previous years of math 106 data, as the two courses are too dissimilar. The success rate in the fall was poor, but the success rate in the spring is promising.
  - Math 71 – because this course is offered only in the self-paced, independent study mode (Math X), and the number of students taking this course is very small, the data are not statistically significant.
  - The Calculus Sequence.  
The calculus sequence consists of Math 1 Calculus I, Math 2 Calculus II and Math 3 Calculus III. As expected, success rates improve as students progress through the sequence: 59% in Calculus I (range from 46% to 68%); Calculus II 61% (but a lot of variation ranging from 40% to 76% success); Calculus III 65% (large range from 35% to 90%). Overall, these success rates are lower than we would like to see and cause us some concern.
    - We feel we should be seeing higher success rates in the Calculus sequence. Since only one section of Calculus III is offered in a given semester, the Calculus III numbers clearly are instructor dependent. However, there are a high number of withdrawals in all three courses. The majority of students enrolled in these courses are math, science, computer science or engineering majors. Most likely, all of these students have a goal of transfer. Failure to complete the sequence in a timely manner jeopardizes the success of the major programs in which they are enrolled and creates set backs in transfer. The reasons for these unsatisfactory success rates are unclear.

- It would be useful to know how our success rates compare with those of other California colleges (both community colleges and four year institutions). Also, having more data about the preparation of these students would help us determine the causes of non-success.
- The Pre-Calculus Sequence
 

The pre-calculus sequence consists of the two courses Math 38 Trigonometry with Geometry and Math 20 Pre-Calculus

  - In Math 38 success rates range from a low of 33% to a high of 62%, with an overall average of 55%. Math 38 is the gateway to Calculus and it is a big step up from intermediate algebra (the prerequisite) to this course. We know that traditionally students struggle with this course. The low success rate could indicate a barrier to successful completion of an educational goal in math/science/engineering type majors. We also find ourselves mystified by the large variation in success rates. To address the root causes of this success rates, there are some questions we need answered:
    - ▶ How many of those enrolled in Math 38 took Math 55? If they took Math 55, were they successful on their first try? (In other words, is poor success in 55 an indicator of trouble in 38?)
    - ▶ How many tested in?
    - ▶ How can we prepare them for the “leap forward” into trig?
  - In Math 20 success rates range from 52% to 71%, with an average of 60% overall. While the average success rate is somewhat higher than in Math 38, and similar to what we see in the Calculus sequence, there is still a lot of variation from semester and cause for concern. Math 38 is the prerequisite for Math 20. Yet, it is possible for a student to test into math 20 without having had a trigonometry course. One area of investigation would be to determine whether those who were not successful in Math 20 had completed Math 38 or had tested into Math 20.
- SUMMARY
 

Looking at the Pre-calculus/Calculus sequence as a whole, we need to investigate the causes of the wide variation in success data from semester as well as the lower than expected success rates. We feel that if we prepare students with a strong foundation, they should be successful as they progress through the sequence. Some data questions we have are

  - How does success in Math 38 translate into success in Math 20? In Math 1? To answer this question, we need throughput data, tracking students from Math 38 to Math 1
  - How do success rates compare for students who tested into Math 38 and Math 20 versus those who took the prerequisite courses? What happens when these students go on to Math 1?

- Drilling down, it would be useful to look at how students who received a grade of A in Math 38 succeed in subsequent math courses, compared with those who receive a grade of C. Is a student who is marginally successful in Math 38 more likely to fail in Math 20 or Math 1?
  - Finally, what happens to students who attempt the course, withdrawal or fail and then repeat the course? We need repeater data for Math 38, Math 20 and Math 1, looking not just at success within the repeated course, but also success in subsequent courses.
- **Statistics Courses**  
 Although we offer four statistics courses (Math 44, Math 41, Math 42A, and Math 42B), the number of students taking Math 41 and Math 42B is too small to provide meaningful, statistically significant data. Both Math 44 and 42A are taken by students needing a math course for transfer. In addition, certain majors require one or the other of these courses. Success rates are generally better in these courses, compared to other math courses.
    - 42A: 60% success
    - 44: 66% success
  - **Other transferable math courses.**  
 Math 33 Finite Mathematics, Math 34 Calculus for Business and the Social Sciences and Math 45 College Algebra round out the transferable math offerings. We offer only one section of each of these courses each semester.
    - Math 33 success: 65%
    - Math 34 success: 55%  
 While the majority of students taking Math 34 are doing so because it is a major requirement, about half of the students in Math 33 take the course because they need a transferable math course. Not too surprisingly, we see higher success rates in Math 33 than in Math 34. Like the transition from intermediate algebra to Trigonometry, the transition from intermediate algebra to business calculus is a big one. The success rate in 34 reflects this transition and is, in fact, similar to what we see happening in Math 38. This leads us to the question, “what can we do in Math 55 to better prepare students for Math 34 and Math 38?”
    - Math 45 success: 52.5%  
 Interestingly, we see more variation from semester to semester in the success rates for this course than we see in Math 33 and Math 34. In part, this is probably due to the challenges instructors face when teaching this course. Most students who take this course do so because they need a transferable math course. Often they are unprepared for the more rigorous nature of a college algebra course. This is a content heavy course in which a lot of material is covered at a very fast pace. Like Math 34 and Math 38, the transition to this course is a difficult one for many students and the success rate reflects this.

- The Pre-Transfer Algebra Sequence

The pre-transfer algebra sequence consists of Math 65 Elementary Algebra and Math 55 Intermediate Algebra. These courses are offered in both regular and half-paced versions, and in different modes (lecture, distance education, and self-paced.) **NB:** The student success data provided for these courses predates the implementation of the revised curriculum discussed earlier in this program review.

- Elementary Algebra

Overall success rates in this course are dismal, despite a number of efforts made to improve student retention and success.

In the full lecture version of the course, the average success rate is 42%. For the half-paced lecture we have averages of 52% in 65A and 62% in 65B. The Math X equivalent courses are 65X and 65Y, with average success rates of 26% and 49%, respectively. The data from the online offerings of this course, while not as complete, indicates similar poor performance overall, with an average success rate of 37%.

These numbers mask wide variation in success rates from semester to semester, especially in the A's and B's and online (where we usually had only one section in a semester). There are some bright spots, as well: The average success rate in 65A is much higher than the overall average. We can attribute the better success rate to the nature of the course; less content in one semester and a slower pace. Also, students who went on to 65B or 65Y did much better than the overall average in 65, indicating that students who succeed in 65A or 65X do fairly well when they go on.

- Intermediate Algebra

Overall success rates in this course are also poor, though somewhat better than those for elementary algebra. In this course, too, we have made a number of efforts to improve student retention and success in the past four years.

In the full lecture version of the course, the average success rate is 47%. For the half-paced lecture we have averages of 58% in 55A and 70% in 55B. The Math X equivalent courses are 55X and 55Y, with average success rates of 33% and 35%, respectively. The data from the online offerings of this course, while not as complete, indicates similar poor performance overall, with an average success rate of 41%.

Overall, the success rates are somewhat higher in intermediate algebra, with the exception of 55Y. The lower success rate in 55Y is most likely because the last half of 55 is the most difficult part of the course and students are taking the course in the self-paced, independent mode (Math

X). We should point out that the number of students in 55X and 55Y is relatively low.

These success numbers mask wide variation in success rates from semester to semester, especially in the A's and B's and online (where we sometimes had only one section in a semester). For instance, in five semesters of 55A data, we see success rates of: 46%, 71%, 70%, 28%, and 74%. Since these would have been single sections, it is likely that the success rates are largely instructor dependent. There are some bright spots, as well: The average success rates in both 55A and 55B are higher than the overall average in 55. Again, we can attribute the better success rate to the nature of the course; less content in one semester and a slower pace. Also, students who went on to 55B did much better than the overall average in 55, indicating that students who succeed in 55A do fairly well when they go on.

**SUMMARY:** While we see some good news in the algebra data, the success rates for these courses are cause for grave concern, given the large number of students in non-transferable math classes with an educational goal of transfer. We know we are not alone in trying to solve this problem. Our success rates in these courses are similar to those reported across the state. The problem with trying to find ways to improve these success rates is that the reasons for lack of success are many and some of them are outside of our control.

In the past five years we have taken several steps to improve student success and retention in the algebra courses. The TBA lab hour requirement and the opening of the Integrated Learning Center were major steps in that effort. We have revised the algebra curriculum and introduced an online homework system. We have participated in the Basic Skills embedded counseling initiative and in the fall of 2010 we are piloting supplemental instruction in 65 and 55. We do not have data from the semesters in which these experiments took place. Many of us in the department have attended conference sessions and participated in workshops dedicated to improving student success in elementary and intermediate algebra. Sometimes these efforts fail: Disappointingly, our data shows that the students who need the ILC the most (those in elementary algebra) are the ones who use it least. This was particularly true in the first few years of operation. We have seen student attendance increase in recent years and are hopeful this will translate into improved performance.

- Data  
We'd like to conclude this section with a discussion about data. The problem is not a lack of data – in fact, sometimes we are inundated with data. We have assessment and placement data, student success data, repeater data. The

problem is that, while the data tells us there is a problem, it does not tell us why. Talk to a dozen mathematics instructors who are teaching Math 65 and you will get two dozen reasons why students are not successful. In a study commissioned by the Pathways through Algebra project some years ago, the researcher associated with the group stated that data studies show that, no matter what you do, you are not likely to get much better than an average passing rate of 70% in a math course. There are simply too many reasons why students fail or withdraw, and no one strategy which will fix them. We believe there are kinds of data which can be useful to us in understanding the causes of non-success, and we look forward to working with the Office of Institutional Research in the future, to design data studies that can help us continue to work toward improvement.

## 7. Program Efficiency

	FTEF (Full-Time)	FTEF (Overload)	FTEF (Part-Time)	FTEF (Total)	FTES	WSCH/FTEF
2005-2006 Academic Year	16.091	6.576	29.218	51.885	883.51	520
2008-2009 Academic Year	23.9	5.546	25.339	54.785	987.62	549
Difference	7.809	-1.03	-3.879	2.9	104.11	
Percent Increase or Decrease	49%	-16%	-13%	6%	12%	
<b>Academic Year</b>	2005-2006	2008-2009				
Percent of Classes Taught by Adjuncts	56%	46%				

Credit FTES Apportionment (08/09): \$4,564.83

Average Cost Per FTEF (08/09): \$45,000

Total FTEF Cost (08/09):	\$ 2,465,325.00
Total FTES Revenue (08/09):	\$ 4,508,317.40
Difference:	\$ 2,042,992.40

The mathematics department has done quite well over the past three years. Most notable is that our department earned approximately two million dollars for the district in the 2008/2009 academic year. You can see from the previous data that our productivity has increased as well as our enrollments with a 6% increase in FTEF translating to a 12% increase in FTES. Also due to our aggressive hiring over the past few years, the Mathematics department is finally under the 50% mark for classes taught by adjunct instructors.

Comparing the Mathematics program efficiency to LPC, we see that, with the exception of spring 2009, our fill rates are higher than those college-wide.

COMPARISON OF FILL-RATES: MATH vs. LPC								
	F2005	S2006	F2006	S2007	F2007	S2008	F2009	S2009
Math	93%	84%	91%	80%	90%	92%	91%	88%
LPC	85%	80%	85%	76%	84%	89%	89%	90%

On average the Mathematics department accounts for 14% of the FTES reported by the college and our WSCH/FTEF is generally much higher than the LPC average.

COMPARISON OF WSCH/FTEF: MATH vs. LPC								
	F2005	S2006	F2006	S2007	F2007	S2008	F2009	S2009
Math	557.52	505.73	539.90	484.15	535.99	537.41	556.94	556.45
LPC	489.49	450.25	487.85	452.06	491.72	497.53	502.14	496.57

### **Math X**

One of our program needs is a full-time instructional assistant for the Math X program. Since they are loaded as labs, the efficiencies for these sections are respectable and they generate a significant amount of FTES for the district. Listed below you will find a detailed breakdown for Math X in 2008 and 2009.

## **8. Student Learning Outcomes**

The Mathematics Department offers nineteen distinct mathematics courses. We have written at least one student learning outcome for each of our courses and have written two or more SLO's for sixteen of them. We have assessed fourteen courses at least once, and have multiple semesters of data for eight of our courses.

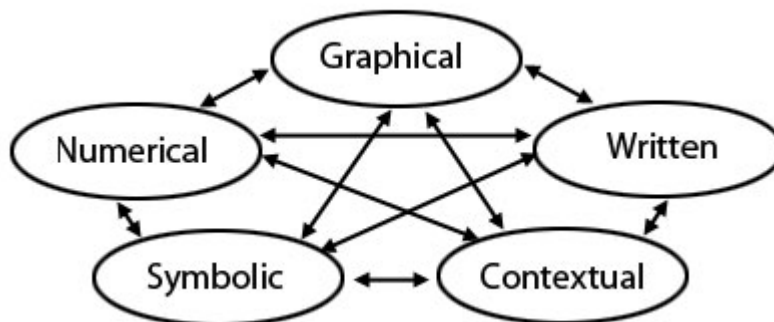
Although the Mathematics Department does not offer a degree, we have developed program level outcomes which reflect the pedagogical philosophy of the department members and the recommendations of such national mathematical organizations as the American Mathematical Association of Two Year Colleges (AMATYC) and the National Council of Teachers of Mathematics (NCTM).

Our program level student learning outcomes are:

- Students will demonstrate the ability to use symbolic, graphical, numerical, and written representations of mathematical ideas.



## Representations Considered



- Students will read, write, listen to, and speak mathematics with understanding.
- Students will use mathematical reasoning to solve problems and a generalized problem solving process to work word problems.
- Students will learn mathematics through modeling real-world situations.
- Students will use appropriate technology to enhance their mathematical thinking and understanding, solve mathematical problems, and judge the reasonableness of their results.

The program level student learning outcomes are posted on the mathematics department website.

The Mathematics Department piloted the use of eLumen in the fall of 2007 and has participated in SLO assessment every semester since then. Because so many of our courses are taught by adjunct faculty, we felt it was imperative that we have adjunct buy-in for the SLO's and assessments we used in our courses. For this reason, during the academic year 2006-2007 we held a series of Friday afternoon meetings (called "Cookies and Conversation") to which we invited our adjunct faculty. We were able to obtain a staff development grant to pay attendees a small stipend for attending some of the meetings, but sometimes they "worked for cookies." During these meeting we worked extensively with our adjunct faculty to develop student learning outcomes, assessments and assessment grading rubrics for a number of our courses. We also offered training to any adjunct who was interested in participating in SLO assessment (and a number of them did). During the fall 2008 flex day we completed the task of writing at least one SLO for every mathematics course. A number of adjunct faculty members worked with us on that project.

The SLO assessment data collected from fall 2007 through fall 2009 is summarized in tables presented below. The percentage of students who assessed as proficient is indicated in the column headed **Prof%**, while the number of students assessed is indicated in the column headed **N**. The mathematics department SLO's represented are: Multiple Representations (MR), Communication (C), Problem Solving (PS) and Modeling (M). The LPC core competencies addressed are Critical Thinking (CT) and Communication (C).

Specific analyses of the data are conducted below, but we would like to preface this presentation and discussion of the data with some general remarks:

We began the SLO assessment process in the fall of 2007. As was discussed above, we had spent the previous year developing SLO's, assessments, an assessment scale and rubric for grading. In retrospect, we were overly ambitious in our design of the assessments, trying to assess several different SLO's with one assessment. In addition, we had developed a seven point (0-6) scale and detailed rubric to score the assessments which, as it turned out, was difficult to implement.

We find it difficult to draw meaningful conclusions from this data. In most cases, the percentage proficient varies significantly from one semester to the next, making it difficult to discern trends or draw conclusions about the success/nonsuccess of various teaching strategies. The data collected in the first three semesters is especially problematic as instructors were allowed some latitude as to how and when they administered the assessment. Some instructors embedded the assessment in an exam, others gave it as a quiz or as in-class extra-credit work. Some instructors gave the assessment soon after the material had been covered in the course (when students could be expected to retain more knowledge), while others gave the assessment at the end of the course. As can also be seen, in some courses the number assessed varies widely from semester to semester (the number of sections did not). This is most likely an indicator that more adjunct instructors were teaching the course in certain semesters and, since adjunct participant in the assessment was voluntary, fewer sections were assessed.

### ELEMENTARY ALGEBRA

Math Course/ Math SLO/ Core Competency	Fall 07		Spr 08		Fall 08		Spr 09		Fall 09	
	Prof %	N	Prof %	N	Prof %	N	Prof %	N	Prof %	N
65/MR/CT	51%	270	63%	197	53%	159				
65/C/C	43%	270	57%	197	44%	159				
65/PS/CT	53%	270	62%	197	55%	159				
65A/MR/CT	78%	18	53%	19	21%	33				
65A/C/C	55%	18	58%	19	21%	33				
65A/PS/CT	58%	18	53%	19	24%	33				
65X/MR/CT	100%	11	67%	18	80%	15				
65X/C/C	100%	11	50%	18	60%	15				
65X/PS/CT	100%	11	72%	18	73%	15				

#### Analysis of Math 65 SLO data:

The assessment cycle was fall 2007 – fall 2008.

First, note that all sections of Math 65B offered during this time period were taught by adjunct faculty who did not participate in the SLO assessment process.

In terms of general trends:

- In 65, we notice a bump in proficiency in spring 2008. We do not know what accounts for this.
- The proficiency numbers for 65A in spring 2008 are exceptionally low. Only one section of this course was offered. Scores in situations such as this are highly instructor dependent. Also, students enrolled in 65A are generally weaker overall than those enrolled in 65.
- In general, students perform better when asked to solve problems or work with multiple representations. They are weakest at communicating about mathematics. This is expected as this may well have been the first time these students have taken a mathematics course in which they were asked to write about the meaning of their mathematical results.
- We also note generally higher proficiency scores in the Math X version of Math 65, compared to the lecture courses. The reasons for this are unclear, although it might be due to the fact that in the time period fall 2007-fall 2008 the assessment in Math X was administered immediately after the student passed the exam on the chapter which covered those student learning outcomes.
- Proficiencies in general are higher than the success rates in these courses.

**Steps Taken:** In the spring of 2008, we revised the curriculum for Math 65 and selected a new textbook. The revised curriculum and selected textbook more directly support the student learning outcomes for the course. The curriculum proposal was approved in the fall of 2008 and implemented in the fall of 2009. We hope to see better assessment scores as a result of adopting the revised curriculum and new textbook. As discussed below, we will be implementing a new SLO assessment model in the fall of 2011, which we will believe will provide us with better data.

### INTERMEDIATE ALGEBRA

Math Course/ Math SLO/ Core Competency	Fall 07		Spr 08		Fall 08		Spr 09		Fall 09	
	Prof %	N	Prof %	N	Prof %	N	Prof %	N	Prof %	N
55/MR/CT	42%	509	49%	520	48%	507				
55/C/C	44%	509	45%	520	48%	507				
55/PS/CT	46%	509	44%	520	49%	507				
55A/MR/CT	26%	27			79%	19				
55A/C/C	30%	27			63%	19				
55A/PS/CT	26%	27			37%	19				
55B/MR/CT			25%	16						
55B/C/C			31%	16						
55B/PS/CT			38%	16						
55X/MR/CT	62%	26	35%	24	66%	29				

55X/C/C	69%	26	42%	24	76%	29				
55X/PS/CT	62%	26	46%	24	65%	29				
55Y/MR/CT			86%	7	36%	11				
55Y/C/C			57%	7	36%	11				
55Y/PS/CT			86%	7	55%	11				

**Analysis of Math 55 SLO data:**

The assessment cycle was fall 2007 – fall 2008.

First, note that during this assessment cycle Math 55A was offered only in the fall, while Math 55B was offered only in the spring. Also, in fall 2007, no 55Y students took an assessment. In terms of general trends:

- The data for Math 55 is generally consistent from semester to semester, with slight increases recorded in the areas of multiple representations and communication over the three semesters.
- The proficiency numbers for 55B in spring 2008 are much lower than those for 55. Only one section of this course was offered. Scores in situations such as this are highly instructor dependent.
- In 55A we see strange fluctuations from fall 2007 to fall 2008. Again, only one section of this course was offered in each of those semesters, and we suspect the scores are instructor dependent.
- The data results are more consistent across the three SLO’s assessed; students are at about equal proficiency in the areas of multiple representations, communication and problem solving.
- We also note generally higher proficiency scores in the Math X version of Math 65, compared to the lecture courses. The reasons for this are unclear, although it might be due to the fact that in the time period fall 2007-fall 2008 the assessment in Math X was administered immediately after the student passed the exam on the chapter which covered those student learning outcomes.
- Proficiencies are at about the same level as success rates in these courses.

**Steps Taken:** In the spring of 2008, we revised the curriculum for Math 55 and selected a new textbook. The revised curriculum and selected textbook more directly support the student learning outcomes for the course. The curriculum proposal was approved in the fall of 2008 and implemented in the fall of 2009. We hope to see better assessment scores as a result of adopting the revised curriculum and new textbook. As discussed below, we will be implementing a new SLO assessment model in the fall of 2011, which we will believe will provide us with better data.

## STATISTICS

Math Course/ Math SLO/ Core Competency	Fall 07		Spr 08		Fall 08		Spr 09		Fall 09	
	Prof %	N	Prof %	N	Prof %		Prof %	N	Prof %	N
41/44/42B/MR/CT	42%	71	72%	123	95%*	19*				
41/44/42B/C/C	44%	71	59%	123	95%*	19*				
41/44/42B/PS/CT	46%	71	69%	123	95%*	19*				
44/PS/CT*					44%	50				
42A/MR/CT	44%	94	47%	90	76%	17				
42A/C/C	45%	94	48%	90	29%	17				
42A/PS/CT	54%	94	70%	90	29%	17				
42A/PS/CT*					40%	63	71%	34		

*\*See discussion immediately below*

### Analysis of Statistics Course SLO data:

The assessment cycle was fall 2007 – fall 2008.

**Note:** the statistics courses 41, 42B and 44 are taught as a combined course, so the SLO data for these courses is also combined.

Only the first two semesters of data obtained can be usefully analyzed for trends, due to confusion that occurred in the fall of 2008, which resulted in different versions of the SLO assessment being given in different sections of the same course. In the fall of 2008, new SLO's for statistics were written and a new 0-4 scale was adopted for scoring. Due to a misunderstanding, some instructors assessed the new SLO, rather than continuing with the old ones (which is what they should have done, so that the cycle could be completed with consistent assessment data).

Looking at the data:

- Comparing fall 2007 with spring 2008, we see significant increase in the proficiency scores for 41/42B/44. It is unclear what accounts for this jump.
- The data obtained for Math 42A is more consistent between the two semesters.
- In Math 41/42B/44, in fall 2007, students scored at similar levels across the three SLO's assessed, but there is greater discrepancy in spring 2008.
- In 42A, students showed significantly greater proficiency in problem solving than in multiple representations and communication, indicating a greater need to adjust teaching strategies to ensure students are competent with multiple representations and can communicate about their results.
- In general, the proficiency scores fall below the success rates in these courses, a trend that warrants further investigation.

**Steps taken:** Data discrepancies make it difficult to design appropriate course improvements. The SLO's for the statistics courses have been re-written and new

assessments developed which are more focused. We hope that the data we will collect starting in fall 2011 will lead to better understanding.

In the fall 2008 we began to bring other mathematics courses into the SLO assessment process. Beginning a new assessment cycle, we implemented the five point (0-4) scale for these courses and revised the scoring rubric. As a result, we gained greater internal consistency in the scoring of the assessments. Also, in this semester we re-wrote many course SLO's. The revised SLO's were more objective specific and we refined our assessments, so that only one specific SLO is being assessed. We have three semesters of data only in Math 1 Calculus I and in Math 38 Trigonometry with Geometry.

### OTHER MATHEMATICS COURSES

Math Course/ Math SLO/ Core Competency	Fall 07		Spr 08		Fall 08		Spr 09		Fall 09	
	Prof %	N	Prof %	N	Prof %	N	Prof %	N	Prof %	N
1/PS/CT					76%	54	66%	53	67%	46
2							47%	47		
5									100%	4
20									45%	92
38					41%	49	37%	27	36%	47
107/M/CT									19%	26
107/C/C									27%	26

The proficiency scores for Math 1 are quite good, showing a good understanding of the SLO assessed. Overall, it appears that the percentage of students who achieved proficiency in the student learning outcomes assessed scored at or above the success rates for the course, with Math 38 being the notable exception, where we see proficiency rates significantly below the success rates in those courses. These low proficiency rates in math 38 indicate a need to design better learning strategies for the student learning outcome assessed.

### DATA CONCERNS

In the process of collecting this data from eLumen, several issues arose which lead us to question the reliability of the data recorded. First, in a number of instances, the total number of students reported as being assessed or “no shows” far exceeded the actual enrollments for the course. As an example, consider this eLumen data from 2008:

Course - MATH55 - Intermediate Algebra	NS	0	1	2	3	4	5	6	Total
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3 - Critical Thinking - Assignment / Point in Time Students will demonstrate the ability to use symbolic, graphical, numerical, and written 180 63 58 54 90 94 82 66 **687**

representations of mathematical ideas. [Rubric PDF](#)

1 - Communication - Assignment / Point in Time Students will read, write, listen 172 68 57 61 84 78 95 72 **687**  
to, and speak mathematics with understanding. [Rubric PDF](#)

3 - Critical Thinking - Assignment / Point in Time Students will use mathematical  
reasoning to solve problems and a generalized problem solving 172 43 66 65 91 108 88 54 **687**  
process to work word problems. [Rubric PDF](#)

The first problem is that all three assessments would have been given at the same time, but there are more “no shows” listed for the first SLO than for the other two. Secondly, at census, the enrollment in all sections of Math 55 was 588, yet the data indicates 687 students were enrolled at the time of the assessment! The values in the NS column are clearly erroneous. These discrepancies were noted in more than one course and in more than one semester. We do not know how to account for these errors.

## THE SLO CHALLENGE

We have faced – and continue to face – a number of challenges in terms of implementing a manageable, sustainable process for SLO assessment and review. In any given semester we may offer a total of 75-80 sections, representing as many as 19 different courses. Approximately 45% of those sections are taught by adjunct faculty. As we increase the number of courses being assessed in a particular semester, the logistics of providing the appropriate information (SLO, SLO assessment, SLO rubric) to all of the faculty involved, making sure that faculty know how the SLO is to be administered, know how to use the SLO assessment rubric and know how to enter the SLO assessment data into eLumen is a daunting task. For instance, in the fall of 2009 we were supposed to assess the following courses: Math 107, 65 (includes 65A, 65B, 65X, 65Y), 55 (includes 55A, 55B, 55X, 55Y), 45, 41/44/42B, 42A, 38, 20, 1, 2, 5, and 7. We offered a total of 66 **lecture** sections of these courses, 47% of which were taught by adjunct faculty, and 12 Math X sections, 50% of which were taught by adjunct faculty. With so many courses in various stages of the SLO cycle, it has become difficult to track, from one semester to the next, which courses need to be assessed in that semester.

Additionally, over time, our own understanding of student learning outcomes and assessment has evolved and changed, partly as a result of experience, partly as a result of changes in direction from the SLO committee. Initially, based on what we understood about SLO assessment at that time, our SLOs were broadly stated and we defined, and used, a seven-point rubric to grade assessments and determine proficiency. However, when, in the fall of 2008, the SLO Committee made the recommendation to use a five-point (0 to 4) scale, and to write very specific student learning outcomes (more like objectives) for our courses, we revised our rubric and SLOs to meet the recommendations of the committee.

As a result of these challenges, in the academic year 2010-2011 the mathematics

department is planning to conduct a year-long review of our SLOs, assessments and assessment practices, with the long-range goal of implementing on-going assessment of all SLOs in all of our courses (embedded, continual assessment). In this way, we will be continually assessing and recording the results of those assessments. Our plan is to pick a few courses each semester to review, to analyze the assessment data for those courses, and then to write a report on the results of our analysis. The report will include any recommendations to make changes, if needed, based on the results of the assessment analysis.

## **9. Curriculum Review**

Course outlines are periodically reviewed and updated on a timely basis. We have also taken several courses inactive in recent years (Math 110 Math for the Trades and Math 106 Basic Mathematics) as they were no longer needed.

As described in more detail in Part C.1, the Math Department has revamped our entire basic skills sequence. Math 106 Basic College Arithmetic became Math 107 Pre-Algebra; Math 65 and Math 55 Elementary and Intermediate Algebra were converted from a spiral-curriculum, where all subjects were covered repeatedly, into a true sequential curriculum – where one course picks up where the other leaves off. Throughout the semester, minimal review of previously covered concepts is given, when needed. A new textbook combining Elementary and Intermediate Algebra was chosen to meet our departmental SLOs, provide a quality technology supplement, and meet the needs of students in our many course modes: lecture, half-paced, on-line (hybrid) and independent study (Math X). Surveys distributed to all students in all sections and modes using the new textbook were positive.

Based on changes in the Lower Division Transfer course Protocol (LDTP) for CSUs, course outlines for Math 1, 2, 3, 5, and 7 were revised to meet the protocol standards. All of these transfer level courses are rigorous and parallel the content students would receive in the same course at a UC or CSU. For example, our entire calculus sequence (Math 1, 2, 3) uses the same text that is used at many of the top UC schools.

Currently, the math department does not offer an AA or AS degree in mathematics. However, a student completing an associate degree in Liberal Arts and Sciences may elect an area of emphasis in mathematics. The passage of SB 1440 provides an opportunity to craft a transfer associate degree with a mathematics major. We already offer the mathematics courses (with appropriate articulations) which satisfy the ASCCC recommended transfer model curriculum (TMC) in mathematics. Since most students majoring in the physical sciences, computer science and engineering complete these courses as part of their major preparation, it would be easy for these students to earn a transfer associate degree with a mathematics major. Having this degree would document and emphasize the significant mathematics preparation of these students.

While we do have a wide range of transfer level classes (Math 44, 42A, 33, 34, 38, 45) with Math 55 as a prerequisite, there is no liberal arts alternative math course for transfer. While the department would like to offer a liberal arts alternative for transfer, we need



additional information about who would take the course, additional FTEF to offer the course, and faculty time to research and develop it. Currently, a brief survey is being distributed to transfer level courses with Math 55 as a prerequisite to gauge student interest.

### **Efforts to Improve Consistency across Sections.**

With many sections offered of some of our core courses, the mathematics department created Course Coordinators and Course Information Sheets as part of an effort to improve consistency of content across multiple sections. Course Coordinators are full-time faculty members responsible for being the point person for a given course. Course Coordinators are available to answer any questions regarding what to emphasize while teaching a course and appropriate assignments for students; they act as the departmental liaison with the faculty teaching a course. If instructors have suggestions for improving a course, or questions or concerns, the course coordinator is their point of contact. Course Information Sheets accompany the Course Outline of Record for each course, and are updated and distributed each semester by the Course Coordinator to all instructors teaching the course. This course information sheet details what content must be covered, the current textbook being used, suggestions about pacing, attached TBA lab hour requirements in the ILC, appropriate core math labs designed by the department, Student Learning Outcomes that must be referenced in the syllabus and assessed in that course, etc. Course Coordinators also can make available sample syllabi, suggested calendars, and often homework sets. Information about Course Coordinators and Course Information Sheets are now available online via the math department website. During the recent Accreditation, the Accreditation Team called out efforts that the Math Department has undertaken to communicate the standardized course requirements, syllabus and SLOs for each course as a “shining star” at LPC.

## **10. Interaction With Other Groups and Staff**

The mathematics department has worked collegially with a variety of groups across the campus:

- As a result of staff development activities in 2008, embedded counseling was included in many sections of Math 65 and 55 over a 1.5 year period. Unfortunately due to budget cuts, the counseling department could no longer afford to participate.
- Supplemental Instruction will be piloted in two sections of Math 65 in the fall of 2010. Implementation of this experiment will require working closely with Pauline Trummel in the tutoring center and with the student tutors chosen to conduct the supplemental instruction.
- The College Foundation Semester is a multidisciplinary cohort-based program involving math, English, CIS, and psychology counseling.
- The Integrated Learning Center has been run for the past five years by a

consortium of faculty drawn from the English department, the ESL department and the mathematics department.

Mathematics is often asked to participate in projects both in the community and on campus. We would like to be able to interact more closely with the science faculty on mathematics issues. Although we consider these opportunities very valuable, we do not have the faculty time to participate in many of these activities.

## 11. Other

### a. Math X: The Continual Battle To Finish Our Redesign

Math X is an independent, self-paced, mastery-learning mode that students can choose when trying to complete Math 107, Math 65, Math 55 or Math 71. For many of our students, this material is filled with concepts they have seen multiple times before, and unfortunately for many, never understood. In Math X students learn the material at their own pace, using the textbook as their primary source of information. They must pass chapter exams with an 84%, or better, to progress in the course (they are allowed three tries to achieve this goal). The mode of Math X benefits students by offering independent, flexible pacing (for those who work, have learning disabilities, math phobias, require a quick review, etc.). This program has been an important part of the mathematics department for nearly 30 years. However, little has been done in that time period to make changes to the program that reflect the changing needs of our students or the advancements in mathematics pedagogy and technology. In recent years, we have seen success rates decline and, most recently, the program has suffered from budget cuts which have reduced staffing and the number of sections offered (in the fall of 2006 we offered 16 sections; in the fall of 2010 we will offer six.). With these concerns in mind, for the last five years, we have been working to revamp and revitalize the Math X Program.

The goal of the revision of Math X is to enhance the program's ability to meet the needs of students by

- offering more flexible scheduling
- providing more support to help students succeed in their independent study
- increasing timely feedback on their understanding of the content
- creating a learning environment where students feel encouraged to persist
- guaranteeing quality feedback by the instructor.

Almost every year, we have been able to complete our redesign goal through lots of hard work. Here is a summary of our efforts over the past four years.

**Year One:** To improve the information provided to students about their course requirements, all course syllabi and task sheets were re-done and homework assignments were included. We began tracking student attendance

using the automated sign-in attendance software program called STARS.

**Year Two:** To reflect increased coordination responsibilities and duties and a stronger role in educating faculty about the new policies in Math X, we lobbied successfully to change the current instructional position to an instructional assistant coordinator. A new Math X instructional assistant coordinator was hired. The test banks and homework sets for Math 107X and 107Y were revised to reflect the curriculum changes in 107 and the adoption of a new textbook. We began discussions with the administration about our need to have computers installed in Math X, so that students could access support software while working in the classroom, where they would also have access to support from the instructional staff and instructor.

**Year Three:** To implement our redesigned curriculum for Math 65 and 55, a new textbook was selected based on its ability to support independent student learning and to include a software package to support student understanding of the material (including guided steps simulating the support a lecture would provide, mini-lectures or animations of mathematical concepts, tutorials, unlimited examples to practice with, etc.). Implementing the new curriculum meant we had to create test banks, homework problems and practice exams in Math 65X, 65Y, 55X and 55Y to support student learning of the material in the selected texts.

**Year Four and the Future:** Math X suffered several setbacks. Due to budget cuts, when our IA coordinator position was vacated, the position was not refilled and, as a result of our loss of IA support and more budget cuts, the number of sections offered was reduced in spring 2010 and will be reduced again in fall 2010 (taking us from 12 sections in fall 2010 to six in fall 2011). We were also asked to move locations, from two rooms in Building 500 to a single room in Building 600. Many hours were spent with the architects, project manager and IT staff at Las Positas negotiating the layout and requirements for the classroom. Unfortunately the move to the new site does not include the computers we need to complete our planned redesign of Math X. Without computers (and adequate instructional assistant support), instructors will not be able to provide adequate, timely feedback to students through the paper-homework checks and exam corrections. Moreover, when computers are installed, we plan to offer Math X as a hybrid course, keeping the flexibility of the pacing and the mastery of concepts, but including more support and intervention through the use of technology and small group interactions, to provide students immediate or timely feedback and to promote success. Once the redesigned Math X has been fully implemented and reviewed, and we are assured it is working as planned, we intend to increase offer the newly developed algebra review course, Math 100, in the Math X mode.

**b. The Integrated Learning Center and The Open Math Lab**

The Integrated Learning Center opened its doors in the fall of 2005, after a two-year effort coordinated by the mathematics, English and ESL departments and as part of the institutionalization mandated by a Title 3 grant. For the academic years 2005-2009, the ILC provided a venue for offering TBA lab hours in English 1A and a number of ESL and mathematics courses and housed the Open Math Lab and the Writing Center. In the fall of 2009 the Writing Center re-located to the STARS room in building 2400, sharing the space with the Tutorial Center. Also, in the fall of 2009, the English department decided to move from a TBA lab hour to a scheduled lab hour, effective fall 2010. The ILC will be re-located to building 600 in the fall of 2010 and will continue to be used by both the ESL and mathematics departments. The ILC has been recognized as a Practice with Promise.

There has never been a defined, institutional source of financial support for the ILC. Initially, staffing was provided through a mix of TBA lab hours, special assignment hours, and reassign time (for a coordinator position). In the first year and a half of operation we also had a part-time, temporary mathematics instructional assistant. With these varied staff resources we were able to provide mathematics help 58 hours per week, including four hours on Saturday. The Saturday hours were removed from the schedule in the spring of the second year, partly because of budget cuts which reduced the staff hours available, but also because of low attendance numbers. Over the next two and a half years special assignment hours were repeatedly cut. The amount of reassign time was reduced in the spring of 2008. In the fall of 2010 we will be relying solely on TBA lab hours and (coordinator) reassign time to staff the ILC. As a result, we have had to reduce our hours of operation to 45 hours per week.

From the beginning, the mathematics portion of the ILC has recorded robust numbers of student attendance, with many students logging many more hours than the 17 connected to their TBA lab hour requirement. The chart below shows TBA hours logged, as well as excess hours (above the TBA requirement) and total hours logged, for each semester.

**OPEN MATH LAB SUMMARY**

**Fall 2005 – Fall 2009**

<b>Semester</b>	<b>Number of Student Log-ins</b>	<b>TBA Lab Hours</b>	<b>Excess Hours*</b>	<b>Total Hours</b>
<b>Fall 2005</b>	1239	12,321.00	4571.90	<b>16,892.90</b>
<b>Spring 2006</b>	1163	10,566.51	6528.58	<b>17,095.09</b>
<b>Fall 2006</b>	1477	15,247.66	7688.54	<b>22,936.20</b>
<b>Spring 2007</b>	1481	13,149.90	7535.20	<b>20,685.10</b>

<b>Fall 2007</b>	1679	16,372.60	7045.73	<b>23,418.33</b>
<b>Spring 2008</b>	1509	14,921.05	7543.17	<b>22,464.22</b>
<b>Fall 2008</b>	1538	17,345.80	6048.44	<b>23,394.24</b>
<b>Spring 2009</b>	1383	15,512.47	6326.71	<b>21,839.19</b>
<b>Fall 2009</b>	1735	20,366.29	6282.80	<b>27,443.22</b>

\*Excess Hours calculated by adding excess hours logged by students in classes with TBA lab hours, hours logged by students in non-TBA lab hour math classes and, starting spring 2006, hours logged during finals' week.

There are two things to note about that data. One is that, from fall 2005 to fall 2009, the number of students using the math resources offered by the ILC increased by 40% and the number of hours they logged increased by 62%, while the hours of operation decreased by 22% and the available staff have decreased by 25%.

The second thing to note is the growth in the number of log-ins, which outpaces the growth in the number of sections of math offered. Many students are taking advantage of the resources by the Open Math Lab in the ILC, but in some areas we are falling short.

Semester	MATH 55			MATH 65		
	Total enrolled	Logged in at least once	Logged 15 or more hours	Total enrolled	Logged in at least once	Logged 15 or more hours
Fall 2007	538	502 (95%)	263 (49%)	457	409 (89%)	213 (47%)
Fall 2009	609	599 (98%)	360 (59%)	583	534 (92%)	293 (50%)

As this data shows, we are doing a pretty good job of getting students in the door at least once, but not so well at getting them to make the weekly commitment which is required by the TBA lab hour. We do see a 10% increase, in Math 55, in the percentage of students who are logging 15 hours or more over the semester, but the figure for Math 65 shows only a slight increase. In contrast, for fall 2007 in Math 1, 61% of the students enrolled logged 15 or more hours, while in fall 2009 this number rose to 77%. Two studies conducted by the institutional researcher have shown a strong correlation between success in Math 65 and 55 and the number of hours spent in the ILC; students are twice as likely to succeed in their math class if they attend the ILC 17 or more hours per semester. The data in the table indicates that the students who need this resource the most are the ones who are using it least and it has some alarming implications.

- In Math 65, in particular, the percentage of students logging 15 or more hours over the semester is fairly close to the success rate (44% average over four years). When we look at fall 2007 data from a study conducted

by the institutional researcher, we see that on average, 72% of Math 65 students who log 15 or more hours succeed in their course.

- The TBA lab hour and the ILC have been cornerstones in our efforts to improve success in all of our math classes, but especially in basic skills. For those students who use the resource, it does provide the support they need – but too few students are taking full advantage of this resource. However, if all students were making use of this resource ...
- The ILC has been impacted already by shortened hours, increased attendance and reduced staffing. Much as we would like all of our students to fulfill their lab hour requirement, the reality is that if we truly had every math student spending their required hour in the ILC every week, we would be inundated; we would have not enough seats and not enough staff to meet the increased need.
- There is cause for concern in these figures as the state is moving toward more rigorous oversight of TBA lab hours, asking colleges to account for student time.

## **PART II – PLANNING**

The mathematics department is submitting four maintenance forms and five development forms. All members of the department were involved in the creation and review of these forms.

### **Maintenance**

We are requesting maintenance, or restoration of formerly met needs, in four areas:

- Math X full-time instructional assistant level III
- Math X part-time instructional assistant level II (three positions)
- Budget
- Integrated Learning Center Mathematics Coordinator reassign time

### **Development**

We have a number of exciting projects which we plan to accomplish in the next several years. Of these, by far the most important project, encompassing several years of work to bring to completion, is our redesign of the Math X model. We would like to recognize the significant amount of work already put into the planning for this project by full-time mathematics department member Kristine Woods and part-time mathematics instructional assistant Dianne Duffy. We also have several short-term projects which we hope to accomplish within a year. Our five projects are:

- Math X Project (long-term, multiyear project)
- SLO project (short-term, one year project)
- Creation of Math for Liberal Arts course (short-term, one year project)
- Development of transfer associate degree with mathematics emphasis (short-term, one year project)
- Institution of a part-time mathematics instructional assistant level I for the Open Math Lab in the Integrated Learning Center (on-going position)