

**External Program Review  
Department of Mathematics and Statistics  
California State University, Long Beach  
April 8-10, 2008  
Final Report – Submitted May 29, 2008**

**Review Team:**

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**Introduction**

As part of the Periodic Program Review of the Department of Mathematics and Statistics Program at California State University, Long Beach, the external review team made a three-day visit to the campus and department on April 8-10, 2008. Prior to the visit, the review team was provided with the Department's Program Review Self Study from June 2006. This report will necessarily reflect the time lag between the time of completion of the self-study and the time of the visit of the external review team. During the three-day visit the review team conducted focus group interviews with the following individuals and groups:

- 1) Dr. Robert Mena, Chair
- 2) Dr. Kent Merryfield, Undergraduate Associate Chair
- 3) Dr. Saleem Watson, Graduate Associate Chair
- 4) Dr. Will Murray, Undergraduate Advisor
- 5) Dr. Karen Hakim-Butt, Single Subject Credential Coordinator, and Dr. Shuhua An, Math Education faculty member in the College of Education
- 6) Dr. Florence Newberger, Lower Division Service Coordinator
- 7) Dr. Scott Crass, Associate Professor
- 8) Lawrence Brownson, Coordinator for Pre-baccalaureate Math Classes
- 9) Dr. Melvin Lax, Calculus Committee
- 10) Dr. Angello Segalla, Credential Advisor
- 11) Math Education Faculty
- 12) Applied Mathematics Faculty
- 13) Statistics Faculty
- 14) Pure Mathematics Faculty
- 15) Lecturers
- 16) Graduate Students
- 17) The Departmental office staff
- 18) Dr. Sandra Cynar, College of Engineering

- 19) Dr. Ömer Benli, College of Business
- 20) Dr. Marquita Grenot-Scheyer, College of Education
- 21) University Program Review Committee
- 22) Dr. Laura Kingsford, Dean of the College of NSM
- 23) Dr. Michelle Saint-Germain, Coordinator, Program Review and Assessment

The review is divided into two major components: I) Commendations for the Department and II) Challenges and Recommendations for Improvement. In general, the committee was impressed with the Department, the high morale of those we met, and especially the department's ability to meet the challenges of managing large enrollments over the entire review period.

## **I. Commendations of the Department's Strengths**

### **A. The Major Curriculum**

The curriculum for mathematics and statistics majors begins with mainline calculus and then, with some overlaps, separates into four tracks: pure mathematics, applied mathematics, mathematics education, and statistics. In each of these tracks, the curriculum is appropriate and seems to serve well the math and statistics majors as well as students in other department. Each of these tracks provides solid training and a strong background in mathematics, statistics or mathematics education.

### **B. The Pre-baccalaureate Program**

First-time freshmen who fail the Entry Level Mathematics Exam are required to enter the remedial mathematics program or pre-baccalaureate program. The curriculum in this program includes courses in which students do not earn degree credit. These courses cover elementary and intermediate algebra, material that is included in the typical secondary curriculum. This pre-baccalaureate program has had a steady enrollment of between 1200 and 1600 students with about 60% passing the course. This program is under current revision which allows students to be remediated at either a general education level or at a level appropriate for technical majors. This clever bifurcation of the program may lead to higher success levels for students and training that is better suited to student needs. The Department will be tracking student outcomes in this two-tiered program.

### **C. The General Education Program**

A substantial proportion of the Department's teaching and service responsibility is within the lower division general education program. The Department has nine courses at the 100 level which meet the General Education requirement in Category B2. The spring

2008 schedule included 80 sections of these GE (8 of which are large lecture classes) and served approximately 3500 students. For most of these courses the Department has developed a course coordinator who oversees the various tenured, tenure-track and mostly part-time faculty who teach these many sections. These course coordinators are quite effective, and the Department benefits from a large cadre of effective and loyal lecturers who are generally assigned to teach these courses.

#### **D. The Graduate Program**

The Department has established a successful and high quality graduate program which allows students to earn Masters of Science degrees with options in pure mathematics, applied mathematics, mathematics educations and statistics. Each of these options currently has between 25 and 60 students in their program. These students may choose between a thesis, comprehensive examinations, or combination project and examinations as their culminating experience for the degree. Students can finish these programs in two years, but it is not uncommon for students, particularly those who choose the thesis option, to extend their course of study beyond the two year goal. The large (and impressive) collection of graduate courses, the direction of thesis work, the substantial comprehensive exam responsibility (10 to 12 exams each semester), and the recent move to establish mathematical and statistical consulting operations represent a significant workload for the Department faculty. Release time for certain of these tasks is available and more is under consideration.

#### **E. Quality and Integration of Math Education within the Department**

In many colleges and universities, there are no mathematics educators in the mathematics department; often there is a chasm between mathematicians and mathematics educators at such places. Where there are mathematics educators in the math department, communication need not be much better. At CSULB, almost all of the courses math education majors take, both math content and pedagogical, are offered in the math department, a little unusual but not without other examples. For a variety of reasons, there seems to be excellent communication between the math education group and the other three groups in the math department, and also with the College of Education. The math education group has several new young people with lots of energy. As a whole, the group has several grants and is involved with several projects in the schools and in the summer. Several projects involve CSULB math education students working with high school and summer students, to the benefit of all involved.

#### **F. Quality of Recent Full-time Faculty Hires**

Like many other departments at CSULB, the Department of Mathematics and Statistics is likely to experience regular turnover in their faculty in the coming decade, as many of the those faculty members of the department who were hired before 1980 and even the current mid-career faculty members reach retirement age. Faced with expected retirements, the 1999 External Review emphasized the need to hire new faculty members and to provide the needed support for their success. The Self-Study of the department indicates that the goals of this aspect of their plan were met. At least 17 new faculty members were hired in the various disciplines of pure mathematics, statistics, applied mathematics and mathematics education in the past 9 years. The committee was impressed during the interviews of these recently hired faculty members by their enthusiasm, their dedication to quality education and the plans for establishing research programs that involve both undergraduate and graduate students.

#### **G. Quality of the Office Staff in Meeting the Challenges of High Level FTES**

From AY 2001-2002 to 2004-2005 the Full Time Equivalent Students (FTES) served by the Department of Mathematics has been large ranging from 1469 to 1655. The fall enrollment figures for 2005, 2006, and 2007 indicate that enrollments have continued to be large and are on the increase, explained by the surge of pre-baccalaureate students. The number of office staff (four full-time) serving students and faculty, including a large contingent of part-time faculty, has remained the same. However, despite the enormous pressure of dealing with a constant stream of students during first few weeks of school and the need to currently serve over 35 full-time faculty members and roughly an equal number part-time faculty members, the office staff is to be commended for their ability to cope with these numbers.

#### **H. Support for Untenured Faculty**

The College and the Department have allocated their resources to provide all new faculty members with a half-time teaching load during their first two years. The Department in recent years has extended its support for untenured faculty members by releasing them from one course each semester for years 3 through 6. The untenured faculty members were uniformly satisfied about their interactions with the chair, communication about the RTP expectations, and the supportive, collegial atmosphere of the department. Whether the level of support can be maintained during the state's current fiscal crisis will be a challenge to the department and may affect the progress of the new faculty as well as the recruitment of new faculty.

### **I. High Morale of Part-time Faculty and Lecturers**

The department has a large number of part-time faculty, 41 in spring 2003 17 of whom taught at least 11.6 units, to service large enrollments in the many sections of mathematics courses. The committee met with four of these faculty members, two who typically teach close to 15 units and two whose teaching loads are 6 to 12 units, a small number relative to the total number in the department. From this small sampling, it appears that morale is very high and these faculty members are positive about their experiences in the department. The faculty in attendance felt that they were respected, provided support in their efforts to improve their teaching through the evaluation process, and were impressed by the leadership of the chair and the faculty they interacted with who serve as course coordinators for the many multi-section courses. They are provided support to attend conferences to enhance their teaching, benefit from occasional seminars on teaching, and have worked on some joint grant projects with community college instructors to improve teaching. The Department allows each lecturer to express their course preferences on teaching assignments. Each commented on the chair's effective leadership, his essential fairness, and his support in dealing with problem students. One of these lecturers commented that she turned down a full-time tenure-track position at a community college because she felt that her situation in this department was so positive – her one word description was “awesome.”

### **J. Increased Involvement of Undergraduates in Research/Problem Solving with Faculty**

Undergraduate research has recently become more popular in mathematics programs across the United States. While undergraduate research is common in other College of NSM (CNSM) departments, the necessity for extensive background in mathematics has been a barrier for participation of undergraduates in mathematical research. Even so, the department has had some success in this area. From 2004 to 2006 four students wrote undergraduate honors theses and two articles with undergraduate co-authors were submitted for publication. At this point some of the applied mathematics and mathematics education faculty reported that their efforts in undergraduate research have focused on conducting independent studies with motivated students. A more pointed effort has been made in having students participate in the national Putnam Exam Competition. The Department has established a track record of success in this competition with regular, impressive performances from 2001 to 2006. In 2007, the Departmental Putnam team finished 42<sup>nd</sup> in the nation, an incredible performance for a CSU mathematics department.

**K. Course Coordinator System of Full-time Faculty Overseeing and Coordinating Multiple Sections of Courses**

A component of the department's infrastructure is the coordination of multi-section courses by full-time faculty members, both tenured and lecturers. Much of the department's resources are directed towards service courses for other majors and with the high level of FTES during the review period and the need for large numbers of part-time faculty to teach in lower division courses with multiple sections, the coordinators play an important role in maintaining some uniformity and quality in the learning experiences of students enrolled in the multi-section courses.

**L. Increased Integration of Technology into the Teaching of Mathematics**

The department has made a concerted effort to incorporate technology into the teaching of mathematics during the period under review. Substantial resources have been devoted to making computational technology available to their students. The Department has three computer laboratories – two outfitted with Windows based machines and the other with MacIntosh equipment. The College information technology staff supports these computing facilities, but with staff responsibilities extending across the entire college, that support may be inadequate.

**M. Mathematics Education and Liaison with K-12 Schools and Community Colleges**

The Department recognizes its liaisons with area schools as one of its strengths and continued demand for professional development of teachers will be an opportunity for the department to enhance those relationships. The Department has roughly 360 majors with just under half of them pursuing their Bachelor's Degree in the Mathematics Education Option. This represents a substantial pool of potential future teachers. The Single-Subject Credential Program in Mathematics attracts about 120 students each year, with half of them completing their credentials. This is a credit to the Department as this is one of the largest, if not the largest, single-subject credential program in mathematics in California. The Department recognizes the need to more effectively screen student entry into the program so that the rate of student success increases. The Departmental leadership, including the chair and the credential advisor, and the loyal and very able cadre of lecturers who work in this program are to be commended for their success. The graduate program focusing on Mathematics Education is also beginning to flourish with about 40 students in the program and its first graduates this spring. This program should continue to succeed because high school math teachers need such programs and because of the strong support from the Department the faculty. The faculty members who are involved in mathematics education have received multiple external grants, which have meant

working with local middle school and high school teachers and their students. This grant activity has resulted in the creation of a liaison with the local schools.

#### **N. Interactions with other Departments**

A course in mathematics is required for nearly every student at CSULB, and in some disciplines multiple courses in mathematics are needed for their majors to be successful in their fields. Consequently, the Department of Mathematics has a vast service role, and there is every indication that the Department is successful in that role. Our discussions with faculty members and administrators from the College of Engineering, College of Education and College of Business Administration, three of the principal constituencies whose students rely on courses from the Department of Mathematics, indicate that the Department has a good working relationship and ongoing positive collaborations across the CSULB campus. The representatives from the College of Education were especially laudatory of the Department as they characterized the Department as responsive, supportive, and flexible. They have successfully collaborated to produce a high level flow of credentialed teachers. The College of Business Administration also views the Department as a cooperative service unit as they are currently undertaking deliberations to settle on the appropriate mathematics requirements for CBA students.

The students from the College of Engineering are the most reliant on the Department for courses that are integral to their courses of study. At a minimum they take Calculus I and a new course that is a combination Calculus II and Calculus III for Computer Science and Computer Engineering majors, an effort that demonstrated the Department's willingness to accommodate the needs of other units. It is not uncommon for the faculty in the engineering fields to have concerns about the curriculum and in the required mathematics courses for their students. Dr. Sandra Cynar expressed those concerns for the CSULB College of Engineering. Given the demonstrated willingness of the Department to work with other units, we are confident that a joint resolution of these concerns can be reached.

#### **O. Productivity of the Department Faculty**

The Department's Self-Study Report indicates that in the period from 2001 to 2006 many members of the department had active research programs, and with few exceptions, each faculty member had at least one refereed publication. A quick professional activity survey of the math faculty conducted at the time of the external committee's campus visit gave results that tend to be somewhat, but not completely, consistent with this self-study observation. Only 24 of the 37 faculty members responded to the survey. Thirteen of those 24 reported having at least one refereed article since 2005 with 10 of those reporting more than one such article. All 24 respondents indicated a variety of

professional activity including conference presentations, grant projects, professional journal reviewing, manuscript submissions and problem solution submissions. In our interviews with the various sub-groups of faculty members, they took pride in the quality and quantity of their professional activity. While the information provided in the self-study, in the interviews and by the survey is incomplete, it gives an indication that the math faculty is an active and productive group.

## **P. Student Attitudes toward the Department**

The Department's Self-Study provides the results of a spring 2006 survey of 179 upper division and 87 graduate students. In general, this survey indicated that students have a positive view of the department and their program of study in mathematics. Students tended to have very positive opinion of department faculty members as instructors and mentors. It should be noted that no lower division, general education or pre-baccalaureate students were included in this survey.

These survey results were largely consistent with the information that we gathered when we interviewed a group of about a dozen students, all of whom were graduate students except for one very strong undergraduate student. The graduate students were among the department's best as nearly all of them serve as teaching associates. These students we met with were very happy with their program and with the care and consideration given by the Mathematics Department faculty. They indicated that the department has established a friendly and supportive environment for students. They appreciated the mentoring advice that they had received from various faculty members and the chair as well as the recently implemented teaching associate training program.

After hearing this stream of positive input, we pressed these students for anything of the other end of the spectrum. They mentioned their cramped (but still tolerable) office space, lack of group study rooms, and their disappointment with the preparation of the undergraduate graduate students in their classes. The principal concern of the TAs was their low compensation and that it includes neither a tuition waiver nor health benefits. This may be an indicator that there has been a partial communication gap as teaching associates who teach at least half-time are eligible for health insurance.

## **II. Challenges and Recommendations for Improvement**

### **A. Class size**

In the current difficult budget climate in which this department (and the entire CSU) has to operate, it was decided that certain freshmen level courses could be efficiently conducted in a large (120 to 150 students) lecture format. In particular, the spring 2008

schedule includes two large lectures for Math 103 (Mathematical Ideas), one for Math 108 (Statistics for Everyday Life), two for Math 114 (Finite Math), and three for Math 115 (Business Calculus). The Department is well aware of the challenges of course delivery in a large lecture setting and has implemented two important mitigation measures. First, there is a recognition that faculty members vary in their suitability for teaching in large lectures, and so the most able large lecture faculty members have been identified and considered for these teaching assignments. Also, the Department has allocated resources for teams of graders for each of these courses so that regular homework assignments, quizzes and exams can be built into the structure of these courses. Other departments at CSULB have expanded their basic courses to large lectures in order to partially deal with their inevitable financial stress. The Math Department has resisted this pressure until recently, as small classes are better for student learning, but that pressure remains. Even with the best of planning, many students will struggle in large lectures and would have had a better opportunity for success in a small class format. The 1999 External Review Report lauded the Department for its commitment to small class size, observing that small class size has been a major component in the success and effectiveness of the Department's teaching program. The Department and the College should come to an understanding on the future of large lecture mathematics courses. Such courses should be viewed as a temporary response to current budget pressures, and all should agree that a reversion to small class sizes will be implemented in the near term. Such a reduction in class size can be administratively problematic in the short run, but it serves the interest of students, the Department and the College in the long run.

#### **B. Development of a Process for Programmatic Assessment of the Math Curriculum**

The Department's Self-Study does not provide any indication that programmatic learning goals for its various student constituencies (pre-baccalaureate, general education, courses in the major programs, graduate programs) have been established. Such goals should be developed along with a process for programmatic assessment of the math curriculum within each of the above departmental segments. There does not appear to be a systematic plan to provide feedback to the department about student learning in the math curriculum. There is considerable expertise in the math department in the form of the math educators to provide the guidance and faculty development necessary to accomplish programmatic assessment of the math curriculum. Just as important is how the Department will respond to the feedback.

The Self-Study does give evidence that the assessment task has been given consideration as each course description in Appendix II includes specific learning goals for that course as well as an assessment method. For most courses this method was "Embedded questions throughout homework, quizzes, and exams." Department members indicated

that results on these embeddings were informally discussed among instructors teaching different sections of the same course but that no systematic tracking scheme of this data is in place. As the Department develops its assessment plan, it also has the advantage that there are natural groupings in the infrastructure of the department for developing learning goals and assessing their attainment for the multi-section courses in the form of the coordinators and the faculty members they oversee.

A possible component of an assessment plan is the use of common final examinations in multi-section courses. For example, it is extremely difficult to evaluate the effectiveness of their calculus program over time as they do not have uniform finals. For some reasons which are not clear to us, some faculty members inappropriately believe that uniform finals are an infringement on their academic freedom. However, many institutions (including both of ours in many of our multi-section courses) have uniform finals, and many have uniform midterms. These common exams are a mechanism to assure coverage of important topics and to evaluate the effectiveness of this coverage each semester and over time. Unless the Department finds some other ways of assuring the integrity of their courses and assessing their performance, we encourage the Department to reconsider their policy.

### **C. Development of a Hiring Plan**

There are currently 15 full professors out of a total of 37 full-time faculty members in the Department, 10 of whom are candidates for retirement in the near or midterm. This suggests that there will be considerable turnover of faculty members before the next Program Review. It is imperative that the Department develops a prioritized plan for future hiring that involves input from the entire Department and attention to where the field of mathematics is heading to enhance the mix of pure mathematicians, applied mathematicians, statisticians, and mathematics educators. This issue was not addressed in the Self-Study.

The Department of Mathematics and Statistics has an interesting situation (common in most mathematics departments in this country) in which almost any of the faculty members they hire can teach many of the courses in their undergraduate curriculum, especially the various service courses. Therefore, the driving force for hiring is not who can teach the various math courses offered by the department but the areas where the department can develop strengths among cohorts who might be able to collaborate and to involve undergraduates and master's level students in their scholarly activities. Faculty members in pure mathematics who are needed for specialized math courses may find it difficult to involve undergraduate and master's level students in their scholarly activities. Such considerations should be important criteria in future hires. Prioritizing the areas of

mathematics for development within the department will be an important task that should involve the entire department with a long term view of the department's composition, how best to meet the needs of constituents served, and the resources available for faculty to meet the requirements for tenure and promotion.

#### **D. Ongoing Faculty Evaluation Plan**

The Department does not conduct an annual review of professional activities of its tenure-track and tenured faculty members outside of the Retention-Tenure-Promotion process. (Both of our departments do; see Part I, Section O for related comments.) An annual self-evaluation followed by Departmental constructive comments can be very important for the continued professional development of each faculty member. The Department should give this additional evaluation consideration.

#### **E. Office Space**

Each tenured faculty member occupies their own office, as does the chair and each staff member. Teaching associates occupy a common shared space, which does not seem not to be overly crowded and on which the TA's seemed satisfied. However, the lecturers are assigned office space in two large rooms and four single person offices outfitted with at least three desks. This arrangement, especially in the large rooms, is unacceptably overcrowded and creates a difficult learning situation for students when a private consultation with their instructor is required. This situation will be exacerbated by the hiring of additional tenure track faculty members. These new hires will be assigned to the single person offices currently occupied by multiple lecturers, and those lecturers will need to be moved into the already cramped conditions in the large rooms. In fact, this dilemma seems to have been a partial motivation for going to large lecture sections as this resulted in a reduced need for lecturers. Such a massive shift in program delivery should not be justified by office space considerations. Clearly the College and the University will need to support the Department in addressing this space problem.

On a related space matter, there are no dedicated areas for undergraduates for group study and group projects. Undergraduate students are our apprentices, and they need gathering places where they can comfortably interact and study. Such space might be used in combination with the math club. The Department should give this issue consideration.

In the current office configuration, the chair's office is directly off of the main hallway on the first floor of the building occupied by Department faculty. This arrangement has a direct impact on the manner in which the chair carries out his administrative duties. He is left to monitor traffic into his office, and he also answers his incoming phone calls. This is an inappropriate inefficiency in the operation of the department and not good use of the

chair's time. A reconfiguration should be considered in which a receptionist filters both walk-in and phone traffic for the chair.

#### **F. Resolution of the Business Calculus Problem**

The College of Business and the Department have entered discussions on the future of the Business Calculus course, which is an important service course for the COB. Each unit has a set of legitimate concerns. Business Calculus is an extremely common course across the country, taught at both of our schools. At CSULB, it used to have a discrete math prerequisite, a course which included some coverage of basic algebra. Somewhat recently the College of Business decided to drop this prerequisite a unit reduction measure, but the departments inside the COB have yet to agree on a replacement. We understand at least one department believes that perhaps a prerequisite is not needed, in which case any student who has passed the ELM would qualify for Business Calculus. At both of our institutions, Business Calculus has a college algebra prerequisite (which can be placed out of). Students need some algebra skills, even to set up an Excel spreadsheet to say nothing of succeeding in calculus. Michigan State, facing similar discussion in the recent past, tried a five-credit course covering both algebra and business calculus (the standard course is three credits), but this was an unsuccessful arrangement and was soon dropped with a reversion to requiring College Algebra as a prerequisite. The Department has indicated a willingness to accommodate the College of Business on this issue, but the COB will need to realize that a dilution of the Business Calculus prerequisites will result in a reduction in mathematics learning outcomes among their students. This might require the involvement of the respective deans or even the Provost Office to bring about a resolution.

#### **G. The Placement Exam Problem**

In addition to requiring that students pass or be exempt from the Entry Level Mathematics (ELM) exam, the Department has recently begun to require a passing score on the Mathematics Diagnostic Placement Test (MDPT) for students seeking to enroll in Calculus I (Math 122) or Biological Sciences Calculus (Math 119A). Implementation of the MDPT has proved to be problematic. Communicating this requirement to new freshmen has been difficult with the Department being forced to staff each freshmen orientation session in order to communicate the requirement and administer the exam. Further, the Department has been forced to maintain a shadow system of record keeping on MDPT results. Both of these efforts have consumed inordinate amounts of staff and faculty time with uncertain results. The Department may need to consider seriously developing an on-line placement exam, which students could take at home or school, with the results stored electronically in a student's records. It would have to be developed in part by math faculty, but should be administered through the University's

testing unit. The Department would need to monitor the results on such exam on an item by item basis, modifying questions as appropriate, setting appropriate cut off scores. Michigan State University has such an exam, and cheating seems very low. An alternative in this regard is to consider implementing an online version of the MDPT. These exams have been used for a number of years and are generally highly regarded in terms of validity and reliability. Their online option is a relatively recent development.

#### **H. The Teaching Load Concern**

The Department has a policy of offering reduced teaching loads until tenure is awarded. For the first two probationary years, a faculty member's teaching load is reduced from the standard 12 units to six units. In probationary years three through six, a reduction to a nine unit teaching load has been implemented. In all of our contacts with the various faculty subgroups, they consistently observed that their loads were high and that if their teaching duties for all faculty members were to be reduced from 12 credits to nine credits, they would be more productive in research, professional activities and service. There is, of course, considerable justification for this position, as faculty members have a wide assortment of demands thrust upon them. It is common for faculty members to be assigned three different courses to teach in one semester, with only one of them at the lower division level. Along with a lower division course, teaching two upper division or graduate courses at one time is a very heavy load.

CSU math departments which have reduced teaching loads have implemented merit systems based on publication output and success in garnering external funds. They have done this in combination with regular use of large lecture sections of lower division courses. Both of these would represent radical changes in the mission and culture of the Department and should only be implemented after careful consideration. A simpler alternative that would provide some teaching load relief is the use of two-preparation teaching schedule instead of three. This would help on lecture and exam preparation time (though not with grading and students problem time), but the faculty members expressed reluctance to accept such a teaching assignment. The Department should consider a pilot of such schedules beginning with faculty members who are the most open to this experiment. Such schedules are common on other CSU campuses.

#### **I. Concerns about Mathematics Education**

The Mathematics Education faculty is very energetic and has a broad range of interests. They could readily be awarded enough grants to buy themselves out of all of their usual classroom time (as happens elsewhere). We feel this would not be a positive development for the department or the individuals (as does the chairperson). We would encourage the individual math educators to focus on a course or two with which they

want to get deeply involved and then carefully allocate time between them and their outside projects.

The second concern involves the Mathematics Education lecturers. The Department has a high mathematics education teaching load, with a very high percentage carried by lecturers. Several of these are highly trained mathematically, and every indication is that they are doing an excellent job. Furthermore the department encourages and supports them to attend conferences that will help expand the “education” part of their training. However, when asked about “math wars” they seemed to be unaware of this huge national controversy. (Simply google “math wars” or even “California math wars.”) The point here is that this is one of several issues regarding mathematics education (a system that is found to be severely wanting by some), and all people involved in education should be aware of them. It is in the interest of the Department and their students to make certain that these key contributors to the mathematics education program maintain a currency in the field, whether through conferences, workshops, or other professional venues. (We note that the 1999 External Review raised similar concerns.)

#### **J. The Need for a Department IT Consultant**

With the three computer teaching labs, the various individual instructors’ desktop and laptop computers, and the staff’s desktop computers, the Department of Mathematics and Statistics represents a substantial information technology maintenance challenge – there are certainly over 100 and perhaps closer to 200 computers in the Department. With the printers and other peripheral equipment, the software needs and licensing, and the routine problems that arise on these computers, it is not possible for the College’s small IT staff to provide timely and uniformly effective service to the Department, given that it must also serve the needs of four other departments as well as the Dean’s office. The Department and its students would be well served if the Department Staff were to be expanded to include an IT consultant.

#### **K. Improve Outreach to Local Companies for Sources of Internships for Students, Real-life Problems for Research or Student Capstone Projects**

The Applied Mathematics and Statistics have programs that depend on having contacts outside of the University. The Applied Math group is actively seeking to strengthen their ties in industry. The Statistics group has just opened a consulting center and seeks projects from both on and off campus. These are both positive activities. To give them direct support, the Department should consider establishing a Board of Governors, composed of mathematicians, statisticians and scientists from local business and industry, to provide feedback about academic programs in the Department, help develop

internships for students, provide projects for graduate students, provide leads for statistical consulting projects, and provide information about employment opportunities for math and statistics students. This is especially important as the Department continues to hire more applied mathematicians and statisticians. Moreover, math students have requested information about careers in math and statistics, and this Board could play an important role in motivating current math students and in recruiting math majors by providing a conduit to employment in industry.

**Summary:** This is one happy department. Faculty, staff, and students are working hard but are considerate of one another. They cooperate with one another for the good of the department, and they feel looked after. Considerable credit for this goes to the Chairperson, Dr. Robert Mena. He is a very considerate individual who exudes competence, caring, and openness. The spin-off to the department is that the four groups of faculty (applied math, math ed, statistics, and theoretical math) cooperate among themselves and between the groups. We heard several times that it is like one big happy family there. The several departments whom they serve had similar positive feelings about the department. Their programs have professional integrity, their teaching is effective, the Department faculty is professionally active and productive, and their students are well-served. As with any department, the Department of Mathematics and Statistics has issues that need to be addressed, but it has a culture and leadership that should allow these concerns to be approached.