Mathematics Department Strategic Plan 2008

The Mathematics Department at Boise State University has a complex role within the university. The department has a very large service role. It provides courses that fulfill the core mathematics requirement as well as courses required by degree programs in business, computer science, education, engineering, nursing, the natural and social sciences. These service courses cover a wide range of levels from remedial to graduate courses. In addition to the huge service demand the department offers BS or BA degrees in Mathematics and Mathematics Secondary Education, a BS degree in Applied Mathematics, and MS degrees in Mathematics and Mathematics Education. Because of this dual role the goals for the department can be grouped into two groups: those that address the direction the department desires to take to ensure that we are a vital part of the university as it matures into a metropolitan research university of distinction and those that address the service role of the department.

It should be noted that the department has had research as a major goal since 1986. Long before the university placed an emphasis on research the department was achieving its goals of hiring people to do research and finding ways to give faculty time to do research. The department has worked hard to improve the quality of the major degree programs that we offer and at the same time, with limited resources, adjusted to meet the service demands of the university.

The goals in this document resulted from work at a departmental retreat August 2008, the work of the steering committee Fall 2008, and input from the entire department throughout the process. The current steering committee is an ad-hoc committee. The by-laws of the department should be changed to establish a permanent committee which will update and maintain the strategic plan, and monitor its implementation.

1 Develop and Enhance Research

The Department’s number one goal aligns with Goal III of the College of Arts and Sciences’ strategic plan [2].

The current state of research in the department can be described by the formally recognized active research areas displayed on the departmental website [3]. The research areas are, in alphabetical order: Applied and Computational Mathematics, Geometric Topology, Mathematics Education, Set Theory, Statistics. A number of faculty members have research activities not yet represented on the department website: combinatorics, computer assisted reasoning, cryptology, computational molecular biology and group theory. This “description of state” is somewhat shallow since historically the department has not deliberately collected and analyzed data on quantifiable indicators of the state of research in the department.

The past strategy for developing research was to create focused research groups by building on existing strengths. Existing strengths were initially established by historical chance or by considering the service mission of the department to other departments in the university and to the community. The academic context in which this strategy was conceived was a predominantly undergraduate institution.

Currently, Boise State University is in transition towards being a metropolitan research university of distinction. It currently offers Ph.D.’s in five areas, with another Ph.D. program already approved by the State Board of Education. It also offers numerous Master’s degrees. The research demographics of the department and university have changed from predominantly a teaching institution to an institution where research is an integral part of tenure track employment. Whereas
the majority of department’s tenure track faculty in 1988 were not actively doing research, the majority in 2008 are actively involved in research activities. The department has Master’s degree programs in Mathematics and in Mathematics Education.

The department is in an underdeveloped strategic position regarding research: The existing Ph.D. programs in Engineering, Geophysics and Geosciences as well as numerous Master’s level programs in the sciences and engineering are all sensitive to the mathematical method. There also exists an interdisciplinary Master’s degree and the soon to be Ph.D.s in Biomolecular Sciences and Materials Science and Engineering. These will be interdisciplinary Ph.D.s. Several science departments have established undergraduate research traditions. This tradition does not yet exist in the Department of Mathematics.

Members of the department are recruited to serve on graduate culminating activity committees or serve as thesis advisors by students from other departments or colleges. Examples include serving on Computer Science Master’s level committees, Computer Engineering Master’s level committees, and Geophysics Master’s and Ph.D. level committees. In the examples with Computer Science and Computer Engineering, initial contact was made through the two cryptology courses (owned by the Department of Mathematics). In the examples with Geophysics the initial “contact” was made through an interdisciplinary NSF grant and through the graduate level numerical analysis courses. This type of activity is also emerging with Biology, and in this case the initial “contact” was also made via an interdisciplinary NSF grant.

The department is in the College of Arts and Sciences, and in college tenure and promotion committees it is grouped with the sciences, not the arts or humanities.

The new department strategy should be to strategically adapt to the research culture now maturing in the department, the college and the university. In particular we should develop new research emphases in critical or advantageous disciplines not currently represented on the department web site, and enhance research in existing areas when a clear benefit consistent with university/college goals can be established. In particular:

- Promote and advance interdisciplinary collaborations and research.
  The scope of this item includes:
  Intra-departmental collaboration between different mathematical disciplines, where feasible. Examples include recent joint seminars between the topology group and the cryptology group, the statistics group and the applied and computational mathematics group on subjects of potentially mutual interest.
  Inter-department/college collaboration between mathematicians and academics in other fields. Examples include collaboration between mathematicians and geophysics, mathematicians and computer scientists, mathematicians and biologists, mathematicians and materials scientists, and between Mathematics Education faculty and College of Education faculty.

- Establish a permanent post-doctoral position.
  Sources of funds for this position may be salary savings from sabbaticals, indirect costs from externally funded research, the salary from Alex’s 1/2 position (resulting from the split between Mathematics and Computer Science), and/or an external sponsor that would endow such a position.
  The position would be funded at an entry level salary, and for an enforced non-renewable fixed
term of “occupancy”. A task force should be established to develop the details of this action item, including a policy on how this position is to be used. We recommend that an initial “test period” for this position could be three cycles of occupancy followed by a re-evaluation of the policy.

- Establish a vigorous regular Mathematics Colloquium.

The department has made a valiant effort over the years to keep a departmental colloquium alive. The past two years have been especially successful. However, the department budget for colloquium activities is inadequate. Specific resources needed to maintain a vigorous colloquium include:

- funds to import well-targeted speakers and offer modest refreshments,
- a room/facility equipped with the necessary working equipment and enough room for an audience of 45,
- a fixed time slot during the week reserved for colloquium activities, with schedule coordinated with teaching schedules so that attendance and participation is optimized.

It should be anticipated that some speakers will be from out-of-town and will overnight in Boise. It should also be kept in mind that the speakers do not have to be mathematicians, but can be scientists from fields we would like to learn about and potentially collaborate with.

- Offer Ph.D. degrees in mathematics and mathematics education.

Refer to the fifth item in Goal III of [2].

The department is in a strategic position, as pointed out above. Interdisciplinary collaborations can lead to identifying significant mathematical problems which are not treated by the traditional disciplines of Mathematics, and whose solution would lead to significant new insights in the partner field where the problem was identified.

The traditional mathematics research departments continue to produce progress in the traditional fields of mathematics. Undoubtedly these departments can also modernize and develop disciplines of mathematics motivated by the identification of problems in related fields of science and technology. This is a niche area for Boise State University: with the rise of Ph.D.’s and master’s degrees in affiliated disciplines, and with expanded interdisciplinary activity, it will be relatively easy to develop a viable Ph.D. producing a new kind of highly sought after mathematician. Initially the job markets for these mathematicians may be purely industrial, commercial, or as associated scientists in large departments in other fields. Eventually more mathematics departments may also develop in this direction at the undergraduate or Master’s level, in which case our Ph.D. graduates would be likely candidates for positions at such departments.

There is a need for Mathematics Education in the state of Idaho. None of the universities in the state offer a Ph.D. in Mathematics Education. Nationally the demand for people with Ph.D.s in Mathematics Education is much greater than the supply. According to an article in the NOTICES of the AMS [5] in 2007 40% of the academic positions for Mathematics Education were unfilled. Each of the last four searches at Boise State has required 2 years to find a candidate that was suitable and would accept the job. In Idaho, Boise State University is the logical place for a Ph.D. program in Mathematics Education. Having a Ph.D. program with graduate students who could work as research assistants during the year would greatly enhance the effort to recruit and retain quality faculty in Mathematics Education. The
students in the MS in Math Ed programs are usually working teachers and are only on campus in the summer, when they are taking intensive course work. Doctoral students would be expected to be on campus for at least a year during which they could work as research assistants. Having a doctoral program in Math Ed would also greatly increase the amount of service we could provide to the teachers and administrators in the state of Idaho.

A departmental task force should be established to develop this initiative.

2 Strengthen Graduate and Undergraduate Education

Currently, the department has a large undergraduate service component. The number of mathematics majors used to be low. Currently the department offers undergraduate degrees in Mathematics, Applied Mathematics and Mathematics Education. The department also offers M.S. degrees in Mathematics and in Mathematics Education. Here is data (as of November 2008) from the past 12 years on the number of undergraduate majors graduating from our program.

<table>
<thead>
<tr>
<th>Year</th>
<th>Appl. Math</th>
<th>Math</th>
<th>Math Ed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>4</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>4</td>
<td>2</td>
<td></td>
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<tr>
<td>1999</td>
<td>3</td>
<td>4</td>
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<tr>
<td>2000</td>
<td>5</td>
<td>5</td>
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<tr>
<td>2001</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>4</td>
<td>1</td>
<td></td>
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<tr>
<td>2004</td>
<td>2</td>
<td>5</td>
<td></td>
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<tr>
<td>2005</td>
<td>2</td>
<td>8</td>
<td>3</td>
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<td>2006</td>
<td>1</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>2007</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>2008</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

As of November 2008 12 students have graduated through the department’s M.S. programs. The table below indicates two types of data: The first three columns contain data on the Mathematics option and the fourth column, on the Mathematics Education option. There are three options for a culminating experience towards the M.S. degree: a project, a thesis or an examination.

<table>
<thead>
<tr>
<th>Year</th>
<th>M.S. Project</th>
<th>M. Thesis</th>
<th>Exam</th>
<th>M. Ed. Thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2007</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The department is in a strategic position regarding undergraduate and graduate education: mathematics is a central component of progress in the sciences and engineering. Science and engineering at Boise State has become progressively stronger. There is a new scientific revolution in progress in the life sciences. A number of fields outside the natural sciences also have mathematics and statistics as an important component of their intellectual endeavors. These include economics, finance and anthropology. Unlike some of the sciences, engineering, and other fields mentioned above, mathematics is a subject universally taught in schools (K-12).
Through our course offerings and potential interaction with colleagues in the sciences and engineering we have access to strong students in their programs and we are in a position to modernize and update our own offerings. We are in a strong position to develop mathematics curricula that take advantage of our strategic position.

As was pointed out in the narrative to Goal 1, the department’s graduate education courses have spawned interdisciplinary contacts. This is a small sample of how a modern curriculum could open opportunities in initiating interdisciplinary relationships.

The number of undergraduates graduating with a degree in mathematics seems very low and for all practical purposes stable. It is clear that there is enormous potential for, and room for strengthening our educational programs. Below we list a number of action items that we see as the first steps of a more extensive agenda to strengthen both graduate and undergraduate education in Mathematics, Mathematics Education and Statistics.

- Offer Ph.D.’s in Mathematics and Mathematics Education, with assistantships.
  See the corresponding action item under Goal 1.

- Offer more options for the M.S. degree.
  Currently we offer a Master’s degree with two options: M.S. in Mathematics and M.S. in Mathematics Education. It can be beneficial to the department, and to our students, to offer a a wider range of emphases for the Master’s degree. Statistics and Computational Mathematics are obvious cases. Some of our students may be more competitive in finding related employment if their credentials are more explicit.

- Develop undergraduate research.
  Boise State University is currently still an RUI (Research at Undergraduate Institutions) institution by NSF standards. The NSF also supports research experiences in mathematics for undergraduates. In science departments of the College of Arts and Science undergraduate research is already an established component of the departments’ profiles, and appears prominently in tenure and promotion applications/reviews of members of these departments. The mathematical background of an undergraduate student may be inadequate for certain genres of mathematical research. This is also true of all the sciences and engineering. However, the mathematical background needed to grasp some fundamental problems is quite modest, and new insights or intuitions can very easily come from someone who, with appropriate guidance, thinks sincerely about these problems. Challenges in getting undergraduate research in mathematics started include identifying conceptually accessible problems, identifying and recruiting talented students, and creating an infrastructure to make this part of the normal operations of the department.

  Part of the infrastructure needed in establishing an undergraduate research tradition includes designing an appropriate curriculum in which students are exposed to material that can lead to such research, and in which students learn the fundamentals of the mathematical method. Second part of infrastructure needed would be financially supported research scholarships or fellowships. And a third infrastructure item would be a regular forum where students can be exposed to interesting research ideas. The departmental colloquium, the Putnam competition and the graduate seminar may all be part of this infrastructure. It may be useful to establish an undergraduate seminar. A fourth infrastructure item would be access to computing facilities. A number of outlets for presentation or publication of undergraduate research
exist. There is an annual undergraduate research event on campus. A fifth infrastructure item would be a successful recruiting and admissions mechanism, with mechanisms for mentoring undergraduate researchers. A sixth infrastructure item would be to maintain relevant information regarding this initiative on the department web, incorporating it in departmental reporting, and recognizing this activity, where appropriate, as a faculty work load item. A seventh item would be creation of a mathematics club on campus. Presumably the club would be mainly an undergraduate club.

Undergraduate research in mathematics is plausible and strategically useful to the department. A task force of interested individuals should be created to develop the details of an undergraduate research initiative.

- Define, evaluate and promote teaching effectiveness.

The department and the university have an interest in assessing the effectiveness of instruction in the department and in ensuring uniformity of outcomes in different sections of the same course (this is important as we offer service courses important to other departments). Our current efforts along these lines include outcomes assessment programs underway for our majors and the core curriculum. Further efforts which we might undertake along these lines include an overhaul of our student evaluation process and the collection of statistics on performance of students who take our courses in subsequent courses. For uniformity of results, we need to consider providing common rubrics and/or offering common assessment instruments in all sections of certain courses.

- Recognize and reward outstanding graduate students.

The department could have an annual function at which outstanding work (teaching, thesis work, etc) by graduate students are recognized. Such recognition may include awarding a summer fellowship, starting a graduate “Hall of Fame” on the departmental web site, and so forth.

It would also be useful to do something analogous in connection with undergraduate research.

- Effectively advertise our graduate program nationally and internationally.

Our program has been advertised in “Assistantships and Graduate Fellowships in the Mathematics Sciences” published by the American Mathematical Society, Boise State offers on-line brochures, and we send direct mailings to Universities and individuals throughout the world. We will continue to explore additional outlets.

- Offer T.A.s more options for fulfilling their required time for the department.

Organize seminar or activities for the mathematics club (once established), administer common exams (M333 e.g.) once these exist, or gather statistical information for outcomes assessment.

3 Foster and Expand Community Engagement

Currently, the department interacts with the local community in an ad-hoc manner. When the community needs mathematical expertise, we receive calls to the main math number, which presumably get forwarded to the chair. This has happened a couple of times with the media. Most recently, a news channel wanted to gain an understanding of the magnitude of the national debt,
and they were given the phone numbers of the applied mathematicians. Less formally, we hear of faculty receiving requests from friends and family in matters regarding education and court cases.

The department plans to better engage with our local community. We will create formal mechanisms to receive input from the community regarding our curriculum, research, and a way in which to get our expertise into the community. These mechanisms include an advisory board, a Center for Math, Math Ed, and Statistics, and maintaining a strong web presence of our services.

- Establish an advisory board to guide us in meeting the educational needs of the region. This is the first step to engaging with the community is to create an advisory board. The board could include people from Micron, Treasure Valley Math and Science Center (TVMSC), Blue Cross of Idaho, Intermountain Medical Imaging, city officials from water resources management, St. Luke’s Mountain States Tumor Institute, etc. A possible approach to forming this advisory board is to begin with an internal university advisory board of people from education, geoscience, biology and engineering and solicit their advice for contacts in the region.

Once the advisory board is in place, we will solicit their input regarding our curriculum, and how they anticipate needing our services for their respective businesses or industry.

- Create a Treasure Valley Resource Center for Math, Math Ed, and Statistics which responds to the needs of the region. Establish a work group to develop a plan for the scope and activities of such a center, obtain estimates of the potential cost, and identify possible funding sources. Potentially hire a senior person who will be responsible for acquiring and maintaining funding for it.

Suggestions for the scope and activities of this center will come from the advisory board. Their input will be combined with the existing strengths of the department. For example the department has active research faculty in computational math, statistics and mathematics education. Current research in our department could benefit the community, for example Sharon and Margaret could work with educational institutions such as the TVMSC; Jodi and Leming could assist with medical imaging research; Jodi, Grady and Steve in water resources; Grady and Barbara at the tumor institute; Leming, Jaechoul and Kyungduk in the financial industry and general statistical consulting.

We anticipate that students will play an active role in the Center. Our T.A. program allows us to fund Master’s students to work on research projects with the community. In addition, undergrads can sign up for MATH 480 and do an undergraduate research project to help faculty with research. However, the Center cannot rely solely on current resources. It must supply research salaries for these students, and have Ph.D. students in computational math, statistics or math education working on projects. Money for students will come in the form of grants from industry, but initially university, state or federal start-up money will be necessary. Eventually, the Center should support itself and bring money into the department.

The Center requires a leader who will go out in the community, engage people and educate them about our services. They will also need to identify projects, coordinate efforts (possibly with other university departments), and seek external funding.

The Center will also require physical infrastructure such as areas for the community, faculty and students to interact. It should include state of the art computing facilities, but also take advantage of campus facilities such as the new 3-D visualization lab in the Interactive Learning Center.
• Provide a convenient interface on our website for those who seek consulting.

The Center is a long term goal, but in the meantime, the department can create a web interface through which to interact with the community. The department has a part time systems administrator, but a full time systems administrator is needed to fulfill the computing needs of the department, including maintenance of the department web site and adition of this consulting portal.

4 Provide faculty, staff and students with state-of-the-art programs and facilities.

The Math Department is currently housed primarily in the Math-Geosciences building, with the Math Learning Center in a temporary location nearby on Chrisway. Office space, especially space for part-time faculty and graduate students is insufficient for our current needs. Our current building has three computer labs: MG-104 used for calculus and higher level course work, MG-122 which is the mathematics education lab and MG-115 which was added to the Math Learning Center’s space in fall 2008. Although MG-104 is meeting our current needs (most semesters) for calculus and higher courses computing facilities, MG-122 is not meeting our needs for math education computing facilities. MG-122 has only 10 computers and the layout of the room makes it unsuitable for instruction. Math 270, which is required for math education majors, has a cap of 10 due to this room size. The demand for this course far exceeds what we are able to offer. (See also goals under hiring and retaining faculty). The space being allocated for computing facilities for non-developmental courses has not changed since the computer science department split from the mathematics department, but the increase in calculus and higher level undergraduate and graduate course offerings mean that our need for computing facilities is growing.

• Obtain a permanent home for the MLC.

The Math learning center has been operating in its current temporary location since fall of 2002. The MLC has already outgrown the temporary building where it currently resides and uses classroom and computer lab facilities in the Math Geosciences building. The current MLC location is scheduled to be the site of a parking garage in the university master plan. The Math Department desires close proximity to the Math Learning Center’s eventual permanent home.

• Reside in a facility that includes sufficient offices for full-time faculty, graduate students, special lecturers, and part time faculty; with large spaces for working groups and a tutor center.

Our part time instructors are currently located in one of several rooms in the math-geosciences building: MG 214-D, a room with 8 stations (long tables with small separations) and a single small classroom size space, and MG 220 with 4 desks and two tables. MG 214-D holds 6 adjuncts (two stations are “general use”) and MG-220 houses 19 adjuncts. Adjuncts frequently hold office hours in the hall because MG-220 is too crowded. We have lost most of our office space in PAAW and are expecting to lose the remaining cubicle we have there soon.

Space for graduate student offices is very limited. If we continue to grow and improve our graduate programs, we will need additional office space for graduate students.
• The Math Department facility should be clustered with the MLC, Engineering and Science departments.

The university master plan says “it was decided that over time, the sciences would move into new buildings grouped around one, and later two shared research laboratory buildings between University Drive and Beacon Street, Michigan Avenue and Grant Avenue.” Sadly, the university does not consider mathematics to be a “science” as indicated by the following:

“As the Sciences and others vacate spaces that they currently occupy in the central campus during the next decade, so those spaces will be remodeled to enable departments that are now scattered to consolidate and expand. Those include Education, English, Languages, Literature, Philosophy, Art, Mathematics and Administration.”

Since many researchers in the Math Department are pursuing interdisciplinary projects, the department would like to remain physically close to the departments with whom we share common research. The Mathematics Department should be physically clustered with Engineering, Computer Science, Geosciences, Biology, Chemistry and Physics.

Additionally, some instructors have had students complain that it is hard to get across campus from engineering to the Math-Geosciences building if classes are back-to-back, without being late; being physically closer to the departments that we serve will facilitate between-class travel for many of our students.

5 Recruit and retain faculty and staff to meet departmental goals

This goal is critical to the long-term vitality of our program. To fulfill completely our roles in three major components: service courses, major programs, and research and scholarship, we must have enough permanent faculty to cover all of our service courses and all of our undergraduate and graduate major courses, and still be able to set the teaching component of our loads at a level which will allow enough time for research and scholarship. This goal is also important to support the university’s vision to be a metropolitan research university of distinction and to meet the community’s and state/federal agencies’ consistent needs in mathematical and statistical consulting, including math education consulting, and interdisciplinary research.

With these critical roles of the department, we feel that the department is substantially understaffed. We lost two positions in the budget reductions of the middle 1990’s which were never restored, and similarly we lost two positions again in the 2002 budget reduction exercise which should be restored as promised by the Provost. We are still feeling the effect of these losses in our rapidly growing reliance on part-time faculty. Over the last decade, the portion of the math credit hours generated by part-time faculty had been drastically and consistently increased from 50.5% in Spring 1998 to 81.4% in Spring 2006, with 83.9% highest in Fall 2005, until full-time special instructors were first appointed in Fall 2006.
<table>
<thead>
<tr>
<th>Year (Term)</th>
<th>Math SCH</th>
<th>Tenured/Tenure-track (%)</th>
<th>Special (%)</th>
<th>Adjunct (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998 (S, F)</td>
<td>11824, 13377</td>
<td>49.5, 44.6</td>
<td>50.5, 55.4</td>
<td></td>
</tr>
<tr>
<td>1999 (S, F)</td>
<td>12852, 15414</td>
<td>47.0, 40.1</td>
<td>53.0, 59.9</td>
<td></td>
</tr>
<tr>
<td>2000 (S, F)</td>
<td>14102, 16635</td>
<td>36.0, 35.7</td>
<td>64.0, 64.3</td>
<td></td>
</tr>
<tr>
<td>2001 (S, F)</td>
<td>15469, 17754</td>
<td>36.0, 28.2</td>
<td>64.0, 71.8</td>
<td></td>
</tr>
<tr>
<td>2002 (S, F)</td>
<td>16458, 16715</td>
<td>26.5, 27.7</td>
<td>73.5, 72.3</td>
<td></td>
</tr>
<tr>
<td>2003 (S, F)</td>
<td>15965, 19078</td>
<td>27.4, 21.6</td>
<td>72.6, 78.4</td>
<td></td>
</tr>
<tr>
<td>2004 (S, F)</td>
<td>17616, 20053</td>
<td>20.0, 17.4</td>
<td>80.0, 82.6</td>
<td></td>
</tr>
<tr>
<td>2005 (S, F)</td>
<td>17647, 19969</td>
<td>19.7, 16.1</td>
<td>80.3, 83.9</td>
<td></td>
</tr>
<tr>
<td>2006 (S, F)</td>
<td>17624, 20863</td>
<td>18.6, 18.9</td>
<td>13.5</td>
<td>81.4, 67.6</td>
</tr>
<tr>
<td>2007 (S, F)</td>
<td>17658, 19343</td>
<td>18.8, 19.1</td>
<td>13.9, 18.8</td>
<td>67.3, 62.1</td>
</tr>
<tr>
<td>2008 (S, F)</td>
<td>17882, 20527</td>
<td>21.7, 19.1</td>
<td>22.4, 18.9</td>
<td>55.9, 62.0</td>
</tr>
</tbody>
</table>

In addition, the department experiences substantially increasing student/faculty ratios. For instance, in Fall 1986, the student/full-time faculty ratio was 22.1 (566.7:25.6). However, this ratio has drastically increased since then with the student/full-time (including tenured, tenure-track, and special lecturer) faculty ratio of 45.2 (1378.9:30.5) in Fall 2008. Unbelievably, focused on the tenured/tenure-track faculty group, this ratio easily jumps up to 60.0 (1378.9:23), which is about 2.7 times higher than two decades ago!!!

Despite all of these disappointing figures and limited resources, a shining fact is that more tenured/tenure-track faculty members continue to produce research papers published in highly respected scientific journals and research proposals funded by the NSF. Some research groups in the department easily outperform relevant groups in U of I and ISU. What make this possible is that over the last decade, active research faculty members have taught two courses per semester and have been able to devote more time to research. In addition, the department supports faculty travel to conferences, and guides individual tenure-track members through the tenure process. All of these strategies have contributed to successful recent hires.

This goal would be more successfully accomplished with strong support from the administration. We will take the following actions as a part of our side.

- The first priority is to fill the vacant position in Mathematics Education.

  The Math Education faculty are responsible for 4 courses in the BS in Mathematics Education, all of the Math Ed courses in the MS in Mathematics Education, and 2 mathematics content courses for students in Elementary Education. The Math Education faculty also supervise Master’s degree thesis work in Math Education and serve on thesis committees for students in the College of Education. In addition these faculty serve as a resource for teachers and policy makers throughout the state. Besides the work already mentioned Math Education faculty are expected to be active productive members of the mathematics education research community. Given the importance of Mathematics Education at all levels in the state this position is critically important to the department, university and the state.

- The second priority is to keep Alan’s position and to restore lost positions.

  Restoring lost faculty positions and hiring more new faculty are important to the department, not only because they will help us fulfill our commitment to quality teaching and reduce reliance on part-time faculty, but also because they will allow for increased emphasis on research and scholarship. Adequate staffing in the department will also support our own
undergraduate and graduate education programs. There is some discussion about which research area Alan’s slot would be allocated to, even though there seems to have been a mild consensus for allocation to either Math Ed or Applied Math focusing on interdisciplinary research activity.

- Introduce more special lecturers or other full time positions, and a tenure process for them.

  A significant amount of the credit hours generated by the Math Department are lower division and service courses. For instance, these courses amount to 93.7% of all math credit hours in Fall 2008. To allow more time for research and scholarship for tenured/tenure track faculty, the department has part-time instructors teach lower division courses. One of the problems with our substantial reliance on part-time adjunct faculty instructors is that it is difficult to assess the quality of their teaching and the level of their mathematical understanding. In addition, part-time instructors do not advise students or serve on departmental or university committees. Recruiting more special lecturers/full-time instructors for teaching lower division courses, and giving them service duties would allow the department to improve management of teaching quality and help increase the time available for research and scholarship. To retain qualified special lecturers, we also need to have the university establish a tenure process for them.

- Develop a hiring plan and research direction that supports the vision of broad, productive interaction across disciplines.

  Our circumstances and professional interests change over time. Interaction across diverse disciplines, rather than a single scientific branch, is more effective in solving challenging practical problems. Not surprisingly, significant scientific advances are often achieved by a group of individuals in diverse disciplines. This leads us to hire candidates who can help current faculty prepare to adapt to the change. Recruiting candidates who conduct interdisciplinary research will create environments which foster success of all colleagues in changing circumstances. We need to develop a hiring strategic plan to support our vision of broad and productive interdisciplinary research. Further, we will fine-tune our research direction to strengthen the interaction.

- Add faculty members in math education, and have the math department oversee the student teaching component in secondary education.

  The math department has a direct impact on the mathematics education on a large number of students in Idaho at the pre-college level, because we teach their teachers. We currently have a lot of control over teachers that graduate from Boise State. The two courses we provide for pre-service elementary teachers are very good and are based on the current recommendations of the National Council of Teachers of Mathematics (NCTM). The program that our secondary math majors take has recently been updated and is a very strong program. Under the current system, the math department has no oversight or control of our student teachers. This results in some unfortunate placements for our students. Additional faculty members specializing in math education are needed so that the math department can oversee the student teaching component.

- Create a full time systems administrator position for the math department.

  Use of up-to-date computing resources is mandatory for research and teaching in current mathematics and statistics areas. As a result of recent development in computing resources,
more complicated and powerful computing algorithms are feasible in mathematical and statistical sciences. In addition, new instructional methods require innovative use of computers in mathematics and statistics learning. To adopt these technological advances in research and classroom teaching, it is important for us to have a full time systems administrator who works solely for the math department.

- Promote flexible hiring such as dual career programs and minority hiring.

Applicants for faculty positions are often in unusual circumstances where a flexible hiring process is needed. For instance, dual career couples tend to make a decision contingent on the availability of employment for both individuals in their relevant departments. To adapt to such circumstances, we promote flexible hiring, including dual career programs. In addition, as the university gets nationalized and internationalized, we need to enhance diversity in the department. Diversified faculty expands our research and scholarship activities. The diversity of ideas and ways of knowing is also beneficial to our students. We enrich our faculty and student by hiring a more diverse body of candidates, including minorities.

6 Maintain a successful developmental mathematics program which provides qualified students access to math and science degrees, and prepares non-technical majors for success in their required math courses.

Pre-college level algebra is essential, fundamental knowledge for living and working in a metropolitan area. It is therefore necessary for the university to stress the delivery of this content at the appropriate time for students and in an appropriate setting.

Currently Math 025 and Math 108 are based out of the Math Learning Center (MLC), a 4-wide modular building which is in disrepair and slated to be a parking garage in the University Master Plan. The MLC houses two computer labs, one for classroom use and one for general Math 025/108 student use, as well as four offices for the director, assistant director, system administrator, and a shared office for all the adjuncts who teach Math 025/108. The MLC is currently under interim direction and a search for a qualified full-time director is underway. Once a director is hired he/she should be given the resources needed to make the MLC a more welcoming place for students and staff and to improve student success in developmental mathematics. During this interim period the math department can take the following steps to assist students in achieving success in developmental mathematics.

- Require current (within last 6 months) test scores or prerequisite completion for enrollment and an advisors signature to enroll.

There are many hurdles to overcome as we improve student success in pre-college level or developmental mathematics. Up to 25% of the students enrolled in Math 108 either do not need to take the course for their program of study or are not prepared for the content of the course. Many mathematics instructors go to great pains to advise students once they are enrolled to switch into a more suitable course, however it is often too late to convince the student of the needed change and it is far from required of the math instructor to act as advisor for every department on campus. Proper advising before enrollment and knowledgeable advisors who
sign off on enrollment could eliminate those students whose program does not require Math 108. A more rigorous prerequisite, such as recent (within 6 months) prerequisite completion or placement exam scores, can help to reduce the number of students who are unprepared.

- Make Math 108 a zero credit course.

Currently students are sometimes confused about the effects of a zero credit course on the logistics of attending college. Many students take Math 108 thinking that it is a college level course because it has credits associated with it, when in fact it is not college level and does not count toward core credits. Again, proper advising can help with this, however it appears that advisors sometimes get the same idea. An appropriate action would be to make Math 108 a zero credit - 4 hour course just as Math 025 is a zero credit - 3 hour course. Making Math 108 a zero credit course will not only stress to the University that the material is considered prerequisite to college course work, it will help reinforce the necessity of preparatory courses to be successful in college courses.

Another major problem is that students put off taking math classes until the very end of their program, many students then discover that they have forgotten much of their mathematics and need to take more courses than they originally planned. A possible solution to this could be to require that all preparatory courses (in any department) be completed before students are allowed to take upper-division courses in their program of study. We are not suggesting that we require students to take a math course their first semester of college, some students need to get into the rhythm of college before taking a course that they may struggle with such as a math course, we are suggesting that math courses should be taken early enough that they do not keep a student at the University past their anticipated graduation date.

Routing students to the correct math courses will dramatically increase student success, thus decreasing the number of repeat students and the number of sections of each of the zero credit courses that need to be offered. Currently there are three pre-college level courses offered by the Mathematics Department: Math 015 Pre-algebra, Math 025 Beginning Algebra, and Math 108 Intermediate Algebra.

- Phase out the teaching of Math 015 - encourage students at this level to attend community college.

Only a few Math 015 classes are offered each semester, while around 15 and 20 Math 025 and Math 108 classes are offered respectively. The material covered in Math 015 is so fundamental that we should gradually decrease the number of sections we offer, stressing to the students that they should take that level of instruction in a community college setting, rather than at a university. Not all students are ready for math to be taught at the rigorous pace which is appropriate for university taught review courses such as Math 025 and Math 108. Many students would benefit from taking pre-college level courses in the more relaxed environment of a community college.

7 Maintain a working relationship with our service departments

The majority of the credits taught by the Mathematics department are in service courses. These service courses are either specific for students in a particular major like MATH 157 and 257 which are required for students majoring in Elementary Education, core classes like MATH 124, or courses like MATH 170 and MATH 175 which are taken by students in several different majors. There
have always been some issues with the service courses. In the past there have been periods when the College of Education was unhappy with MATH 157 and 257, or when the College of Business was dissatisfied with MATH 160. Currently the College of Engineering appears to be the most dissatisfied. In the past we have been able to resolve the problems with communication between the departments. As the university grows communication between departments becomes more critical and also more difficult, therefore we are proposing the following action items:

• We need to formalize the interaction between the Mathematics Department and those departments that are most directly impacted by our service courses. The Mathematics Department proposes having standing committees which are charged with maintaining contact with specified service departments. This charge may be given to an existing committee, such as the Mathematics Education committee or Algebra committee, or by establishing a new committee, for example an Engineering Liaison committee. This structure would provide for better two-way communication between the departments. Service departments would have a way to provide input regarding curriculum or other issues they may have and we would have a way to report on outcomes assessments or curriculum issues that would be of interest to them.

• Engineering has requested that we find a way to standardize 143, 144, 147, 170, 175, 275, and 333 so that students have similar experiences with different instructors. We already have committees in place that control the curriculum in these courses and a committee has been working on standardizing MATH 333. The department will continue to explore how we can provide more uniform standards for student achievement in these courses.

8 Promote departmental collegiality that fosters faculty, staff, and student interactions

An intangible resource which the department has which it ought to preserve is a collegial atmosphere. In general terms, we get along. We are friendly to each other and we have not so far subdivided into factions. In pursuit of this goal, we will take the following specific actions.

• Maintain an annual department newsletter.

  A member of the department or a committee should prepare a newsletter which will appear at a scheduled time annually (or semi-annually if this is feasible). The newsletter should contain reports on the activities of committees and research groups in the department (and committees and research groups should be expected to submit these reports in a timely manner). The newsletter should recognize noteworthy achievements of faculty and both graduate and undergraduate students, such as honors and awards, publications, or significant service to the department, college, university or community. The same individual or committee should forward significant items to college and university publications.

• Regularize department social events.

  The department should have one or two department-wide social events which occur at scheduled times each year, with a committee responsible for making sure that they happen in an orderly manner. As in past years, faculty should contribute to expenses and logistics while
graduate and undergraduate students should simply be invited. The benefits of regular so-
cial contact among department members to the intangible goal being served here cannot be
overestimated.

- Recognize faculty who are active on college or university committees, and especially the
  Faculty Senate.

The rationale for this item is that the department appears not to be well represented in
university committees at this time. Service on university or college committees is useful for
faculty seeking tenure, and representation on these committees and the Faculty Senate will
make it more likely that our voice will be heard on issues important to us. Recognition
includes the concrete (service workload units) and the less concrete (the sincere appreciation
of the department, formally recognized in the department newsletter).

- Set up a student math club.

There should be an official student math club. A faculty member (perhaps the same one who
handles practice for the Putnam examinations, which might be a club activity) should be
responsible for coordinating educational and social activities for such a body. The existence
of a math club and department attention to it should help build relationships between our
students and between students and those faculty who take an interest. This item is also
mentioned briefly under the goal of strengthening undergraduate education above.

- Update by-laws so that part time adjuncts and special lecturers are integrated and supported
  within the department.

The nature of the voting representation of special lecturers in the department should be
revisited as the status of these instructors (full time adjuncts) has changed. The department
should consider whether the number of delegates allocated to special lecturers should increase
or whether special lecturers should be individual voting members of the department. The
number of delegates of the part time adjuncts should be considered and effective contact
of the part time adjuncts with their delegate(s) and the rest of the department should be
promoted. If special lecturers are to vote as individuals, some consideration should be given
in the by-laws to what kinds of issues should be voted on by all present and what kind of
issues should be voted on by the tenure-track faculty. This issue should be revisited from
time to time if conditions change.

References