

## Department of Mathematical Sciences



**To:** Christa Slaton, Dean, Arts and Sciences  
**From:** Joseph Lakey, Academic Department Head  
**Date:** 10 December 2010  
**Subject:** Department Summary

### Mission Statement

The Department of Mathematical Sciences provides core education in mathematics and statistics that prepares graduate and undergraduate students to be knowledgeable and responsible citizens of the world. It does this by conducting research, scholarship, and teaching, including teaching service courses for other programs, to fulfill the land grant mission of the university.

### Accomplishments

As is typical, most individual accomplishments and recognitions, ranging from proving important mathematical theorems, to being invited to deliver plenary lectures at topical conferences, or organizing such conferences, to being nominated to serve on national committees, to serving on review panels for funding agencies, to serving on editorial boards for research journals, are difficult to pigeonhole into a brief departmental summary. A reasonable level of activity in all of these and other aspects of the profession is manifested collectively in the annual reports of the members of the Department of Mathematical Sciences. A subset of particular achievements is highlighted below.

**Grant Funding.** As in 2009, the Mathematically Connected Communities (MC2-LIFT) project, a joint project with faculty and staff in the College of Education, is a major source of funding for the department. With continued funding from the National Science Foundation and funding from the New Mexico Public Education Department renewed in 2010, the program is funded overall at a level of approximately \$1.5 million per year. Seven faculty members from the Department of Mathematical Sciences participate in this program. Departmental faculty also participate in teaching related grants funded externally through the Park City Math Institute and through NSF, including interdisciplinary grants involving teaching using primary historical sources (with the Computer Science department) and mentoring undergraduates studying mathematical biology (with the Biology

department). Teaching collaboration also continues with the College of Engineering, funded through the New Mexico Alliance for Minorities and other sources. In addition to external funding related to education programs, four faculty members have funding for their technical research through NSF. Funding through the individual technical programs at NSF is extremely competitive; typically at most 15 percent of applicants receive awards. One faculty member recently obtained funding from NSF to run the *Southwest Local Algebra Meeting* in March at NMSU. This conference will host several speakers of international prominence.

**Awards.** David Pengelley was recognized by the Carnegie Foundation for the Advancement of Teaching as the *2010 New Mexico Professor of the Year*. This is the second national teaching award for David in consecutive years. David's innovative and enthusiastic approach to teaching is emblematic of department's culture, and teaching grants in which David has participated over the years have always been joint projects with other faculty in the department. Another substantial award in the department is Robert Smits' *Fulbright* Research Award, which will allow Robert to spend the summer of 2011 working with an eminent computational physicist in the Center of Mathematical Physics at the University of Lisbon. Among other research recognitions, John Harding was awarded the "Best Paper" for the 2010 North American Fuzzy Information Processing Society International Conference.

**Research Productivity.** Twenty four research papers and an edited volume were published by departmental faculty in 2010. Over 40 invited presentations and workshops were given by faculty at national and international conferences and seminars and colloquia at universities outside of New Mexico. Five tenure-track faculty had sabbaticals in 2010 and there were five additional research course buyouts, so 2011 is expected also to be a relatively productive year in terms of research output.

**Fundraising.** The Anna Kist scholarship, funded annually by Professor Emeritus Joe Kist, awards an outstanding graduate student. The Debra Thomas Scholarship, funded by contributions of John and Laura Thomas, is awarded to outstanding tutors in our Math Tutoring Center. In 2009, Elbert and Carol Walker established a \$250,000 endowment to support mathematical research in the department. The endowment funds have been used primarily to support faculty travel to work with colleagues and to bring in visitors for collaboration and colloquia. In the coming year some of the funds will be used to help support research conferences at NMSU.

**Student Credit Hour and Ph.D. production.** According to class enrollments listed under the course listings in Banner as of December 8, 2010, in Fall of 2010 the department generated 10,979 student credit hours in courses numbered 101—251. Except for courses specifically geared toward Education majors, virtually every section of these courses was filled to near or even above capacity. 1965 SCHs were

generated in courses numbered 279—513, and 294 SCHs were generated in courses numbered 530 or above.

The total SCH production represents a marginal increase over Fall 2009, though less than a 3 % increase. Factors implemented over the past few years, including larger sections of some courses, classes filled to capacity, the addition of a fourth credit hour in our freshman engineering calculus sequence, and running several sections of supplementary instruction and a few other courses that are funded through external grants, have contributed to this increase. However, the department is at an all time low in terms of permanent budgeted faculty resources and we are stretching our resources very thin in a number of ways. Twenty sections are being taught by temporary adjunct faculty; about the same number are being taught by regularized, non-budgeted faculty; and more courses than ever are being covered by graduate assistants. The department is very fortunate to have very professional College Faculty members who can help to manage multi-section courses covered largely by temporary faculty and GAs. But these factors lead to a lot of last minute scheduling rearrangements, and a lot of extra burden of course coordination, needed to insure that adjunct faculty and GAs are providing excellent instruction, falls on budgeted faculty. In addition to general instruction, the graduate program has also been growing. In particular, the production of PhDs in the past few years has been very high, with five PhDs graduating in 2009 and seven in 2010. Nineteen PhD students are currently enrolled in Math 700, Dissertation Research.

**Outcomes Assessment.** The last few years have been a period of change in the outcomes assessment procedures and, with a new departmental administration that is just getting up to speed on these matters, it is still early in the process to report much about how it is working. The department is in the third year of data collection in a five-year cycle in which to assess our common core courses. However, the program philosophy seems to be changing. The department head has met a couple of times with the campus Director of Assessment this fall in order to discuss plans for future implementation. Program assessment is a very complex matter, and direct assessment of student work on exam items addressing particular competencies is but one input into the process of deciding how to teach our students better. Through its committee structure, including liaison committees to solicit feedback from client disciplines and, more recently, through several externally funded programs that are geared specifically toward course and teacher development, the department has put a great deal of thought and effort into quantifying and improving student learning. Nevertheless, the department will continue to work closely with the Director of Assessment in order to continue to try to improve our student outcomes.

**National Status of the Department.** The latest National Research Council rankings of academic programs were published on-line in 2010. These rankings include a *high* and *low* ranking, based on averages of random samples taken from respondents who provided ratings falling within the 5<sup>th</sup> and 95<sup>th</sup> percentiles among all rankings of a particular department in each of a number of different categories. In 1995, the NRC ranked NMSU's Department of Mathematical Sciences as 111<sup>th</sup> in the country among all math departments. In 2010, the NRC's S-Rank—a measure of strength in the criteria that scholars say are most important—returned a *high* value of 61<sup>st</sup> and *low* value of 90th overall for the Department of Mathematical Sciences, while the research ranking—derived from faculty publications, citation rates, grants, and awards—placed the department at 73<sup>rd</sup> for its *high* value and 102nd overall for its *low* value. Thus, even the low values represent a significant improvement in ranking, while the high values represent an astounding improvement in ranking. NMSU's program in Mathematical Sciences rated particularly well in terms of diversity, with a composite high ranking of 3rd overall and a composite low ranking of 10th overall! To have jumped in overall national reputation by this magnitude is an achievement in which we take great pride. However, at the same time we recognize that some of the faculty who helped us achieve our current reputation either have moved to institutions of international prominence, such as the University of Edinburgh, the Australian National University, etc., or have retired or will retire before too long. It is imperative that we continue to hire excellent faculty in order to maintain our reputation.

## **Progress on Goals**

The department's goals, as listed on our strategic plan, are

1. The department will retain 5% more of its majors each year, by keeping them at NMSU, until its retention rate is 65% of existing majors.
2. The department will be at or above the median publication rate of the university's peer institutions.
3. To increase its visibility, the department will increase the number of internationally recognized visitors through invitations to give talks the department organizes.

Several faculty members continue to work on curriculum of several math major classes, particularly those that lie at critical transition points, such as MATH 332, to help students make the transition from being a good problem solver to being one who can synthesize abstract concepts. We continue to organize social events both for majors and for our graduate students as a means of providing a supportive environment. We are beginning to keep better track of our list of majors as a means of verifying item (1) in our strategic goals.

The department still needs to collect data regarding the second of our stated strategic goals. One major complication that we did not foresee when our strategic plan was formulated was the somewhat precipitous decline in faculty lines in our department. Two years ago, the department expected to have about 27 tenure-track members by now. Instead, we are effectively down to 22 tenure-track faculty. Our graduate and undergraduate programs are still going strong and our raw SCH production is as high as ever. Consequently, the burden of continuing to run our programs at a high level will inevitably take its toll on our research production in the next few years. Thus, the department will need to revise goal (2) to account for a finer comparison of circumstances in peer departments, including faculty resources and sizes of programs.

Though not stated in our strategic goals, maintenance of our strong reputation as a diverse department should continue to be a priority for us. One major initiative begun this year by several of the tenure-track women in our department is the *Graduate Women in Mathematics program*, which is meeting monthly in a social-professional context. Each meeting provides a lunch-time discussion of matters of major concern really to anyone who has not achieved full rank in the profession, but focusing primarily on thematic topics in career development, with special emphasis on matters pertaining to women in the profession. Unfortunately, in the past year the department lost two of its women who achieved the rank of Professor—Lolina Alvarez, due to retirement, and Caroline Sweezy, lost to us due to cancer. The department will continue to encourage and reward the achievement of excellence its female faculty members.

The department also continues to encourage collaborative research at the highest level by supporting faculty travel to attend conferences and, especially, to continue national and international research collaborations and to bring visitors to NMSU to discuss their research. The Walker endowment will allow us to maintain and enhance such activity in the coming years, and thereby meet the stated goal (3) of our strategic plan.